



# Appendix A. Planning Process Documentation



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<sup>1</sup> Section Cover Photo: Tree-lined street in Poipu, Kaua‘i. Photo by Megan Brotherton





# APPENDIX A. PLANNING PROCESS DOCUMENTATION

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This appendix provides supporting information on the planning process captured in Section 2 (Planning Process). Information on agency, stakeholder, subject matter expert, focus group, and public outreach that was conducted as part of the 2023 SHMP Update planning process and is not already captured in Section 2 (Planning Process) is included below. In addition, the public comments received on the draft 2023 SHMP Update are summarized.

Meeting agendas, sign-in sheets, and presentations (where applicable and as available) for the State Hazard Mitigation Forum, FEMA, and public meetings convened during the development of the 2023 SHMP Update are included. Additional meeting information is available upon request.

Table A-1 summarizes the key planning meetings and milestone during the 2023 SHMP Update planning. Table A-2 lists the SMEs identified and consulted in the 2023 SHMP Update planning process.

When the draft 2023 SHMP Update was completed in early 2023, the SHMO identified lead and supporting reviewers per plan section to ensure the first-round of review was conducted by SMEs. The lead reviewers are listed in Table A-3. The draft 2023 SHMP Update sections were distributed to the lead reviewers via the project Microsoft Teams file sharing site. All comments received from the SMEs were considered by the HI-EMA Mitigation Section and Forum Chair, and incorporated into the draft, where appropriate. In addition, the SHMO invited stakeholders listed in Table A-2 and Table A-3 to review the draft plan released on April 26, 2023, concurrent with public review.

A summary of the various sectors engaged in the update process is in Table A-4 below, along with a brief description of their involvement. Forum members and hazard specific SMEs already captured in Table A-2 and Table A-3 are not included below.





**Table A-1. Key 2023 SHMP Update Planning Meetings and Milestones**

Date	Meeting and Planning Milestone	Participants (where applicable)
<b>June 6, 2022</b>	HI-EMA/Mitigation Plan Consultant Introductory Meeting <ul style="list-style-type: none"> <li>• Forum participation overview</li> <li>• Schedule project kick-off meeting</li> </ul>	HI-EMA and Tetra Tech
<b>July 15, 2022</b>	HI-EMA Project Kick-Off with Mitigation Plan Consultant <ul style="list-style-type: none"> <li>• Review of 2018 SHMP and new FEMA planning policy</li> <li>• Organization of the planning team</li> <li>• Outreach strategy</li> <li>• Changes and enhancements to updating the mitigation strategy</li> </ul>	HI-EMA, Forum Chair, and Tetra Tech
<b>July 29, 2022</b>	FEMA Mitigation Program Annual Consultation	HI-EMA and FEMA Region IX
<b>August 18, 2022</b>	State Hazard Mitigation Planning Meeting <ul style="list-style-type: none"> <li>• Hazards of concern determined</li> </ul>	HI-EMA, Forum Chair, Tetra Tech
<b>August and September 2022</b>	Meetings with State Agencies, Stakeholders, Focus Groups, and SMEs <ul style="list-style-type: none"> <li>• Data collection (events/losses, spatial data)</li> <li>• Building codes and standards overview</li> <li>• Defined social vulnerability for Hawai'i</li> </ul>	County of Hawai'i, City and County of Honolulu, County of Kaua'i, County of Maui, DBEDT, DLNR, DOH, FEMA, HETAC, HI-EMA, Hawai'i Interagency Council on Homelessness, Hawai'i Tourism Authority, NOAA, OHS, OPSD, SBCC, SEA0H, SOEST, UH
<b>September 2022</b>	StoryMap developed for public outreach	N/A
<b>September 2022–February 2023</b>	State agency reviews and updates to the mitigation strategy	SBCC, DBEDT, DLNR, DOH, HETAC, HI-EMA, UH
<b>October 5, 2022</b>	State Hazard Mitigation Planning Meeting <ul style="list-style-type: none"> <li>• Review goals</li> <li>• Develop objectives</li> </ul>	HI-EMA, Forum Chair, Tetra Tech
<b>October 12, 2022</b>	Special State Hazard Mitigation Forum Meeting <ul style="list-style-type: none"> <li>• New FEMA Planning Policy</li> <li>• Hazards of concern</li> <li>• Forum role and involvement</li> <li>• Subject matter expert and focus group outreach</li> <li>• Goals and objectives exercise</li> <li>• Mitigation strategy overview</li> </ul>	HI-EMA, Forum, Tetra Tech
<b>December 7, 2022</b>	State Hazard Mitigation Forum Meeting <ul style="list-style-type: none"> <li>• Define Community Lifelines</li> <li>• Risk assessment               <ul style="list-style-type: none"> <li>○ Analysis methodology and new data</li> <li>○ Review scenarios</li> <li>○ Present draft vulnerability results</li> </ul> </li> </ul>	HI-EMA, Forum, Tetra Tech
<b>December 20, 2022</b>	Virtual Statewide Public Meeting <ul style="list-style-type: none"> <li>• Public hazard awareness survey released</li> <li>• Hazard mitigation plan overview</li> <li>• Mitigation success stories</li> <li>• Social vulnerability requirements and map overview</li> <li>• Risk assessment results</li> </ul>	HI-EMA, Tetra Tech





Date	Meeting and Planning Milestone	Participants (where applicable)
<b>December 28, 2022</b>	State Hazard Mitigation Planning Meeting <ul style="list-style-type: none"> <li>• Capability assessment working session               <ul style="list-style-type: none"> <li>○ Review and update 2018 SHMP capabilities</li> <li>○ Add new capabilities</li> </ul> </li> </ul>	HI-EMA, Forum Chair, Tetra Tech
<b>January 11, 2023</b>	State Hazard Mitigation Planning Meeting <ul style="list-style-type: none"> <li>• Mitigation strategy update progress</li> <li>• Hazard ranking review</li> </ul>	HI-EMA, Forum Chair, Tetra Tech
<b>January–February 2023</b>	Draft 2023 SHMP Update hazard sections to lead subject matter expert reviewers	Refer to Table 2.1-3
<b>February 7, 2023</b>	Capabilities and Mitigation Action Workshop <ul style="list-style-type: none"> <li>• Capabilities interactive exercise</li> <li>• SMEs share best practices in mitigation</li> <li>• Mitigation action development</li> </ul>	County of Hawai'i, City and County of Honolulu, County of Kaua'i, County of Maui, DHHL, HDOT, DBEDT, DLNR, DOH, HETAC, HI-EMA, Hawai'i Broadband and Digital Equity Office, Hawai'i Council on Homelessness, Hawai'i Tourism Authority, Honolulu Board of Water Supply, Kaua'i Utility Board, OPSD, SBCC, SEAOH, SOEST, State Energy Office, UH, USGS
<b>February–March 2023</b>	State agencies, stakeholders, and SMEs update capabilities	County of Hawai'i, City and County of Honolulu, County of Kaua'i, County of Maui, DHHL, HDOT, DBEDT, DLNR, DOH, HETAC, HI-EMA, Hawai'i Broadband and Digital Equity Office, Hawai'i Council on Homelessness, Hawai'i Tourism Authority, Honolulu Board of Water Supply, Kaua'i Utility Board, OPSD, SBCC, SEAOH, SOEST, State Energy Office, UH, USGS
<b>February 8–10, 2023</b>	Mitigation Action Item Development Workshops with Individual Sectors <ul style="list-style-type: none"> <li>• Housing</li> <li>• Health and Social Services</li> <li>• Infrastructure</li> <li>• Land Use and Development</li> <li>• Economic Development</li> <li>• Emergency Management</li> <li>• Natural and Cultural Resources</li> </ul>	County of Hawai'i, City and County of Honolulu, County of Kaua'i, County of Maui, DHHL, HDOT, DBEDT, DLNR, DOH, HETAC, HI-EMA, Hawai'i Broadband and Digital Equity Office, Hawai'i Council on Homelessness, Hawai'i Tourism Authority, Honolulu Board of Water Supply, Kaua'i Utility Board, OPSD, SBCC, SEAOH, SOEST, State Energy Office, UH, USGS
<b>March 1, 2023</b>	State Hazard Mitigation Planning Meeting <ul style="list-style-type: none"> <li>• Plan maintenance</li> <li>• Funding prioritization</li> </ul>	HI-EMA, Forum Chair, Tetra Tech





Date	Meeting and Planning Milestone	Participants (where applicable)
<b>March 23, 2023</b>	State Hazard Mitigation Planning Meeting <ul style="list-style-type: none"> <li>• Final risk ranking</li> <li>• Review of hazard dashboarding and new mitigation actions</li> <li>• Draft plan overview and how to comment</li> <li>• Upcoming public meetings and how to promote</li> </ul>	HI-EMA, Forum Chair, Tetra Tech
<b>March–April 2023</b>	Draft 2023 SHMP Update sections to lead reviewers	Refer to Table 2.1-3
<b>April 5, 2023</b>	City and County of Honolulu In-person Public Meeting <ul style="list-style-type: none"> <li>• Purpose of the Hawai‘i State Hazard Mitigation Plan</li> <li>• Draft Plan Overview</li> <li>• Mitigation Strategies Input</li> <li>• Coordination with Other Planning Efforts</li> </ul>	City and County of Honolulu, DLNR, Members of the Public, HI-EMA, Forum Chair, Tetra Tech
<b>April 17 and 18, 2023</b>	County of Hawai‘i In-person Public Meetings in Hilo and Kona <ul style="list-style-type: none"> <li>• Purpose of the Hawai‘i State Hazard Mitigation Plan</li> <li>• Draft Plan Overview</li> <li>• Mitigation Strategies Input</li> <li>• Coordination with Other Planning Efforts</li> </ul>	County of Hawai‘i, Members of the Public, HI-EMA, Forum Chair, Tetra Tech
<b>April 19 and 20, 2023</b>	County of Maui In-person Public Meetings on Moloka‘i and Maui Island <ul style="list-style-type: none"> <li>• Purpose of the Hawai‘i State Hazard Mitigation Plan</li> <li>• Draft Plan Overview</li> <li>• Mitigation Strategies Input</li> <li>• Coordination with Other Planning Efforts</li> </ul>	Maui County, Members of the Public, HI-EMA, Forum Chair, Tetra Tech
<b>April 24, 2023</b>	County of Kaua‘i In-person Public Meeting <ul style="list-style-type: none"> <li>• Purpose of the Hawai‘i State Hazard Mitigation Plan</li> <li>• Draft Plan Overview</li> <li>• Mitigation Strategies Input</li> <li>• Coordination with Other Planning Efforts</li> </ul>	Kaua‘i County, Members of the Public, HI-EMA, Forum Chair, Tetra Tech
<b>April 26, 2023</b>	Draft 2023 SHMP Update posted on the project website and StoryMap for Forum and public review and comment	N/A
<b>May 3, 2023</b>	Statewide Hybrid Public Meeting in Kapolei <ul style="list-style-type: none"> <li>• Purpose of the Hawai‘i State Hazard Mitigation Plan</li> <li>• Draft Plan Overview</li> <li>• Mitigation Strategies Input</li> <li>• Coordination with Other Planning Efforts</li> </ul>	DHHL, Members of the Public, HI-EMA, Forum Chair, Tetra Tech
<b>May 22, 2023</b>	Submit to FEMA for review	





Table A-2. Agency and Stakeholder Coordination

Agency	Name	Area of Expertise
<b>Emergency Management</b>		
<b>Maui County Emergency Management Agency</b>	Gina Albanese	Hazard mitigation, emergency management
<b>Maui County Emergency Management Agency</b>	Herman Andaya	Hazard mitigation, emergency management
<b>Hawai'i Office of Homeland Security</b>	Jimmie Collins	Critical infrastructure security and resilience, cybersecurity, and emerging threats
<b>Hawai'i State Department of Health, State Toxicologist</b>	Diana Felton	Toxicology, hazardous materials, human health, chemical contamination
<b>Kaua'i Emergency Management Agency</b>	David Kennard	Hazard mitigation, resiliency, communication
<b>Honolulu Board of Water Supply</b>	Ernie Lau	Watershed management, water quality
<b>Hawai'i Emergency Management Agency</b>	David Lopez	Emergency management
<b>County of Hawai'i Civil Defense Agency</b>	Talmadge Magno	Disaster recovery, emergency management
<b>County of Hawai'i Civil Defense Agency</b>	Barry Periatt	Disaster recovery, emergency management
<b>Kaua'i Emergency Management Agency</b>	Chelsie Sakai	Hazard mitigation, emergency management
<b>Honolulu Department of Emergency Management</b>	Hirokazu Toiya	Emergency management
<b>Kaua'i Emergency Management Agency</b>	Elton Ushiro	Disaster recovery, emergency management
<b>Hawai'i Emergency Management Agency</b>	Carmela Vigue	Emergency Management
<b>Honolulu Department of Emergency Management</b>	Jennifer Walter	Hazard mitigation, emergency management
<b>Economic Development</b>		
<b>Department of Business, Economic Development &amp; Tourism</b>	Lauren Primiano Amber Ternus	Economic development
<b>DAGS Risk Management Office</b>	Tracy Kitaoka Ann Sueoka	Economic development
<b>Land Use and Development</b>		
<b>State Office of Planning and Sustainable Development</b>	Danielle Bass	Sustainability planning, policy development, urban and regional planning, Hawai'i legislature
<b>County of Maui Department of Planning</b>	James Buika	Coastal planning, shoreline setbacks, land use policy
<b>Martin, Chock &amp; Carden Structural Engineers; State Building Code Council</b>	Lyle Carden	Building codes and standards
<b>Hawai'i Planning Department</b>	Douglas Le	Disaster recovery, community planning
<b>Hawai'i Planning Department</b>	Bethany Morrison	Long-range planning, shoreline setbacks, community resiliency
<b>Office of Planning and Sustainable Development</b>	Ann Ogata-Deal	Planning, land use policy
<b>Hawai'i Planning Department</b>	April Surprenant	Long-range planning, recovery, resilience, and sustainable planning
<b>County of Hawai'i Public Works Building Division; Hawai'i State Energy Office, State Building Code Council</b>	Neal Tanaka	Building codes and standards
<b>State of Hawai'i Office of Planning and Sustainable Development, Coastal Zone Management</b>	Lisa Webster	GIS, Coastal Zone Management, Ocean Resources Management Plan, urban and regional planning
<b>Hawai'i State Energy Office, State Building Code Council</b>	Howard Wiig	Energy resiliency, building codes
<b>Housing</b>		
<b>Department of Human Services</b>	Joe Campos	Housing







Agency	Name	Area of Expertise
<b>Health and Social Services</b>		
Hawai'i State Department of Health, State Toxicologist	Diana Felton	Toxicology, hazardous materials, human health, chemical contamination
Hawai'i State Department of Health, Disease Investigations Branch	Caroline Pratt	Infectious diseases, health risks
<b>Infrastructure</b>		
Hawai'i State Energy Office	Jonathan Chin	Energy efficiency, energy systems planning, energy analysis
City and County of Honolulu, Office of Climate Change, Sustainability and Resiliency	Sarah Harris	Hazard mitigation and long-term disaster recovery
State of Hawai'i Department of Land and Natural Resources, Engineering Division	Edwin Matsuda	Dam safety, flood control
Honolulu Board of Water Supply	Ernie Lau	Watershed management, water quality
Kaua'i Public Works	Michael Moule	Civil and transportation engineering codes and standards
Honolulu Board of Water Supply	Raelynn Nakabayahi	Critical infrastructure: water supply
State Department of Transportation, Highways Division	Genevieve Sullivan	Environmental policy, climate change, and resiliency initiatives for transportation planning
Kaua'i Utility Board	Jan TenBruggencate	Communications, outreach, scientific writing
State Department of Transportation, Airports Division	Herman Tuiolosega	Planning
Hawai'i State Energy Office, State Building Code Council	Howard Wiig	Energy resiliency, building codes
<b>Natural and Cultural Resources</b>		
County of Maui Department of Planning	James Buika	Coastal planning, shoreline setbacks, land use policy
Department of Land and Natural Resources Aha Moku	Leimana DaMate	Traditional Hawaiian methodologies and knowledge of cultural and natural resource management
Office of Planning and Sustainable Development Coastal Zone Management	Justine Nihipali	Coastal zone management, land use policy
Maui Planning	Tara Owens	Coastal processes, hazards, and resilience; science and policy communication; community building
State of Hawai'i Department of Land and Natural Resources, Division of Forestry and Wildlife	Michael Walker	Forestry
State of Hawai'i Office of Planning and Sustainable Development, Coastal Zone Management	Lisa Webster	GIS, Coastal Zone Management, Ocean Resources Management Plan, urban and regional planning
Department of Land and Natural Resources Hawai'i State Historic Preservation Division	Michael Wahl	GIS, anthropology, cultural resources, water conservation, native food resources
<b>Climate Change</b>		
School of Ocean and Earth Science and Technology, University of Hawai'i	Chip Fletcher, PhD	Coastal processes, hazards, and resilience
University of Hawai'i Sea Grant Program; State DLNR, Office of Conservation and Coastal Lands	Bradley Romine, PhD	Coastal processes, hazards, and resilience
Maui Planning	Tara Owens	Coastal processes, hazards, and resilience; science and policy communication; community building





Agency	Name	Area of Expertise
State of Hawai'i Office of Planning and Sustainable Development, Coastal Zone Management	Lisa Webster	GIS, Coastal Zone Management, Ocean Resources Management Plan, urban and regional planning
Kaua'i Planning, University of Hawai'i Sea Grant Program	Ruby Pap	Coastal processes, hazards, and resilience
<b>Social Vulnerability</b>		
Hawai'i Tourism Authority	Jennifer Chun	
Department of Hawaiian Home Lands	Niniau Kawaihae	
Department of Business, Economic Development & Tourism	Lauren Primiano	Economic development planning
Hawai'i State Department of Health, State Toxicologist	Diana Felton	Toxicology, hazardous materials, human health, chemical contamination
Department of Business, Economic Development & Tourism Broadband Strategy Officer	Burt Lum	Economic development planning
Hawai'i Interagency Council on Homelessness	Scott Morishige	
	Dayevin Bunao	
Lead for America	Alexis Ching	Community Building
<b>Hazards of Concern</b>		
School of Ocean and Earth Science and Technology, University of Hawai'i	Chip Fletcher, PhD	Climate Change and Sea Level Rise
State of Hawai'i Department of Land and Natural Resources, Engineering Division	Edwin Matsuda	Infrastructure Failure (Dam Failure)
Drought and Water Conservation Coordinator Hawai'i Department of Land and Natural Resources	Neal Fujii	Drought
University of Hawai'i, East-West Center	Ryan Longman	Climate, water resources, drought
United States Geological Survey, Hawaiian Volcano Observatory	Paul Okubo, PhD	Earthquake
State of Hawai'i Department of Land and Natural Resources, Engineering Division; National Flood Insurance Program Coordinator	Carol Tyau-Beam	Flood
State of Hawai'i, Department of Land and Natural Resources, Engineering Division	Jizella San Andres	Flood
State of Hawai'i Department of Land and Natural Resources, Engineering Division	Edwin Matsuda	Flood
State of Hawai'i Office of Planning and Sustainable Development, Coastal Zone Management	Lisa Webster	Flood
Hawai'i County Floodplain Manager	Bryce Harada	Flood
Hawai'i State Department of Health, State Toxicologist	Diana Felton	Hazardous Materials
Hawai'i Institute of Geophysics and Planetology Center for the Study of Active Volcanoes	Donald Thomas, PhD	Hazardous Materials
Hawai'i State Department of Health	Judy Kern	Hazardous Materials
Hawai'i State Department of Health, State Toxicologist	Diana Felton	Health Risks
Hawai'i State Department of Health	Judy Kern	Health Risks
Hawai'i State Department of Health Office of Public Health Preparedness	Michelle Kwok	Health Risks





Agency	Name	Area of Expertise
Hawai'i State Department of Health Office of Public Health Preparedness	Casey Nagatoshi	Health Risks
Hawai'i State Climatologist, University of Hawai'i	Pao-Shin Chu, PhD	Windstorm
Federal Emergency Management Agency	Victor DeJesus	Windstorm
National Oceanic and Atmospheric Administration/ National Weather Service Honolulu Forecast Office	Kevin Kodama	Windstorm
National Oceanic and Atmospheric Administration	Tina Stall	Windstorm
United State Geological Survey	Ken Hon	Landslide and Rockfall
Hawai'i State Climatologist, University of Hawai'i	Pao-Shin Chu, PhD	Hurricane
National Oceanic and Atmospheric Administration	Jon Bravender	Hurricane
University of Hawai'i	Gerald Fryer, PhD	Tsunami
University of Hawai'i	Ian Robertson	Tsunami
State of Hawai'i Office of Planning and Sustainable Development, Coastal Zone Management	Lisa Webster	Tsunami
United States Geological Survey	Jim Kauahikaua	Volcanic Hazards
United States Geological Survey	Frank Trusdell	Volcanic Hazards
United States Geological Survey	Patricia Maddau	Volcanic Hazards
Hawai'i Institute of Geophysics and Planetology Center for the Study of Active Volcanoes	Donald Thomas, PhD	Volcanic Hazards
State of Hawai'i Department of Land and Natural Resources, Division of Forestry and Wildlife	Dietra Myers Tremblay	Wildfire
State of Hawai'i Department of Land and Natural Resources, Division of Forestry and Wildlife	Michael Walker	Wildfire
<b>Building Codes</b>		
City and County of Honolulu, Office of Climate Change, Sustainability and Resiliency	Matthew Gonser	Building codes, climate change, resiliency
County of Maui Department of Planning	James Buika	Coastal planning, shoreline setbacks, land use policy
Kaua'i Emergency Management Agency	David Kennard	Hazard mitigation, resiliency, communication
County of Hawai'i Public Works Building Division; Hawai'i State Energy Office, State Building Code Council	Neal Tanaka	Building codes and standards
Hawai'i State Energy Office, State Building Code Council	Howard Wiig	Energy resiliency, building codes
Martin, Chock & Carden Structural Engineers; State Building Code Council	Lyle Carden	Building codes and standards
State of Hawai'i, Department of Land and Natural Resources, Engineering Division	Carol Tyau-Beam	Flood, Infrastructure Failure (Dam Failure), National Flood Insurance Program Coordinator
Hawai'i Emergency Management Agency	Francis Kau	Emergency preparedness and response, individual assistance
County of Hawai'i Public Works Building Division	Kelly Wilson	Building codes and standards
City and County of Honolulu, Office of Climate Change, Sustainability and Resiliency	Sarah Harris	Hazard mitigation, long-term disaster recovery





**Table A-3. Lead Draft 2023 SHMP Update Reviewers**

Section	Agency	Name
<b>Section 1 – Introduction</b>	County of Kaua’i and State Hazard Mitigation Forum Chair	David Kennard
<b>Section 2 – Planning Process</b>	County of Kaua’i and State Hazard Mitigation Forum Chair	David Kennard
<b>Section 3 – State Profile</b>	County of Kaua’i and State Hazard Mitigation Forum Chair	David Kennard
<b>Section 4.0 – Risk Assessment*</b>	County of Kaua’i and State Hazard Mitigation Forum Chair	David Kennard
<b>Section 4.1 – Overview*</b>	County of Kaua’i and State Hazard Mitigation Forum Chair	David Kennard
<b>Section 4.2 – Climate Change and Sea Level Rise</b>	School of Ocean and Earth Science and Technology, University of Hawai’i	Chip Fletcher, PhD
<b>Section 4.3 – Cyber Threat</b>	State Office of Homeland Security	Jimmie Collins
<b>Section 4.4 – Drought</b>	Drought and Water Conservation Coordinator Hawai’i Department of Land and Natural Resources	Neal Fujii
<b>Section 4.5– Earthquake</b>	United States Geological Survey	Paul Okubo, PhD
<b>Section 4.6 –Flood</b>	State of Hawai’i, Department of Land and Natural Resources, Engineering Division	Carol Tyau-Beam Jizella San Andres
<b>Section 4.7 – Hazardous Materials</b>	Hawai’i State Department of Health Hawai’i Institute of Geophysics and Planetology Center for the Study of Active Volcanoes	Diana Felton Donald Thomas, PhD
<b>Section 4.8 – Health Risks</b>	Hawai’i State Department of Health	Diana Felton
<b>Section 4.9 – Hurricane</b>	Hawai’i State Climatologist, University of Hawai’i	Pao-Shin Chu, PhD
<b>Section 4.10 – Infrastructure Failure</b>	State of Hawai’i Department of Land and Natural Resources, Engineering Division	Edwin Matsuda
<b>Section 4.11 – Landslide and Rockfall</b>	United State Geological Survey Hawaiian Volcano Observatory	Ken Hon
<b>Section 4.12 – Terrorism</b>	State Office of Homeland Security	Jimmie Collins
<b>Section 4.13 – Tsunami</b>	Geophysicist, Pacific Tsunami Warning Center	Gerard Fryer, PhD
<b>Section 4.14 – Volcanic Hazards</b>	United States Geological Survey Hawai’i Institute of Geophysics and Planetology Center for the Study of Active Volcanoes	Jim Kauahikaua, PhD Donald Thomas, PhD
<b>Section 4.15 – Wildfire</b>	State of Hawai’i Department of Land and Natural Resources, Division of Forestry and Wildlife	Michael Walker
<b>Section 4.16 – Windstorm</b>	Hawai’i State Climatologist, University of Hawai’i	Pao-Shin Chu, PhD
<b>Section 4.17 – Vulnerability Summary</b>	County of Kaua’i and State Hazard Mitigation Forum Chair	David Kennard
<b>Section 5 – Capability Assessment**</b>	County of Kaua’i and State Hazard Mitigation Forum Chair	David Kennard
<b>Section 6 – Mitigation Strategy**</b>	County of Kaua’i and State Hazard Mitigation Forum Chair	David Kennard
<b>Section 7 – Plan Maintenance</b>	County of Kaua’i and State Hazard Mitigation Forum Chair	David Kennard
<b>Appendices</b>	County of Kaua’i and State Hazard Mitigation Forum Chair	David Kennard
<b>References</b>	County of Kaua’i and State Hazard Mitigation Forum Chair	David Kennard
<b>Acronyms</b>	County of Kaua’i and State Hazard Mitigation Forum Chair	David Kennard
<b>Executive Summary</b>	County of Kaua’i and State Hazard Mitigation Forum Chair	David Kennard

**Notes:**

\* The risk assessment methodology was discussed with SMEs listed in Table 2.1-3 at the beginning stages of the 2023 SHMP Update.

\*\*The State Hazard Mitigation Forum members and state agencies were consulted throughout the planning process, both at in-person and virtual meetings and via email and telephone to update their agency-specific information and contribute to each of these sections.





*Table A-4. Sectors Engaged in the 2023 SHMP Update*

Agency	Involvement
<b>Emergency Management</b>	
<b>FEMA Region 9 Pacific Area Office</b>	Invited to and attended Forum meetings to provide input on all aspects of the 2023 SHMP Update.
<b>FEMA Region 9</b>	Invited to and attended Forum meetings; participated in regular calls with the HI-EMA Mitigation Section regarding the 2023 SHMP Update progress.
<b>HI-EMA</b>	The Mitigation Section led the 2023 SHMP Update; additional sections and SMEs were invited to and attended Forum meetings as noted in the Forum member table (Table 2.2-1 above); invited to the Mitigation Workshop in February 2023 and invited to updated capabilities and submit mitigation strategies.
<b>City and County of Honolulu Office of Climate Change, Sustainability and Resiliency</b>	Invited to and participated in the Building Codes and Standards Focus Group; invited to the Mitigation Workshop in February 2023 and invited to update capabilities and submit mitigation strategies.
<b>State of Hawai'i Office of Homeland Security</b>	Member of the Forum; invited to and attended Forum meetings to provide input on all aspects of the 2023 SHMP Update; subject matter expert for cyber and terrorism hazard sections.
<b>County Emergency Management Agencies</b>	Members of the Forum include county emergency management agency representatives; invited to and attended Forum meetings to provide input on all aspects of the 2023 SHMP Update.
<b>Economic Development</b>	
<b>Hawai'i State Department of Business, Economic Development and Tourism</b>	Invited to and participated in the Social Vulnerability Focus Group; invited to the Mitigation Workshop in February 2023 and invited to update capabilities and submit mitigation strategies.
<b>State Department of Accounting and General Services - State of Hawai'i Risk Management Office</b>	Provided state building database for the risk assessment; invited to public meetings.
<b>Land Use and Development</b>	
<b>State of Hawai'i Office of Planning and Sustainable Development, Coastal Zone Management</b>	Member of the Forum; invited to and attended Forum meetings to provide input on all aspects of the 2023 SHMP Update; invited to and participated in the Social Vulnerability Focus Group.
<b>County Planning Departments</b>	Members of the Forum include county planning department representatives; invited to and attended Forum meetings to provide input on all aspects of the 2023 SHMP Update.
<b>Housing</b>	
<b>Department of Human Services</b>	Invited to participate in the Social Vulnerability Focus Group; invited to the Mitigation Workshop in February 2023 and invited to update capabilities and submit mitigation strategies.
<b>Health and Social Services</b>	
<b>Hawai'i State Department of Health</b>	Member of the Forum; invited to and attended Forum meetings to provide input on all aspects of the 2023 SHMP Update; SME review of the hazardous materials and health risks sections (Sections 4.7 and 4.8); contributed mitigation strategies.
<b>Infrastructure</b>	
<b>State Department of Transportation – Harbors Division</b>	Member of the Forum; invited to and attended Forum meetings to provide input on all aspects of the 2023 SHMP Update; invited to the Mitigation Workshop in February 2023 and invited to update capabilities and submit mitigation strategies.





Agency	Involvement
State Department of Transportation – Highways Division	Member of the Forum; invited to and attended Forum meetings to provide input on all aspects of the 2018 SHMP Update; invited to the Mitigation Workshop in February 2023 and invited to update capabilities and submit mitigation strategies.
State Department of Land and Natural Resources, Engineering Division	Ex officio member of the Forum; invited to and attended Forum meetings to provide input on all aspects of the 2018 SHMP Update; invited to the Mitigation Workshop in February 2023 and invited to update capabilities and submit mitigation strategies.
Kaua’i Island Utility Cooperative	Member of the Forum; invited to and attended Forum meetings to provide input on all aspects of the 2023 SHMP Update; invited to the Mitigation Workshop in February 2023 and invited to update capabilities and submit mitigation strategies.
Honolulu Board of Water Supply	Member of the Forum; invited to and attended Forum meetings to provide input on all aspects of the 2023 SHMP Update; invited to the Mitigation Workshop in February 2023 and invited to update capabilities and submit mitigation strategies.
Hawai’i State Energy Office	Member of the Forum; invited to and attended Forum meetings to provide input on all aspects of the 2023 SHMP Update; invited to the Mitigation Workshop in February 2023 and invited to update capabilities and submit mitigation strategies.
State Building Code Council	Invited to and participated in the Building Codes and Standards Focus Group; invited to the December 7, 2022 Forum meeting; invited to the Mitigation Workshop in February 2023 and invited to update capabilities and submit mitigation strategies.
<b>Natural and Cultural Resources</b>	
Department of Land and Natural Resources, Hawai’i State Historic Preservation Division	Provided dataset for cultural resources for the vulnerability assessment.
Department of Land and Natural Resources, Division of Forestry & Wildlife	Member of the Forum; invited to and attended Forum meetings to provide input on all aspects of the 2023 SHMP Update; invited to the Mitigation Workshop in February 2023 and invited to update capabilities and submit mitigation strategies.
University of Hawai’i Sea Grant Program	Member of the Forum; invited to and attended Forum meetings to provide input on all aspects of the 2023 SHMP Update; invited to the Mitigation Workshop in February 2023 and invited to update capabilities and submit mitigation strategies; SME review of the climate change and sea level rise hazards (Section 4.2).
Department of Land and Natural Resources, Engineering Division and State National Flood Insurance Program Coordinator	Ex officio member of the Forum; invited to Forum meetings to provide input on all aspects of the 2023 HMP Update; invited to the Mitigation Workshop in February 2023 and invited to update capabilities and submit mitigation strategies; SME review of the flood and infrastructure failure hazards (Sections 4.6 and 4.10); Invited to participate in the Building Codes and Standards Focus Group.
Department of Hawaiian Home Lands Planning Office	Invited to the Mitigation Workshop in February 2023 and invited to update capabilities and submit mitigation strategies.
<b>Private Sector</b>	
Building Industry Association of Hawai’i	Invited to the public meetings in April and invited to submit mitigation strategies.
Structural Engineer Association of Hawai’i (SEAOH)	
American Institute of Architects	





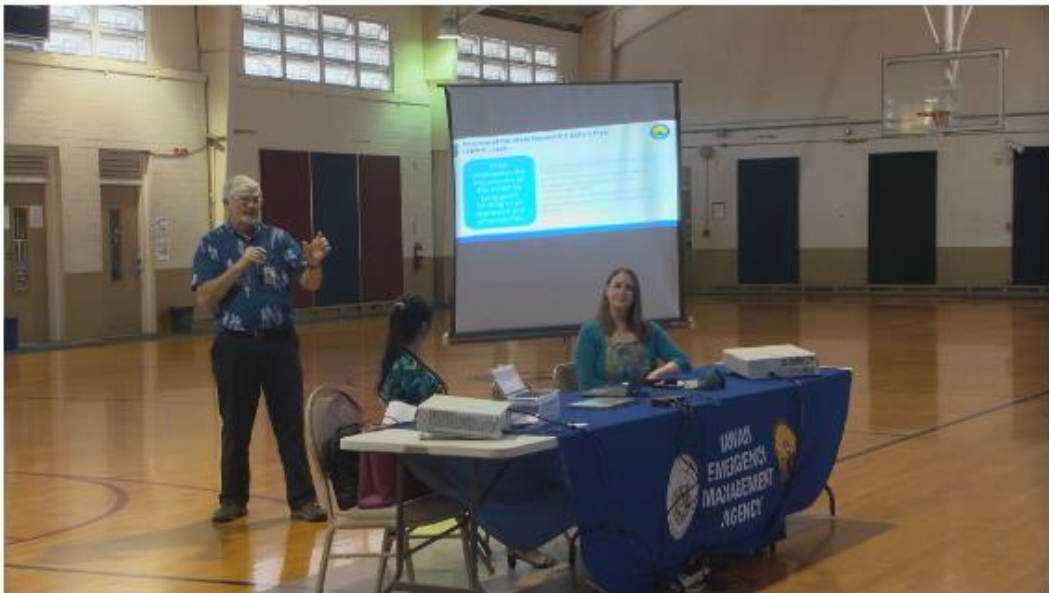
## A.1 Additional Public Outreach

Additional news articles publicizing the availability of the draft 2023 SHMP Update for review and comment and associated public meetings are highlighted in Figure A-1 through Figure A-4. Refer to Section 2 (Planning Process) for the HI-EMA meeting announcements.

Figure A-1. KITV News Coverage of the April 5, 2023 Public Meeting in Honolulu

# HI-EMA plans for natural disasters

By Cait Medeiros | Apr 5, 2023 Updated Apr 5, 2023




HI-EMA meeting

f t e b i

HONOLULU (KITV4) - The Hawaii Emergency Management Agency held a meeting Wednesday for community discussion on its hazard mitigation plan.

HI-EMA presented their response plans to potential natural disasters in Hawai'i and how they will protect the community against threats of disasters like tsunamis, hurricanes, and flooding.




A series of meetings across the state this month will give members of the public an opportunity to help build a safer Hawai'i.

Source: KITV





Figure A-2. April 10, 2023 Maui News Article Promoting Public Meetings



WE'RE BIG ON MAUI!

## State seeks public input on hazard plan

LOCAL NEWS


APR 10, 2023

SHARE TWEET

Download PDF (Free)

PDF Shark

Open



The Maui News

The Hawaii Emergency Management Agency will host meetings on Maui, Molokai and Lanai this month to seek public input on how the state can better protect against hazards like hurricanes and wildfires.

**The Maui News**

**YOUR TRUSTED NEWS**

for Maui.

Subscribe Today

Meetings on the 2023 State Hazard Mitigation Plan had originally been planned for December but were postponed because the agency staff who were organizing them were assigned to work the Mauna Loa volcanic eruption. The agency gathered public input from across the state for the 2023 plan during a virtual meeting in December.

*"We fully update these plans every five years because they're a key tool we use to reduce or eliminate the harm caused by the hazards we face across Hawai'i,"* James Barros, administrator of the agency, said in a news release Tuesday.

The state and the counties rely on these plans to guide their efforts to protect communities against the threats of flooding, hurricanes, wildfires, tsunamis and other hazards.

Meetings will be held across the state, including at:

- Mitchell Pauole Community Center, 90 Ainoa St., Kaunakakai, 5-6 p.m. April 19.
- Kahului Community Center, 275 Uhu St., 5-6 p.m. April 20.

The site for the April 25 meeting on Lanai is to be determined.

For more details on upcoming meetings, the draft plan or the online public input survey, visit [experience.arcgis.com/experience/f60e1a0a7dfc4069a0ea862108023c43/page/Public-Participation/](https://experience.arcgis.com/experience/f60e1a0a7dfc4069a0ea862108023c43/page/Public-Participation/) or scan the QR code.

Source: [State seeks public input on hazard plan | News, Sports, Jobs - Maui News](#)







Figure A-3. April 18, 2023 Public Meeting Promotion on Hawaii News Now

The screenshot shows the Hawaii News Now website interface. At the top, there is a navigation bar with categories like Live, News, Weather, Sunrise, Sports, Special Reports, Podcasts, HI Now, Entertainment, and Merrie Monarch Festival. Below the navigation bar, a blue banner reads "High Surf Advisory Is In Effect".

An advertisement for "Hawai'i Meals on Wheels" is displayed, with the text: "Become a Hawai'i Meals on Wheels delivery volunteer! Help needed Mon, Thur, and Fri between 9 AM and Noon." and a "JOIN THE HUI" button.

The main article headline is "State agency requests community input for Hawaii's hazard mitigation plan". Below the headline is a video player showing a volcanic eruption with a play button overlay. The video is credited to "USGS".

Below the video player, there is a "HAPPENING TODAY" section with a QR code and the text: "STATE HAZARD PLAN PUBLIC MEETING WEST HAWAII CIVIC CENTER, KONA | 5 PM".

The article text below the video reads: "The Hawaii Emergency Management Agency is continuing a series of community meetings across the state to help refresh its hazard mitigation plan." It is attributed to "By HNN Staff" and includes publication and update dates: "Published: Apr. 18, 2023 at 5:36 AM HST | Updated: Apr. 18, 2023 at 10:28 AM HST".

Social media sharing icons for Facebook, Email, Twitter, Pinterest, and LinkedIn are provided. The article continues with: "HONOLULU (HawaiiNewsNow) - The Hawaii Emergency Management Agency is continuing a series of community meetings across the state to help refresh its hazard mitigation plan. HIEMA's plans are updated every 5 years in an effort to minimize or prevent long-term risks from threats including flooding, hurricanes, wildfires and tsunamis. Officials said Mauna Loa's eruption forced the agency to reschedule meetings that were originally set for last December. Those who want to see the current Multi-hazard mitigation plan can do so on HI-EMA's website. Public comments can also be

Source: [State agency requests community input for Hawaii's hazard mitigation plan \(hawaiinewsnow.com\)](https://www.hawaiinewsnow.com)





Figure A-4. April 27, 2023 Post on Big Island Video News

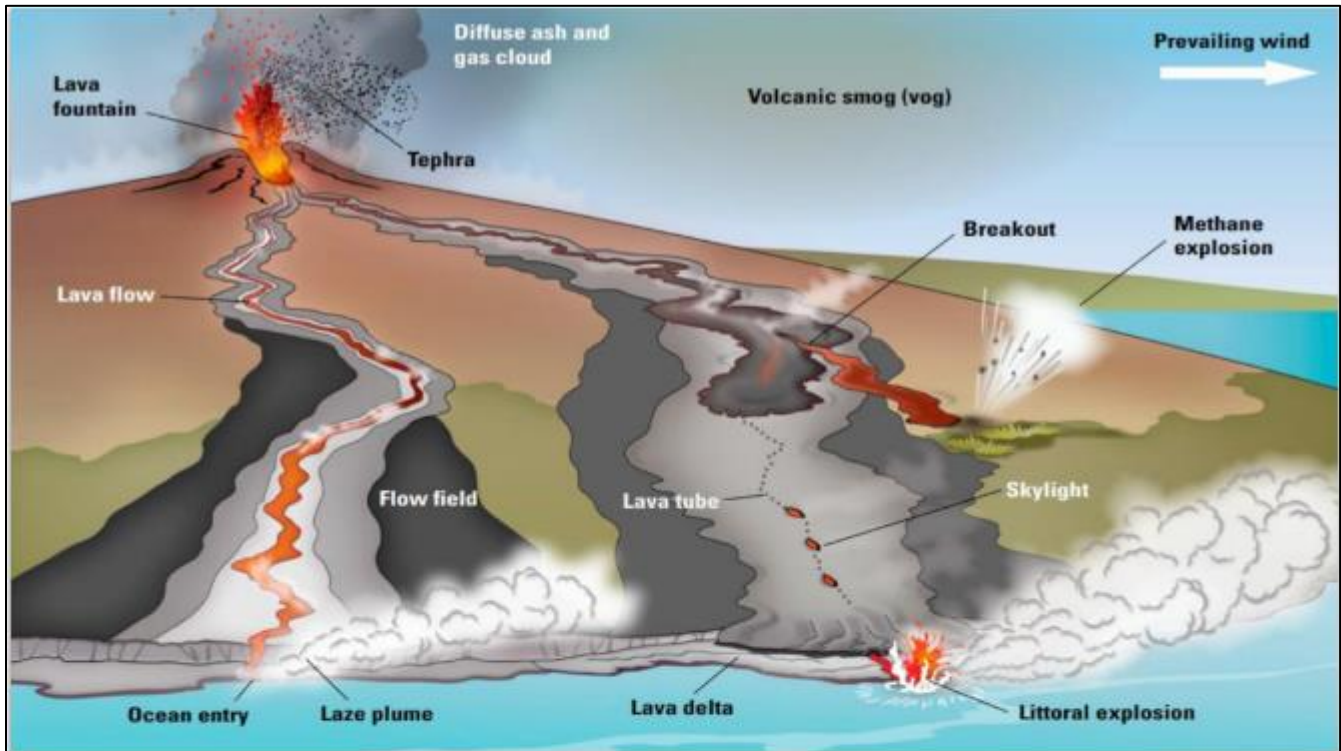


Figure 4.14-1 from the draft plan, Shield Volcano and Lava Field Components (Source: U.S. Geological Survey 2019)

# Hawai'i Posts Draft Hazard Mitigation Plan For Public Comment



by Big Island Video News  
on Apr 27, 2023 at 1:17 pm

93  
Shares



Source: [Hawai'i Posts Draft Hazard Mitigation Plan For Public Comment \(bigislandvideonews.com\)](https://bigislandvideonews.com)





## A.2 Summary of Public Comments Received on the Draft 2023 SHMP Update

HI-EMA held one virtual public meeting, six in-person public meetings, and one hybrid statewide meeting to allow residents the opportunity to provide input on the planning process. Additionally, the state posted the draft 2023 SHMP Update on the StoryMap and HI-EMA websites, along with a comment capture form to enable residents to submit comments based on their review of the plan. All comments received were considered by the HI-EMA Mitigation Section and Forum Chair for incorporation into the final submittal to FEMA. Table A-5 provides a summary of the public meetings.

Table A-5. Summary of Public Meetings

Date and Time	Location	Number of Persons Signed In
December 20, 2022 (5:30–6:30 p.m.)	Virtual (Statewide)	23
April 5, 2023 (4–5 p.m.)	HI-EMA Building 300 Gym 3949 Diamond Head Road, Honolulu 96816	14
April 17, 2023 (5–6 p.m.)	Aupuni Center Conference Room 101 Pauahi Street, Hilo 96720	15
April 18, 2023 (5–6 p.m.)	West Hawai'i Civic Center Community Meeting Hale 74-5044 Ane Keohokalole Highway, Kailua-Kona 96740	10
April 19, 2023 (4–5 p.m.)	Mitchell Pauole Community Center 90 Ainoa Street, Kaunakakai 96748	8
April 20, 2023 (4–5 p.m.)	Kahului Community Center 275 Uhu Street, Kahului 96732	6
April 24, 2023 (4–5 p.m.)	Moikeha Conference Room 4444 Rice Street, Līhu'e 96766	19
May 3, 2023 (5–7 p.m.)	HIARNG Building 19, Room 121 19 Shangrila Street, Kapolei 96707 and Virtual	18

On December 20, 2022, a virtual public meeting was held to provide an overview and status update on the 2023 SHMP Update. A brief presentation provided an overview of the plan, the update process, and the draft risk assessment results. The meeting was publicly advertised to encourage residents to provide input on the planning process.

The following provides a summary of the topics discussed during the December meeting:

- Social vulnerability considerations in the State of Hawai'i
- Hardening facilities against wind, wildfire, and other hazards
- Revising hazard maps to account for roads inundated by lava from the Kīlauea eruption

A survey was released during the December public meeting to gauge awareness of hazards in the State of Hawai'i. The survey was kept open until April 30, 2023. 15 members of the public provided input via the survey about hazards experienced:





- Ten or more of the respondents have experienced an earthquake, hurricane, flood, or health risk.
- Between 5 and 9 respondents have experienced:
  - Climate change and sea level rise
  - Cyber threat
  - Drought
  - Landslide and rockfall
  - Tsunami
  - Wildfire
  - Windstorm
  - Volcanic hazard
- Less than 5 respondents have experienced:
  - Hazardous Materials Incident
  - Infrastructure/Dam Failure
  - Terrorism
  - Volcanic Hazards
  - Additional comments indicated that respondents had experienced a missile threat and post-fire air quality issues when soil is blown by the wind.

On April 26, 2023, HI-EMA released the draft 2023 SHMP Update allowing the public to provide input on the draft plan prior to submittal to FEMA. The public comment period was open through May 9, 2023. The principal avenues for public comment on the draft plan were the StoryMap and HI-EMA website. In total, 29 comments were received via the form posted on the websites. Additionally, public meetings were held to allow an opportunity to provide comment on the draft plan, ask questions, and discuss mitigation with the SHMO. These meetings were held on all the major islands.

At each meeting, the SHMO, the State Hazard Mitigation Chair, and the planning consultant gave a presentation and answered questions posed by attendees. Specific comments received are available upon request. All comments were reviewed by the SHMO and planning consultant and incorporated into the draft plan as appropriate. The following provides a summary of the topics discussed at the public meetings and the public comments received via the websites.

- April 5, 2023 Public Meeting in the City and County of Honolulu:
  - Local mitigation successes and potential new mitigation projects
  - Feasibility of implementing mitigation projects
- April 17, 2023 Public Meeting in Hilo, Hawai'i County:
  - Progress with CDBG funding related to local hazard mitigation projects
  - Social vulnerability distribution across the island
  - Integration of additional USGS data when representing earthquake risk
  - Lack of local emergency evacuation routes





- April 18, 2023 Public Meeting in Kailua-Kona, Hawai'i County:
  - Risks from floods, lack of evacuation routes, and potential fallout from a missile attack
  - Importance of including impacts to animals (agricultural, ranching, and domestic) in the risk assessment
- April 19, 2023 Public Meeting on Moloka'i Island, Maui County:
  - Mitigation grant funding distribution for remote islands like Moloka'i
  - Ideas for mitigation projects that would be viable for the island
- April 20, 2023 Public Meeting on Maui Island, Maui County:
  - Challenges of effective emergency management when staff resources are reduced
- April 24, 2023 Public Meeting in Kaua'i County:
  - Need for atmospheric modeling to predict increased storms and flooding
  - Actual cost of building code upgrades verses the benefits
  - Mitigation funding for health risks
  - Mayor Kawakami expressed the need for disaster preparedness/shelter-in-place kits for visitors staying in vacation rentals and for socially vulnerable populations
  - Datasets to better represent social vulnerability
- May 3, 2023 Hybrid Statewide Public Meeting in Kapolei, Honolulu County:
  - Additional consideration of historic windstorms in the Kawaihae
- Public Comments Received on the Draft Plan via the Form on the Website
  - Consider extreme heat as a separate hazard
  - Well-written draft that explains concepts clearly
  - Include biosecurity and additional invasive species hazard discussion and analysis in planning efforts
  - Discuss additional funding and plan implementation strategies
  - Dashboards provide a great snapshot of each hazard section
  - Include additional information on drought and its connection to climate change
  - Dataset coordination needed among state agencies and planning efforts
  - Vulnerability of both Maui and Hawai'i counties to the earthquake hazard should be emphasized
  - Indicate hazard mitigation planning compliance with National Incident Management System (NIMS)
  - Include success of the Hawai'i Mesonet efforts for climate monitoring





## A.3 Meeting Attendees and Materials

All agencies and stakeholders listed in Table A-2 were invited to the public meetings in December 2022, April 2023, and May 2023. Those who attended included representatives from the County of Kaua'i, the City and County of Honolulu, the County of Maui, the County of Hawai'i, Hawai'i Department of Land and Natural Resources, and the Department of Hawaiian Homelands.

Representatives from each of the sectors listed in Table A-4 were invited to and attended the capability and mitigation strategy working sessions and applicable sector meetings in February 2023.

All Forum members listed in Appendix B (State Hazard Mitigation Forum Membership and Bylaws) were invited to Forum meetings. Attendees at each meeting included representatives from each county and sector.

Meeting presentations (where applicable and as available) for the State Hazard Mitigation Forum meetings and public meetings convened during the development of the 2023 SHMP Update are included in chronological order. Photographs from select public meetings are also included in chronological order. Sign-in sheets for public meetings and more information on project status meetings, Forum meetings, FEMA meetings and meetings with subject matter experts is available upon request.





# State of Hawai'i 2023 Hazard Mitigation Plan

Special Hawai'i State Hazard  
Mitigation Forum Meeting  
October 12, 2022

Megan Brotherton, Tetra Tech



# StoryMap

[HI State Hazard Mitigation Plan Update \(arcgis.com\)](https://experience.arcgis.com/experience/f60e1a0a7dfc4069a0ea862108023c43/)

<https://experience.arcgis.com/experience/f60e1a0a7dfc4069a0ea862108023c43/>



Online, interactive platform for stakeholders and the public to remain engaged throughout the planning process.

- Background Information
- Overview of planning process
- Plan drafts
- Opportunities for engagement

The screenshot shows the top navigation bar of the StoryMap with the State of Hawai'i logo and the text 'State of Hawai'i'. To the right are four menu items: 'Welcome', 'Plan Overview', 'Hazards', and 'Engage'. The main content area features a satellite-style image of the Hawaiian Islands with the title '2023 State of Hawai'i Hazard Mitigation Plan Update' overlaid in large blue text. Below the image is a paragraph of introductory text.

As an island-based community, the State of Hawai'i is vulnerable to a wide range of hazards including lava, hurricanes, tsunami, and flooding. These events have greatly impacted lives, property, natural and cultural resources, and the economy. The State of Hawai'i is committed to reducing or eliminating the long-term risks and impacts of natural hazards through mitigation and resiliency efforts. This year HI-EMA is focusing on engaging with community in a new way, using this StoryMap as part of the planning process. Please continue to refer back to this website for announcements of plan update progress and opportunities for public engagement.





# Why update the State HMP?

- Meet new FEMA requirements for State Plans
- Update Hazard Analysis and Risk Assessment
- Update Capability Assessment
- Update Mitigation Strategy
- Keep the State eligible for FEMA mitigation grant funding



# New FEMA Planning Policy



Assess **climate change** impacts on natural hazards.



Assess **future changes** in population and development.



Incorporate considerations for **underserved communities and socially vulnerable populations**.



Assess adoption and enforcement of **building codes**.



# New FEMA Planning Policy



Evaluate all **dam risk** and include criteria required under High Hazard Potential Dam grant program.



Demonstration **integration of FEMA programs** (e.g., Community Lifelines, Fire Mitigation Assistance Grant, NFIP, Risk MAP, etc.).



Detailed description of **planning process and stakeholder engagement**.



Detailed description of State support for **local hazard mitigation planning**.



# Hazards Addressed in the 2023 Update

1. Climate Change and Sea Level Rise
2. Cyber Threat (new)
3. Drought
4. Earthquake
5. Flood  
(including Chronic Coastal and Event-Based )
6. Hazardous Materials
7. Health Risks
8. Hurricane
9. Infrastructure Failure  
(including Dam Failure)
10. Landslide and Rock Fall
11. Terrorism (new)
12. Tsunami
13. Volcanic Hazards
14. Wildfire
15. Windstorm



# Forum Role and Involvement

The Hawai'i State Hazard Mitigation Forum serves in an advisory capacity relative to the incorporation of hazard mitigation in policy in Hawai'i.

- Coordinate hazard mitigation activities in the State
- Recommend and prioritize project nominations for the Hazard Mitigation Grant Program (HMGP)
- Conduct a statewide public awareness campaign
- Assist in obtaining funds for mitigation projects
- Develop a hazard mitigation strategy for the State

The Forum will be engaged throughout the planning process during regularly scheduled meetings, including:

- Providing expertise to the planning process including emergency management, natural hazards, land use planning, building codes, transportation and infrastructure from both state and county perspectives
- Updates on the planning process
- Providing data and information to support the update
- Reviewing interim and draft plan deliverables



# Subject Matter Expert and Focus Group Outreach

Tetra Tech and HI-EMA engaged about 35 subject matter experts to provide current hazard data sources and inform hazard scenarios.

Focus Group meetings were conducted to gather current local information on:

- Building Codes and Standards
- Social Vulnerability



# Goals and Objectives Overview



- All components stand on their own merit.
- Each component is selected based on the ability to meet multiple aspects of its superior component.
- Objectives are used to prioritize actions.
- Aim to develop multi-objective actions.



# Goals and Objectives Exercise

<https://www.surveymonkey.com/r/HawaiiHMPGO>





# Draft Goals

2018 Goals	2023 Goals – <i>Suggested Revisions</i>
<p><b>Goal 1</b>—Reduce the long-term vulnerability of Hawaii’s people, property and jurisdictions, including state-owned or operated buildings, infrastructure and critical facilities, to natural hazards while conserving the State’s natural, historical, and cultural assets. This includes high risk properties such as repetitive loss (RL) and severe repetitive loss (SRL) properties.</p>	<p><b>Goal 1</b> – Utilize state-of-the-art methods and technology and local knowledge to identify and analyze hazards and assess State capabilities to reduce the impact of those hazards. <i>(2018 goal #4 was moved to #1)</i></p>
<p><b>Goal 2</b>—Promote actions designed to ensure long-term resiliency</p>	<p><b>Goal 2</b> – Promote public awareness of hazard risks and public action to reduce the long-term risks. <i>(2018 goal #5 was moved to #2)</i></p>
<p><b>Goal 3</b>—Strengthen partnerships and leverage existing resources and capabilities to identify, assess and reduce the impact of natural hazards</p>	<p><b>Goal 3</b> – Provide a framework for robust local hazard mitigation planning and mitigation strategy implementation in alignment with this plan. <i>(2018 goal #6 was moved to #3)</i></p>
<p><b>Goal 4</b>—Utilize state-of-the-art methods and technology and local knowledge to identify and analyze natural hazards and assess State capabilities to reduce the impact of those hazards</p>	<p><b>Goal 4</b> – Strengthen partnerships and leverage existing resources and capabilities to identify, assess and reduce the impact of hazards. <i>(2018 goal #3 was moved to #4)</i></p>
<p><b>Goal 5</b>—Promote public awareness of natural hazard risks and public action to reduce the long-term risks</p>	<p><b>Goal 5</b> – Promote long-term resiliency by reducing the vulnerability and consequences of Hawaii’s people and property, including state-owned or operated buildings, infrastructure, and critical facilities, to hazards and their impacts while conserving the State’s natural, historical, and cultural assets. <i>(Combined 2018 goals #1 and #2. Moved the goal to #5 in 2023 plan.)</i></p>
<p><b>Goal 6</b>—Provide a framework for robust local hazard mitigation planning and mitigation strategy implementation in alignment with this plan.</p>	<p><b>Goal 6</b> —<i>Build capacity and capabilities to increase disaster resiliency among historically underserved populations, individuals with access and functional needs, and in communities disproportionately impacted by hazards and their impacts.</i> <i>(New goal for 2023)</i></p>
	<p><b>Goal #7</b> – Leverage federal grant programs such as the High Hazard Potential Dams, Hazard Mitigation Grant Program Post Fire, and Flood Mitigation Assistance, to strengthen Hawaii’s resiliency to hazards and their impacts. <i>(Split the latter part of 2018 goal #1 out into its own goal)</i></p>



# Draft Objectives to Consider (1-10 of 23)

1. Establish and maintain public-private partnerships among all levels of government, community groups, the private sector, and institutions of higher learning to improve and implement methods to protect life, property and the environment.
2. Utilize the best available data, science and technology to identify and communicate the risk exposure to hazards, climate change risks, and vulnerabilities to inform risk-reduction measures, preparedness response, and adaptation strategies.
3. Improve the understanding of the locations, potential and cascading impacts, and linkages among the threats, hazards, vulnerabilities, and measures needed to protect life, community lifelines, the environment, property, and infrastructure.
4. Promote, coordinate, and implement hazard mitigation plans and projects to be consistent with and supportive of climate action and adaptation goals, policies, and programs, and community needs at all governmental levels.
5. Actively promote and work collaboratively with local governments on coordinated hazard mitigation planning efforts to foster and reinforce resilient communities while addressing risk at a scale consistent with hazard areas.
6. Promote plan integration of local hazard mitigation plans and provide training and guidance to integrate and strengthen the linkages between the plans.
7. Increase community capacity to develop community-based disaster resilience plans that incorporate education and risk -reduction measures, for residents and visitors.
8. Reduce mitigation related disparities impacting underserved populations and historically marginalized communities through developing equitable and inclusive plans, investments, and engagements. Develop plans, programs, and policies that are adaptive and recognize the historic, cultural, economic, social, and demographic influences of the community.
9. Encourage and promote leveraging existing federal, state, local, and non-governmental resources to foster a comprehensive state-wide, whole community approach to mitigation.
10. Identify and encourage the use of state-wide recommended criteria to develop and inform a shared data repository to integrate into state, local, and non-governmental plans, strategies, and actions.

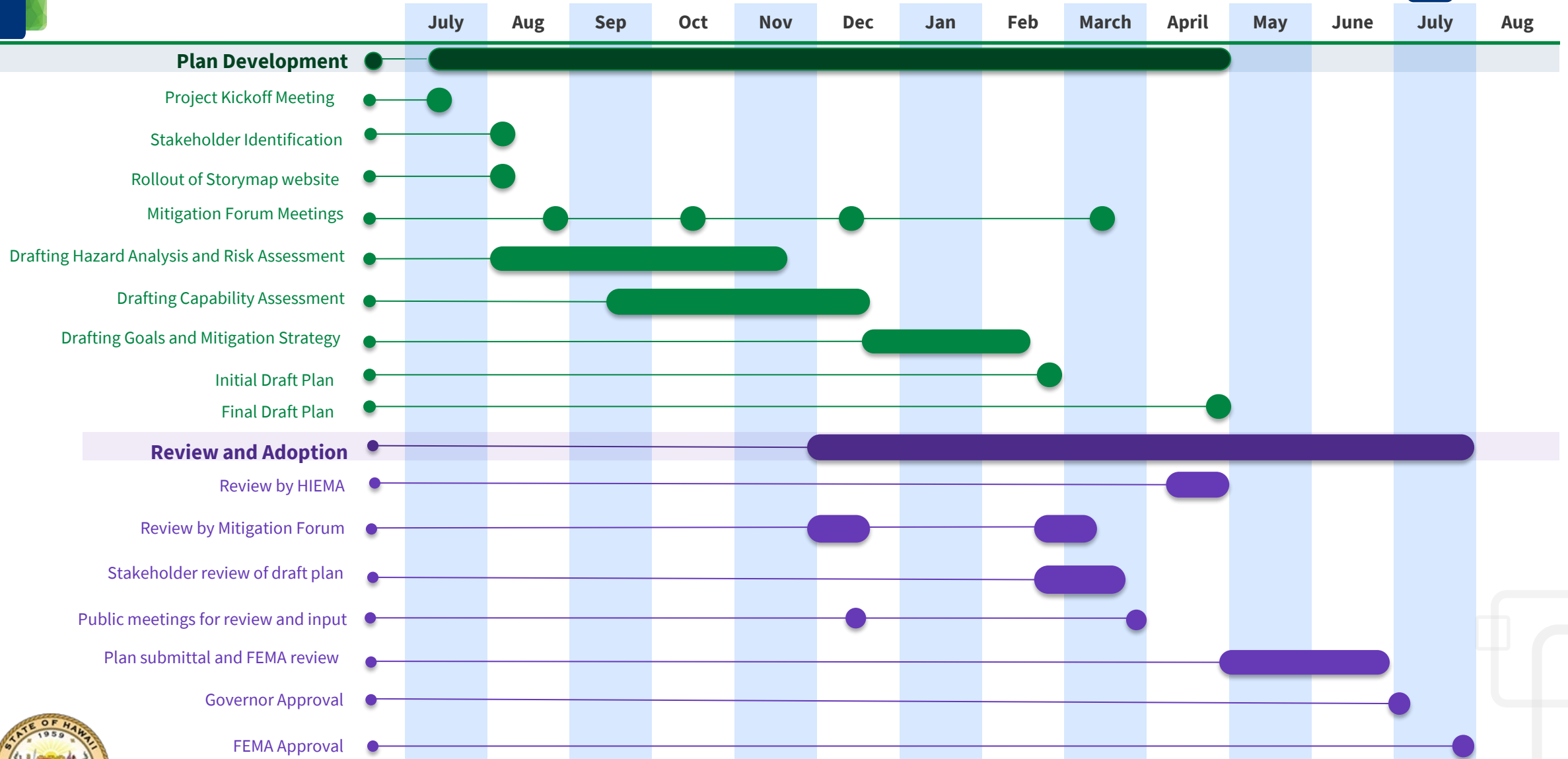


# Draft Objectives to Consider (11-23 of 23)

11. Develop and implement mitigation policies, protocols, programs, and procedures to address the state's changing environment and climate.
12. Incorporate mitigation measures into the built environment, especially in areas with substantial hazard risk and those known to have repetitive loss.
13. Incentivize and implement mitigation measures for hazard risk and repetitive loss areas to address repairs, major alternations, development plans and practices.
14. Promote and implement the retrofit, hardening, acquisition or replacement of at-risk structures and lifelines to increase community resilience.
15. Adopt and enforce building codes and standards that are affordable and feasible for life and property protection.
16. Annually review the effectiveness of current land use related plans, codes, and standards for appropriate future development within hazard areas, and amend them as necessary to account for climate change effects.
17. Prioritize investment and support efforts to improve resilience of community lifelines in socially vulnerable communities.
18. Minimize impacts of hazard events on the economic drivers for the State.
19. Recognize and support the disaster resilience inherent in host culture traditions and practices including holistic watershed management, community connectivity, and local, ahupua'a based decision-making.
20. Support hazard mitigation measures that promote and enhance natural infrastructure and natural processes to minimize adverse impacts on the ecosystem and minimize public safety risks.
21. Improve warning and emergency communication systems and utilize a diversity of communication media.
22. Create supply chain diversity and improved resilience by supporting local food and energy production and increased multi-modal transportation.
23. Leverage limited financial and human resources by prioritizing projects that provide multiple benefits addressing social equity, disaster mitigation, and greenhouse gas reduction.



# Schedule



# Mitigation Strategies (Action Plan)

- The 2023 action plan will be developed after the 2018 actions are updated
  - Mitigation Strategy Workshop will be scheduled in December
- Actions will address hazards analyzed in the risk assessment
- FEMA mitigation grants are only available for natural hazards
- Each action will be designed to meet multiple objectives
- Focus on measurable actions that can be completed during the next 5 years





# State of Hawai‘i 2023 Hazard Mitigation Plan

Hawai‘i State Hazard  
Mitigation Forum Meeting  
December 7, 2022

Megan Brotherton, Tetra Tech



# Risk Assessment Analysis

Three levels of analysis were used depending on the data available for each hazard:

- **Qualitative Analysis and Historical Occurrences** —Qualitative assessments used best available data and professional judgement. Historic impacts were examined to understand potential future events of similar size.
- **Exposure Assessment**—Hazards with defined extent and locations were overlaid with assets in GIS to determine which assets are exposed to the hazard.
- **Hazus Loss Estimation**—Hazus modeling software was used to estimate potential losses for Earthquake, Flood, Hurricane, and Tsunami hazards.



# What is Hazus?

Hazus is a nationally standardized risk modeling methodology. FEMA's Hazus Program provides standardized tools and data for estimating risk from:



Earthquake



Flood



Hurricane



Tsunami

Hazus can quantify and map risk information such as:

- **Physical damage** to residential and commercial buildings, schools, critical facilities and infrastructure.
- **Economic loss**, including lost jobs, business interruptions, and repair and reconstruction costs.
- **Social impacts**, including estimates of displaced households, shelter requirements, and populations exposed to floods, earthquakes, hurricanes and tsunamis.





# Risk Assessment Analysis Summary (Qualitative, Exposure, Hazus)

Hazard	Data Analyzed						
	State Buildings	State Roads	Community Lifelines & Critical Facilities	Total Population & Vulnerable Population	General Building Stock	Environmental Resources	Cultural Assets
Climate Change and Sea Level Rise	E	E	E	E, H	E, H	E	E
Cyber Threat	Q	Q	Q	Q	Q	Q	Q
Drought	Q	Q	Q	Q	Q	Q	Q
Earthquake	E, H	E, H	E, H	E, H	E, H	E	E
<b>Flood</b>							
Chronic Coastal	E	E	E	E	E	E	E
Event-Based	E, H	E, H	E, H	E, H	E, H	E	E
Hazardous Materials	Q	Q	Q	Q	Q	Q	Q
Health Risks	Q	Q	Q	Q	Q	Q	Q
Hurricane	E, H	E, H	E, H	E	E, H	E	E
Infrastructure Failure (Dam Failure)	E	E	E	E	E	E	E
Landslide and Rockfall	E	E	E	E	E	E	E
Terrorism	Q	Q	Q	Q	Q	Q	Q
Tsunami	E	E	E	E, H	E, H	E	E
Volcanic Hazards	E	E	E	E	E	E	E
Wildfire	E	E	E	E	E	E	E
Windstorm	Q	Q	Q	Q	Q	Q	Q



# New Risk Assessment Data

The 2023 SHMP update analyzes:

- **Critical Facilities *and* Community Lifelines**—The seven Community Lifeline categories are included in the risk assessment.
- **Coral Reefs**—Reefs are now included in the Environmental Resources analysis along with critical habitat, wetlands, and parks and reserves.
- **Total Population *and* High Vulnerability Population**—Tracts that met the overall Social Vulnerability Index score of  $\geq 80\%$  are included in the high vulnerability population analysis.



# Community Lifelines

- Lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function.
- FEMA has developed a construct for objectives-based response that prioritizes the rapid stabilization of Community Lifelines after a disaster.



**Safety and Security** - Law Enforcement/Security, Fire Service, Search and Rescue, Government Service, Community Safety



**Food, Water, Shelter** - Food, Water, Shelter, Agriculture



**Health and Medical** - Medical Care, Public Health, Patient Movement, Medical Supply Chain, Fatality Management



**Energy** - Power Grid, Fuel



**Communications** - Infrastructure, Responder Communications, Alerts Warnings and Messages, Finance, 911 and Dispatch



**Transportation** - Highway/Roadway/Motor Vehicle, Mass Transit, Railway, Aviation, Maritime



**Hazardous Material** - Facilities, HAZMAT, Pollutants, Contaminants



# Climate Change & Sea Level Rise Hazard Scenarios and Select Vulnerability Results



Scenarios:

- **Sea Level Rise Exposure Area (SLR-XA) 3.2ft scenario** (future chronic coastal flooding)
- **1%-Annual-Chance Coastal Flood Zone (1%CFZ) + 3.2ft SLR** (event-based coastal flooding plus SLR)

State Building Loss from (SLR-XA-3.2), by County:

County	Total Number of State Buildings	Total Value	Number of State Buildings in SLR-XA-3.2	Percent of Total Buildings	Total Value of State Buildings in SLR-XA-3.2	Percent of Total Value
County of Kaua'i	531	\$990,850,824	1	0.19%	\$248,896	0.03%
City and County of Honolulu	3,472	\$17,393,945,915	51	1.47%	\$56,886,036	0.33%
County of Maui	831	\$3,097,491,689	2	0.24%	\$370,372	0.01%
County of Hawai'i	1,261	\$4,638,567,141	0	0.00%	\$0	0.00%
<b>Total</b>	<b>6,095</b>	<b>\$26,120,855,568</b>	<b>54</b>	<b>0.89%</b>	<b>\$57,505,304</b>	<b>0.22%</b>



# Earthquake Hazard Scenarios and Select Vulnerability Results

Hazus:

- **100-year probabilistic EQ event**
- **4 USGS ShakeMap scenarios:**
  - Kalapana 1975 M7.7 scenario
  - Ka‘ū M8.0 scenario
  - Lāna‘i M7.0 scenario
  - NE Maui M7.0 scenario

202 U.S. Census Population Located on the NEHRP Class D and E Soils by County:

County	Population				
	Total Population	Total Population Located in Hazard Area	Population Exposed as Percent (%) of Total Population	High Vulnerability Population Located in Hazard Area	Population Exposed as Percent (%) of Total Population
County of Kaua‘i	71,949	-	-	-	-
City and County of Honolulu	979,682	-	-	-	-
County of Maui	167,093	80,507	48%	2,764	1.65%
County of Hawai‘i	201,350	6,681	3%	20,783	10.32%
<b>Total</b>	<b>1,420,074</b>	<b>87,188</b>	<b>6%</b>	<b>23,547</b>	<b>1.66%</b>



# Flood Hazard Scenario and Select Vulnerability Results

Hazus:

- **Loss Assessment to 1% Annual Chance Flood**

## State Road Exposure to the 1% Annual Chance Flood Event by County:

County	Length (in miles)		
	Total Length	Length in the SFHA	Percent of Total Length
County of Kaua'i	103.7	15.5	14.95%
City and County of Honolulu	374.9	44.9	11.98%
County of Maui	245.9	20.7	8.42%
County of Hawai'i	379.2	4.4	1.16%
<b>Total</b>	<b>1,103.70</b>	<b>85.5</b>	<b>7.75%</b>



# Hurricane Hazard Scenario and Select Vulnerability Results

Hazus:

- **SLOSH** (Sea, Lake and Overland Surges from Hurricanes) **Categories 1-4**

## Storm Surge Inundation by County:

County	Area (in square miles)								
	Total Area	Cat 1	Cat 1 as % of Total Area	Cat 2	Cat 2 as % of Total Area	Cat 3	Cat 3 as % of Total Area	Cat 4	Cat 4 as % of Total Area
County of Kaua'i	624.2914	4.5	0.72%	5.8	0.93%	10.1	1.62%	12.2	1.95%
City and County of Honolulu	598.5707	10.9	1.82%	22.3	3.73%	31.8	5.31%	38.2	6.38%
County of Maui	1,176.28	5.8	0.49%	7.9	0.67%	9.8	0.83%	11.4	0.97%
County of Hawai'i	4,039.64	1.9	0.05%	2.5	0.06%	3.7	0.09%	5.3	0.13%
<b>Total</b>	<b>6,438.78</b>	<b>23.1</b>	<b>0.36%</b>	<b>38.5</b>	<b>0.60%</b>	<b>55.4</b>	<b>0.86%</b>	<b>67.1</b>	<b>1.04%</b>



# Infrastructure Failure (Dam Failure)

## Hazard Scenario and Select Vulnerability Results

Scenario:

- **All High Hazard dam inundation areas**

### Critical Facilities Exposure to High Hazard Dam Inundation Areas by Community Lifeline Category:

Community Lifeline Category	Total Number of Critical Facilities	Total Replacement Cost Value	Number of Critical Facilities in Hazard Area	Percent of Total Facilities	Value in the Hazard Area	Percent of Total Value
Communications	188	\$776,797,683	12	6.38%	\$47,000,315	6.05%
Energy	89	\$3,093,949,530	15	16.85%	\$557,941,340	18.03%
Food, Water, Shelter	345	\$11,847,189,588	21	6.09%	\$740,398,300	6.25%
Hazardous Material	12	\$436,474,800	0	0.00%	\$0	0.00%
Health and Medical	193	\$4,606,713,364	7	3.63%	\$95,885,988	2.08%
Safety and Security	486	\$38,164,188,232	21	4.32%	\$3,036,032,806	7.96%
Transportation	56	\$2,039,091,600	8	14.29%	\$290,352,000	14.24%
Additional Critical Facilities	106	\$447,698,794	5	4.72%	\$86,491,270	19.32%
<b>Total</b>	<b>1,475</b>	<b>\$61,412,103,591</b>	<b>89</b>	<b>6.03%</b>	<b>\$4,854,102,018</b>	<b>7.90%</b>





# Landslide and Rockfall Hazard Scenario and Select Vulnerability Results

Scenario:

- **High landslide susceptibility areas**

State Land Use Districts Located in High Landslide Susceptibility Areas:

Land Use District	Total (square miles)	Square Miles in High Landslide Susceptibility Areas	Percent of Total Area
Agricultural	2,973.6	645.5	21.71%
Conservation	3,202.9	512.8	16.01%
Rural	16.3	0.2	1.22%
Urban	319.1	14.4	4.51%
<b>Total</b>	<b>6,511.95</b>	<b>1,172.90</b>	<b>18.01%</b>



# Tsunami Hazard Scenarios and Select Vulnerability Results

Hazus:

- **SOEST Historic (200-yr)**
- **Great Aleutian Tsunami (GAT) (1,500-yr)**
- **ASCE Design Inundation Mapping (3,500-yr)**

## Environmental Resources in SOEST Inundation Areas:

Environmental Resource	Statewide		
	Total Square Miles of Resources	Square Miles in the SOEST Inundation Area	Percent (%) of Total Resource Area
Critical Habitat	951	1	0.1%
Wetlands	3,637	18	0.5%
Parks and Reserves	2,778	9	0.3%
Reefs	55	1	1.9%
<b>Total</b>	<b>7,420</b>	<b>29</b>	<b>0.4%</b>



# Volcanic Hazards

## Hazard Scenarios and Select Vulnerability Results

Scenarios:

- **Hawai‘i County**  
lava zones 1-4
- **Maui County**  
lava zones 1-2

### Cultural Resources Located in the Lava Flow Hazard Area:

Cultural Resource Site Type	Area in square miles		
	Total Square Miles of Asset	Square Miles in Lava Flow Hazard Areas	Percent of Total Asset Area
Archaeology	90.9	19.2	21.1%
Burial Sensitivity Area	2.1	0.5	24.5%
Historic Building	2.7	0.4	15.3%
Historic District	849.4	358.2	42.2%
Historic Object	9.6	9.6	99.9%
Historic Structure	20.7	16.5	79.4%
<b>Total</b>	<b>975.4</b>	<b>404.4</b>	<b>41.5%</b>



# Wildfire Hazard Scenario and Vulnerability Results

Scenario:

- **Communities at Risk from Wildfire (CAR) high wildfire risk areas**

Hawaiian Home Lands Located in the High Wildfire Risk Hazard Area:

County	Area (in square miles)		
	Total Area	Hazard Area	Hazard Area as Percent of Total Area
County of Kaua'i County	32.1	2.2	6.8%
City and County of Honolulu	10.6	4.5	42.1%
County of Maui	102.6	38.3	37.3%
County of Hawai'i	191.5	6.1	3.2%
<b>Total</b>	<b>336.7</b>	<b>51.0</b>	<b>15.1%</b>





# State of Hawai‘i 2023 Hazard Mitigation Plan

*Virtual Open House*

December 20, 2022

**Mahalo for joining!**  
**The program will begin soon.**

# Virtual Open House Participants



- Luke Meyers, Administrator, HI-EMA
- Kelsey Yamanaka, Acting State Hazard Mitigation Officer, HI-EMA
- Amber Ternus, Mitigation Strategist, HI-EMA
- David Kennard, Kauaʻi Emergency Management Agency (KEMA) Disaster Assistance Project Manager, State Hazard Mitigation Forum Chair
- Megan Brotherton, Lead Project Planner, Tetra Tech, Inc.
- and YOU!



# Agenda and Ground Rules



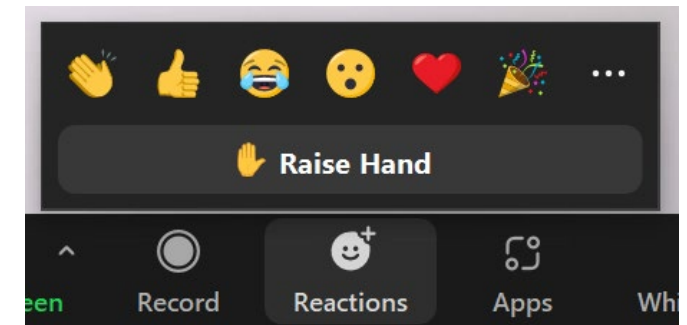
- Hazard Mitigation Plan Overview
- Social Vulnerability Requirements
- Risk Assessment Results and Path Forward

Each agenda item allows for public comment and questions

To participate, use the “Raise Hand” feature in “Reactions”

Or add your question or comment to “Chat”

Please limit comments to 3 minutes



# Public Survey and Comment Form

Please use the link below or scan the QR code to take a brief survey and share comments about the plan update.

<https://www.surveymonkey.com/r/SaferHI>





# Contacts for Emergency Management Agencies

- Hawai'i Emergency Management Agency [HawaiiEMA@hawaii.gov](mailto:HawaiiEMA@hawaii.gov)
- Kaua'i Emergency Management Agency [kema@kauai.gov](mailto:kema@kauai.gov)
- Maui Emergency Management Agency [emergency.management@mauicounty.gov](mailto:emergency.management@mauicounty.gov)
- Honolulu Department of Emergency Management [dem@honolulu.gov](mailto:dem@honolulu.gov)
- County of Hawai'i Civil Defense [hccda@hawaiiicounty.gov](mailto:hccda@hawaiiicounty.gov)

# Purpose of the State Hazard Mitigation Plan (SHMP)

Why do we have a SHMP? Why do we update it?

- FEMA and the Emergency Management Community acknowledge that our communities are subject to natural hazards and recognize that Hazard Mitigation Planning provides a framework to:
  - Identify the natural hazards and assess their impacts on the State and our communities,
  - Assess State's capacity to respond to and recover from the impacts of the natural disasters,
  - Develop strategies to reduce or eliminate these impacts on lives and property and to ensure the continued functionality of critical services, and
  - Reduce the disaster assistance costs resulting from natural disasters

# Purpose of the State Hazard Mitigation Plan (SHMP), cont.

Why do we have a SHMP? Why do we update it?

- FEMA emphasizes the importance of the SHMP by tying grant funding to an approved and adopted Plan
  - Certain categories of Public Assistance (PA Categories C-G)
  - Hazard Mitigation Grant Program (HMGP)
  - Building Resilient Infrastructure and Communities (BRIC)
  - Fire Management Assistance Grants (FMAG)
  - Rehabilitation of High Hazard Potential Dam (HHPD)

# SHMP Update Process and Timeline

- FEMA and the EM Community recognized that Hazards, Capabilities and Strategies can change
  - FEMA requires States to update the SHMP at least every 5 years
  - HI-EMA and its Consultant (Tetra Tech) are wrapping up the updated Hazard Assessment
  - Will soon begin reviewing the Capability Assessment, and updating the Mitigation Strategy with Mitigation Actions
  - Have final draft SHMP Update ready for FEMA review and approval by October

# County of Hawai'i – Department of Water Supply Emergency Standby Power Connection at Critical Sites

Honokohau – Transfer Switch



Piihonua – Transfer Switch and Term Box



Honokohau – Termination Box



Piihonua Interconnect



# County of Hawai'i – Hilo Fire Station Structural Retrofit



# County of Maui – Maui Food Bank Generator



**MAUI FOOD BANK**  
*Helping the Hungry*

# City and County of Honolulu – Hardening of Honolulu Harbor





# City and County of Honolulu – Waikiki Fire Station Bay Door Hardening



# County of Kaua'i - Kaua'i War Memorial Convention Hall Envelope Hardening





**Questions?**

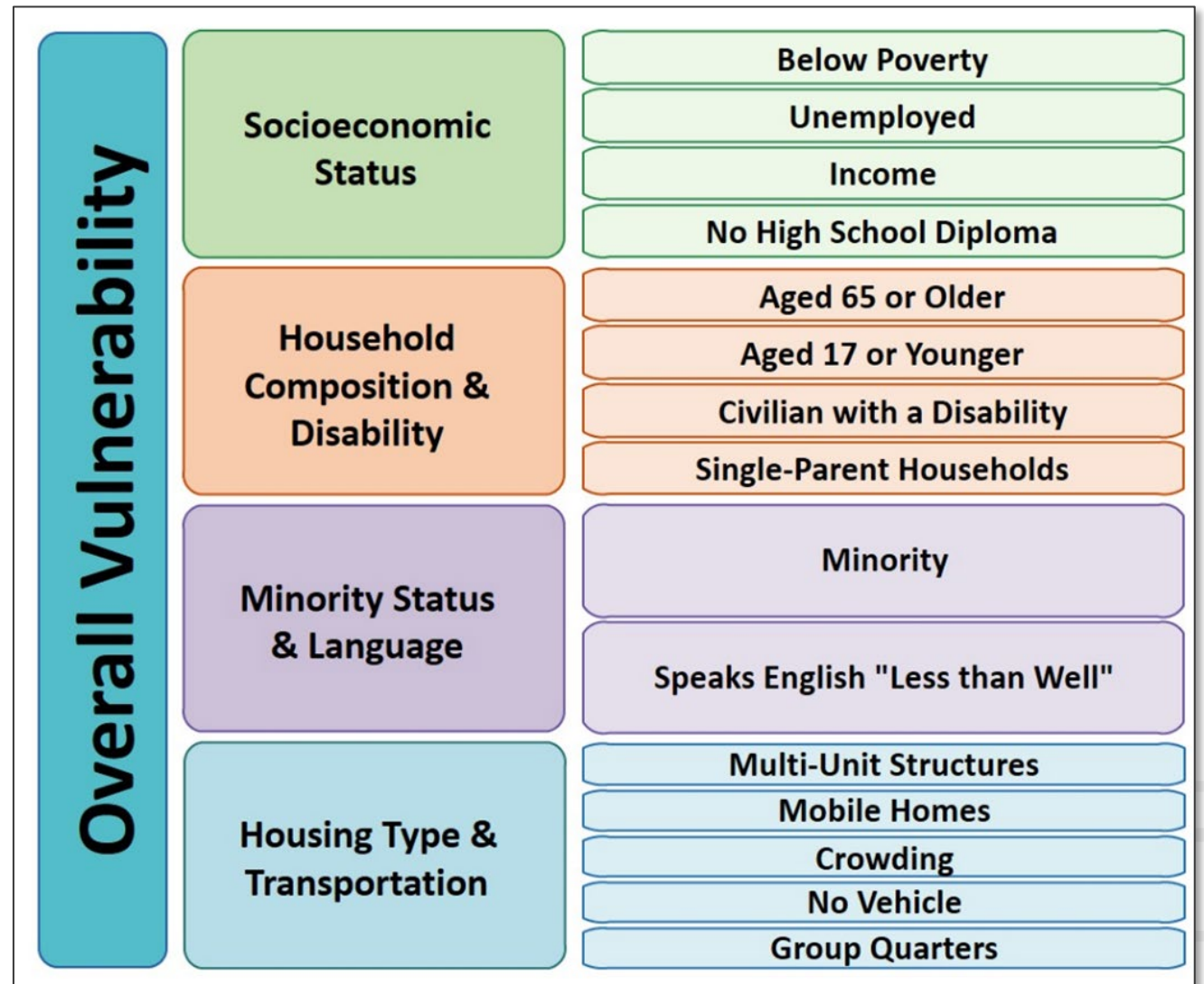


**Comments?**

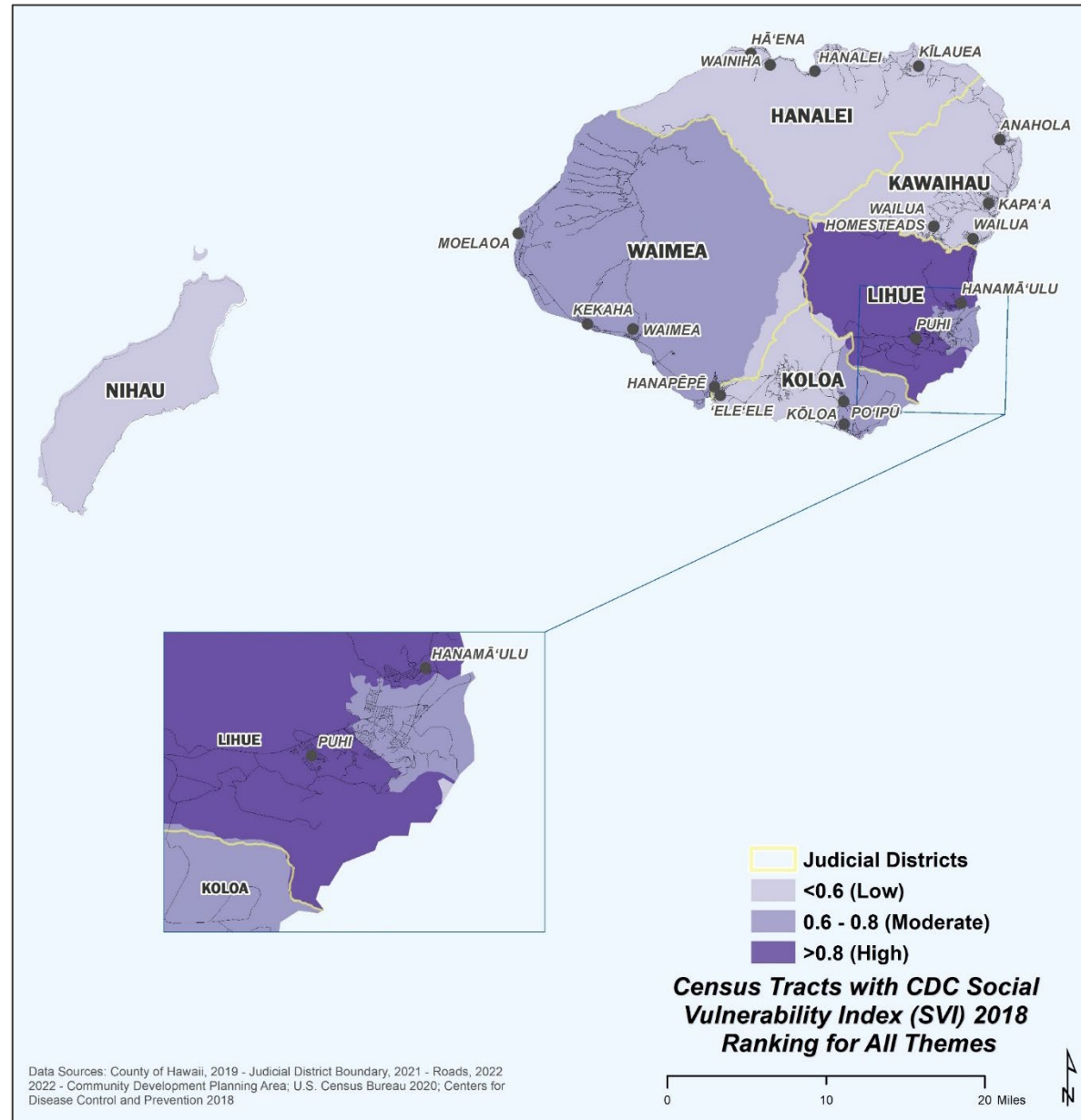
Please “Raise Hand” in “Reactions” or type your question in “Chat”

# New FEMA Requirement for 2023

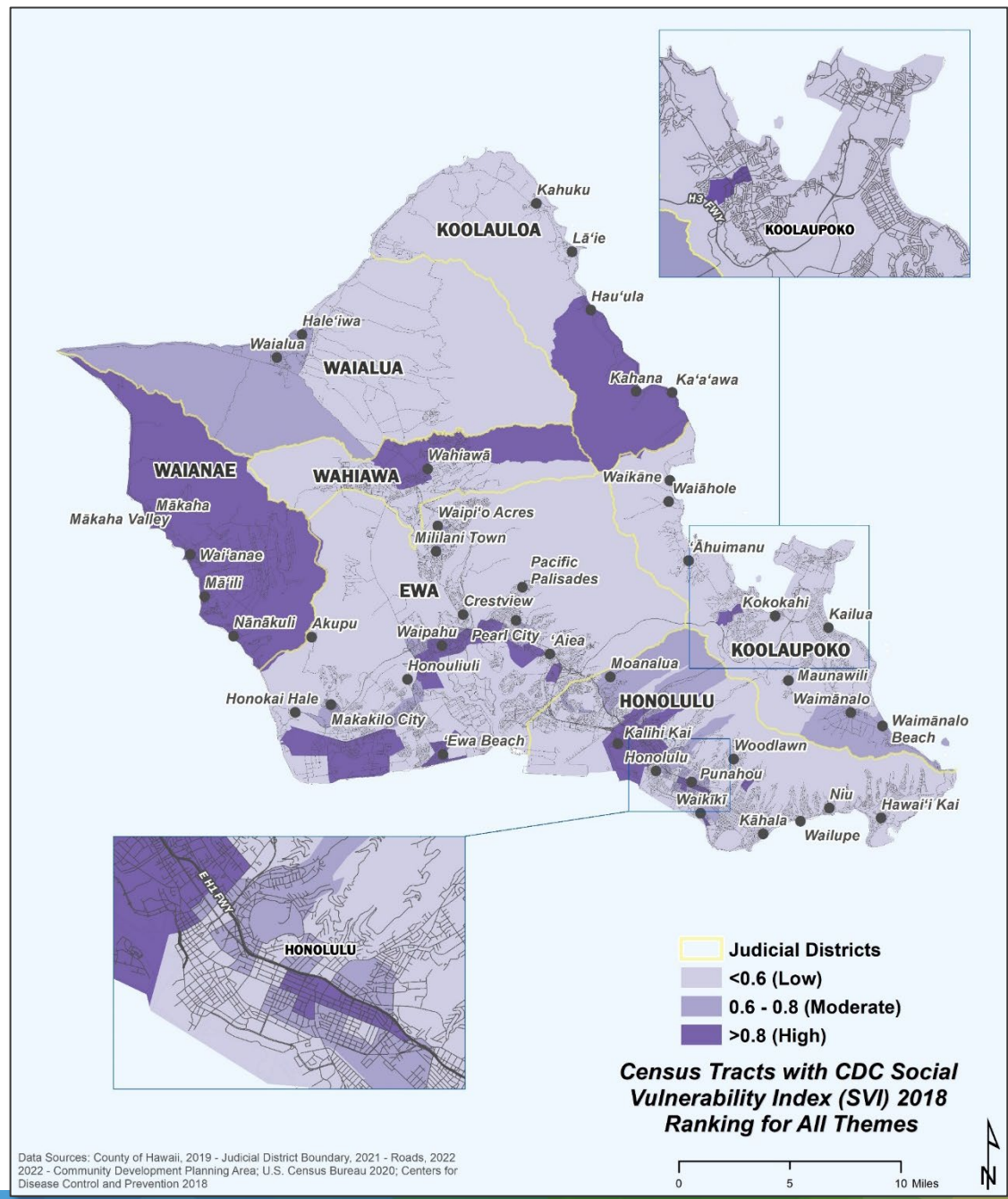
Incorporate considerations for underserved communities and socially vulnerable populations



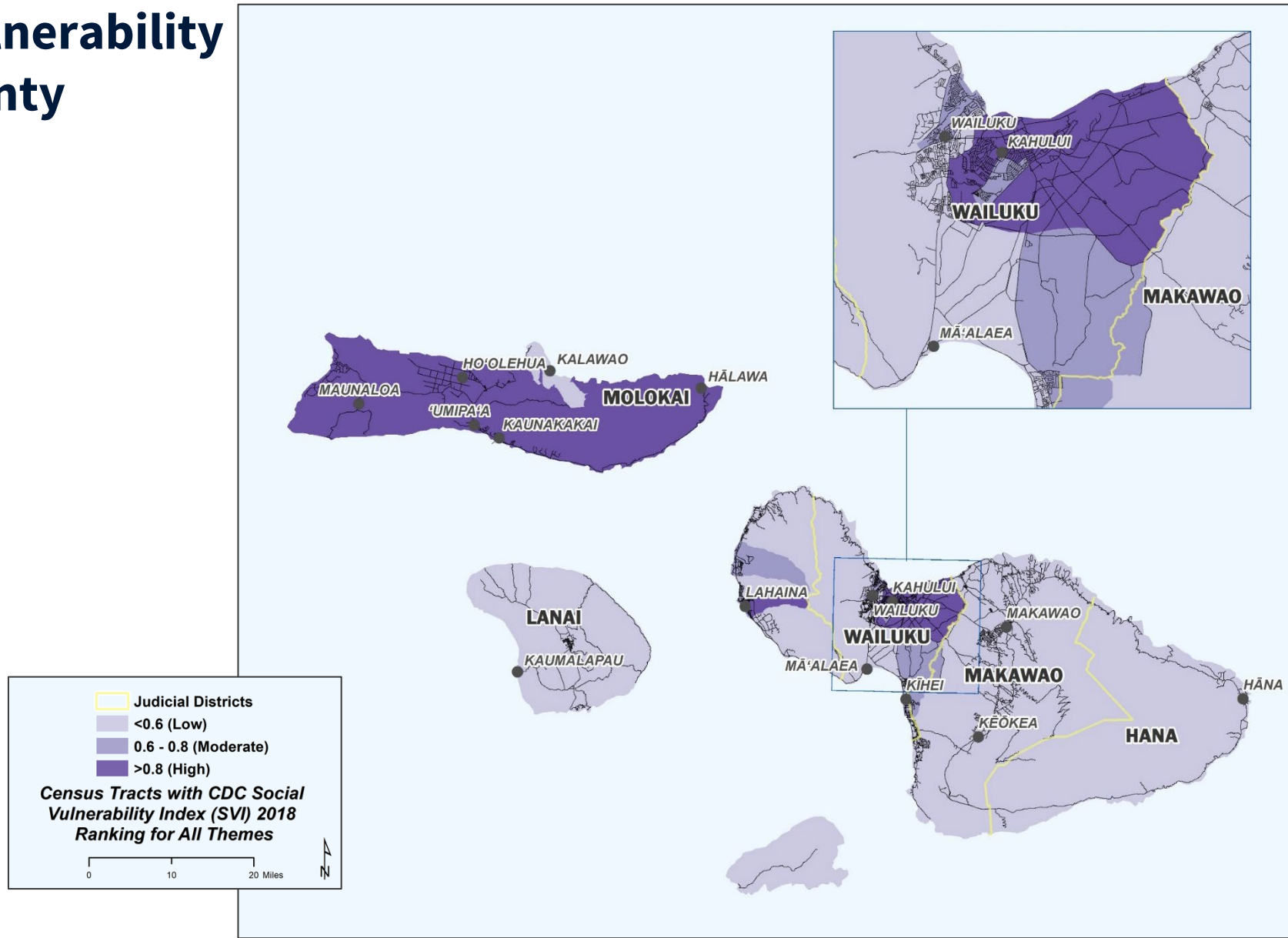
# Social Vulnerability Kaua'i County



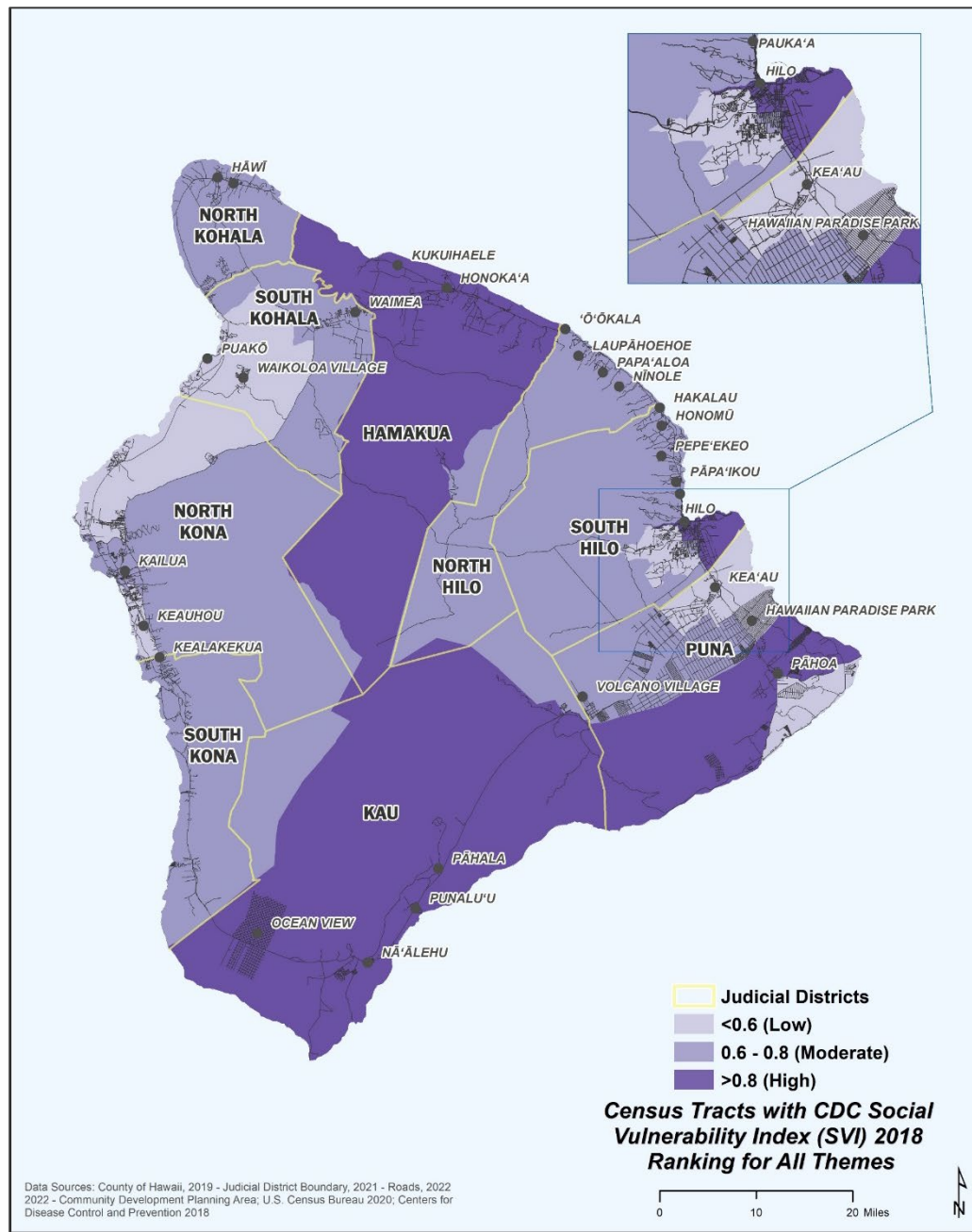
# Social Vulnerability Honolulu County



# Social Vulnerability Maui County



# Social Vulnerability Hawai'i County







**Questions?**



**Comments?**

Please “Raise Hand” in “Reactions” or type your question in “Chat”

# Disasters Since 2018

Declaration Date	Disaster Number	Event	Federal Funding Obligations		
			Individual Assistance	Public Assistance	Hazard Mitigation Assistance
May 8, 2018	DR-4365	Kaua'i & O'ahu Flooding & Landslides	\$1,593,486	\$15,500,269	\$2,791,984
May 11, 2018	DR-4366	Kīlauea Volcano Eruption and Earthquakes	\$13,188,508	\$123,675,352	\$4,753,531
September 27, 2018	DR-4395	Hurricane Lane	-	\$17,653,567	\$2,222,398
October 23, 2019	FM-5294	Maui County Kahana Ridge Fire (HMGP Post Fire)	-	\$110,837	-
April 1, 2020	DR-4510	COVID-19	\$2,969,922	\$219,474,425	-
July 9, 2020	DR-4549	Kaua'i Flood	-	\$1,120,707	-
May 13, 2021	DR-4604	Maui Severe Storms, Flooding and Landslides	-	\$5,965,731	-
August 1, 2021	FM-5404	Hawai'i County Mana Road Fire (HMGP Post Fire)	-	\$1,097,960	-
February 15, 2022	DR-4639	Severe Storms, Flooding & Landslides (Kona Low)	-	\$343,001	-
<b>Total Funding Obligations 2018-2022</b>			<b>\$17,751,916</b>	<b>\$384,941,849</b>	<b>\$6,978,721</b>

# Risk Assessment Analysis

Three levels of analysis were used depending on the data available for each hazard:

- **Qualitative Analysis and Historical Occurrences**—Qualitative assessments used best available data and professional judgement. Historic impacts were examined to understand potential future events of similar size.
- **Exposure Assessment**—Hazards with defined extent and locations were overlaid with assets in GIS to determine which assets are exposed to the hazard.
- **Hazus Loss Estimation**—Hazus modeling software was used to estimate potential losses for Earthquake, Flood, Hurricane, and Tsunami hazards.

# Earthquake – Lāna‘i High & Elementary School, Lāna‘i



## Earthquake

Earthquakes in Hawai'i are caused by eruptive processes within the active volcanoes or by deep structural adjustments due to the weight of the islands on Earth's underlying crust. Local or distant earthquakes can lead to tsunamis in the State. [ShakeMap](#) data prepared by the U.S. Geological Survey (USGS) and probabilistic earthquake data were used to assess the earthquake hazard. The evaluation of the following historic events utilizing the current environment provides an understanding of potential loss if the event were to happen today.

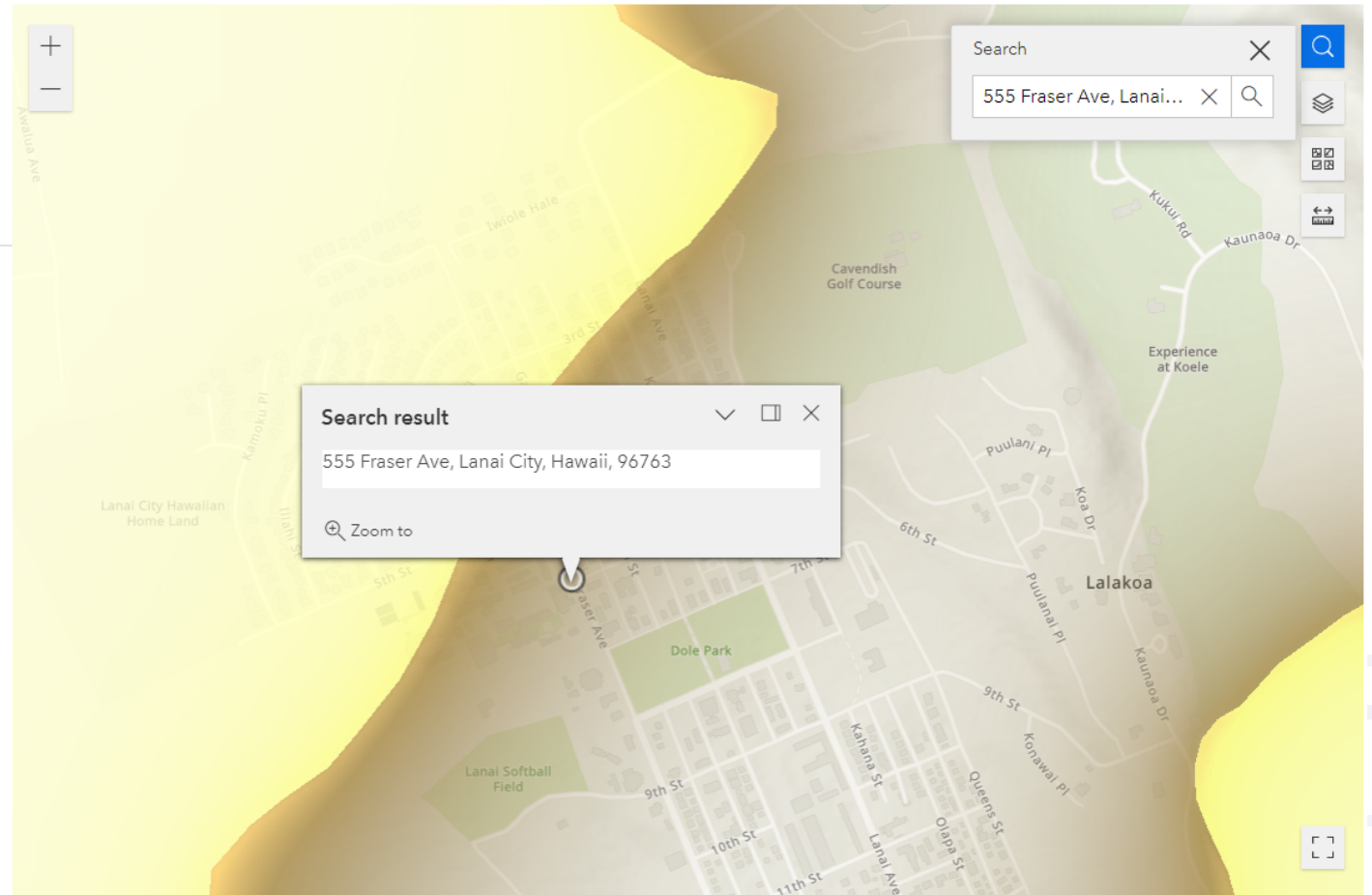
- The Kalapana 1975 M7.7 scenario with an epicenter approximately 26 miles south southeast of Hilo. This scenario represents the Kalapana M7.2 earthquake on November 29, 1975.

### NEHRP Soils

#### Type



### Hawaii Boundary



# Flood – Ala Wai Elementary School, Honolulu



## Flood

According to FEMA, floods occur in the United States more frequently than any other natural disaster. Because Hawai'i is surrounded by ocean, the state is susceptible to coastal and inland floods. Two types of flooding are represented in this map.

### Chronic Coastal Flooding

Chronic coastal flooding is shown for the Sea Level Rise Exposure Area 1.1 (SLR-XA-1.1). SLR-XA-1.1 is defined as the combined effects of annual high wave flooding, passive flooding, and coastal erosion exacerbated by sea level rise. This hazard layer is defined in the 2017 Hawai'i Sea Level Rise Vulnerability and Adaptation Report. This hazard layer represents current conditions.

### Event-Base Flooding

The quantitative risk assessment for the event-

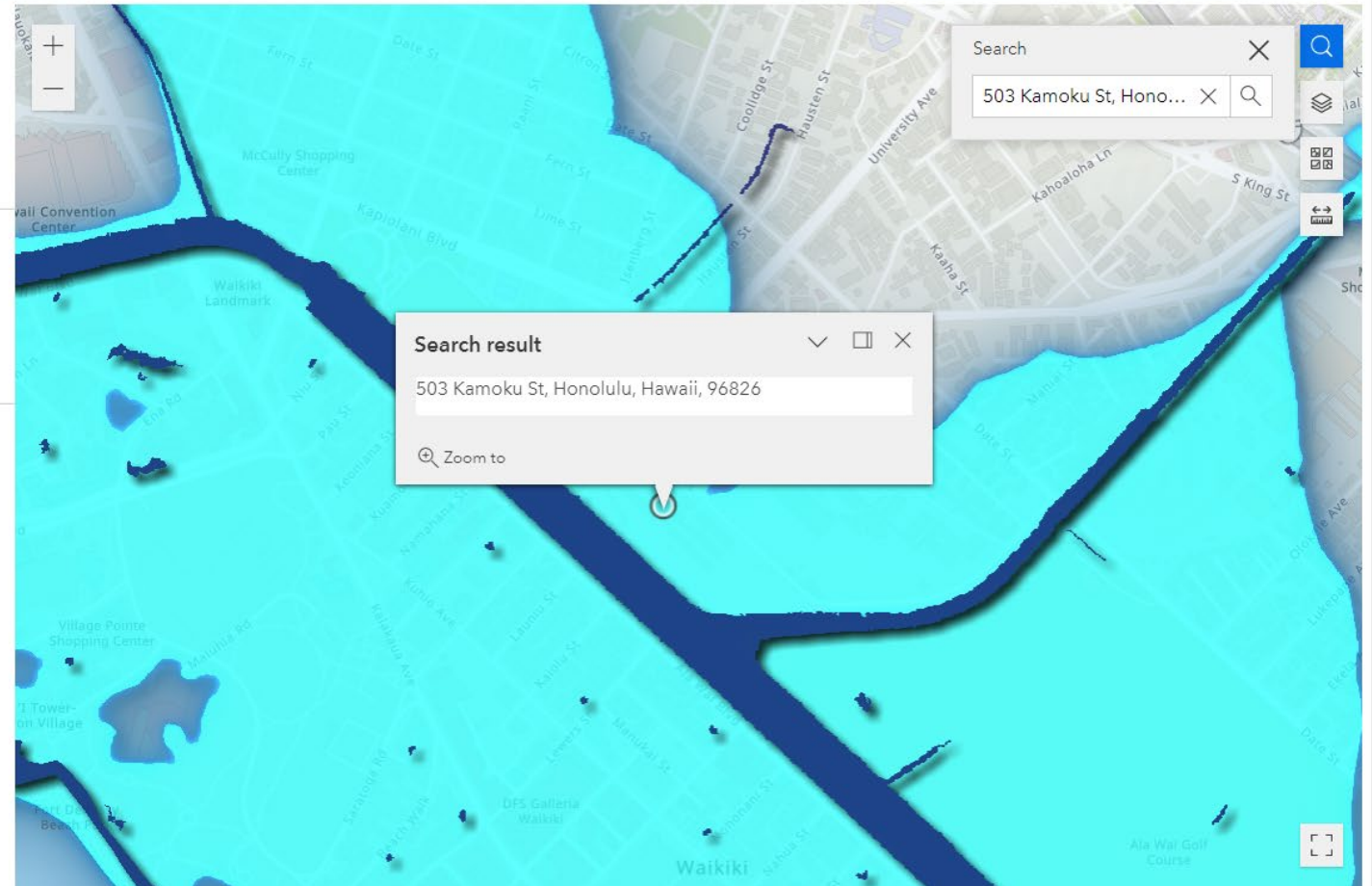
Chronic Coastal Flood  
(SLR-XA 1.1 ft hazard  
area)



FEMA Flood Hazard  
Area (1-Percent Annual  
Chance Flood)



Hawaii Boundary



# Infrastructure (Dam) Failure – Kōloa Elementary School, Kaua‘i



State of Hawai‘i

Welcome

Draft Plan

Citizen Survey

Hazards ▾

## Infrastructure Failure

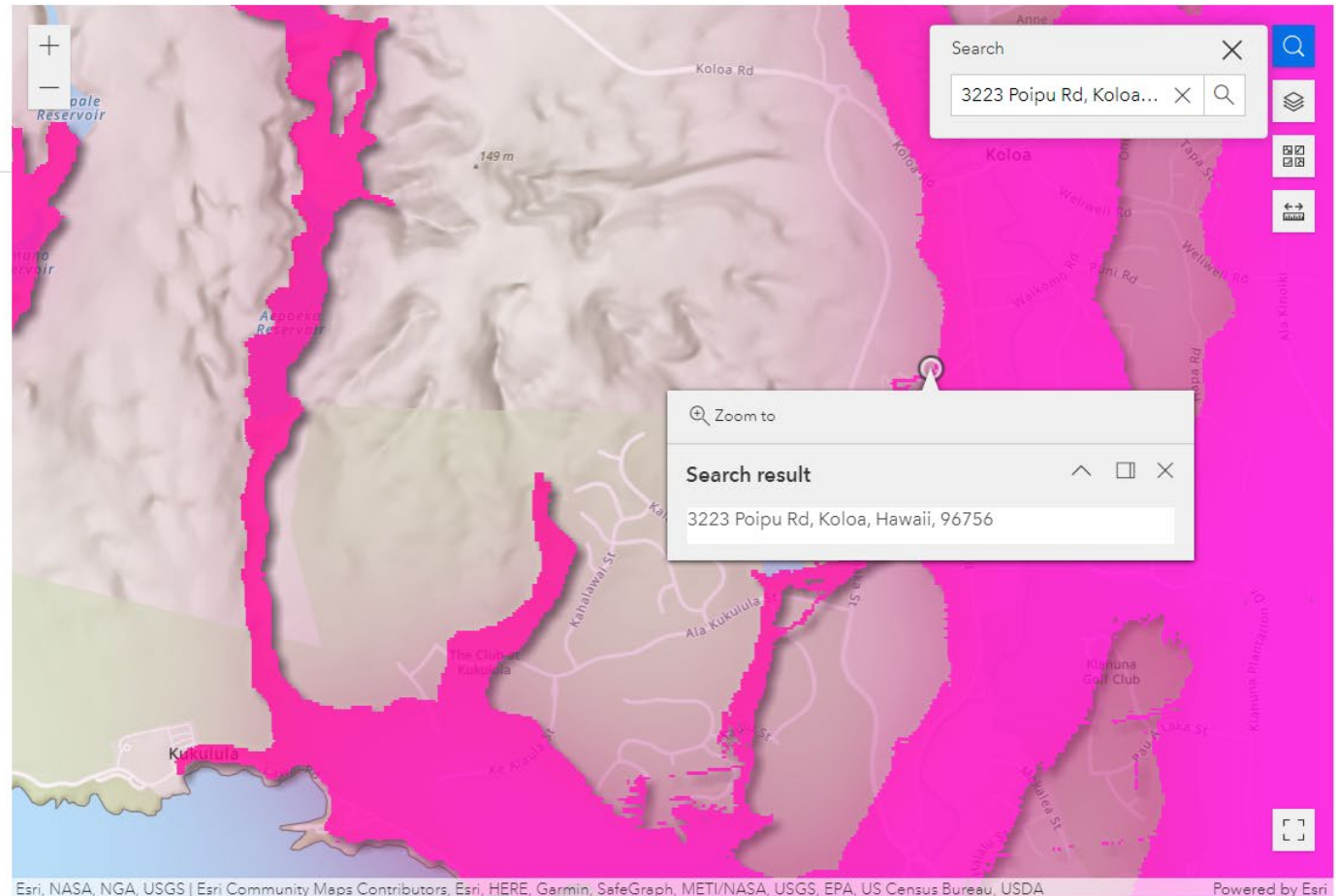
Dam failure is the mapped hazard for infrastructure failure. All high-hazard dam failure inundation areas in the state are shown on this map.

Access to additional dam information about dams in Hawai‘i can be found [here](#).

Dam Inundation Hazard Area



Hawaii Boundary



# Tsunami – Kīhei Elementary School, Maui



State of Hawai'i

Welcome

Draft Plan

Citizen Survey

Hazards ▾

## Tsunami

Tsunamis are a single wave or a series of waves caused by earthquakes, landslides, or other disturbances in or near large bodies of water like seas and oceans. Tsunami waves can travel at hundreds of miles per hour and create waves as tall as 100 feet when they reach the shore.

Hawai'i's location in the Pacific Ocean, surrounded by the Circum-Pacific Belt (or the "ring of fire" – an earthquake-active region that encompasses much of the edges of the Pacific Ocean), makes it a likely target for earthquake-generated tsunamis throughout the Pacific. In the last 100 years, eight destructive tsunamis have affected the State, the worst of which came in 1946 and 1960.

Three scenarios were used to develop inundation area data for the tsunami hazard map:

Great Aleutian Tsunami (GAT) (1,500-yr)

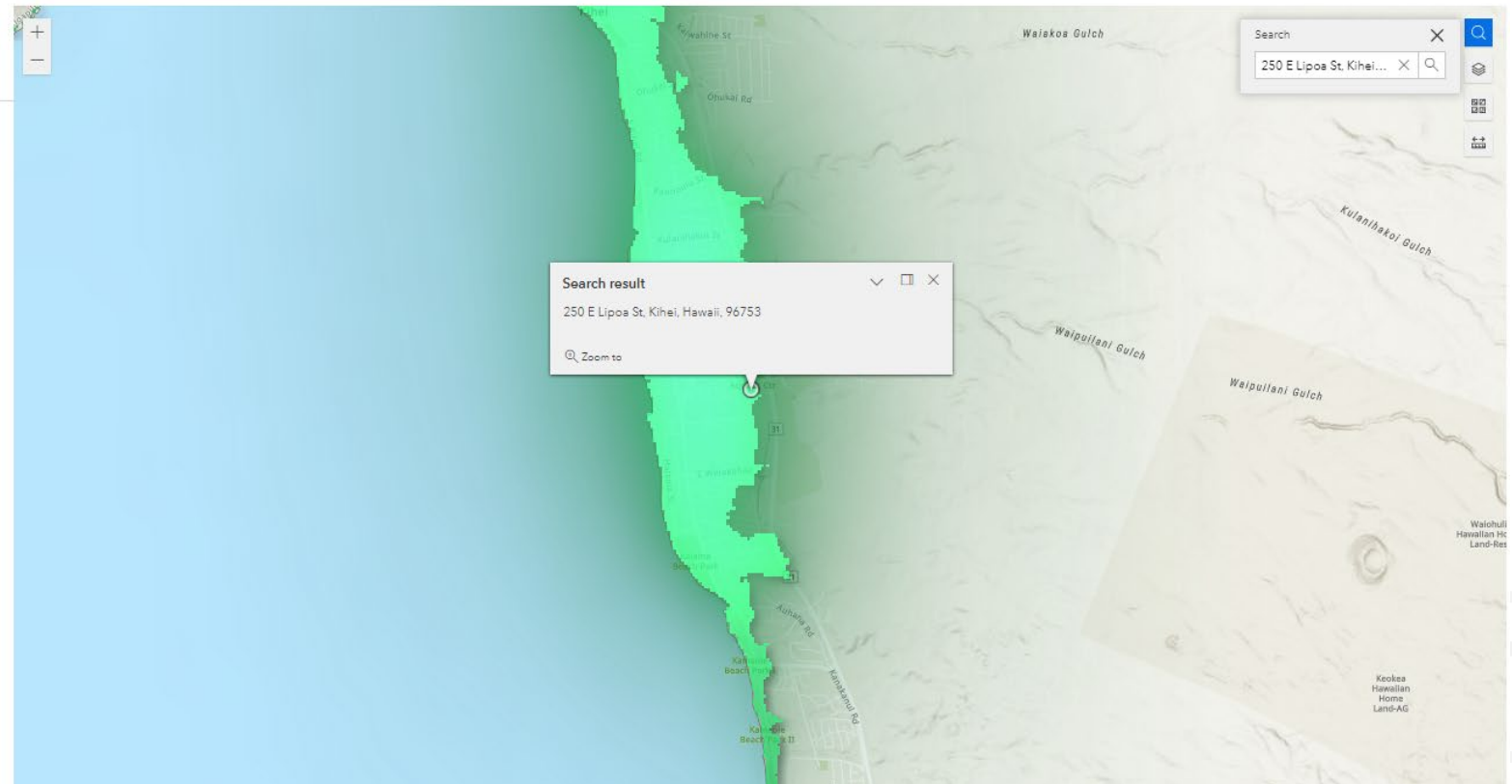
School of Ocean & Earth Science & Technology (SOEST) Historic (200-yr)

American Society of Civil Engineers (ASCE) Design Inundation Mapping (3,500-yr)

ASCE (3,500-yr)



Hawaii Boundary



# Volcanic Hazards – Hilo Union School, Hawai‘i



## Volcanic Hazards

Volcanic hazards include lava flow and vog hazards. Mapping is based on the lava flow zones for the counties of Maui and Hawai‘i. Flows typically erupt from a volcano’s summit or along rift zones on its flanks, as seen in the 2022 Mauna Loa eruption. The USGS provides lava flow zones on Maui. The Hawai‘i Statewide GIS program provides Hawai‘i County’s lava zones.

### Volcanic Zones - Hawai‘i County

#### Hazard Zone

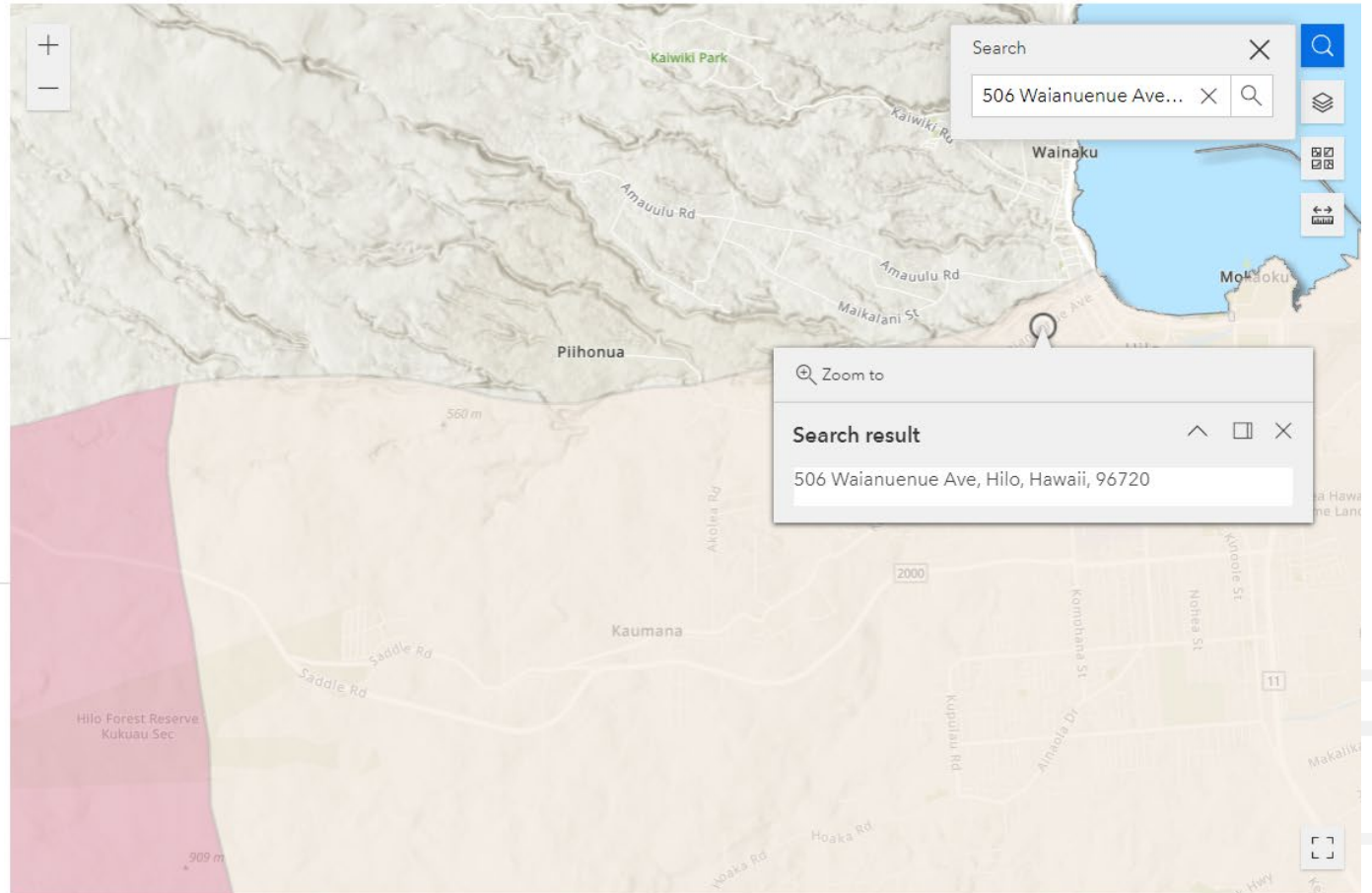
- Zone 1
- Zone 2
- Zone 3
- Zone 4

### Volcanic Zones - Maui County

#### Hazard Zone

- Zone 1
- Zone 2

### Hawaii Boundary





# Wildfire – Moloka‘i High School



## Wildfire

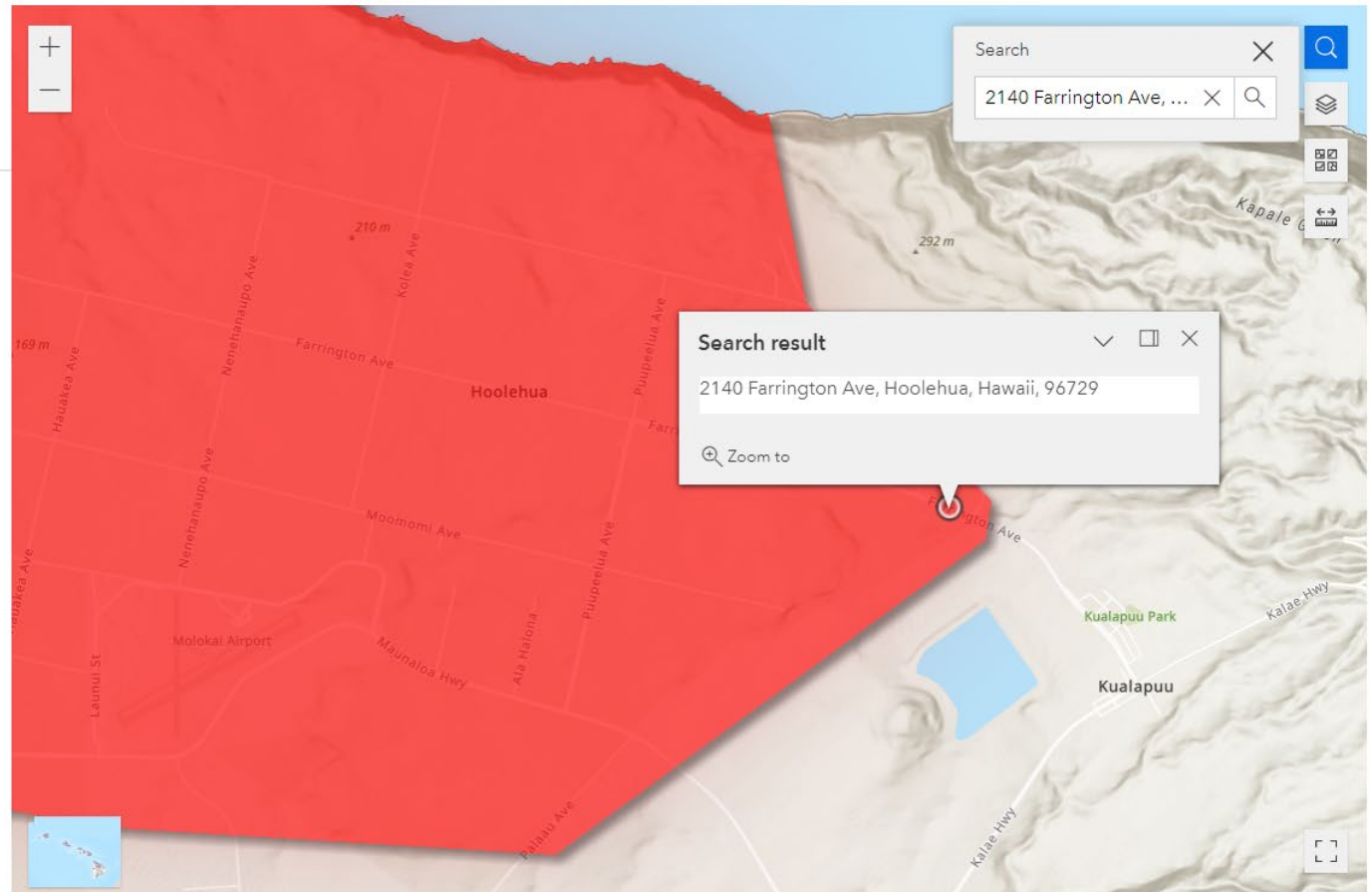
“Wildfire” describes any unwanted and unplanned fire burning in undeveloped land regardless of whether it is naturally or human-caused. Wildfires in Hawai‘i destroy native forests, alter soil composition, and threaten human safety and infrastructure. The Hawai‘i

Wildfire Management Organization has developed mapping of Communities at Risk from Wildfire (CAR), which was used for the wildfire qualitative risk assessment. The high-risk wildfire area is shown on this map. More information on the Hawai‘i Wildfire Management Organization can be found [here](#).

High Risk Wildfire Hazard Area



Hawaii Boundary



Esri, NASA, NGA, USGS, FEMA | Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, US Census Bureau, USDA | These 2013 Hawaii CAR... Powered by Esri



**Questions?**

**Comments?**

Please “Raise Hand” in “Reactions” or type your question in “Chat”



# Mahalo for participating to help build a safer Hawai'i

Good Mitigation  
Does not improve the Response  
It lessens the Need  
*-D. Kennard*



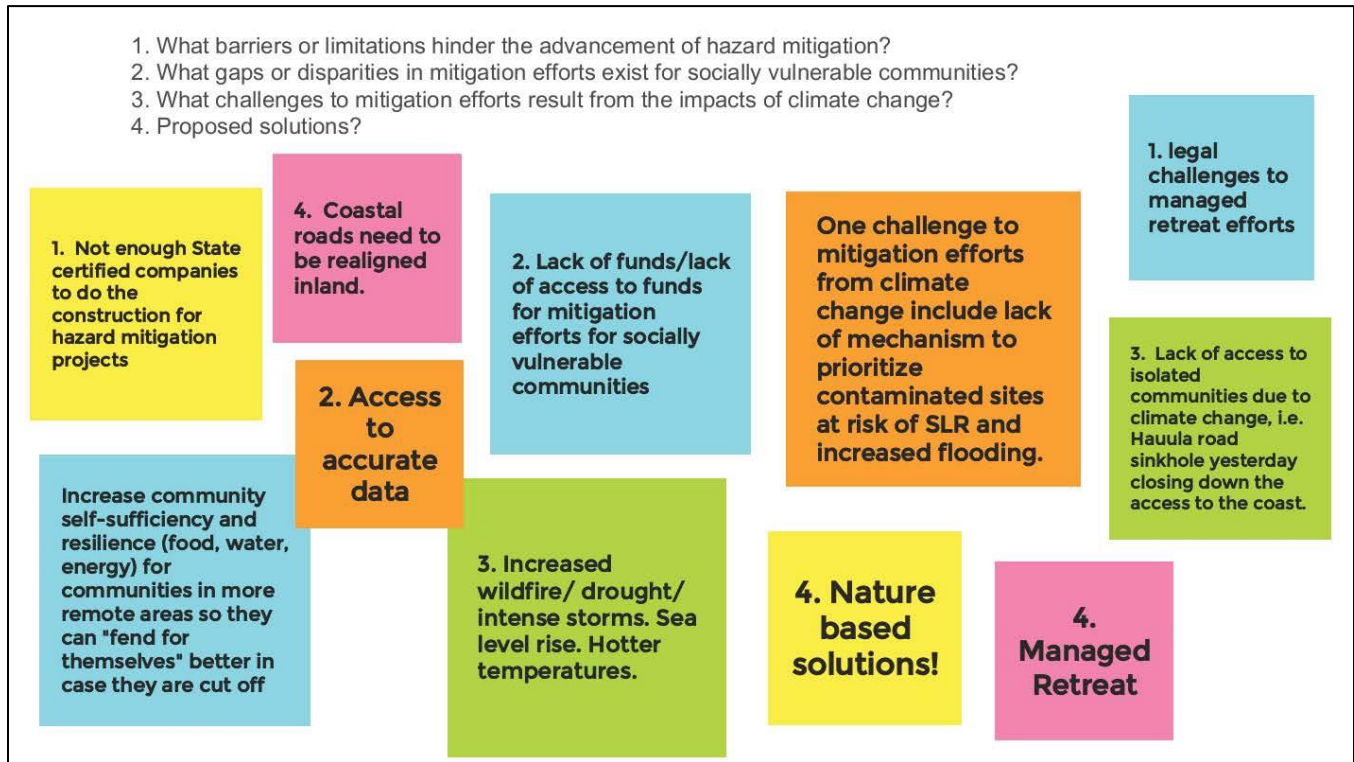
## A.3.4 FEBRUARY 2023 MITIGATION ACTION ITEM DEVELOPMENT WORKSHOPS WITH INDIVIDUAL SECTORS

Figure A-5. Jamboard Input from the Capabilities and Mitigation Strategy Working Session on February 7, 2023





Figure A-6. Jamboard Input from the Housing & Health and Social Services Sector Meeting on February 8, 2023



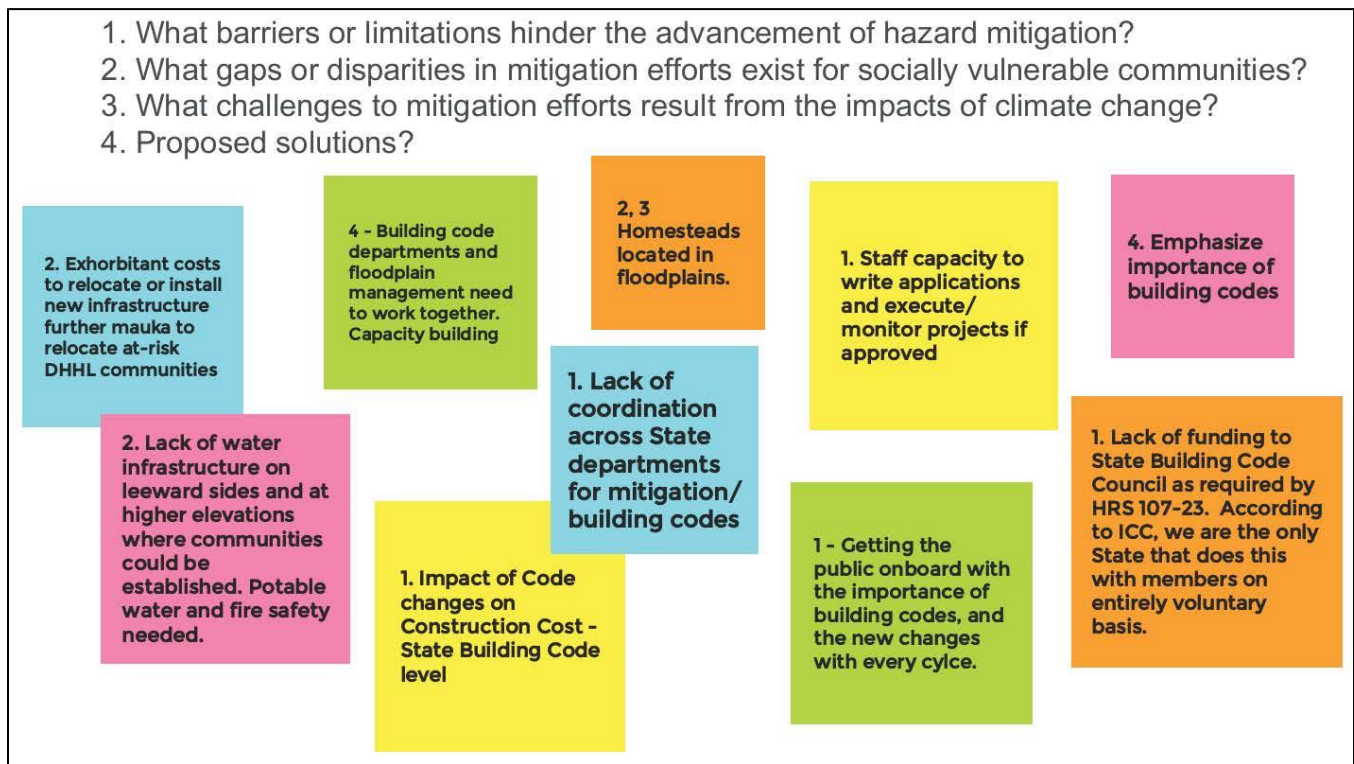


*Figure A-7. Jamboard Input from the Emergency Management Sector Meeting on February 8, 2023*





Figure A-8. Jamboard Input from the Infrastructure & Land Use and Development Sector Meeting on February 8, 2023





**Figure A-9. Jamboard Input from the Economic Development Sector Meeting on February 8, 2023**

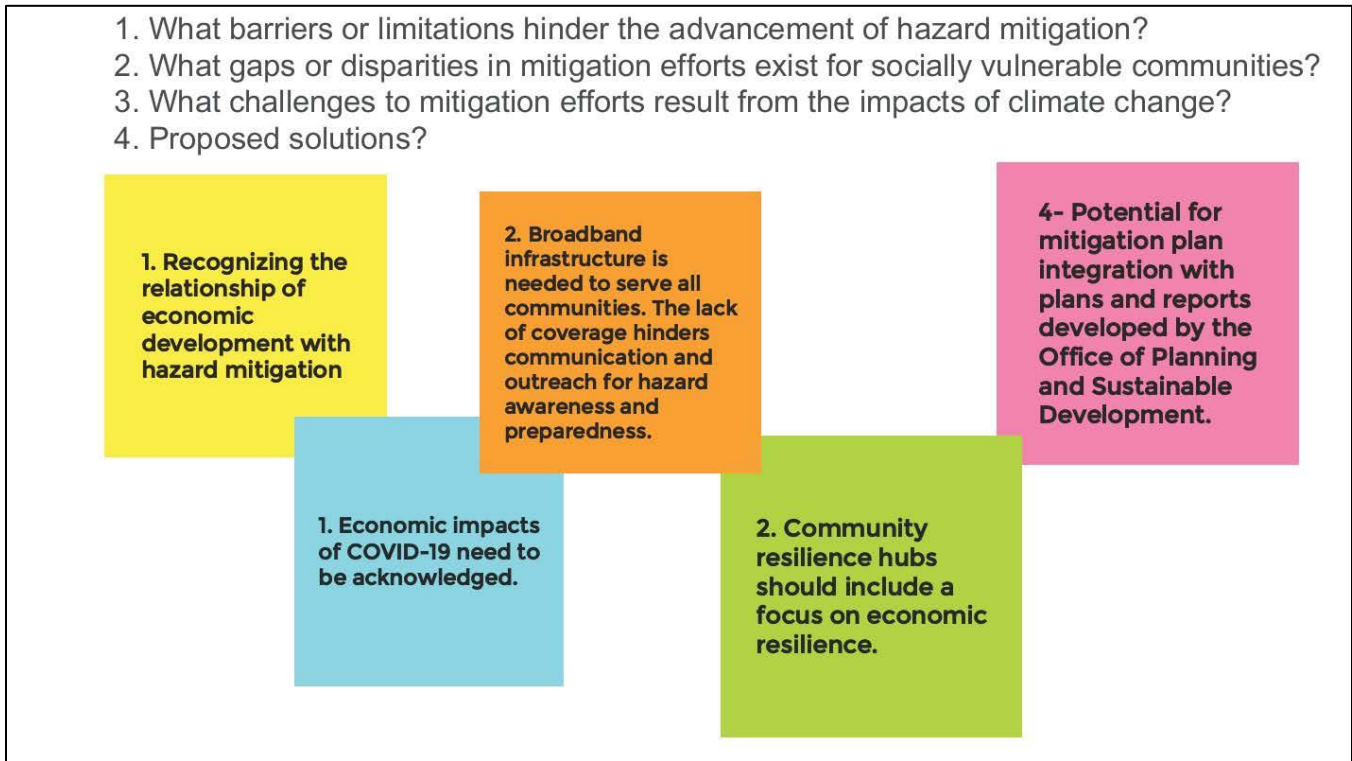
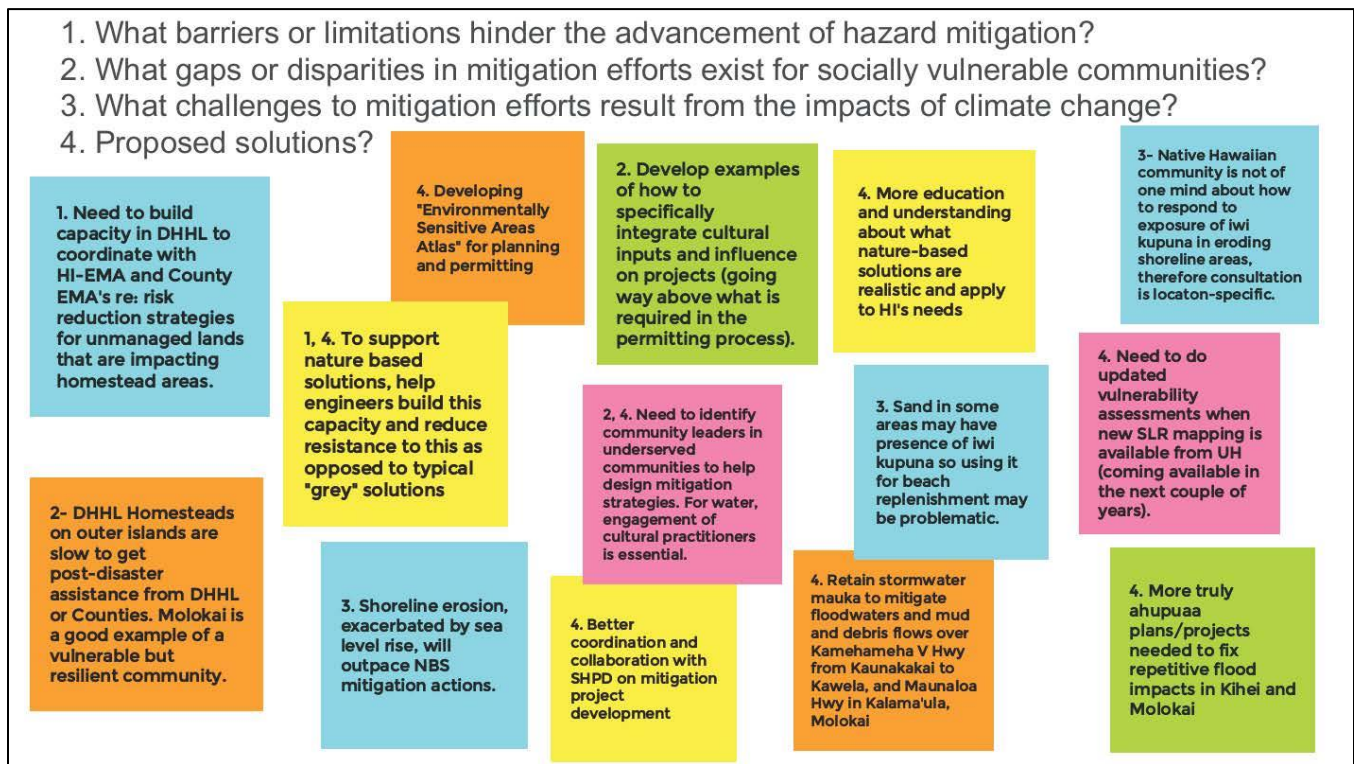






Figure A-10. Jamboard Input from the Natural and Cultural Resources Sector Meeting on February 9, 2023





# State of Hawai'i 2023 Hazard Mitigation Plan

Hawai'i State Hazard  
Mitigation Forum Meeting  
March 23, 2023

Megan Brotherton  
Tetra Tech, Inc.



# Final Risk Assessment – Hazard Ranking Results



Hazard Rank	Hazard	Probability	Category								Relative Risk Factor
			Impact			Spatial Extent	Warning Time	Duration	Adaptive Capacity	Changing Future Conditions	
			Population	Assets/Economy	Environmental Resources/Cultural Assets						
High	Health Risks	3	3	3	0	3	3	3	2	0	5.6
High	Climate Change and Sea Level Rise	3	1	3	2	2	0	3	2	3	4.6
High	Hurricane	2	2	2	1	3	0	3	2	3	4.5
High	Tsunami	1	2	2	1	2	3	3	2	3	4.3
High	Earthquake	1	2	2	1	3	3	3	2	1	4.2
High	Volcanic Hazards	3	1	2	3	2	1	3	2	1	4.2
Medium	Flood	3	1	2	1	2	1	3	2	3	3.9
Medium	Wildfire	2	2	1	1	2	1	2	2	3	3.8
Medium	Landslide and Rockfall	2	1	1	3	2	3	3	2	3	3.8
Medium	Drought	3	1	1	1	3	0	3	2	3	3.5
Medium	Windstorm	2	1	1	1	3	0	3	2	2	3.2
Medium	Cyber Threat	2	1	1	1	3	3	1	3	0	3.0
Low	Infrastructure Failure	1	1	1	1	2	2	3	1	2	2.8
Low	Terrorism	1	1	1	1	3	3	1	2	0	2.7
Low	Hazardous Materials	2	1	1	1	1	3	1	2	0	2.6

# Hazard Ranking Methodology



A Hazard Ranking is used to understand your vulnerabilities to hazards and to prioritize projects and activities for mitigation. It considers the following elements:

- 1. Probability** of the hazard occurring
- 2. Estimated impact** as a result of an event (population, assets/economy, environmental and cultural resources)
- 3. Spatial extent** of the hazard (i.e., local, island-wide, statewide)
- 4. Warning time** of the hazard in advance of an event occurring
- 5. Duration of hazard event** from impact to time of full recovery
- 6. Adaptive Capacity** is the State's ability to protect from or withstand a hazard event
- 7. Changing future conditions** consider climate change projections and their associated confidence level regarding increase in severity/frequency

**2023 Formula for Relative Risk = [(Probability × 0.25) + (Impact × 0.25) + (Spatial Extent × 0.15) + (Warning Time × 0.05) + (Duration × 0.1) + (Adaptive Capacity × 0.1) + (Changing Future Conditions × 0.1)]**

# Mitigation Strategy Additions



27 new mitigation actions have been proposed by state agencies and sector groups including:

- Coral reef restoration for flood risk reduction, with sites first prioritized by type of infrastructure protected and reef health conditions
- Actions to integrate economic mitigation planning across state agencies, led by DBEDT
- Residential hurricane retrofit program led by HI-EMA in cooperation with state agencies, county governments, and non-government organizations
- Strategy to establish and fund programs to implement managed retreat, led by the State Climate Commission
- Infrastructure project to mitigate storm damage to water transmission lines on Maui





# Mitigation Strategy Additions

Additional mitigation actions can still be added to the SHMP.

Email new actions to:

[Megan.Brotherton@TetraTech.com](mailto:Megan.Brotherton@TetraTech.com)

Or add them to the BATool, if you already have a login.

Include:

- Project name and a brief description
- Lead agency
- Problem mitigated
- Hazards addressed
- Estimated costs
- Potential funding sources
- Estimated timeframe for completion

# Draft Plan Overview – Section 1. Introduction



- Defines mitigation and the planning requirements for the Hawai‘i State Hazard Mitigation Plan
- Discussed the 2023 SHMP Update organization and a summary of changes made during the planning process:
  - Aligns with 44 CFR 201.4 and the 2023 FEMA State Mitigation Planning Policy Guide
  - Provides an overview of the Emergency Management Accreditation Program (EMAP)



## Draft Plan Overview – Section 2. Planning Process



- Documents the planning process, the agencies, stakeholders and subject-matter experts (SMEs) involved, and the manner of their involvement.
- Highlights the extended outreach efforts conducted to encourage participation and increased involvement during this 2023 SHMP update.
- Describes how the planning process has been integrated into ongoing federal and state programs and initiatives.



# Draft Plan Overview – Section 3. State Profile



## Description of the State of Hawai‘i:

- Physical setting
- Demographics
- Economy
- State assets
- Community lifelines and critical facilities
- Cultural assets
- Natural resources
- Land use and development



## Draft Plan Overview – Section 4. Risk Assessment Enhancements

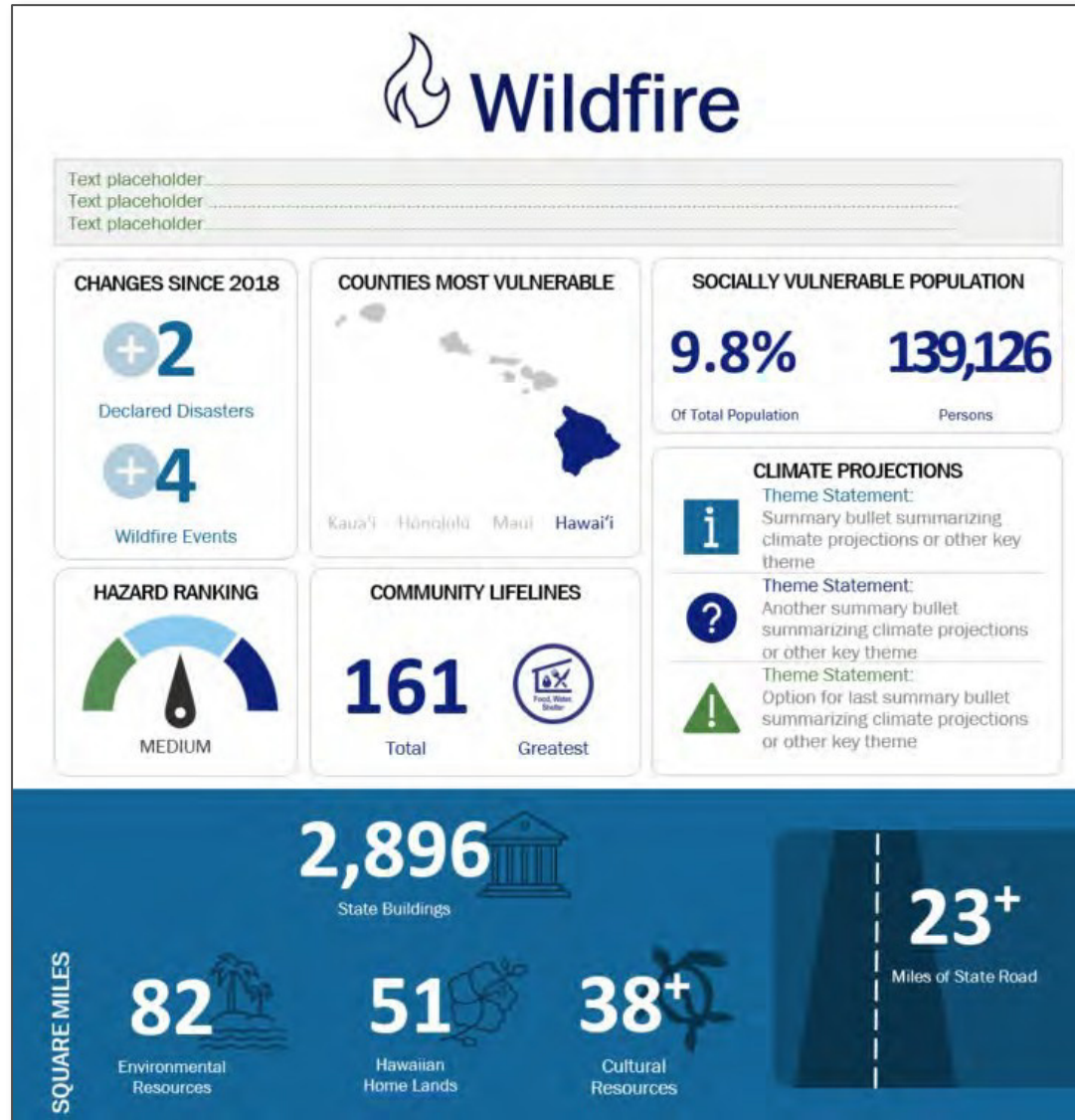


- Hazard categories align with HI-EMA's *Hazards and Vulnerabilities Overview* and *THIRA* documents
- Two additional tsunami hazard scenarios were modeled
- Community Lifelines and Critical Facilities were analyzed
- Socially Vulnerable Communities were analyzed for each mapped hazard
- Dashboard summary for each hazard

# Draft Plan Overview – Section 4. Risk Assessment Enhancements



Example Hazard Dashboard



# Draft Plan Overview – Section 4. Risk Assessment Enhancements



Last opportunity to send local photos of hazard events to include in the SHMP. Submit by Friday afternoon (March 24) to: [Megan.Brotherton@TetraTech.com](mailto:Megan.Brotherton@TetraTech.com)

Include a brief description and photo credits.

Example:

O'ahu North Shore Coastal Erosion  
DLNR



# Draft Plan Overview – Section 5. Capability Assessment



State and local capabilities have been reviewed and updated:

- Legal
- Regulatory
- Policies
- Programs
- Administrative and Technical Staffing
- Funding
- People-powered (Volunteer Groups)

Capabilities were revised to meet FEMA guidance for alignment with:

- Social Vulnerability
- Climate Change
- Community Lifelines
- SHMP Goals

# Draft Plan Overview – Section 6. Mitigation Strategy



The 2018 SHMP mitigation actions, updated risk assessment, updated capability assessment, and local HMP actions were used to identify mitigation actions for the 2023 SHMP Update.

Types of actions included:

- Planning and Regulations
- Structure and Infrastructure Projects
- Natural Systems Protection
- Education and Awareness

Actions are included to align with the new FEMA requirements to address socially vulnerable communities and climate change considerations.




## Draft Plan Overview – Section 7. Plan Maintenance

- Updated maintenance strategy based on the effectiveness of the plan maintenance procedures outlined in the 2018 SHMP.
- Standardized grant funding prioritization framework.
- Each State mitigation action is now tracked in the Baseline Assessment Tool (BATool<sup>SM</sup>) for streamlined monitoring, updating, and reporting.
  - On-line plan review service that will allow Forum members and other state agencies and stakeholders to login to a secure site and provide a status update to their mitigation actions.

# Upcoming Opportunity for Forum Review and Comment on the Draft Plan



- The draft is nearly complete and is undergoing editorial review. It will be available for concurrent Forum and public review soon.
- Comments will be accepted via an online Survey Monkey electronic form. The link to comment will be shared by HI-EMA when the draft is available.

### Hawai'i State Hazard Mitigation Plan (SHMP) Update 2023

#### Public Comment Survey

The State Hazard Mitigation Plan (SHMP) is Hawai'i's primary hazard mitigation document outlining our historical and current hazards, mitigation strategies, goals, and objectives. Most importantly, the SHMP reflects the State's commitment to reduce or eliminate potential risks and impacts of natural and human-caused disasters by making our 'Ohana, homes, and communities better prepared and more disaster-resilient. The SHMP is updated on a five-year cycle as required by the Robert T. Stafford Disaster Relief and Emergency Assistance Act.

Please use this form to submit your comments, feedback, and text edits on the draft 2023 SHMP.


This form does not require an answer to every question.

The questions are organized as follows:


- Volume 1, which contains the core plan, is organized by chapter. Put your comments in the section for the chapter you are commenting on.
- Volume 2 contains the appendices to the core plan. Put your comments in the section for the appendix you are commenting on.


For assistance accessing this survey or the SHMP document, please contact HI-EMA at [ema@hawaii.gov](mailto:ema@hawaii.gov).


Thank you for your participation and input in this planning process. Your comments will be reviewed and incorporated into the final plan on (Date).

1. Enter your first and last name. (Optional)  0

2. What is your email address? (Optional)  0

10. If you wish to comment on Volume 1, Section 1. Introduction, note here  0

11. If you wish to comment on Volume 1, Section 2. Planning Process, note here  0

12. If you wish to comment on Volume 1, Section 3. Hawai'i State Profile, note here  0



# April Public Open House Schedule



## Honolulu County

Wednesday, April 5 from 4 – 5 p.m. at the HI-EMA Building 300 Gym

## Hawai'i County

**Hilo** – Monday, April 17 from 5 – 6 p.m. at the Aupuni Center

**Kona** – Tuesday, April 18 from 5 – 6 p.m. at the West Hawai'i Civic Center

## Maui County

**Moloka'i** – Wednesday, April 19 from 5 – 6 p.m. at the Mitchell Pauole Community Center

**Maui** – Thursday, April 20 from 5 – 6 p.m. at the Kahului Community Center

**Lāna'i** – Tuesday, April 25 TBD

## Kaua'i County

Monday, April 24 from 4 – 5 p.m. at the Moikeha Conference Room

# Next Steps

## Support and promote an open house in your county in April.

The open house will present:

- Purpose of the Hawai'i State Hazard Mitigation Plan
- Draft Plan Overview
- Mitigation Strategies Input
- Coordination with Other Planning Efforts

Share with HI-EMA how the meetings are promoted locally. Outreach will be summarized in the SHMP.



### Help Build a Safer Hawai'i – On All Islands

Have you experienced impacts to your 'Ohana, your home, or your community from a:



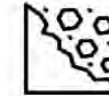
**Flood**



**Wildfire**



**Volcano**



**Landslide**



**Hurricane**



**Other Hazard**

Hazard Mitigation planning develops strategies to minimize the impacts from hazards on the people and places we love.

The Hawai'i Emergency Management Agency (HI-EMA) is updating the State's Hazard Mitigation Plan and wants to hear from YOU!

Scan the QR code or click [HERE](#) for complete details about the in-person meetings hosted by HI-EMA in April on all the main islands.



Our team will share highlights from the draft plan, allow input from community members on the mitigation strategy, and share how the State Hazard Mitigation Plan can coordinate with local planning efforts.

Get involved today to make our communities more disaster resilient tomorrow!



Mahalo for your time and commitment  
to help develop the  
2023 Hawai'i State Hazard Mitigation Plan Update!

Good Mitigation  
Does not improve the Response  
It lessens the Need  
*-D. K.*



# **State of Hawai‘i 2023 Hazard Mitigation Plan**

## ***Public Meeting For the City and County of Honolulu***

**April 5, 2023**

# Public Meeting Participants



- **James Barros**, Administrator, HI-EMA
- **Kelsey Yamanaka**, Acting State Hazard Mitigation Officer, HI-EMA
- **David Kennard**, Kaua‘i Emergency Management Agency (KEMA)  
Disaster Assistance Project Manager, State Hazard Mitigation Forum  
Chair
- **Megan Brotherton**, Lead Project Planner, Tetra Tech, Inc.
- and **YOU!**





# Agenda and Participation Guidelines

- Purpose of the Hawai‘i State Hazard Mitigation Plan
- Draft Plan Overview
- Mitigation Strategies Input
- Coordination with Other Planning Efforts
- Public Questions and Comments

The second half of the meeting will allow for public participation. Please limit questions and comments to topics applicable to state or local hazard mitigation planning. Comments should be kept to 3 minutes, if additional input is needed, please submit your comment or question in writing. HI-EMA and/or County agencies will follow up on all written comments!

# Public Survey and Comment Form



Please use the link or scan the QR code to take a brief survey and share comments about the plan update.

<https://www.surveymonkey.com/r/SaferHI>



# Contacts for Emergency Management Agencies



Hawai'i Emergency Management Agency

[HawaiiEMA@hawaii.gov](mailto:HawaiiEMA@hawaii.gov)

Honolulu Department of Emergency Management

[dem@honolulu.gov](mailto:dem@honolulu.gov)



# Purpose of the State Hazard Mitigation Plan (SHMP)



FEMA and the Emergency Management Community acknowledge that our communities are subject to natural hazards and recognize that Hazard Mitigation Planning provides a framework to:

- Identify the natural hazards and assess their impacts on the State and our communities,
- Assess State's capacity to respond to and recover from the impacts of the natural disasters,
- Develop strategies to reduce or eliminate these impacts on lives and property and to ensure the continued functionality of critical services, and
- Reduce the disaster assistance costs resulting from natural disasters

# Purpose of the State Hazard Mitigation Plan (SHMP), cont.



FEMA emphasizes the importance of the SHMP by tying grant funding to an approved and adopted Plan

- Certain categories of Public Assistance (PA Categories C-G)
- Hazard Mitigation Grant Program (HMGP)
- Building Resilient Infrastructure and Communities (BRIC)
- Fire Management Assistance Grants (FMAG)
- Rehabilitation of High Hazard Potential Dam (HHPD)



# SHMP Update Process and Timeline

FEMA and the  
Emergency  
Management  
Community  
recognize that  
Hazards,  
Capabilities and  
Strategies can  
change

- FEMA requires States to update the SHMP at least every 5 years
- HI-EMA and its Consultant (Tetra Tech) are finalizing the plan, which will soon be available for public comment
- Final draft SHMP Update ready for FEMA review and approval by October

# SHMP Format



## Volume 1

- **Introduction**
- **Planning Process**
- **Hawai'i State Profile**
- **Risk Assessment** (includes hazard profiles and vulnerability assessments for 15 hazards)
- **Capability Assessment**
- **Mitigation Strategy**
- **Plan Maintenance**

## Volume 2

- **Appendices**

# Hazard Dashboard



## Flood

Floods caused by heavy or sustained rainfall and coastal high tides and surges cause more water to accumulate in an area than its natural or human-made drainage systems can support, which results in flood flow velocities that contain water filled debris and surge mudflow. Statistics below reflect event-based 1% annual chance flooding.

### CHANGES SINCE 2018

**+2**  
Declared Disasters

**+19**  
Significant Events

### COUNTIES MOST VULNERABLE



### SOCIALLY VULNERABLE POPULATION

**1.11%** **15,800**  
Of Total Population      Persons

### HAZARD RANKING



### COMMUNITY LIFELINES

**153**  
Total      Greatest

### CLIMATE PROJECTIONS

- Coastal flooding from hurricanes and tropical storms will increase as sea levels rise
- Heavy or extreme rain events will increase, causing more frequent or intense flooding
- Event-based coastal flooding with sea level rise would alter the extent of the area impacted by flooding from storm events, increasing beach erosion

SQUARE MILES

**489**  
State Buildings

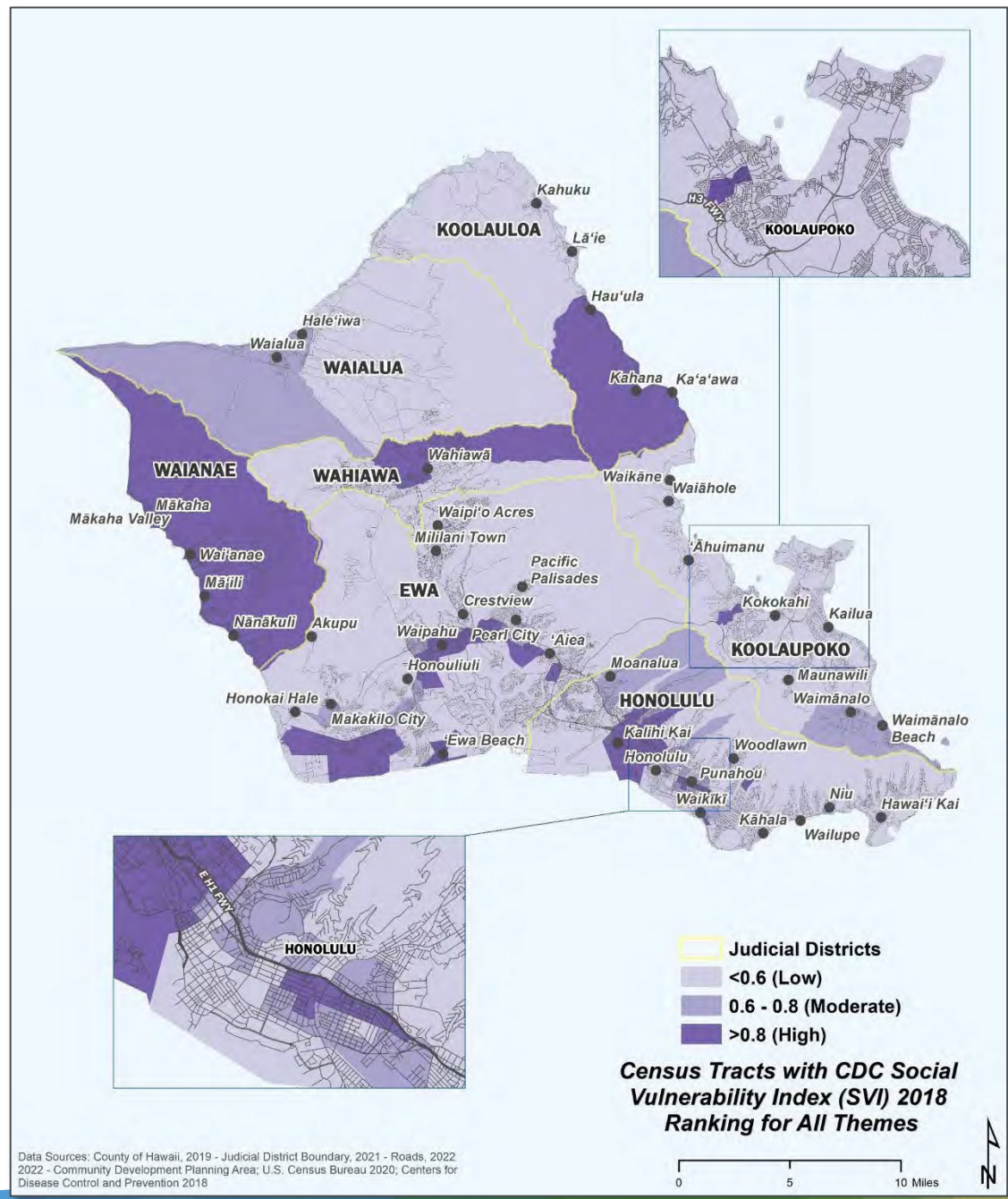
**147**  
Environmental Resources

**4**  
Hawaiian Home Lands

**48**  
Cultural Resources

**85.5**  
Miles of State Road

# Social Vulnerability Honolulu County



Data Sources: County of Hawaii, 2019 - Judicial District Boundary, 2021 - Roads, 2022 - Community Development Planning Area; U.S. Census Bureau 2020; Centers for Disease Control and Prevention 2018

# Mitigation Strategy Success Story – CRS Program



The **City and County of Honolulu** included a mitigation strategy in its Local Hazard Mitigation Plan to work to qualify for participation in the CRS program. In April 2022, the City and County qualified at a Class 7 level, resulting in automatic flood insurance premium discounts of 10% for properties in the mapped floodplain area.



This resulted in a **savings of more than \$2.3 Million each year** for City and County residents!

# Mitigation Strategies Input



Submit your ideas for mitigation strategies. You may use the Survey Monkey tool, or email HI-EMA or the City and County DEM.

## Categories for Mitigation:

- Local Planning and Regulations
- Structure and Infrastructure Projects
- Natural Systems Protection
- Education and Awareness Programs



# Coordination with Other Planning Efforts



## The Hawai'i State Hazard Mitigation Plan:

- Is the guiding document for Local Hazard Mitigation Plans (HMPs)
- Is integrated in the THIRA (Threat and Hazard Identification and Risk Assessment) and the SRP (Stakeholder Preparedness Review)

## Local HMPs are used when developing or updating:

- Climate Adaptation Plans
- Community Wildfire Protection Plans
- Economic Recovery Plans
- General Plans
- And many more!



**Questions?**

**Comments?**

Limited to 3 minutes about hazard mitigation planning



# Mahalo for participating to help build a safer Hawai'i

Good Mitigation  
Does not improve the Response  
It lessens the Need  
*-D. Kennard*



# State of Hawai'i 2023 Hazard Mitigation Plan

## *Public Meeting For Hawai'i County*

April 17, 2023 (Hilo)

April 18, 2023 (Kona)

# Public Meeting Participants



- **James Barros**, Administrator, HI-EMA
- **Kelsey Yamanaka**, Acting State Hazard Mitigation Officer, HI-EMA
- **David Kennard**, Kaua‘i Emergency Management Agency (KEMA)  
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County of Hawai'i Civil Defense

[hccda@hawaiicounty.gov](mailto:hccda@hawaiicounty.gov)



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# SHMP Update Process and Timeline

FEMA and the  
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## Volume 2

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# Hazard Dashboard



## Volcanic Hazards

Volcanic eruptions create local and regional hazards. Lava flows can destroy anything in their paths, and the gasses and ash expelled into the atmosphere can endanger plant, animal, and human life as far as the wind carries them. The statistics below represent lava flow hazard areas in Hawai'i and Maui Counties.

### CHANGES SINCE 2018

+1

Declared Disaster

+4

Volcanic Events

### COUNTIES MOST VULNERABLE



Kaūa'i Honolulu Maui Hawai'i

### SOCIALLY VULNERABLE POPULATION

10%

Of Total Population

36,475

Persons

### CLIMATE PROJECTIONS



Projected changes in wind and rainfall frequency and intensity may alter the dispersion of volcanic gas emissions, adversely impacting human, animal, and plant health



Carbon Dioxide release from recent eruptions has not been shown to lead to a detectable increase in global warming

### HAZARD RANKING



Low Medium High

### COMMUNITY LIFELINES

239

Total



Greatest

1,115

State Buildings



SQUARE MILES

1,938

Environmental Resources



71

Hawaiian Home Lands



404

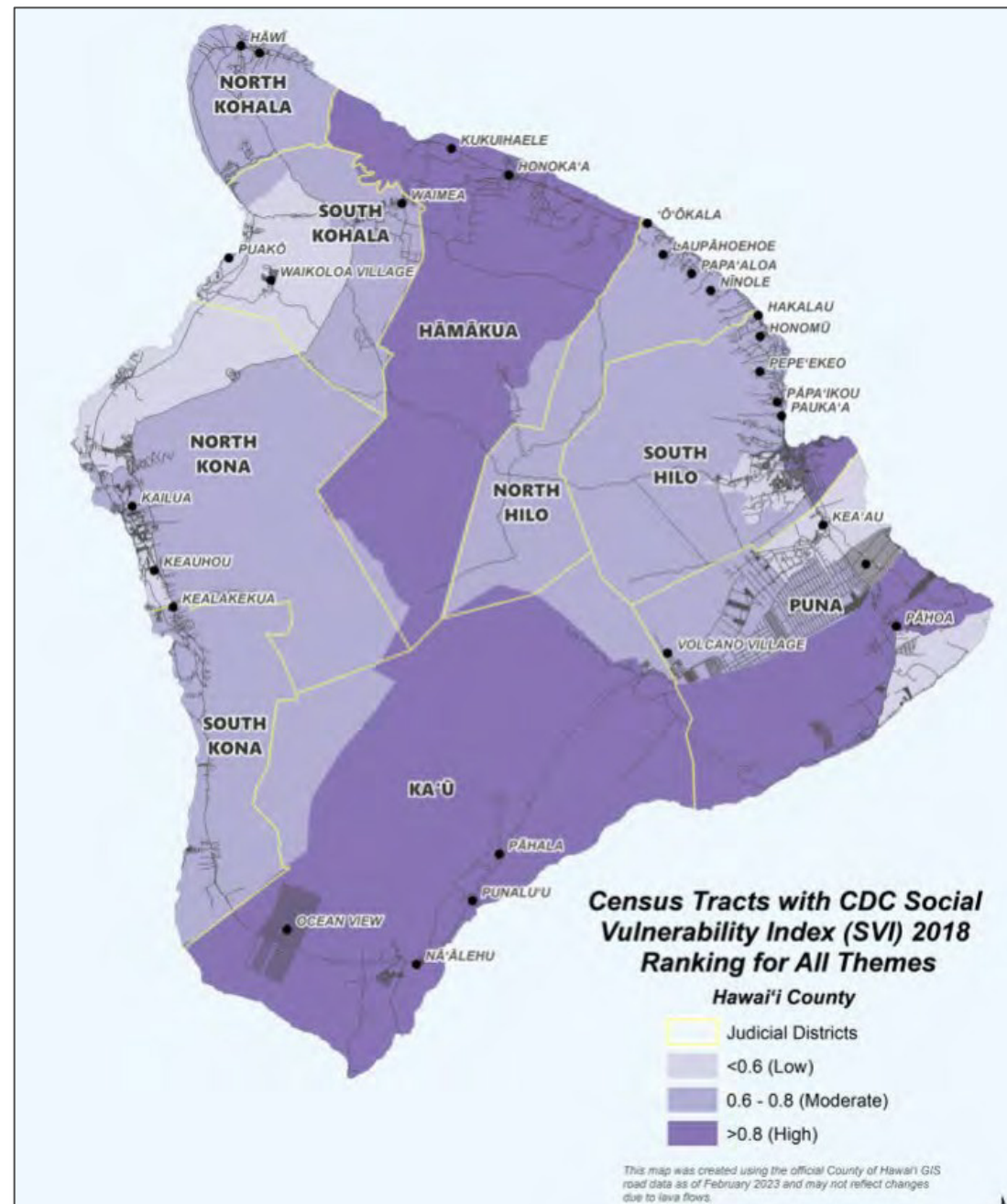
Cultural Resources



241

Miles of State Road

# Social Vulnerability Hawai'i County

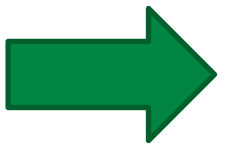


# Mitigation Strategy Success Story

## *Community Rating System*



The **County of Hawai‘i** has participated in the CRS program since 2011. The County is currently at a Class 7 level, resulting in automatic flood insurance premium discounts of 15% for properties in the mapped floodplain area.



This results in a **savings of more than \$520,000 each year** for County residents!



# Mitigation Strategy Success Story

## Department of Water Supply Generator



The **2020 County of Hawai'i Multi-Hazard Mitigation Plan** included a mitigation action to harden DWS potable water producing facilities by installing needed emergency generating infrastructure.

The project received nearly \$174,000 of Federal grant funding to complete the mitigation action.



Honokōhau Transfer Switch

➔ This allows DWS to better **protect the health and welfare** of our island community by continuing to supply potable water despite power outages.

Pi'ihonua Transfer Switch and Terminal Box





# Mitigation Strategies Input



Submit your ideas for mitigation strategies. You may use the Survey Monkey tool, or email HI-EMA or the Hawai'i County Civil Defense.

## Categories for Mitigation:

- Local Planning and Regulations
- Structure and Infrastructure Projects
- Natural Systems Protection
- Education and Awareness Programs

# Coordination with Other Planning Efforts



## The Hawai'i State Hazard Mitigation Plan:

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**Comments?**

Limited to 3 minutes about hazard mitigation planning



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*-D. Kennard*



Figure A-11. Hilo Public Meeting in Hawai'i County, April 17, 2023





# State of Hawai‘i 2023 Hazard Mitigation Plan

## *Public Meetings For Maui County*

April 19, 2023 (Moloka‘i)  
April 20, 2023 (Maui Island)

# Public Meeting Participants



- **James Barros**, Administrator, HI-EMA
- **Kelsey Yamanaka**, Acting State Hazard Mitigation Officer, HI-EMA
- **David Kennard**, Kaua‘i Emergency Management Agency (KEMA)  
Disaster Assistance Project Manager, State Hazard Mitigation Forum  
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Maui Emergency Management Agency

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## Volume 2

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# Hazard Dashboard



## Wildfire

Wildfires are unplanned and uncontained fires that burn in undeveloped land. Many Hawai'i communities and elements of infrastructure are in wildfire risk areas. Each island has unique wildfire risk areas, firefighting access, and local planning and preparedness efforts. The statistics below represent the statewide high wildfire risk area.

### CHANGES SINCE 2018

**+2**  
Declared Disasters

**+27**  
Wildfire Events

### COUNTIES MOST VULNERABLE



### SOCIALLY VULNERABLE POPULATION

**9.8%** **139,126**  
Of Total Population Persons

### CLIMATE PROJECTIONS



**Dry vegetation** from increased temperatures may intensify wildfire danger



**Average temperatures in Hawai'i** could increase by as much as 5-7.5° F by the end of the century



**Rainfall Changes**  
An increase in consecutive dry days and decrease in total rainfall may increase wildfires.

### HAZARD RANKING



### COMMUNITY LIFELINES

**239**  
Total Greatest

**2,896**  
State Buildings

SQUARE MILES

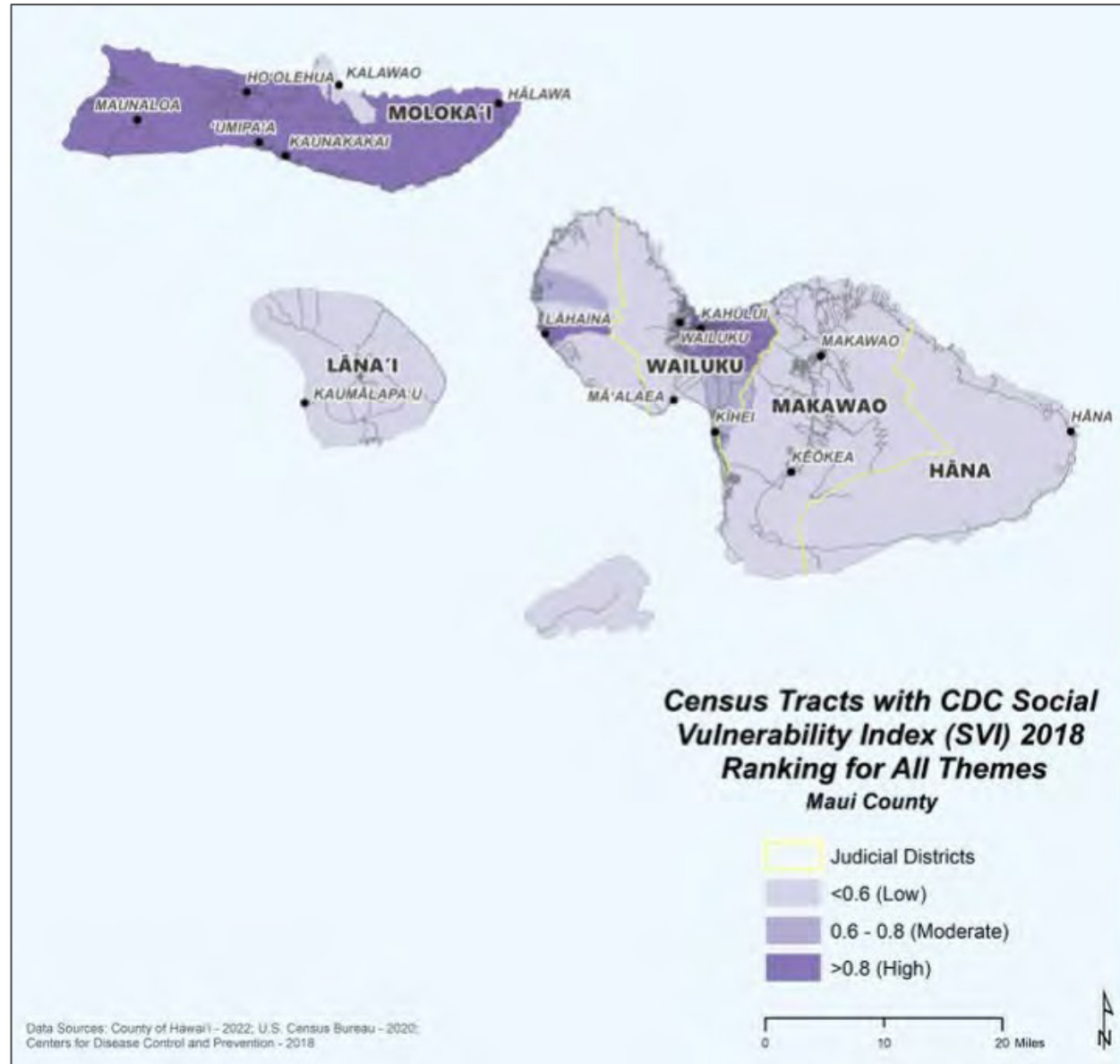
**82**  
Environmental Resources

**51**  
Hawaiian Home Lands

**39**  
Cultural Resources

**335**  
Miles of State Road

# Social Vulnerability Maui County



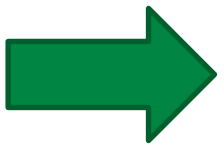


# Mitigation Strategy Success Story

## *Community Rating System*



The **County of Maui** has participated in the CRS program since 1995. The County is currently at a Class 7 level, resulting in automatic flood insurance premium discounts of 15% for properties in the mapped floodplain area.



This results in a **savings of more than \$1.1 million each year** for County residents!





# Mitigation Strategy Success Story

## *Maui Food Bank Generator*

The **2020 County of Maui Hazard Mitigation Plan** included a mitigation action to acquire generators for critical facilities including the Maui Food Bank.

The project received nearly \$94,000 of Federal grant funding to implement the mitigation action.

➔ This allows the Maui Food Bank to better **serve the needs** of vulnerable members the community community by continuing to supply fresh food despite power outages.



# Mitigation Strategies Input



Submit your ideas for mitigation strategies. You may use the Survey Monkey tool, or email HI-EMA or the Maui Emergency Management Agency.

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- Local Planning and Regulations
- Structure and Infrastructure Projects
- Natural Systems Protection
- Education and Awareness Programs

# Coordination with Other Planning Efforts



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- Is integrated in the THIRA (Threat and Hazard Identification and Risk Assessment) and the SRP (Stakeholder Preparedness Review)

## Local HMPs are used when developing or updating:

- Climate Adaptation Plans
- Community Wildfire Protection Plans
- Economic Recovery Plans
- General Plans
- And many more!



**Questions?**

**Comments?**

Limited to 3 minutes about hazard mitigation planning



# Mahalo for participating to help build a safer Hawai'i

Good Mitigation  
Does not improve the Response  
It lessens the Need  
*-D. Kennard*



Figure A-12. Kaunakakai Public Meeting on Moloka'i Island, April 19, 2023



Figure A-13. Kahului Public Meeting on Maui Island, April 20, 2023





# State of Hawai'i 2023 Hazard Mitigation Plan

## *Public Meeting For Kaua'i County*

April 24, 2023



# Public Meeting Participants



- **James Barros**, Administrator, HI-EMA
- **Kelsey Yamanaka**, Acting State Hazard Mitigation Officer, HI-EMA
- **David Kennard**, Kaua‘i Emergency Management Agency (KEMA)  
Disaster Assistance Project Manager, State Hazard Mitigation Forum  
Chair
- **Megan Brotherton**, Lead Project Planner, Tetra Tech, Inc.
- and **YOU!**





# Agenda and Participation Guidelines

- Purpose of the Hawai‘i State Hazard Mitigation Plan
- Draft Plan Overview
- Mitigation Strategies Input
- Coordination with Other Planning Efforts
- Public Questions and Comments

The second half of the meeting will allow for public participation. Please limit questions and comments to topics applicable to state or local hazard mitigation planning. Comments should be kept to 3 minutes, if additional input is needed, please submit your comment or question in writing. HI-EMA and/or County agencies will follow up on all written comments!

# Public Survey and Comment Form



Please use the link or scan the QR code to take a brief survey and share comments about the plan update.

<https://www.surveymonkey.com/r/SaferHI>



# Contacts for Emergency Management Agencies



Hawai'i Emergency Management Agency

[HawaiiEMA@hawaii.gov](mailto:HawaiiEMA@hawaii.gov)

Kaua'i Emergency Management Agency

[kema@kauai.gov](mailto:kema@kauai.gov)

# Purpose of the State Hazard Mitigation Plan (SHMP)



FEMA and the Emergency Management Community acknowledge that our communities are subject to natural hazards and recognize that Hazard Mitigation Planning provides a framework to:

- Identify the natural hazards and assess their impacts on the State and our communities,
- Assess State's capacity to respond to and recover from the impacts of the natural disasters,
- Develop strategies to reduce or eliminate these impacts on lives and property and to ensure the continued functionality of critical services, and
- Reduce the disaster assistance costs resulting from natural disasters

# Purpose of the State Hazard Mitigation Plan (SHMP), cont.



FEMA emphasizes the importance of the SHMP by tying grant funding to an approved and adopted Plan

- Certain categories of Public Assistance (PA Categories C-G)
- Hazard Mitigation Grant Program (HMGP)
- Building Resilient Infrastructure and Communities (BRIC)
- Fire Management Assistance Grants (FMAG)
- Rehabilitation of High Hazard Potential Dam (HHPD)



# SHMP Update Process and Timeline

FEMA and the  
Emergency  
Management  
Community  
recognize that  
Hazards,  
Capabilities and  
Strategies can  
change

- FEMA requires States to update the SHMP at least every 5 years
- HI-EMA and its Consultant (Tetra Tech) are finalizing the plan, which will soon be available for public comment
- Final draft SHMP Update ready for FEMA review and approval by October

# SHMP Format



## Volume 1

- **Introduction**
- **Planning Process**
- **Hawai'i State Profile**
- **Risk Assessment** (includes hazard profiles and vulnerability assessments for 15 hazards)
- **Capability Assessment**
- **Mitigation Strategy**
- **Plan Maintenance**

## Volume 2

- **Appendices**



# Hazard Dashboard



## Climate Change and Sea Level Rise

The Hawaiian Islands are highly exposed to the effects of climate change and sea level rise. The State has seen a decline in total rainfall, but increases in sea level rise, sea surface temperature, and acidification of ocean water over the last three decades. The statistics below represent the Sea Level Rise Exposure Area (SLR-XA) 3.2 feet.

### CHANGES SINCE 2018

+0

Declared Disasters

+0

Events

### COUNTIES MOST VULNERABLE



Kaua'i Honolulu Maui Hawai'i

### SOCIALLY VULNERABLE POPULATION

0.5%

Of Total Population

7,127

Persons

### HAZARD RANKING



Low Medium High

### COMMUNITY LIFELINES

33

Total



Greatest

### CLIMATE PROJECTIONS



Warmer, more acidic ocean will drive changes in circulation and biologic activity



Climate change can lead to a decrease in precipitation, streamflow, and groundwater levels and increase the number of and duration of droughts



Coastline erosion alters the habitats and conditions of endemic Hawaiian species

SQUARE MILES

54

State Buildings



32

Environmental Resources



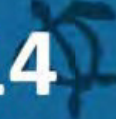
1

Hawaiian Home Lands



14

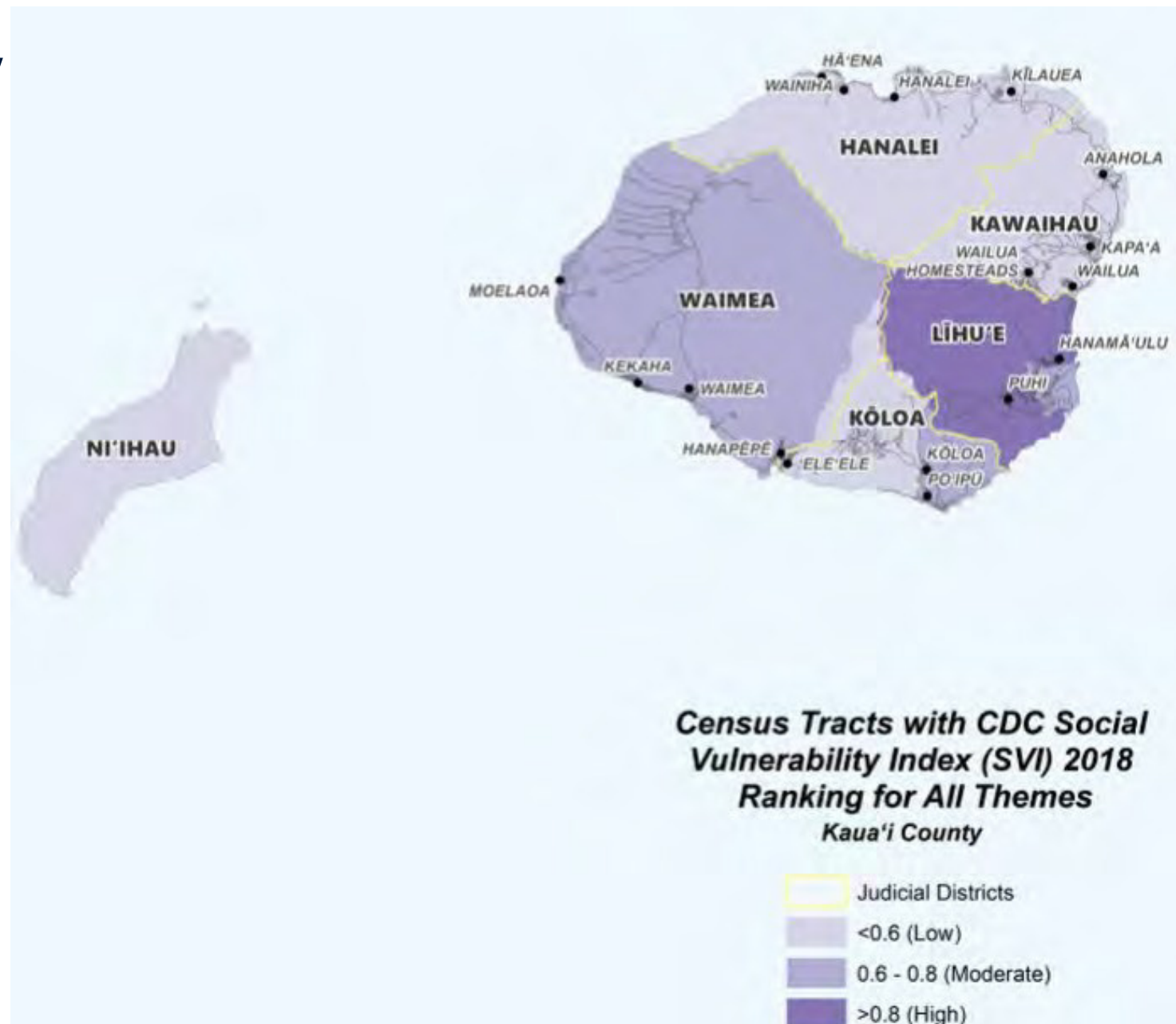
Cultural Resources



39

Miles of State Road

# Social Vulnerability Kaua'i County

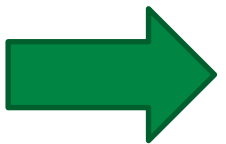


# Mitigation Strategy Success Story

## *Community Rating System*



The **County of Kaua‘i** joined the CRS program in 2023, making Hawai‘i the **first state** in the nation to have all communities participating in the program! The County is currently at a Class 8 level, resulting in automatic flood insurance premium discounts of 10% for properties in the mapped floodplain area.



This results in a **savings of more than \$370,000 each year** for County residents!





# Mitigation Strategy Success Story

## *Wilcox Medical Center Generators*

The **County of Kaua‘i** has included an ongoing mitigation action in each update of its plan to retrofit facilities to withstand hazard events, including installing emergency generation equipment.

The mitigation project to install emergency generators at Wilcox Medical Center received \$4 million of Federal funding to complete the project!



This allows the hospital to better **care for the health and welfare** of our island community by continuing to supply critical medical services despite power outages.



Photo Credit: Dennis Fujimoto, The Garden Island

# Mitigation Strategy Success Story

## *Weke Road Reconstruction*



Weke Road was washed out by 2018 floodwaters in the Hanalei basin. The recovery and mitigation project to reconstruct the road to standards that will better withstand future storm events received DR-4365 Federal funding to complete the project.



Photo credit: County of Kaua'i

# Mitigation Strategies Input



Submit your ideas for mitigation strategies. You may use the Survey Monkey tool, or email HI-EMA or the Kaua‘i Emergency Management Agency.

## Categories for Mitigation:

- Local Planning and Regulations
- Structure and Infrastructure Projects
- Natural Systems Protection
- Education and Awareness Programs

# Coordination with Other Planning Efforts



## The Hawai'i State Hazard Mitigation Plan:

- Is the guiding document for Local Hazard Mitigation Plans (HMPs)
- Is integrated in the THIRA (Threat and Hazard Identification and Risk Assessment) and the SRP (Stakeholder Preparedness Review)

## Local HMPs are used when developing or updating:

- Climate Adaptation Plans
- Community Wildfire Protection Plans
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- General Plans
- And many more!



**Questions?**

**Comments?**

Limited to 3 minutes about hazard mitigation planning





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Good Mitigation  
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It lessens the Need  
*-D. Kennard*



*Figure A-14. Līhu'e Public Meeting in Kaua'i County, April 24, 2023*






**State of Hawai‘i**  
**2023 Hazard Mitigation Plan**  
*Statewide Hybrid Public Meeting*  
*Kapolei and Microsoft Teams*

May 3, 2023



# Public Meeting Participants

- **James Barros**, Administrator, HI-EMA
- **Kelsey Yamanaka**, Acting State Hazard Mitigation Officer, HI-EMA
- **David Kennard**, Kaua‘i Emergency Management Agency (KEMA) Disaster Assistance Project Manager, State Hazard Mitigation Forum Chair
- **Megan Brotherton**, Lead Project Planner, Tetra Tech, Inc.
- and **YOU!**



If you are attending virtually, please sign in using the “Chat” feature. Add your name and the County you’re joining from. In-person attendees can use the paper sheet to sign in.



# Agenda and Participation Guidelines

- Purpose of the Hawai'i State Hazard Mitigation Plan
- Draft Plan Overview
- Mitigation Strategies Input
- Coordination with Other Planning Efforts
- Public Questions and Comments



# 2023 Draft Plan Public Comment Form



Please use the link or scan the QR code to provide comments on the draft plan.

<https://www.surveymonkey.com/r/HISHMP2023>



# Contacts for Emergency Management Agencies



Hawai'i Emergency Management Agency

[HawaiiEMA@hawaii.gov](mailto:HawaiiEMA@hawaii.gov)

Kaua'i Emergency Management Agency

[kema@kauai.gov](mailto:kema@kauai.gov)

Honolulu Department of Emergency Management

[dem@honolulu.gov](mailto:dem@honolulu.gov)

Maui Emergency Management Agency

[emergency.management@mauicounty.gov](mailto:emergency.management@mauicounty.gov)

County of Hawai'i Civil Defense

[hccda@hawaiiicounty.gov](mailto:hccda@hawaiiicounty.gov)

# Purpose of the State Hazard Mitigation Plan (SHMP)



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# Purpose of the State Hazard Mitigation Plan (SHMP), cont.



FEMA emphasizes the importance of the SHMP by tying grant funding to an approved and adopted Plan

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- FEMA requires States to update the SHMP at least every 5 years
- HI-EMA and its Consultant (Tetra Tech) finalized the draft plan, which is available for public comment
- Final draft SHMP Update ready for FEMA review and approval by October

# SHMP Format



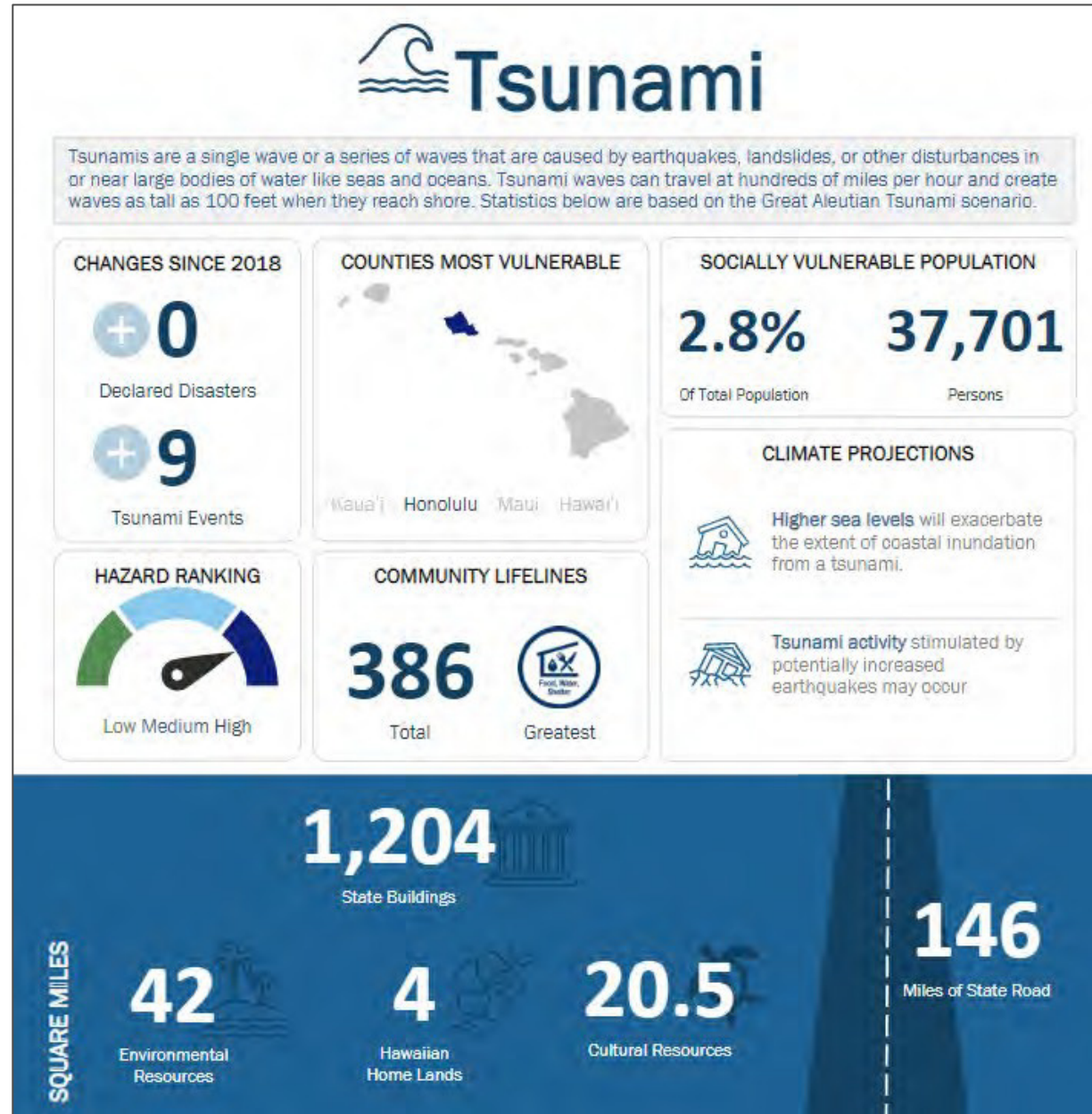
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## Volume 2

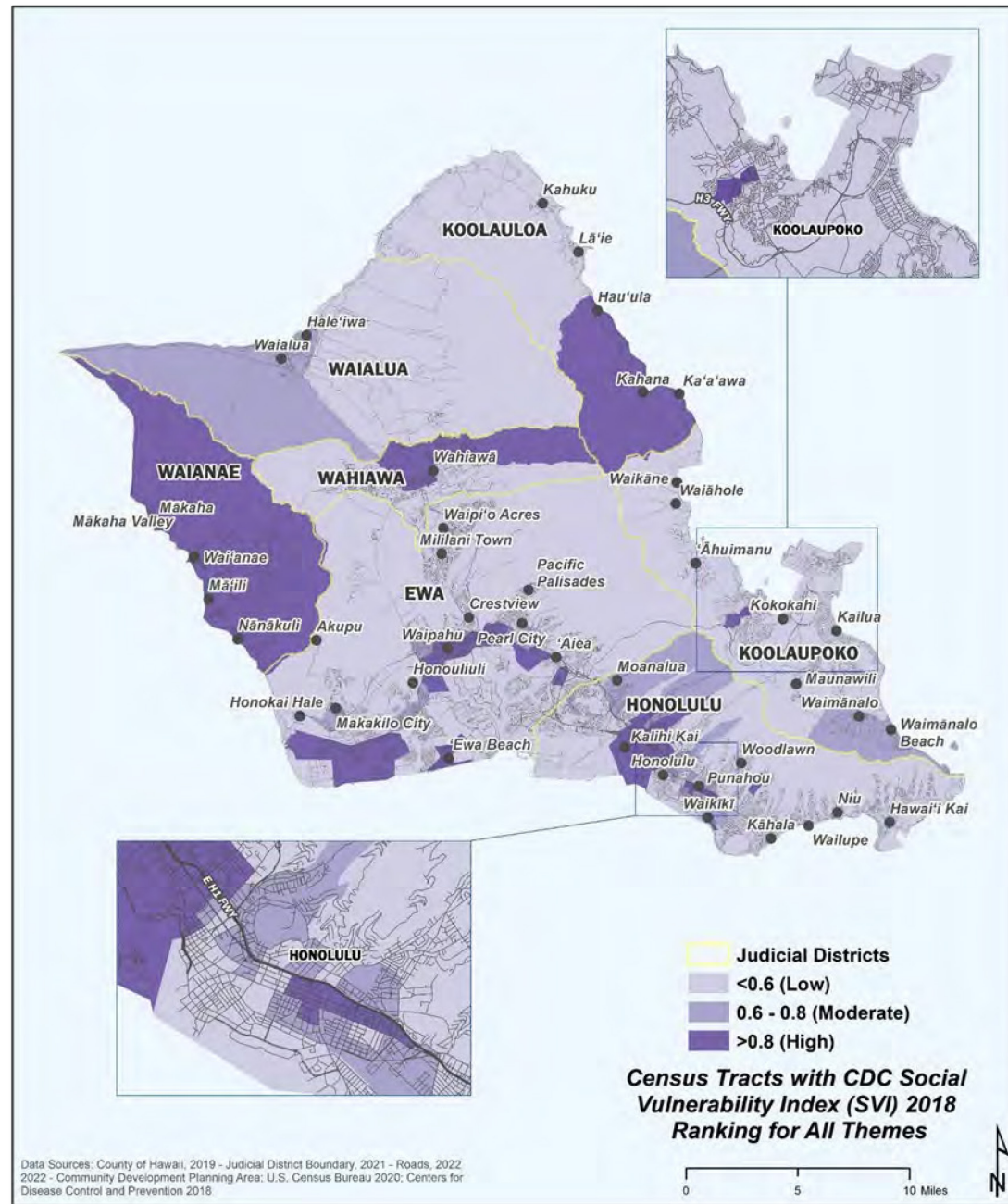
- **Appendices**

# Hazard Dashboard



# Social Vulnerability

## Example: City and County of Honolulu



# Kaua'i County Mitigation Success Story

## *Weke Road Reconstruction*



Weke Road was washed out by 2018 floodwaters in the Hanalei basin.

The recovery and mitigation project to reconstruct the road to standards that will better withstand future storm events received DR-4365 Federal funding to complete the project.



Photo credit: County of Kaua'i

# City and County of Honolulu Mitigation Success Story

## *CRS Program*



The **City and County of Honolulu** included a mitigation strategy in its Local Hazard Mitigation Plan to work to qualify for participation in the CRS program. In April 2022, the City and County qualified at a Class 7 level, resulting in automatic flood insurance premium discounts of 10% for properties in the mapped floodplain area.



This resulted in a **savings of more than \$2.3 Million each year** for City and County residents!

# Maui County Mitigation Success Story

## Maui Food Bank Generator



The **2020 County of Maui Hazard Mitigation Plan** included a mitigation action to acquire generators for critical facilities including the Maui Food Bank.

The project received nearly \$94,000 of Federal grant funding to implement the mitigation action.

➔ This allows the Maui Food Bank to better **serve the needs** of vulnerable members the community community by continuing to supply fresh food despite power outages.





# Hawai'i County Mitigation Success Story

## Department of Water Supply Generators



The **2020 County of Hawai'i Multi-Hazard Mitigation Plan** included a mitigation action to harden DWS potable water producing facilities by installing needed emergency generating infrastructure.

The project received nearly \$174,000 of Federal grant funding to complete the mitigation action.

➔ This allows DWS to better **protect the health and welfare** of our island community by continuing to supply potable water despite power outages.



Honokōhau Transfer Switch

Pi'ihonua Transfer Switch and Terminal Box



# Mitigation Strategies Input



Submit your ideas for mitigation strategies  
to: [HawaiiEMA@hawaii.gov](mailto:HawaiiEMA@hawaii.gov)

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- Local Planning and Regulations
- Structure and Infrastructure Projects
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- Education and Awareness Programs

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# Appendix B. Forum Membership and Bylaws



# CONTENTS

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APPENDIX B. STATE HAZARD MITIGATION PLAN FORUM BYLAWS ..... B-1

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<sup>1</sup> Section Cover Photo: Maku'u Point Sunrise. Photo by Megan Brotherton





# APPENDIX B. STATE HAZARD MITIGATION FORUM MEMBERSHIP AND BYLAWS

This appendix includes the State Hazard Mitigation Forum Membership and Bylaws.

*Table B-1. State Hazard Mitigation Forum Members*

Agency	Name	Sector/Area of Expertise
<b>Members</b>		
Maui County Emergency Management Agency	Gina Albanese	County Emergency Management
State of Hawai'i Office of Planning and Sustainable Development	Danielle Bass	Land Use and Development
County of Maui Department of Planning	James Buika	County Land Use and Development, Building Codes
Hawai'i State Energy Office	Jonathan Chin	Infrastructure
Hawai'i State Climatologist, University of Hawai'i	Pao-Shin Chu, PhD	Natural and Cultural Resources, Climate Change, Natural Hazards
State of Hawai'i Office of Homeland Security	Jimmie Collins	Emergency Management, Terrorism and Cyber Threat
Hawai'i State Department of Health, State Toxicologist	Diana Felton	Health and Social Services, Hazardous Materials
City and County of Honolulu, Office of Climate Change, Sustainability and Resiliency	Sarah Harris	Natural and Cultural Resources, Land Use and Development; Climate Change
Kaua'i Emergency Management Agency	David Kennard (Chair)	Emergency Management
County of Hawai'i Planning Department, Long Range Planning Division	Bethany Morrison	Land Use and Development
County of Kaua'i Department of Public Works	Michael Moule	Infrastructure
Honolulu Board of Water Supply	Raelynn Nakabayashi	Infrastructure (Water)
University of Hawai'i	Tara Owens	Natural and Cultural Resources, Coastal Hazards
County of Hawai'i Civil Defense Agency	Barry Periatt	Emergency Management
State of Hawai'i Department of Transportation, Highways Division	Genevieve Sullivan	Infrastructure (Transportation)
County of Hawai'i Planning Department	April Surprenant	County Land Use and Development, Building Codes
Island Strategy LLC, Kaua'i Island Utility Cooperative	Jan TenBruggencate	Infrastructure (Energy)
Hawai'i State Department of Business, Economic Development and Tourism	Amber Ternus	Economic Development
State of Hawai'i Department of Land and Natural Resources, Division of Forestry and Wildlife	Michael Walker	Natural and Cultural Resources
State of Hawai'i Office of Planning and Sustainable Development, Coastal Zone Management	Lisa Webster	Natural and Cultural Resources, Social Vulnerability







Agency	Name	Sector/Area of Expertise
<b>Ex Officio Members</b>		
<b>Maui County Emergency Management Agency, Administrator</b>	Herman Andaya	Emergency Management
<b>Volunteer (former Hawai'i State Emergency Management Agency State Hazard Mitigation Officer)</b>	Larry Kanda	Emergency Management
<b>Honolulu Board of Water Supply</b>	Ernest Lau	Infrastructure (Water)
<b>County of Hawai'i Planning Department</b>	Douglas Le	County, Land Use and Development
<b>Hawai'i Emergency Management Agency</b>	David Lopez	Emergency Management
<b>County of Hawai'i Civil Defense Agency</b>	Talmadge Magno	Emergency Management
<b>State of Hawai'i Department of Land and Natural Resources, Engineering Division</b>	Edwin Matsuda	Infrastructure
<b>State of Hawai'i Office of Planning and Sustainable Development, Coastal Zone Management</b>	Justine Nihipali	Land Use and Development
<b>Volunteer</b>	Ann Ogata-Deal	Land Use and Development
<b>Hawai'i Emergency Management Agency</b>	Jennifer Robertson	Emergency Management
<b>Kaua'i Emergency Management Agency</b>	Chelsie Sakai	Emergency Management
<b>City and County of Honolulu Department of Emergency Management</b>	Hirokazu Toiya	Emergency Management
<b>State of Hawai'i Department of Land and Natural Resources, Engineering Division; National Flood Insurance Program Coordinator</b>	Carol Tyau-Beam	Infrastructure
<b>Kaua'i Emergency Management Agency, Administrator</b>	Elton Ushiro	Emergency Management
<b>Hawai'i Emergency Management Agency</b>	Carmela Vigue	Emergency Management

*Note: The State Hazard Mitigation Forum members listed in this table are current as of March 2023*





## **BYLAWS**

### **HAWAII STATE HAZARD MITIGATION FORUM**

#### **ARTICLE I – NAME and AUTHORITY**

- I-1. The name of this organization is the Hawaii State Hazard Mitigation Forum (Forum), hereinafter referred to as the “Forum.”
- I-2. As delegated by the Disaster Mitigation Act of 2000 Sec. 204, the State may coordinate and administer a committed mitigation grants and planning program. The key responsibilities of the State and local activities relating to hazard evaluation and mitigation are delegated as per 44 CFR 201.
- I-3. The Forum is established under the authority contained in the Hawaii Revised Statutes Chapter 127A, which empowers the Hawaii Emergency Management Agency (HI-EMA) to carry out the emergency management program for the State of Hawaii.

#### **ARTICLE II – MISSION and PURPOSE**

- II-1. The Forum mission is to promote a more disaster-resilient Hawaii.
- II-2. The Forum shall advise and support HI-EMA Hazard Mitigation, on matters concerning planning, projects and policies for all natural and human-caused hazards. All Forum activities must meet the requirements stated in the Hawaii State Hazard Mitigation Plan (SHMP).
- II-3. The Forum shall:
  - 1. Implement the SHMP through the following actions:
    - a. Evaluate and prioritize measures to mitigate the risks associated with Hawaii’s hazards;
    - b. Assist HI-EMA to solicit, review, and prioritize nominations for hazard mitigation projects to be included in the SHMP;
    - c. Advise the selection of applicants for FEMA’s Hazard Mitigation Assistance (HMA) funding, including the Building Resilient Infrastructure and Communities (BRIC), the Hazard Mitigation Grant Program (HMGP), and the Flood Mitigation Assistance(FMA) programs; and other Federal, State, and Private Grant Programs.
    - d. Assist State and county agencies in obtaining other, non-FEMA funding to implement hazard mitigation projects;
    - e. Develop a comprehensive public awareness program on the activities of the Forum, highlighting successful hazard mitigation projects; and
    - f. Coordinate activities and hazard mitigation planning among other entities.
  - 2. Review and update the SHMP, as required by federal law, or as needed.



### ARTICLE III - DEFINITIONS

- III-1. The following definitions are derived from statutory documents which have been accepted by all levels of government involved in emergency management activities or operations:
1. Flood Mitigation Assistance: A Federal Emergency Management Agency (FEMA) grant program authorized by Section 1366 of the National Flood Insurance Act of 1968, as amended, with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). FMA provides funding to States, Territories, and local communities for projects and planning that reduces or eliminates long-term risk of flood damage to structures insured under the NFIP. FMA grants are awarded on a competitive basis and funding is appropriated by Congress annually.
  2. Hazard Mitigation: Any action taken to reduce or permanently eliminate the long-term risk to human life and property loss or damage from hazards.
  3. Hazard Mitigation Assistance: any of three programs administered by FEMA that provide funding for eligible mitigation planning and projects to reduce disaster losses and protect life and property from future disaster damages. The programs are the Building Resilient Infrastructure and Communities (BRIC) Program, the Hazard Mitigation Grant Program (HMGP), and the Flood Mitigation Assistance (FMA) Program.
  4. Building Resilient Infrastructure and Communities (BRIC) grant program: a FEMA grant program that provides funding to States, Territories, and local communities to implement a sustained pre-disaster natural hazard mitigation program. The goal is to reduce overall risk to the population and structures from future hazard events, while also reducing reliance on Federal funding in future disasters. This program awards planning and project grants and provides opportunities for raising public awareness about reducing future losses before disaster strikes. Planning is a key process used to break the cycle of disaster damage, reconstruction, and repeated damage. The BRIC program is funded annually by Congressional appropriations and grants are awarded on a nationally competitive basis.
  5. Hazard Mitigation Grant Program (HMGP): A FEMA program involving a coordinated effort of State and county agencies and private organizations to reduce risks to people and property from natural hazards. During and after Presidentially declared disasters, the Stafford Act makes available federal funds up to 15 percent of the estimated aggregate amount of grants for emergencies and permanent repairs under the federally-declared disaster. The federal government may contribute up to 75 percent of any cost-effective measure while the State, county governments or private nonprofit organizations contribute the remaining 25 percent of the project costs.
  6. Major Disaster: Any natural catastrophe, or, regardless of cause, any fire or explosion which, in the determination of the President, causes damage of sufficient severity and magnitude to warrant major disaster assistance under the Stafford Act to supplement the efforts and available resources of State and county governments and disaster relief organizations in alleviating the damage, loss, hardship, or suffering caused thereby.
  7. Measure/Project: Any activity proposed to reduce risk of future damage, hardship, loss, or suffering from major disasters. The terms are used interchangeably.



8. Stafford Act: Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended, signed into law on November 23, 1988, amended the Disaster Relief Act of 1974, PL 93-288.
9. State Hazard Mitigation Officer: The officer who coordinates and monitors all State hazard mitigation programs. This responsibility has been placed in HI-EMA.

#### **ARTICLE IV - MEMBERSHIP**

- IV-1. The Forum shall be composed of a minimum of 11 members and a maximum of 19 members, appointed by the HI-EMA Administrator. Each county shall be entitled to at least one member. If the county seat is filled by other than the County Civil Defense or Emergency Management Administrator (CA), the CA shall be a non-voting, ex-officio member. A FEMA representative shall be entitled to non-voting, ex-officio membership.
- IV-2. Membership Terms:
  1. Forum members shall serve three-year terms and may be reappointed.
  2. Prior to the last meeting of each calendar year, members shall reaffirm willingness to remain on the Forum through written confirmation. HI-EMA will contact each Forum member and request their confirmation through a standardized consent form.
  3. A member who has more than two absences from scheduled meetings per year without valid cause may be requested by the HI-EMA Administrator to forfeit membership. A member may be represented by an approved alternate at a specific meeting.
  4. If a vacancy should occur, the remaining members may recommend to the HI-EMA Administrator a replacement to fill the vacancy. The Administrator shall appointment a replacement as soon as possible, but not more than four months from the vacancy. The appointee shall complete the term of the individual whose position was vacated.
- IV-3. Forum members shall have experience and interest in hazard mitigation activities such as, but not limited to, the following areas of expertise: Risk Analysis, Hazard Analysis, Public Awareness, Education, Emergency Management, Environmental Studies or Protection, Structural Engineering, Seismology, Geology, Public Works, Public Utilities, Insurance, Planning, Flood Control, Land Utilization, Waste Management, Sheltering, Energy, Construction, Communications, Building Codes, Architecture, Coastal Zone Management, Resilience, and Grants Management. Members may be selected from governmental agencies, the private sector, and the public at large, if one of the above qualifications is met. Each county government will be insured of having at least one member.
- IV-4. The opinions of Forum members need not represent the views of other organizations in which they have membership.



## ARTICLE V - OFFICERS

- V-1. The Forum shall elect a Chair and Vice Chair from among its members. The Executive Assistant(s) will be appointed by the HI-EMA Administrator and/or the SHMO.
- V-2. The duties of the **Chair** shall be:
1. Preside at all meetings of the Forum;
  2. Call for approval of the minutes of the preceding meeting when a quorum is present;
  3. Announce the business before the Forum;
  4. Receive all matters brought before the Forum, and to call for votes on matters that require an announcement of results;
  5. Appoint members to all committees, subject to appeal by a majority of Forum members;
  6. Authenticate, by signature, all acts of the Forum as may be required;
  7. Make known all rules of orders when so requested and to decide all questions of order, subject to appeal to the Forum;
  8. Act as spokesperson for the Forum;
  9. Perform other duties as may be required of such office.
- V-3. The duties of the **Vice Chair** shall be:
1. Act as the presiding officer in the absence or disability of the Chair;
  2. Perform any special duties assigned by the Chair;
  3. In case of resignation or incapacitation of the Chair, the Vice Chair shall become Chair for the unexpired part of the term.
- V-4. The duties of the **Executive Assistant** shall be:
1. Keep accurate and current minutes of each meeting of the Forum, noting all actions taken, whether carried or lost;
  2. Call the meeting to order in the absence of the Chair and Vice Chair and proceed with the election of a temporary Chair;
  3. Prepare and disseminate correspondence as directed;
  4. Send out all notices of meetings;
  5. Keep an account of receipts and expenditures.
  6. Work with the Chair and Vice Chair to develop an annual report of the Forum's activities. Annual reports will be submitted the January following the end of each year.



## **ARTICLE VI - MEETINGS**

- VI-1. A majority of the entire voting Forum membership shall constitute a quorum.
- VI-2. Members are strongly encouraged to attend in person. Meetings may be held in the State emergency operations facility that would allow attendance via secure video teleconferencing with the County emergency operations centers. Other technologies for hosting virtual meeting must be approved by the forum.
- VI-3. Quorum is required to take any action.
- VI-4. Regular meetings of the Forum shall be held quarterly. The Forum may also convene special meetings at any other times deemed appropriate.
- VI-5. Special meetings may be called by the officers of the Forum.
- VI-6. Any Forum member may request that a matter be placed on the agenda by notifying the Executive Assistant 15 calendar days before the date of a meeting.
- VI-7. The Forum requests prior notification of dissenting opinions when such opinions are made public. The Forum shall not prohibit the expression of dissenting opinions.
- VI-8. The Forum shall be notified of any solicitation of outside party review of Forum work. The reviewer shall be notified when their request has reached the Forum.
- VI-9. The Executive Assistant will prepare the minutes of all meetings and disseminate them to all members prior to the next scheduled meeting.

## **ARTICLE VII - COMMITTEES**

- VII-1. The Forum should utilize the work of established committees, boards, councils, etc., which are involved in hazard mitigation affairs such as the Hawaii Earthquake and Tsunami Advisory Committee to facilitate its own actions and to maximize available resources and expertise.
- VII-2. The Forum may establish sub-committees whose members are appointed by the Chair.

## **ARTICLE VIII**

### **PETITION FOR ADOPTION, AMENDMENT, OR REPEAL OF BYLAWS**

- VIII-1. Any voting Forum member may petition the Forum requesting adoption, amendment, or repeal of any articles of the Bylaws.
- VIII-2. Bylaws may be adopted, amended, or repealed by the vote of a majority of the voting membership of the Forum.
- VIII-3. Subject to Article XI, changes to the Bylaws shall become effective at the next regularly scheduled meeting.



**ARTICLE IX - PARLIAMENTARY AUTHORITY**

- IX-1. Robert's Rules of Order, revised, shall govern the Forum in such case that actions are not consistent with these Bylaws.

**ARTICLE X - VALIDITY**

- X-1. If any section or part of the Bylaws is held to be invalid for any reason whatsoever, such invalidity shall not affect the validity of the remaining sections of the Bylaws.

**ARTICLE XI - EFFECTIVE DATE**

- XI-1. These Bylaws shall become effective upon approval of the Administrator of HI-EMA.

\_\_\_\_\_  
Luke P. Meyers  
Administrator  
Hawaii Emergency Management Agency  
State of Hawaii Department of Defense

Mar 2, 2022

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DATE



# Appendix C. Capability Assessment Supplement





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<sup>1</sup> Section Cover Photo: Ironwood Forest. Photo by Megan Brotherton





## APPENDIX C. CAPABILITY ASSESSMENT SUPPLEMENT

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This appendix includes detailed information that supports the Capability Assessment discussion presented in Section 5 (Capability Assessment) of this document.





## C.1 State Capability Assessment Detailed Tables

The following sections include the detailed capability assessment that is summarized in Section 5 (Capability Assessment) of the SHMP. The goal of this assessment was not to identify all capabilities an agency may have, but only those that are currently used or could be used to support mitigation efforts. Capabilities are generally arranged by agency; however, in some instances, capabilities listed are closely associated with the agency/department, but do not fall under their explicit authority. Information is provided for each capability as appropriate:

- **Capability Category and Description**—Lists which capability category the capability best aligns with (i.e., Planning and Regulatory; Administrative and Technical; Capital Projects and Maintenance; Financial; Education, Outreach, and Capacity Building; Disaster Response/Recovery) and a brief, succinct description of the capability
- **Notable changes**—Description of any significant changes that have impacted the capability since the 2018 SHMP was developed. Changes include but are not limited to plan updates, change in staff/resources, change in administrative rules or amendment to law, etc.
- **Challenges**—Describes any issues with implementing the capability, capability effectiveness or any aspects of the capability that conflict with hazard mitigation goals. Challenges include but are not limited to a lack of staffing or funding for implementation, outdated information or protocols, etc.
- **Opportunities**—Describes identified opportunities to address challenges, integrate mitigation goals, or otherwise enhance capabilities
- **Effect on Future Conditions**—Describes how the capability integrates future conditions (i.e., climate change)
- **Equitable Outcomes**—Describes how the capability helps advance equitable outcomes for socially vulnerable populations
- **Community Lifelines**—Lists which community lifeline(s) the capability supports (i.e., Safety and Security; Food, Water, Shelter; Health and Medical; Energy; Communications; Transportation; and/or Hazardous Materials)
- **Hazards**—Lists the hazard(s) of concern that the capability addresses
- **State HMP Goals**—Lists the SHMP goal(s) the capability advances
- **Type of Hazard Management Capability**—Indicates whether the capability applies pre- or post-disaster
- **Effect on Loss Reduction**—Indicates if the capability supports, facilitates or conflicts with hazard mitigation goals.
- **Funding**—Indicates if the capability provides funding for mitigation





### C.1.1 DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES

Table C-1 includes information on hazard mitigation related capabilities for the Department of Accounting and General Services (DAGS). Table C-2 includes information on hazard mitigation related capabilities for the Structural Engineers Association of Hawai'i (SEAOH).

*Table C-1. Department of Accounting and General Services Capabilities*

Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<p><b>Description:</b> DAGS, is headed by the State Comptroller, who concurrently serves as the director of DAGS. The department is responsible for managing and supervising a wide range of state programs and activities.</p>							
<b>State-owned Building Insurance</b>	<b>Capability Category and Description:</b>	Administrative and Technical; Financial; Disaster Response/Recovery DAGS works with the insurance industry to make sure that the state-owned buildings and facilities (more than 7,500) have insurance in case of emergencies and hazards, and works with FEMA, Hawai'i Emergency Management Agency (HI-EMA), and the insurance industry during declared disasters to conduct damage assessments.					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	None identified.					
	<b>Effect on Future Conditions:</b>	None identified.					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Safety and Security; Food, Water, Shelter; Health and Medical; Energy; Communications; Transportation; Hazardous Material					
	<b>Hazards:</b>	Flood, Infrastructure Failure, Earthquake, Windstorm, Hurricane, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire					
<b>State HMP Goals:</b>	1, 3	◆	◆		◆		
<b>Land Acquisition Program</b>	<b>Capability Category and Description:</b>	Planning and Regulatory The Public Works Division of DAGS plans, coordinates, organizes, directs and controls a variety of engineering and architectural services for the state including land acquisition. Funds for land acquisition are appropriated by the legislature through the Capital Improvement Program. Land acquisition is conducted in partnership with the DLNR Land Division.					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	DAGS does not have funding budgeted for this purpose, so all funding would need to come from the legislature.					





Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
	<b>Opportunities:</b> Properties that have experienced repetitive losses from hazard events could be acquired through willing seller programs (i.e., Action 2023-2018-054). <b>Effect on Future Conditions:</b> Buyouts in areas affected by hazards such as sea level rise. <b>Equitable Outcomes:</b> Provide means for disadvantaged persons to leave hazard-prone locations. <b>Community Lifelines:</b> Food, Water, Shelter <b>Hazards:</b> Drought, Climate Change, Tsunami, Flood <b>State HMP Goals:</b> 1, 2		◆		◆		◆
Shelter Upgrade Program <sup>b</sup>	<b>Capability Category and Description:</b> Capital Projects and Maintenance The Public Works Division of DAGS takes the lead in implementing sheltering upgrades for public facilities to withstand disasters. Funds for shelter upgrades are appropriated by the legislature through the Capital Improvement Program.						
	<b>Notable Changes:</b> None identified.						
	<b>Challenges:</b> None identified.						
	<b>Opportunities:</b> None identified.						
	<b>Effect on Future Conditions:</b> Future disasters may be exacerbated by climate change; shelters need to upgrade to withstand increased risk						
	<b>Equitable Outcomes:</b> Provides safe location during a disaster						
	<b>Community Lifelines:</b> Food, Water, Shelter						
<b>Hazards:</b> Hurricane <b>State HMP Goals:</b> 1,2	◆		◆	◆		◆	
Damage Assessments <sup>b</sup>	<b>Capability Category and Description:</b> Disaster Response/Recovery The Public Works Division of DAGS has architectural and engineering staff capable of supporting damage assessments to buildings and structures damaged after an event.						
	<b>Notable Changes:</b> None identified.						
	<b>Challenges:</b> Staff workload would need to be managed for this additional task. Staff time would need to be reimbursed.						
	<b>Opportunities:</b> None identified.						
	<b>Effect on Future Conditions:</b> May prevent damages from higher intensity storms						
	<b>Equitable Outcomes:</b> None identified.						





Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
	<b>Community Lifelines:</b>	Food, Water, Shelter; Safety and Security					
	<b>Hazards:</b>	Earthquake, Hurricane					
	<b>State HMP Goals:</b>	3	◆	◆	◆		
Building Code Council <sup>c</sup>	<b>Capability Category and Description:</b>	Planning and Regulatory The State Building Code Council (the Council) which is administratively attached to the Department of Accounting and General Services and is authorized by Section 107-22, Hawai'i Revised Statues. The purpose of the Council is to establish a state building code through the timely adoption of national building codes and would include the latest fire code as adopted by the State Fire Council, the latest edition of the International Building Code, the latest edition of the Uniform Plumbing Code, and Hawai'i design standards to implement Act 5, Special Session Laws, 2005 as applicable to emergency shelters and essential government facilities. HAR §3-180 sets forth the State Building Code. Counties may make local amendments					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	Work on the adoption and implementation of modern building codes for all counties is still ongoing. The 2018 IBC is still pending for some counties. The 2018 codes have some HI-specific amendments that are focused on wind that are important. DAGS has a mitigation grant to facilitate the adoption of amendments. Challenges have involved some changes in legislation that impact the logistical aspects of the adoption process. Adoption is expected to move forward in the short-term.					
	<b>Opportunities:</b>	The American Society of Civil Engineers (ASCE)'s 2016 edition of ASCE 7 Standard Minimum Design Loads and Associated Criteria for Buildings and Other Structures includes a unified set of analysis and design methodologies for tsunami forces and effects on critical and essential facilities, and tsunami evacuation centers for the states of Alaska, Washington, Oregon, California, and Hawai'i. The standards can also be applied to other multi-story buildings, as determined by the local jurisdiction. The standard's methods are consistent with state-of-the-art tsunami physics, and utilizes probabilistic hazard analysis and structural target reliability analysis similar to the methods underlying earthquake design in ASCE 7. In addition to the standards, ASCE developed Tsunami Design Zone Maps which graphically depict the extent of inundation for a 1 in 2,500 annual chance Maximum Considered Tsunami (MCT) along the coastlines of the five applicable states, including the State of Hawai'i (Chock, Wei, Cox 2016). These maps provide the default design maps, are being replaced by high-resolution maps with finer spatial resolution as local Hawai'i map amendments for application in state building codes (Chock 2016). These provisions are currently required in the State of Hawai'i for all new construction of critical and essential buildings and facilities within the Tsunami Design Zone, as well as regular buildings that exceed 75 feet in height, including hotels, condominiums, office buildings, etc. The next edition of the ASDCE 7 standard was published in 2022 and retains all of these tsunami design requirements, while the Tsunami Design Zone maps of O'ahu and portions of Hawai'i Island have been updated with high-resolution maps. High resolution maps for Maui and Kaua'i are currently being developed for potential inclusion in the 2028 edition of ASCE 7 (i.e., Actions 2023-2018-049 and 2023-2018-050). Increase capacity to adopt new building codes in a timely manner (i.e., Action 2023-2013-004)					





Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<b>Effect on Future Conditions:</b>	May prevent damages from higher intensity storms and hazards						
<b>Equitable Outcomes:</b>	None identified.						
<b>Community Lifelines:</b>	Food, Water, Shelter						
<b>Hazards:</b>	Earthquake, Flood, Windstorm, Hurricane, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire						
<b>State HMP Goals:</b>	1, 2, 3	◆		◆	◆		

- a. Support is defined as programs, plans, policies, regulations, funding, or practices that help the implementation of mitigation actions, while facilitate is defined as programs, plans, policies, regulations, funding, or practices that make implementing actions easier.
- b. Identified by the department/agency as one of the most effective capabilities for achieving mitigation goals.
- c. Identified by a stakeholder group as presenting an opportunity to improve effectiveness at meeting hazard mitigation goals. In this instance, opportunity primarily lies with adoption and enforcement at the local level.

**Table C-2. Structural Engineers Association Capabilities**

Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<b>Description:</b> SEAOH is the Structural Engineers Association of Hawai'i, a charter member of the National Council of Structural Engineers Association (NCSEA). SEAOH is a non-profit, member-driven organization that pursues the common interests of practicing structural engineers and others sharing an interest in the activities of structural engineers.							
<b>Disaster Response Committee</b>	<b>Capability Category and Description:</b>	Disaster Response/Recovery The purpose of the SEAOH Disaster Response Committee (DRC) is to consider and coordinate activities the structural engineering community can do before and after disasters occur. The DRC maintains a list of SEAOH member volunteers who: (1) want to participate in Pre-disaster Organization and Training and (2) can be called upon to act as Post-Disaster Volunteer Engineers.					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	None identified.					
	<b>Effect on Future Conditions:</b>	None identified.					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community</b>	Safety and Security; Food, Water, Shelter					







Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation	
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict		
Building Code Committee	Lifelines:							
	Hazards:	Infrastructure Failure, Earthquake, Flood, Hurricane, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire						
	State HMP Goals:	2, 3, 4	◆	◆		◆		
	Capability Category and Description:	Planning and Regulatory One member of the State Building Code Council is a member of the SEAOK. The committee reviews the International Building Code and International Residential Code in support of this role.						
	Notable Changes:	None identified.						
	Challenges:	None identified.						
	Opportunities:	None identified.						
	Effect on Future Conditions:	None identified.						
	Equitable Outcomes:	None identified.						
	Community Lifelines:	Food, Water, Shelter						
	Hazards:	Flood, Infrastructure Failure, Earthquake, Flood, Windstorm, Hurricane, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire						
State HMP Goals:	2, 3, 4	◆		◆	◆			

a. Support is defined as programs, plans, policies, regulations, funding, or practices that help the implementation of mitigation actions, while facilitate is defined as programs, plans, policies, regulations, funding, or practices that make implementing actions easier.





**C.1.2 DEPARTMENT OF BUDGET AND FINANCE**

Table C-3 includes information on hazard mitigation related capabilities for the Department of Budget and Finance (DBF).

*Table C-3. Department of Budget and Finance Capabilities*

Capability		Type of Hazard Management Capability		Effect on Loss Reduction a			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<p><b>Description:</b> <i>The Department of Budget and Finance (DBF), headed by the Director of Finance, administers the state budget, develops near- and long-term financial plans and strategies for the state, and provides programs for the improvement of management and financial management of state agencies.</i></p>							
<p><b>Capital Improvements Budget</b></p>	<p><b>Capability Category and Description:</b></p>	<p>Financial</p> <p>Project appropriation proposals submitted by state and county agencies are reviewed, prioritized, and evaluated to ensure conformity with statewide planning goals and objectives and executive priorities, and an estimate of the operational costs for each proposed capital improvement project is provided to the governor for consideration for possible inclusion in the executive capital improvement project budget that is to be presented to the legislature. The department also reviews, analyzes, and reports on state and county capital improvement project appropriation proposals that extend over wide geographical areas of the state and that have significant impacts upon economic development, land use, environmental quality, construction employment, and executive policy directions.</p> <p>Act 286 (HRS § 226-109) adopting Climate Change Adaptation Priority Guidelines as a policy of the Hawai'i State Planning Act mandates that all county and state agency actions consider climate change adaptation in capital improvement.</p>					
	<p><b>Notable Changes:</b></p>	<p>None identified.</p>					
	<p><b>Challenges:</b></p>	<p>None identified.</p>					
	<p><b>Opportunities:</b></p>	<p>Projects identified in capital budgets can be submitted for consideration in federal grant programs. Opportunities to integrate hazard mitigation goals, should be included in capital project review and development.</p> <p>This source of funding may be used for mitigation, including:</p> <ul style="list-style-type: none"> <li>• Wildfire               <ul style="list-style-type: none"> <li>○ Nursery improvements needed to provide native plants for green breaks, which help shade out grass to break the grass fire cycle, by replacing non-native, invasive grasses and shrubs with mostly native plants and trees (i.e., Action 2023-2018-026); and</li> <li>○ Development of water sources, including installation of water storage structures and improvements to existing water storage structures (i.e., Action 2023-2018-027)</li> </ul> </li> <li>• Rockfall               <ul style="list-style-type: none"> <li>○ Rockfall and slope stabilization projects are included in the capital budget.</li> </ul> </li> </ul>					





Capability		Type of Hazard Management Capability		Effect on Loss Reduction a			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<b>Effect on Future Conditions:</b>	None identified.						
<b>Equitable Outcomes:</b>	None identified.						
<b>Community Lifelines:</b>	Safety and Security						
<b>Hazards:</b>	Flood, Climate Change and Sea Level Rise, Infrastructure Failure, Drought, Earthquake, Hazardous Materials, Landslide and Rockfall, Wildfire						
<b>State HMP Goals:</b>	1, 2, 5	◆		◆	◆		◆

a. Support is defined as programs, plans, policies, regulations, funding, or practices that help the implementation of mitigation actions, while facilitate is defined as programs, plans, policies, regulations, funding, or practices that make implementing actions easier.





**C.1.3 DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT AND TOURISM**

The Department of Business, Economic Development and Tourism (DBEDT) is a large department with many mitigation-related capabilities. Table C-4 includes information on hazard mitigation related capabilities for the Hawai'i Community Development Authority (HCDA), Table C-5 includes information for the Hawai'i Tourism Authority (HTA), Table C-6 includes information for the Hawai'i State Energy Office, and Table C-7 includes information for the Office of Planning and Sustainable Development (OPSD).

*Table C-4. Hawai'i Community Development Authority Capabilities*

Capability	Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation
	Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<b>Description:</b> <i>The Hawai'i Community Development Authority (HCDA) is a public entity created by the Hawai'i State Legislature to establish community development plans in community development districts; determine community development programs; and cooperate with private enterprise and the various components of federal, state, and county governments to bring community development plans to fruition. The HCDA's work should result in economic and social opportunities and aim to meet the highest needs and aspirations of Hawaii's people.</i>						
<b>Community Development District Program</b>	<b>Capability Category and Description:</b>	Planning and Regulatory At the time of this plan update there are three community development districts in the state: Kaka'ako, Kalaeloa and He'eia				
	<b>Notable Changes:</b>	None identified. Annual reports are available online at: <a href="http://dbedt.Hawaii.gov/hcda/hcda-annual-reports/">http://dbedt.Hawaii.gov/hcda/hcda-annual-reports/</a>				
	<b>Challenges:</b>	None identified.				
	<b>Opportunities:</b>	As a community development planning agency, HCDA has the opportunity to integrate natural hazard mitigation goals and strategies into its development programs and districts.				
	<b>Effect on Future Conditions:</b>	Integration of natural hazard mitigation goals and strategies into its development programs and districts				
	<b>Equitable Outcomes:</b>	None identified.				
	<b>Community Lifelines:</b>	Safety and Security; Food, Water, Shelter; Health and Medical; Energy; Communications; Transportation				
	<b>Hazards:</b>	Flood, Climate Change and Sea Level Rise, Infrastructure Failure, Drought, Earthquake, Hazardous Materials, Health Risks, Windstorm, Hurricane, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire				
	<b>State HMP Goals:</b>	3, 6	◆	◆	◆	

a. Support is defined as programs, plans, policies, regulations, funding, or practices that help the implementation of mitigation actions, while facilitate is defined as programs, plans, policies, regulations, funding, or practices that make implementing actions easier.





**Table C-5. Hawai'i Tourism Authority Capabilities**

Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<p><b>Description:</b> HTA works closely with state and county safety and security agencies to ensure visitor safety remains a top priority. To accomplish this, HTA utilizes technology to reach and deliver safety messages directly to visitors in times of danger or potential danger. Visitor Assistance Programs (VAPs) in all four counties provide assistance with aloha to visitors in need.</p>							
<b>GoHawai'i Mobile App</b>	<b>Capability</b>	Education, Outreach, and Capacity Building					
	<b>Category and Description:</b>	In 2016 HTA developed the GoHawai'i mobile app – the State of Hawaii's first destination app – which offers safety information available in English, Chinese, Korean, Japanese and German to educate visitors on enjoying the Hawaiian Islands safely. Additionally, the app's push notification capability enables HTA to send messages directly to users, alerting them of dangerous or hazardous situations (HTA 2016).					
	<b>Notable Changes:</b>	This is a new capability.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	Expand the GoHawai'i mobile app information to address all hazards of concern for Hawai'i.					
	<b>Effect on Future Conditions:</b>	Notifies visitors of hazardous conditions					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Safety and Security; Communications					
	<b>Hazards:</b>	Flood, Earthquake, Health Risks, Hurricane, Landslide and Rockfall, Tsunami					
<b>State HMP Goals:</b>	5, 7	◆	◆		◆		

a. Support is defined as programs, plans, policies, regulations, funding, or practices that help the implementation of mitigation actions, while facilitate is defined as programs, plans, policies, regulations, funding, or practices that make implementing actions easier.





Table C-6. Hawai'i State Energy Office Capabilities

Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<p><b>Description:</b> As the designated agency for energy, HSEO works closely with many government and industry emergency management and security partners to lower vulnerabilities, deter threats, minimize the consequences of energy disruptions, and enhance recovery of Hawaii's energy systems.</p>							
Energy Assurance Program	<b>Capability Category and Description:</b>	Administrative and Technical Hawaii's Energy Assurance Program provides organizational and planning support for energy emergency management. The program aims to facilitate the rapid restoration of Hawaii's energy systems and mitigate the impact of energy shortages. The concept of operations for the program includes energy emergency preparedness; response and restoration; monitoring, reporting, and analysis; coordination and outreach; and energy assurance planning.					
	<b>Notable Changes:</b>	Through a FEMA Hazard Mitigation Advance Assistance grant project, HSEO has engaged private and public owners and operators of the state's critical energy infrastructure and community lifelines to conduct risk assessments, characterize dependencies, develop an energy common operating picture, and identify energy hazard mitigation actions and strategies to make the energy system more resilient.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	At the conclusion of the Advance Assistance project, several viable energy hazard mitigation actions and strategies will have been identified for consideration and inclusion in the next Hazard Mitigation Plan update. The relevant agencies and stakeholders can and should pursue funding to implement projects. HSEO is tracking and supporting opportunities from IJIA and IRA concerning grid resilience as well as annual funding opportunities through programs such as Building Resilient Infrastructure and Communities (BRIC).					
	<b>Effect on Future Conditions:</b>	Seeks to mitigate energy shortages in the event of a disaster					
	<b>Equitable Outcomes:</b>	Seeks to mitigate energy shortages in the event of a disaster					
	<b>Community Lifelines:</b>	Safety and Security; Energy					
	<b>Hazards:</b>	Climate Change, Infrastructure Failure, Earthquake, Flood, Windstorm, Hurricane, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire					
	<b>State HMP Goals:</b>	1, 3, 4, 6	◆	◆		◆	

a. Support is defined as programs, plans, policies, regulations, funding, or practices that help the implementation of mitigation actions, while facilitate is defined as programs, plans, policies, regulations, funding, or practices that make implementing actions easier.





**Table C-7. Office of Planning and Sustainable Development Capabilities**

Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	Funding for Mitigation <sup>b</sup>
<b>STATE LAND USE LAW <sup>d</sup></b>							
<p><b>Description:</b> <i>The State Land Use Law (Chapter 205, Hawai'i Revised Statutes) was adopted in 1961, establishing a framework of land use management and regulation in which all lands in the State of Hawai'i are classified into one of four land use districts. The Land Use Division of the Office of Planning and Sustainable Development represents the state's interests as they pertain to District Boundary Amendments, Special Permits, and Important Agricultural Lands. Land Use Division staff ensure petitions for boundary amendments meet the land use commission decision-making criteria, address impacts to state infrastructure, and evaluate whether the proposed project complies with the Hawai'i State Plan.</i></p>							
<b>Land Use Districts</b>	<b>Capability</b>	Planning and Regulatory					
	<b>Category and Description:</b>	All lands in the State of Hawai'i are classified in one of the four land use districts: urban, rural, agricultural, and conservation. County governments have regulatory authority over Urban District lands and shared authority over Agricultural and Rural District Lands. Conservation District lands are regulated and managed by the State Department of Land and Natural Resources.					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	Use of agricultural lands for non-farm uses, expansion of permissible uses in Chapter 205 for non-farm uses, subdivision and use of condominium property regimes for residential developments without active farming remain challenges for managing agricultural lands.					
	<b>Opportunities:</b>	OPSD will be conducting a soil classification study in 2023 to determine how soil quality data and ratings, particularly with respect to agricultural productivity, might be better used in land use regulation. This affords an opportunity to examine how different soil characteristics and conditions might be susceptible to natural hazards and whether mitigation measures are effectively applied in accommodating land uses on such soils. Support mitigation action 2013-2013-035 to analyze soils for seismic modeling by sharing applicable data from the OPSD soil classification study.					
	<b>Effect on Future Conditions:</b>	Land districts can influence the damages felt following a disaster.					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Safety and Security; Food, Water, Shelter					
<b>Hazards:</b>	Flood, Climate Change, Infrastructure Failure, Drought, Earthquake, Windstorm, Hurricane, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire						
<b>State HMP Goals:</b>	1, 2	◆		◆			





Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	Funding for Mitigation <sup>b</sup>
<b>Periodic Boundary Review</b>	<b>Capability</b>	Planning and Regulatory					
	<b>Category and Description:</b>	Hawai'i Revised Statutes § 205-18 called for the periodic "review of the classification and districting of all lands in the state." Such reviews have been conducted in 1969, 1974, and 1990.					
	<b>Notable Changes:</b>	Chapter 205 was amended in 2021 to remove the requirement for periodic Boundary Reviews to simply state that OPSD may undertake a boundary review.					
	<b>Challenges:</b>	Boundary reviews have been used in the past to identify those lands that are more suitable in another district due to their physical characteristics or emerging threats or opportunities for lands within each district.					
	<b>Opportunities:</b>	Future Reviews can include issues such as sustainability and climate change issues.					
	<b>Effect on Future Conditions:</b>	Land districts can influence the damages felt following a disaster.					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Safety and Security; Food, Water, Shelter; Health and Medical; Energy; Communications; Transportation					
	<b>Hazards:</b>	Flood, Landslide and Rockfall, Tsunami, Volcanic Hazards					
<b>State HMP Goals:</b>	1, 2	◆		◆			
<b>Land Use Commission</b>	<b>Capability</b>	Planning and Regulatory					
	<b>Category and Description:</b>	The Land Use Commission (LUC) administers the Land Use Law. The LUC is composed of nine members, one from each county and five members appointed at large. The Land Use Commission Rules outline standards for determining district boundaries, which include consideration of some natural hazards.					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	None identified.					
	<b>Effect on Future Conditions:</b>	Land districts can influence the damages felt following a disaster.					
	<b>Equitable Outcomes:</b>	None identified.					
<b>Community Lifelines:</b>	Safety and Security; Food, Water, Shelter; Health and Medical; Energy; Communications; Transportation; Hazardous Materials						







Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	Funding for Mitigation <sup>b</sup>
<b>Hazards:</b>	Flood, Landslide and Rockfall, Tsunami, Volcanic Hazards						
<b>State HMP Goals:</b>	1, 2	◆		◆			
<b>COASTAL ZONE MANAGEMENT PROGRAM</b> <sup>b, c, d</sup>							
<p><i>Description: The Hawai'i Coastal Zone Management Program (CZM Program) was approved in 1977 and is responsive to the Federal CZM Act of 1972. It serves as the state's resource management policy umbrella and the guiding perspective for the design and implementation of allowable land and water use activities throughout the state. All agencies must assure their statutes, ordinances, rules and actions comply with the CZM's ten objectives and related policies. The coastal zone in the State of Hawai'i consists of the entire state and the area extending seaward to the limit of the state's police power and management authority. The Office of Planning and Sustainable Development administers the Coastal Zone Management Law through the Coastal Zone Management Program and sub-programs; however, 14 agencies have responsibilities relating to marine and coastal zone management.</i></p>							
<b>Hawai'i CZM Program Document</b>	<b>Capability Category and Description:</b>	Planning and Regulatory Approved by NOAA in 1990, the Hawai'i Coastal Zone Management Program document provides a description of the Hawai'i Coastal Zone Management Program including links between the federal, state, and county governments, Hawaii's land use and environmental management systems, and special components of the Hawai'i CZM program (OPSD, 1990). In 2011 a supplemental document describing the CZM program as it existed in 2011 was produced, but it is not intended to be a replacement for the 1990 program document. Reducing hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution is a stated objective of the program and four policies have been developed to support this objective (OPSD 2011).					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	None identified.					
	<b>Effect on Future Conditions:</b>	None identified.					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Safety and Security					
	<b>Hazards:</b>	Flood, Climate Change, Hurricane, Tsunami					
	<b>State HMP Goals:</b>	3	◆		◆		
<b>Coastal Nonpoint Pollution Control Program (CNPCP)</b>	<b>Capability Category and Description:</b>	Planning and Regulatory The purpose of this program is "to develop and implement management measures for nonpoint source pollution to restore and protect coastal waters." Projects to address polluted runoff control are outlined in the Coastal Nonpoint Pollution Control Management Plan					





Capability	Type of Hazard Management Capability	Effect on Loss Reduction			Provides Funding for Mitigation <sup>b</sup>			
		Pre-Disaster	Post-Disaster	Support		Facilitate	Conflict	
	(CNPCP) and Hawai'i Nonpoint Source Management Plan and are eligible for Clean Water Act section 319 funding. The State of Hawaii's CNPCP is co-implemented by the Department of Health and is a requirement of the 1990 Coastal Zone Act Reauthorization Amendments (16 U.S.C. – 1455b).							
<b>Notable Changes:</b>	The State of Hawaii's Nonpoint Source Management Plan update was published for 2021-2025. In 2020, the Hawai'i CZM Program received approval from NOAA/EPA for a 5-year Workplan containing interim benchmarks and a timeline for meeting the outstanding conditions of the conditionally approved CNPCP. In 2021, Hawai'i has achieved obtaining a total of 54 Management Measures and Administrative Elements preliminarily approved by NOAA/EPA. In 2022, HAR 11-56 Nonpoint Source Pollution Control was adopted to provide the regulatory framework for the prevention, abatement, and control of new and existing nonpoint sources of pollution.							
<b>Challenges:</b>	319 grant funding is limited with \$167.9 million available in 2017 and projects must meet pollution reduction objectives. NO dedicated funding from CZM.							
<b>Opportunities:</b>	While the focus of the program is on pollution control, some projects, such as those addressing urban stormwater runoff and water source protection, may also help meet mitigation goals and objectives. There may be an opportunity to align and leverage program objectives at the time of the next update.							
<b>Effect on Future Conditions:</b>	None identified.							
<b>Equitable Outcomes:</b>	None identified.							
<b>Community Lifelines:</b>	Safety and Security; Hazardous Materials							
<b>Hazards:</b>	Climate Change, Flood, Health Risks							
<b>State HMP Goals:</b>	1, 2	◆			◆			◆ (F)
<b>Marine and Coastal Zone Advocacy Council (MACZAC)</b>	<b>Capability Category and Description:</b> Planning and Regulatory MACZAC is a public advisory body to assist the Hawai'i CZM Program toward the implementation of an integrated and comprehensive management system for marine and coastal zone resources, consistent with the objectives and policies of the Hawai'i Coastal Zone Management Act. Comprised of twelve advisory members recruited from the Islands of Kaua'i, O'ahu, Maui, Moloka'i, Lāna'i, and Hawai'i, MACZAC members have diverse backgrounds in business, environment, native Hawaiian practices, terrestrial and marine commerce, recreation, research, and tourism. The council's mission statement is to "Advocate for a comprehensive management system which restores, preserves and protects Hawaii's marine and coastal environment."							
	<b>Notable Changes:</b> None identified.							





Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	Funding for Mitigation <sup>b</sup>
	<b>Challenges:</b>	Capabilities are limited to the statutory role to advise and evaluate the CZM program.					
	<b>Opportunities:</b>	MACZAC may be a venue to have community discussion(s) on coastal hazards.					
	<b>Effect on Future Conditions:</b>	None identified.					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Safety and Security					
	<b>Hazards:</b>	Flood, Climate Change, Hurricane, Tsunami					
	<b>State HMP Goals:</b>	3, 4, 5	◆			◆	
<b>Special Management Area (SMA) Permits</b>	<b>Capability Category and Description:</b>	<p>Planning and Regulatory</p> <p>The SMA permit is a management tool designed to assure that developments in the SMA are designed and carried out in compliance with the CZM objectives, policies, and SMA guidelines. The SMA permitting system regulates development within county designated SMAs extending from the shoreline inland (OPSD 2012). OPSD plays a lead role in the administration and management of the program, oversees the consistency of the permit system, provides training sessions to county SMA personnel and the County Planning Commissions, provides SMA permit guidance, and conducts SMA use review and approval for development within the SMA of community development districts. SMA permits were established as part of the Shoreline Protection Act of 1975. County authorities administer SMA permits and may amend their boundaries as necessary; however, boundary contractions are subject to OPSD’s review.</p> <p>Trainings are generally offered for Planning Commissions and City/County Councils, particularly when there are new members. Trainings are requested by the County Planning Department and are typically conducted as a portion of a public meeting and are, therefore, open to the public. In general, these trainings are requested once per year and focus on the SMA basics, including the review criteria regarding coastal hazards.</p>					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	Not all activity in the SMA is required to obtain an SMA permit. SMA permitting definitions exclude certain activities related to: agriculture, interior alterations or non-structural improvements, and underground utilities.					
	<b>Opportunities:</b>	Opportunities to analyze hazard mitigation in the decision-making process can be integrated into SMA trainings offered by OPSD.					





Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	Funding for Mitigation <sup>b</sup>
	<b>Effect on Future Conditions:</b>	Limiting development in areas which may be susceptible to hazards may reduce the amount of damages					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Safety and Security					
	<b>Hazards:</b>	Flood, Climate Change, Hurricane, Tsunami					
	<b>State HMP Goals:</b>	1, 2, 4	◆		◆		
<b>Federal Consistency</b>	<b>Capability Category and Description:</b>	Planning and Regulatory The State CZM Program reviews federal actions affecting any coastal use or resource to ensure that proposed activities are consistent with state enforceable policies, which include provisions for coastal hazards. Federal consistency is required under the national Coastal Zone Management Act (CZMA), Section 307. Procedures and requirements are established in the Code of Federal Regulation, 15 CFR 930.					
	<b>Notable Changes:</b>	A list of current federal license, permit, and financial assistance activities subject to federal consistency is available on the Office of Planning and Sustainable Development website.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	The State CZM Program regularly reviews statutes and ordinances for inclusion as enforceable policies as part of the CZM program and be considered during the federal consistency review.					
	<b>Effect on Future Conditions:</b>	None identified.					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Safety and Security					
	<b>Hazards:</b>	Flood, Climate Change, Hurricane, Tsunami					
	<b>State HMP Goals:</b>	1, 2, 3	◆		◆		
<b>Coastal Zone Enhancement Program</b>	<b>Capability Category and Description:</b>	Planning and Regulatory State CZM program changes addressing one or more enhancement areas (wetlands, coastal hazards, public access, marine debris, cumulative and secondary impacts, special area management planning, ocean/great lakes resources, energy and government facility					





Capability	Description	Type of Hazard Management Capability		Effect on Loss Reduction			Provides	
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	Funding for Mitigation <sup>b</sup>	
		siting, and aquaculture) are eligible for Section 309 funding once an approved Assessment and Strategy has been completed. Past projects included education and outreach materials developed for distribution at community fairs and other public events. The CZM Program took the lead to align its FY2015-2020 coastal hazards strategy with a priority action under the 2013 SHMP to seek funding for and develop probabilistic design zone mapping for O’ahu, Maui, and Kaua’i. This project is slated for completion in 2023.						
	<b>Notable Changes:</b>	The Assessment and Strategy was updated over the performance period of the plan for FY 2021-2025, approved on June 30, 2020. Strategies for implementation in the updated plan include completing the Probabilistic Tsunami Design Zone Maps for the State, Coastline adaptation, and implementation of the Ocean Resources Management Plan (CZM Program 2015b). Document FY21-25 A&S is dated May 2020.						
	<b>Challenges:</b>	This is a fairly small fund.						
	<b>Opportunities:</b>	An update of the Assessment and Strategy will be required during the performance period of the SHMP. There will be an opportunity to identify additional strategies that meet both CZM and hazard mitigation goals and objectives.						
	<b>Effect on Future Conditions:</b>	Projects can educate individuals on risks associated with hazards, including how climate change may intensify an/or exacerbate the impacts and risks						
	<b>Equitable Outcomes:</b>	Projects can educate individuals on risks associated with hazards, including how climate change may intensify an/or exacerbate the impacts and risks						
	<b>Community Lifelines:</b>	Safety and Security; Transportation; Energy						
	<b>Hazards:</b>	Flood, Climate Change, Hurricane, Tsunami						
	<b>State HMP Goals:</b>	2, 4, 5, 7	◆			◆		◆ (F)
<b>Cumulative &amp; Secondary Impact: Stormwater Impact Assessment</b>	<b>Capability Category and Description:</b>	Education, Outreach, and Capacity Building Document that provides easy to follow guidance on assessing stormwater impacts in the planning phase of project development and suggests the incorporation of appropriate mitigation strategies.						
	<b>Notable Changes:</b>	None identified.						
	<b>Challenges:</b>	The guidance document does not impose any legally binding requirements on county, state or federal agencies.						
	<b>Opportunities:</b>	Document could be updated/amended to include guidance on how to incorporate expected/possible changes in stormwater impacts because of climate change.						
	<b>Effect on Future Conditions:</b>	Document could be updated/amended to include guidance on how to incorporate expected/possible changes in stormwater impacts because of climate change.						
	<b>Equitable</b>	None identified.						





Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	Funding for Mitigation <sup>b</sup>
	<b>Outcomes:</b>						
	<b>Community Lifelines:</b>	None identified.					
	<b>Hazards:</b>	Flood					
	<b>State HMP Goals:</b>	1, 2	◆		◆		
<b>Hawai'i Coastal and Estuarine Land Conservation Program</b>	<b>Capability Category and Description:</b>	Planning and Regulatory The Hawai'i Coastal and Estuarine Land Conservation Plan (CELCP) serves as the initial action toward eligibility for the federal Coastal and Estuarine Land Program, which enables permanent protection of coastal and estuarine lands by providing matching funds for community-based projects to acquire property from willing sellers through fee simple purchases or conservation easements.					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	President's budget has not funded CELCP program at the federal level on a regular annual basis.					
	<b>Opportunities:</b>	Although the focus on the program is on protecting resource value associated with ecological value, conservation value, cultural value, recreational value and aesthetic value, there may be overlap between these values and mitigation goals. The Infrastructure Investment and Jobs Act will fund projects under this program during the performance period of the SHMP.					
	<b>Effect on Future Conditions:</b>	Would enable permanent protections of lands, reducing potential future damages					
	<b>Equitable Outcomes:</b>	Could provide means for disadvantaged persons to leave hazard-prone locations.					
	<b>Community Lifelines:</b>	Safety and Security; Food, Water, Shelter					
	<b>Hazards:</b>	Flood, Climate Change, Hurricane, Tsunami					
	<b>State HMP Goals:</b>	1, 2	◆		◆	◆	
	<b>Hawai'i Community Stewardship Directory</b>	<b>Capability Category and Description:</b>	Education, Outreach, and Capacity Building Developed as an implementation tool for the Hawai'i Ocean Resources Management Plan to help community groups and organizations connect with each other to share their experiences and lessons learned in natural and cultural resources management.				
<b>Notable Changes:</b>		None identified.					
<b>Challenges:</b>		Organizations in the Directory have no official capacity to address natural hazards in terms of emergency management.					
<b>Opportunities:</b>		None identified.					





Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	Funding for Mitigation <sup>b</sup>
	<b>Effect on Future Conditions:</b>	None identified.					
	<b>Equitable Outcomes:</b>	Community groups sharing knowledge may be able to assist disadvantaged communities					
	<b>Community Lifelines:</b>	Communications					
	<b>Hazards:</b>	Flood, Climate Change, Infrastructure Failure, Drought, Earthquake, Hazardous Materials, Health Risks, Windstorm, Hurricane, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire					
	<b>State HMP Goals:</b>	3, 4	◆	◆	◆		
<b>Low Impact Development: A Practitioner’s Guide</b>	<b>Capability Category and Description:</b>	Education, Outreach, and Capacity Building This workbook provides information on better site design principles, along with best management practices (BMPs) for stormwater and wastewater management that minimize the impacts to environmental resources. The design requirements for stormwater BMPs are based on the climate and rainfall characteristics experienced in the State of Hawai’i, taking into account the variability in rainfall with elevation and with the windward and leeward sides of the islands (CZM Program 2006).					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	Workbook could be amended/updated to incorporate design considerations for the likely impacts of climate change.					
	<b>Effect on Future Conditions:</b>	Implementation of the principles can minimize the impacts to environmental resources					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Communications					
	<b>Hazards:</b>	Drought, Flood					
	<b>State HMP Goals:</b>	1, 2, 4	◆		◆		
<b>Shoreline Setback Area</b>	<b>Capability Category and Description:</b>	Planning and Regulatory Establishes shoreline setbacks of 20 to 40 feet from the shoreline. Counties may expand the setback area beyond the minimum requirements. Established under HRS Section 205A-43 and 205A-45.					
	<b>Notable Changes:</b>	Act 16 Session Laws of Hawai’i, 2020 amended HRS Chapter 205A and increased the statewide minimum shoreline setback from 20 to 40					





Capability	Type of Hazard Management Capability	Effect on Loss Reduction			Provides Funding for Mitigation <sup>b</sup>			
		Pre-Disaster	Post-Disaster	Support		Facilitate	Conflict	
	feet.							
<b>Challenges:</b>	None identified.							
<b>Opportunities:</b>	Some counties have chosen to expand setback area requirements above the minimum set forth by the State.							
<b>Effect on Future Conditions:</b>	Decreases the likelihood of structural impact from climate change’s influence on sea level rise							
<b>Equitable Outcomes:</b>	None identified.							
<b>Community Lifelines:</b>	Safety and Security							
<b>Hazards:</b>	Flood, Climate Change							
<b>State HMP Goals:</b>	2	◆	◆		◆			
<b>Ocean Resources Management Plan</b>	<p><b>Capability Category and Description:</b> Planning and Regulatory Statewide plan that sets forth the State’s ocean and coastal resources management priorities. The ORMP works by identifying three Focus Areas and five Management Priorities for the next five-year planning period, by identifying responsible agencies and resources, and by providing a method for performance measures and reporting. The ORMP is required under HRS Section 205A-62(1). The current plan was completed in July 2020 and includes coastal hazards, sea level rise, and coastal erosion as well as climate change adaptation: disaster preparedness and community resilience as pressures on the ocean and critical issues that need to be addressed.</p> <p><b>Notable Changes:</b> The ORMP Dashboard was recently updated and moved to the Esri Hub platform. The Dashboard provides information on the progress of implementing the ORMP. See the following sites: <a href="https://ormp.hawaii.gov/">https://ormp.hawaii.gov/</a> <a href="https://planning.hawaii.gov/czm/ormp/">https://planning.hawaii.gov/czm/ormp/</a></p> <p><b>Challenges:</b> None identified.</p> <p><b>Opportunities:</b> None identified.</p> <p><b>Effect on Future Conditions:</b> Addresses climate change adaptation</p> <p><b>Equitable Outcomes:</b> Addresses community resilience to climate change</p> <p><b>Community Lifelines:</b> Safety and Security</p>							







Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation <sup>b</sup>	
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict		
Council on Ocean Resources	<b>Hazards:</b>	Flood, Climate Change, Hurricane, Tsunami						
	<b>State HMP Goals:</b>	2	◆		◆			
	<b>Capability Category and Description:</b>	Planning and Regulatory Established in 2013 by directors of state and county agencies, with unanimous support of federal and community partners, the Council facilitates greater coordination and implementation of the State’s shared ocean and coastal resource management priorities.						
	<b>Notable Changes:</b>	None identified.						
	<b>Challenges:</b>	None identified.						
	<b>Opportunities:</b>	None identified.						
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	Safety and Security						
	<b>Hazards:</b>	Flood, Climate Change, Hurricane, Tsunami						
<b>State HMP Goals:</b>	2, 3	◆			◆			
<b>HAWAI’I STATE PLANNING ACT</b>								
<p><b>Description:</b> All state agencies are guided by the Hawai’i State Planning Act, which is a broad policy document that sets the table for all activities, programs, and decisions made by local and state agencies. The Hawai’i State Planning Act was signed into law in 1978 to “improve the planning process in this state, to increase the effectiveness of government and private actions, to improve coordination among different agencies and levels of government, to provide for wise use of Hawaii’s resources and to guide the future development of the state” (HRS § 226-1). The Act is codified under HRS Chapter 226. The State Plan is divided into three parts: Overall theme, goals, objectives and policies; planning coordination and implementation; and priority guidelines.</p>								
Statewide Planning System	<b>Capability Category and Description:</b>	Planning and Regulatory Coordinates and guides all major state and county activities and implements the overall theme, goals, objectives, policies, and priority guidelines. The system implements the state plan through the development of functional plans and county general plans.						
	<b>Notable Changes:</b>	The State has developed 17 functional plans. Of these only one has been developed and/or updated since 1991. The <i>Housing State Functional Plan</i> was completed in February 2017 (Hawai’i Housing Finance and Development Commission 2017).						
	<b>Challenges:</b>	None identified.						





Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	Funding for Mitigation <sup>b</sup>
	<b>Opportunities:</b>	As functional plans are updated, they can be reviewed and enhanced to ensure consistency with hazard mitigation goals.					
	<b>Effect on Future Conditions:</b>	None identified.					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Safety and Security; Food, Water, Shelter					
	<b>Hazards:</b>	Flood, Climate Change, Infrastructure Failure, Drought, Earthquake, Windstorm, Hurricane, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire					
	<b>State HMP Goals:</b>	2, 3, 4	◆		◆		
<b>Priority Guidelines</b>	<b>Capability Category and Description:</b>	Planning and Regulatory As part of the Statewide Planning System, the guidelines establish priorities to address areas of statewide concern: economic development, population growth and land resource management, affordable housing, crime and criminal justice, and quality education. Established in HRS § 226-59					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	Priority guidelines serve primarily as aspirational or advisory and do not have any clear enforcement mechanisms from which to derive authority.					
	<b>Opportunities:</b>	None identified.					
	<b>Effect on Future Conditions:</b>	Climate change may cause guidelines to be changed, especially in regard to economic development and land resource management					
	<b>Equitable Outcomes:</b>	Guidelines establish priorities to address affordable housing and quality education					
	<b>Community Lifelines:</b>	Safety and Security; Food, Water, Shelter					
	<b>Hazards:</b>	Flood, Climate Change, Dam Failure, Drought, Earthquake, Windstorm, Hurricane, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire					
<b>State HMP Goals:</b>	1, 7	◆	◆	◆			
<b>Hawai'i State Plan Update Phase I</b>	<b>Capability Category and</b>	Planning and Regulatory A comprehensive review of the State Planning Act is underway. Phase 1 of the update involves inventorying and reviewing all state					





Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	Funding for Mitigation <sup>b</sup>
<b>Description:</b>	department plans, strategic plans, functional plans, and capital improvement plans; identifying common themes and policy directions; developing findings as to the overall status of the plans and preparing findings and recommendations for next steps in the update of the State Planning Act.						
<b>Notable Changes:</b>	None identified.						
<b>Challenges:</b>	None identified.						
<b>Opportunities:</b>	The update of the State Plan provides an opportunity to fully integrate the hazard mitigation plan with the State Plan.						
<b>Effect on Future Conditions:</b>	None identified.						
<b>Equitable Outcomes:</b>	None identified.						
<b>Community Lifelines:</b>	Safety and Security						
<b>Hazards:</b>	Flood, Climate Change, Infrastructure Failure, Drought, Earthquake, Hazardous Materials, Health Risks, Windstorm, Hurricane, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire						
<b>State HMP Goals:</b>	4, 6	◆	◆		◆		
<b>HAWAI'I STATEWIDE GEOGRAPHIC INFORMATION SYSTEM PROGRAM</b>							
<b>Hawai'i Statewide Geographic Information System Program</b>	<b>Capability Category and Description:</b>	Administrative and Technical The program leads a multi-agency effort to establish and promote the use of GIS technology in State Government. A centralized database enables agencies to share information while reducing the development of redundant databases, helps standardize the information being analyzed by decision makers and serves as a means for collecting and distributing the best available geospatial data. The program manages and maintains the Hawai'i Open Geospatial Data Portal, and provides mapping, analysis, and consultation to State agencies, various map tools and applications, and other resources.					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	Map tools and applications can continue to be expanded to support statewide planning efforts as well as support hazard mitigation related education and outreach activities. Program capabilities could also be expanded to help support mitigation activities through projects such as maintaining the Hazus-MH model developed as a part of this plan update.					
	<b>Effect on Future Conditions:</b>	GIS provides the ability to introduce climate change impacts to analyses					





Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	Funding for Mitigation <sup>b</sup>
<b>Equitable Outcomes:</b>	None identified.						
<b>Community Lifelines:</b>	Safety and Security; Food, Water, Shelter; Health and Medical; Energy; Communications; Transportation; Hazardous Materials						
<b>Hazards:</b>	Flood, Climate Change, Dam Failure, Drought, Earthquake, Hazardous Materials, Health Risks, Windstorm, Hurricane, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire						
<b>State HMP Goals:</b>	3, 4	◆		◆			

- a. Support is defined as programs, plans, policies, regulations, funding, or practices that help the implementation of mitigation actions, while facilitate is defined as programs, plans, policies, regulations, funding, or practices that make implementing actions easier.
- b. (F) = Federal grant funding
- c. Identified by the department/agency as one of the most effective capabilities for achieving mitigation goals.
- d. Identified by a stakeholder group as presenting an opportunity to improve effectiveness at meeting hazard mitigation goals.





**C.1.4 DEPARTMENT OF COMMERCE AND CONSUMER AFFAIRS**

Table C-8 includes information on hazard mitigation related capabilities for the Department of Commerce and Consumer Affairs (DCCA).

*Table C-8. Department of Commerce and Consumer Affairs Capabilities*

Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<b>REAL ESTATE BRANCH</b>							
<i>Description: The Real Estate Branch, as part of the Professional and Vocational Licensing Division, assists the Real Estate Commission in carrying out its responsibility for the education, licensure and discipline of real estate licensees; registration of condominium projects, condominium associations, condominium managing agents, and condominium hotel operators; and intervening in court cases involving the real estate recovery fund.</i>							
<b>Mandatory Seller Disclosures in Real Estate Transactions</b>	<b>Capability Category and Description:</b>	Planning and Regulatory Requires seller disclosures in residential real property sales including if the residential property lies within the boundary of a special flood hazard area and/or within the anticipated inundation areas designated on the department of emergency management tsunami inundation maps. (HRS §508D)					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	Legislation could be amended to require mandatory disclosure of location in a sea level rise exposure area.					
	<b>Effect on Future Conditions:</b>	Reduces risk for potential buyers					
	<b>Equitable Outcomes:</b>	Reduces risk for potential buyers					
	<b>Community Lifelines:</b>	Food, Water, Shelter; Safety and Security					
	<b>Hazards:</b>	Flood, Tsunami					
<b>State HMP Goals:</b>	1, 2	◆		◆			

a. Support is defined as programs, plans, policies, regulations, funding, or practices that help the implementation of mitigation actions, while facilitate is defined as programs, plans, policies, regulations, funding, or practices that make implementing actions easier.





**C.1.5 DEPARTMENT OF HAWAIIAN HOME LANDS**

Table C-9 includes information on hazard mitigation related capabilities for the Department of Hawaiian Home Lands (DHHL).

*Table C-9. Department of Hawaiian Home Lands Capabilities*

Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation	
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict		
<p><b>Description:</b> <i>The primary responsibilities of the Department of Hawaiian Home Lands (DHHL) are to serve its beneficiaries and manage its extensive land trust. The land trust consists of over 200,000 acres on the Islands of Hawai'i, Maui, Moloka'i, Lāna'i, O'ahu, and Kaua'i. These lands are developed and distributed to native Hawaiian beneficiaries by way of residential, agricultural, and pastoral leases for 99-year terms with lease payments of \$1.00 per year. Some parcels are designated for income-producing purposes and are general leased for industrial, retail, or other uses.</i></p>								
<b>DHHL Land Trust</b>	<b>Capability Category and Description:</b>	<p>Planning and Regulatory</p> <p>Much of the properties originally designated as Hawaiian Home Lands were in remote or otherwise undesirable locations, and prone to natural and man-made hazards. Therefore, during the planning and design of subdivisions, the department evaluates the potentials for hazards, (such as flooding, rockfalls, lava flows, contamination from prior agricultural uses, unexploded ordinance (UXO) from former military uses) and ensures that proper mitigation measures are taken before awarding leases.</p> <p>DHHL coordinates with other federal, state and county agencies to address problems that span beyond the boundaries of Hawaiian Home Lands. Examples are the Waianae Coast Emergency Access Road and Secondary Access Road; flooding in Mapunapuna, O'ahu, and Kalamaula, Moloka'i; reservoir and dam inspections and repairs in Anahola, Kaua'i and elsewhere.</p> <p>DHHL is not subject to State Land Use Laws and County zoning regulations. Otherwise development complies with Federal, State, and County requirements – especially where health and safety are concerned.</p>						
	<b>Notable Changes:</b>	None identified.						
	<b>Challenges:</b>	None identified.						
	<b>Opportunities:</b>	None identified.						
	<b>Effect on Future Conditions:</b>	Reduces the likelihood for impacts of climate change to be felt by residents and visitors						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	Food, Water, Shelter; Safety and Security; Hazardous Material; Safety and Security						
	<b>Hazards:</b>	Flood, Climate Change, Infrastructure Failure, Drought, Earthquake, Hazardous Materials, Health Risks, Windstorm, Hurricane, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire						
	<b>State HMP Goals:</b>	1, 2, 3	◆		◆	◆		

a. Support is defined as programs, plans, policies, regulations, funding, or practices that help the implementation of mitigation actions, while facilitate is defined as programs, plans, policies, regulations, funding, or practices that make implementing actions easier.





## C.1.6 DEPARTMENT OF HEALTH

The Department of Health is a large department with many mitigation-related capabilities. Table C-10 includes information on hazard mitigation related capabilities for the Environmental Management Division (EMD), Table C-11 includes information for the Health Resources Administration (HRA), Table C-12 includes information on the Office of Public Health Preparedness, Table C-13 includes information for the Office of Environmental Quality Control.

*Table C-10. Environmental Health Administration Capabilities*

Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<b>ENVIRONMENTAL MANAGEMENT DIVISION</b>							
<i>Description: EMD is responsible for implementing and maintaining statewide programs for controlling air and water pollution, for assuring safe drinking water, and for the proper management of solid and hazardous waste. The division also regulates the state's wastewater.</i>							
<b>CLEAN WATER BRANCH</b>							
<i>Description: The Clean Water Branch (CWB) protects the public health of residents and tourists who enjoy playing in and around the State of Hawaii's coastal and inland water resources. The CWB also protects and restores inland and coastal waters for marine life and wildlife. This is accomplished through statewide coastal water surveillance and watershed-based environmental management through a combination of permit issuance, monitoring, enforcement, sponsorship of polluted runoff control projects, and public education.</i>							
<b>NPDES Wastewater Discharge Permits</b>	<b>Capability Category and Description:</b>	Planning and Regulatory Issues National Pollution Discharge Elimination System (NPDES) wastewater discharge permits for industries discharging wastewater/ process water to surface waters of the state to ensure compliance with state and federal water quality standards for environmental health and recreation purposes.					
	<b>Notable Changes:</b>	Office moved to 2827 Waimano Home Road, Pearl City, HI 96782.					
	<b>Challenges:</b>	Establish and fill vacant positions. Permits contested by permittees. Finish workplan commitments.					
	<b>Opportunities:</b>	Standardize procedures, process, requirements, and conditions; Factor in considerations of sea level rise and updated flood plain and storm surge maps into the development of permit conditions to reduce instances of illicit discharge of wastewater pollutants because of flooding.					
	<b>Effect on Future Conditions:</b>	Reduces likelihood of contaminants in flood waters					
	<b>Equitable Outcomes:</b>	Reduces potential exposure to contaminants					
	<b>Community Lifelines:</b>	Health and Medical; Hazardous Material; Safety and Security					
	<b>Hazards:</b>	Flood, Hazardous Materials, Health Risks					
	<b>State HMP Goals:</b>	1, 2		◆			◆





Capability	Description	Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<b>Clean Water Act Section 401 Water Quality Certifications</b>	<b>Description</b>	Planning and Regulatory Issues Clean Water Act Section 401 water quality certifications for federal permit for construction in nearshore and inland waters. Identifies sources of water pollution through area surveillance, routine inspections, and compliant investigations.					
	<b>Notable Changes:</b>	Notify public when beach fecal testing result exceeds 130 CFU/100ml by email, website update and posting sign.					
	<b>Challenges:</b>	Establish and fill vacant positions. Permits contested by permittees. Finish workplan commitments.					
	<b>Opportunities:</b>	None identified					
	<b>Effect on Future Conditions:</b>	Reduces likelihood of contaminants in waters					
	<b>Equitable Outcomes:</b>	Reduces potential exposure to contaminants					
	<b>Community Lifelines:</b>	Health and Medical; Hazardous Material; Safety and Security					
	<b>Hazards:</b>	Flood, Hazardous Materials, Health Risks					
<b>State HMP Goals:</b>	1, 2		◆	◆			
<b>Polluted Runoff Control Program</b>	<b>Capability Category and Description:</b>	Planning and Regulatory The Polluted Runoff Control Program’s mission is to protect and improve the quality of Hawaii’s water resources by preventing and reducing nonpoint source pollution. To achieve its mission, the PRC Program updates and implements Hawaii’s Nonpoint Source Management Plan (2015-2020). Each year, the PRC Program uses Clean Water Act Section 319(h) funds to provide grants for polluted runoff projects in Hawai’i.					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	Grant recipients must provide 25% matching funds or in-kind contributions from non-federal sources for the 319(h) grant program.					
	<b>Opportunities:</b>	Although primarily focused on water quality, runoff control projects may also aid in mitigation-related goals.					
	<b>Effect on Future Conditions:</b>	Reduces likelihood of contaminants in waters					
	<b>Equitable Outcomes:</b>	Reduces potential exposure to contaminants					
	<b>Community Lifelines:</b>	Health and Medical; Hazardous Material; Safety and Security					
	<b>Hazards:</b>	Drought, Flood					
<b>State HMP Goals:</b>	1, 2	◆			◆		◆ (F)







Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<b>WASTEWATER BRANCH</b>							
<i>Description: The Wastewater branch oversees several programs including water pollution control and municipal and private wastewater treatment works.</i>							
<b>Act 125 and Cesspool Pilot Grant Program (CPGP)</b>	<b>Capability Category and Description:</b>	Planning and Regulatory					
		Act 125 was passed in the 2017 legislative session and require the replacement of all cesspools by 2050. It directs the Hawai'i Department of Health (DOH) to evaluate residential cesspools in the state, develop a Report to the Legislature that includes a prioritization method for cesspool upgrades, and work with the Department of Taxation on possible funding options to reduce the financial burden on homeowners. The purpose of CPGP is to assist low- and moderate-income property owners with converting, upgrading or connecting cesspools to a more environmentally appropriate method of managing and treating wastewater.					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	Legacy cesspools – 88,000 cesspools identified across the state that pose a significant risk to safe drinking water quality standards and are impacting near shore marine ecosystems					
	<b>Opportunities:</b>	Fully implement the public-private cost share program to incentivize upgrades (i.e., Action 2023-2018-033).					
	<b>Effect on Future Conditions:</b>	Reduces likelihood of contaminants in waters					
	<b>Equitable Outcomes:</b>	Reduces financial burden of cesspools and upgrades to a more environmentally appropriate method of managing and treating wastewater					
	<b>Community Lifelines:</b>	Health and Medical; Hazardous Material; Safety and Security; Food, Water, Shelter					
	<b>Hazards:</b>	Hazardous Materials					
<b>State HMP Goals:</b>	1, 2, 7		◆		◆		◆
<b>SOLID AND HAZARDOUS WASTE BRANCH</b>							
<i>Description: The Solid and Hazardous Waste branch oversees several programs including the hazardous waste section and underground storage tank section.</i>							
<b>Underground Storage Tank Section Regulations</b>	<b>Capability Category and Description:</b>	Planning and Regulatory					
		Regulates underground storage tanks that store petroleum or hazardous substances.					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	None identified.					
	<b>Effect on Future Conditions:</b>	Reduces likelihood of hazardous contaminants					
	<b>Equitable Outcomes:</b>	Reduces likelihood of exposure to hazardous contaminants					
	<b>Community Lifelines:</b>	Health and Medical; Hazardous Material; Safety and Security					
	<b>Hazards:</b>	Drought, Flood, Health Risks					
<b>State HMP Goals:</b>	1		◆		◆		





Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<b>SAFE DRINKING WATER BRANCH</b>							
<i>Description: Assess and determine the integrity of drinking water supply and distribution system infrastructure, ensure drinking water supplies comply with safe drinking water quality standards, and identify alternative safe drinking water supplies if water quality is compromised.</i>							
Safe Drinking Water Emergency FAQs	<b>Capability Category and Description:</b>	Education, Outreach, and Capacity Building Frequently asked questions pertaining to drinking water during emergencies.					
	<b>Notable Changes:</b>	These FAQs are periodically updated.					
	<b>Challenges:</b>	During a large-scale statewide disaster, limited technical staff are mostly located on O‘ahu.					
	<b>Opportunities:</b>	The SDWB has proactively developed disaster FAQs (coordinated with County water supply entities) relating to drinking water treatment, use of alternative supplies, and posted them on their website: <a href="http://health.Hawaii.gov/sdwb/files/2014/08/DrinkWaterFAQinEmergency.pdf">http://health.Hawaii.gov/sdwb/files/2014/08/DrinkWaterFAQinEmergency.pdf</a>					
	<b>Effect on Future Conditions:</b>	None identified.					
	<b>Equitable Outcomes:</b>	Provides answers to potential questions regarding drinking water					
	<b>Community Lifelines:</b>	Health and Medical; Hazardous Material; Safety and Security					
	<b>Hazards:</b>	Health Risks					
<b>State HMP Goals:</b>	1, 5		◆		◆		
<b>ENVIRONMENTAL HEALTH SERVICES DIVISION (EHSD)</b>							
<i>Description: EHSD is responsible for implementing and maintaining statewide programs to assure the safety of food and drugs, control noise and radiation, and improve indoor air quality. The division is also responsible for lead abatement, sanitation, and vector control (rats, mosquitoes, and other public health threats).</i>							
<b>SANITATION BRANCH</b>							
<i>Description: Protects and promotes the health and well-being of Hawaii’s residents and visitor with professionalism, integrity and fairness through education and regulation in the areas of food safety, disease prevention, community sanitation and emergency response</i>							
Mass Feeding Operations	<b>Capability Category and Description:</b>	Disaster Response/Recovery Ensure sanitation of food supply and handling for mass feeding operations as a function of emergency shelter support					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	Opportunities may present themselves as political climates change.					
	<b>Effect on Future Conditions:</b>	None identified.					
	<b>Equitable Outcomes:</b>	Increases food safety if disadvantaged individuals need the use of emergency sheltering					





Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
	<b>Community Lifelines:</b>	Health and Medical; Hazardous Material; Safety and Security; Food, Water, Shelter					
	<b>Hazards:</b>	Health Risks					
	<b>State HMP Goals:</b>	4, 5		◆		◆	
<b>INDOOR AND RADIOLOGICAL HEALTH BRANCH</b>							
<i>Description: The Indoor and Radiological Health Branch is responsible for the implementation of diverse, statewide programs in community noise, radiation control, air-conditioning/ventilation, indoor air quality, asbestos, and lead-based paint."</i>							
<b>Radiation Section- Radiation Assessment Team (RAT)</b>	<b>Capability Category and Description:</b>	Disaster Response/Recovery Radiological emergency response, WMD/CBRNE emergency response and rapid assessment of radiation exposure and environmental contamination. Assist in radiological decontamination.					
	<b>Notable Changes:</b>	In process of developing radiological response public health emergency response annex to the Department of Health's All-Hazards Emergency Response Plan					
	<b>Challenges:</b>	None identified					
	<b>Opportunities:</b>	None identified					
	<b>Effect on Future Conditions:</b>	None identified.					
	<b>Equitable Outcomes:</b>	Reduces likelihood of exposure to hazardous contaminants					
	<b>Community Lifelines:</b>	Health and Medical; Hazardous Material; Safety and Security					
	<b>Hazards:</b>	Hazardous Materials, Health Risks (Radiological exposure and contamination)					
	<b>State HMP Goals:</b>	5		◆	◆		
<b>VECTOR CONTROL BRANCH</b>							
<b>Vector Control Program</b>	<b>Capability Category and Description:</b>	Planning and Regulatory Strategically aims to lessen risks of arboviral and vector borne diseases by suppressing vector populations (organisms capable of transmitting disease or parasites from one animal to another)					
	<b>Notable Changes:</b>	Since the State's response to the 2015 Dengue outbreak on the Big Island, HDOH has created a total of 30 new positions statewide to restore the capabilities of the Vector Control Program that had been substantially impacted by budget cuts in 2008. The program has additionally upgraded its inventory of pesticidal abatement products and various types of equipment used for vector control. Additionally, the program has expanded its preventative measures to include routine larval breeding source reduction and surveillance at ports of entry, vector suppression activities in weeks preceding major events that attract large and international crowds, door-to-door					





Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation	
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict		
		public education, and mosquito suppression activities in areas of high concentrations of elderly populations and around schools.						
	<b>Challenges:</b>	Public perception and resistance to pesticide applications utilized in vector control efforts; Conflicts of interest with organic farmers						
	<b>Opportunities:</b>	Increased availability of pesticides for mosquito abatement that meet organic certification requirements						
	<b>Effect on Future Conditions:</b>	Reduces likelihood of disease transmission as temperatures increase with climate change						
	<b>Equitable Outcomes:</b>	Reduces likelihood of exposure to disease						
	<b>Community Lifelines:</b>	Health and Medical; Hazardous Material; Safety and Security						
	<b>Hazards:</b>	Health Risks (Vector borne diseases)						
	<b>State HMP Goals:</b>	5	◆	◆	◆	◆		
<b>HAZARD EVALUATION AND EMERGENCY RESPONSE OFFICE (HEER)</b>								
<i>Description: The HEER Office is responsible for responding to releases, threats of releases, or discoveries of hazardous substances, including oil, that present a substantial endangerment to public health or the environment. Maintains environmental response programs for planning for, responding to, and preventing releases of hazardous substances into the environment</i>								
<b>Hawai`i Emergency Planning and Community Right to Know Act (HEPCRA)</b>	<b>Capability Category and Description:</b>	Planning and Regulatory HEPCRA establishes requirements for State, local and industry regarding emergency planning and “Community Right-to-Know” reporting required on hazardous and toxic chemicals. There are four major provisions: Emergency Response Planning, Emergency Release Reporting, Hazardous Chemical Storage and Tier II Reporting, and Toxic Release Inventory Reporting. The HEPCRA establishes the Hawai`i State Emergency Response Commission and the Local Emergency Planning Committees.						
	<b>Notable Changes:</b>	None identified						
	<b>Challenges:</b>	None identified						
	<b>Opportunities:</b>	None identified						
	<b>Effect on Future Conditions:</b>	None identified						
	<b>Equitable Outcomes:</b>	Informs communities of potential likelihood of exposure to hazardous contaminants						
	<b>Community Lifelines:</b>	Health and Medical; Hazardous Material; Safety and Security						
	<b>Hazards:</b>	Hazardous Materials						
<b>State HMP Goals:</b>	3, 5	◆	◆	◆	◆			
<b>Red Hill FAQs</b>	<b>Capability Category and Description:</b>	Education, Outreach, and Capacity Building Frequently asked questions pertaining to the Red Hill Water Contamination are posted on the main DOH Red Hill website.						
	<b>Notable Changes:</b>	FAQs posted and updated after each Red Hill fuel or chemical spill.						





Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
	<b>Challenges:</b> Information is often classified by the U.S. Navy, so FAQs do not provide answers to all health concerns. <b>Opportunities:</b> None identified. <b>Effect on Future Conditions:</b> None identified. <b>Equitable Outcomes:</b> Provides answers to potential questions regarding water contamination <b>Community Lifelines:</b> Health and Medical; Hazardous Material; Safety and Security; Food, Water, Shelter <b>Hazards:</b> Health Risks <b>State HMP Goals:</b> 1, 5		◆	◆			
<b>On-Scene Coordinators</b>	<b>Capability Category and Description:</b> Disaster Response/Recovery HEER has State On-Scene Coordinators, also known as Environmental Emergency Responders, who are primary responders/cleanup coordinators to any hazardous material releases caused by natural or human-caused hazards. <b>Notable Changes:</b> None identified. <b>Challenges:</b> None identified. <b>Opportunities:</b> None identified. <b>Effect on Future Conditions:</b> None identified. <b>Equitable Outcomes:</b> None identified. <b>Community Lifelines:</b> Health and Medical; Hazardous Material; Safety and Security <b>Hazards:</b> Earthquake, Flood, Health Risks, Tsunami, Volcanic, Wildfire, Windstorm <b>State HMP Goals:</b> 3		◆	◆			
<b>STATE LABORATORIES DIVISION</b>							
Description: <i>State Laboratories Division (SLD) conducts laboratory testing in support of environmental and public health programs statewide. SLD also conducts research, laboratory science investigations, and participates in emergency response efforts such as bioterrorism preparedness and monitoring for environmental contaminants.</i>							
<b>Laboratory Preparedness and Response Program</b>	<b>Capability Category and Description:</b> Administrative and Technical Conducts analysis in support of laboratory preparedness programs for bioterrorism and chemical terrorism, environmental health and communicable disease monitoring and control activities and investigations <b>Notable Changes:</b> None identified <b>Challenges:</b> Aging physical infrastructure <b>Opportunities:</b> Harden state laboratory facilities (i.e., Action 2023-2018-034) <b>Effect on Future Conditions:</b> None identified. <b>Equitable Outcomes:</b> None identified. <b>Community Lifelines:</b> Health and Medical; Hazardous Material; Safety and Security						





Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
	<b>Hazards:</b>	Hazardous Materials, Health Risks, Terrorism (Bioterrorism, chemical terrorism, infectious disease, and environmental health risks)					
	<b>State HMP Goals:</b>	3,4	◆	◆	◆		

- a. Support is defined as programs, plans, policies, regulations, funding, or practices that help the implementation of mitigation actions, while facilitate is defined as programs, plans, policies, regulations, funding, or practices that make implementing actions easier.
- b. (F) = Federal grant funding supports in full or in part

**Table C-11. Health Resource Administration Capabilities**

Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<b>DISEASE OUTBREAK CONTROL DIVISION</b>							
Description: The Disease Outbreak Control Division (DOCD) comprises the Disease Investigation Branch and Immunization Branch. These programs work together to monitor, investigate, prevent, and control infectious diseases in Hawai'i, especially those preventable through immunizations, and to ensure Hawai'i's ability to respond to emergencies that threaten the public's health.							
<b>DISEASE INVESTIGATION BRANCH</b>							
<b>Epidemiological Surveillance</b>	<b>Capability Category and Description:</b>	Administrative and Technical Conducts surveillance monitoring, investigation, and control of infectious diseases and potential acts of terrorism throughout the State (conducted jointly with the CDC)					
	<b>Notable Changes:</b>	The COVID-19 pandemic has brought increases in temporary staffing. The Disease Investigation Branch has developed the capacity to rapidly scale contract tracing and case investigation. This could be useful in future pandemics assuming adequate funding and procurement support. Development of the Health Care Associated Infections and Data Science Office Teams with plans to reorganize into branches and offices as appropriate. Continued improvement of the Hawai'i Electronic Disease Surveillance System (HI-EDSS/Maven) Continued improvement of the Hawai'i Electronic Laboratory Reporting System (ELR)					
	<b>Challenges:</b>	<ul style="list-style-type: none"> <li>• Anticipated federal funding to pre-pandemic levels.</li> <li>• Position vacancies due to staff turnover and challenges in recruitment.</li> <li>• Fluctuations in federal funding.</li> <li>• Lack of adequate fiscal/administrative support personnel.</li> <li>• Competing priorities of disease outbreaks.</li> </ul>					
	<b>Opportunities:</b>	<ul style="list-style-type: none"> <li>• State funding for key personnel currently federally funded which in nature fluctuates and can be unstable (e.g., epidemiologists, data scientists, infection preventionists.) State funding for additional fiscal/administrative support personnel</li> <li>• State funding for additional investigative personnel on neighboring islands.</li> </ul>					





Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation	
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict		
		<ul style="list-style-type: none"> <li>State funding for maintenance, support, and improvements to information technology systems - e.g., HI-EDSS, ELR</li> </ul>						
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	Health and Medical; Hazardous Material; Safety and Security						
	<b>Hazards:</b>	Health Risks (Infectious Diseases)						
	<b>State HMP Goals:</b>	3, 4	◆		◆			
<b>IMMUNIZATIONS BRANCH</b>								
<i>Description: Promotes immunization of public, both adults and children, against vaccine preventable diseases.</i>								
<b>Immunization Programs</b>	<b>Capability Category and Description:</b>	Administrative and Technical Facilitates access to vaccines for protection of persons not able to pay for vaccines. Continue to grow and maintain complex vaccine distribution processes for multiple federal vaccination programs (e.g. COVID 19, mpox, VFC). Currently have over 200 established federal vaccine providers and over 300 specialty vaccine providers (e.g. COVID 19, mpox.) Distributes federal resources and establishes contracts for emergency vaccine administration and distribution						
	<b>Notable Changes:</b>	During the COVID 19 pandemic the program has distributed / administered over 2.8 million doses of COVID 19 vaccines. This is equivalent to over 12 years of routine vaccine distribution. The Hawai'i immunization registry became functional in early 2021 in capturing provider vaccine administration data. This continues to build the information sharing capacity of providers with state and federal entities to identify vaccine deserts for equitable distribution and administration. The annual Stop Flu at School program was stopped due to increased community provider capacity to engage schools due to the COVID 19 pandemic.						
	<b>Challenges:</b>	Unstable funding – While COVID 19 has brought increased federal funding this is anticipated to return to pre-pandemic levels. The pandemic emphasized populations at greater risk of infection due to limited immunization resources. State funding will be essential to continuing to reduce these disparities by supporting the vaccine infrastructure, community and provider outreach, and education. Position vacancies - The immunization program continues to face challenges in recruiting and retaining immunization staff and experts due to the nature of federal funding and the state hiring system. Competing priorities with outbreaks of vaccine-preventable diseases, such as mpox, hepatitis A and mumps, which divert staff resources to concentrate on the outbreak leaving little time to concentrate fully on other immunization activities.						
	<b>Opportunities:</b>	State general funding would provide continuity of staffing and infrastructure capacity as federal funding fluctuates and will diminish from pandemic levels Continued exploration of recruitment and retention efforts is needed. Exploring private public partnership for mobile and fixed site vaccination.						
	<b>Effect on Future Conditions:</b>	None identified.						





Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation	
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict		
	<b>Equitable Outcomes:</b>	Access to vaccinations						
	<b>Community Lifelines:</b>	Health and Medical; Hazardous Material; Safety and Security						
	<b>Hazards:</b>	Health Risks (Infectious diseases)						
	<b>State HMP Goals:</b>	3, 4	◆			◆		

a. Support is defined as programs, plans, policies, regulations, funding, or practices that help the implementation of mitigation actions, while facilitate is defined as programs, plans, policies, regulations, funding, or practices that make implementing actions easier.

**Table C-12. Office of Public Health Preparedness Capabilities**

Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation	
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict		
<b>Description:</b> Responsible for coordinating the department’s all-hazards emergency preparedness and response planning efforts; facilitating training and exercising for the entire department to ensure the department’s ability to respond to and support recovery from public health emergencies.								
<b>Department of Health All-Hazards Training and Exercise Program</b>	<b>Capability Category and Description:</b>	Disaster Response/Recovery Facilitates training and exercises for the entire department to ensure the department’s ability to respond to and support recovery from public health emergencies						
	<b>Notable Changes:</b>	None identified						
	<b>Challenges:</b>	Staffing vacancies, unstable funding						
	<b>Opportunities:</b>	Public Health Preparedness Branch is internally being reorganized as an office under the Director of Health						
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	Health and Medical; Safety and Security						
	<b>Hazards:</b>	Flood, Climate Change, Infrastructure Failure, Drought, Earthquake, Hazardous Materials, Health Risks, Windstorm, Hurricane, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire						
<b>State HMP Goals:</b>	2, 3, 4, 5	◆	◆	◆	◆		◆	
<b>Medical Countermeasure (MCM) Points of Distribution (PODs)</b>	<b>Capability Category and Description:</b>	Disaster Response/Recovery HDOH Public Health Preparedness Branch manages the receipt and distribution of the Strategic National Stockpile (SNS), a repository of antibiotics, vaccines, chemical antidotes, antitoxins, and other critical medical equipment necessary for a public health emergency (e.g., infectious disease outbreak or chemical attack)						







Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
	<b>Notable Changes:</b>	HDOH has increased the number of partnerships with key business sectors and industries across the state to provide Closed Points of Distribution (PODs) to enhance the efficiency of prophylaxis distribution, reduce volume of population reliant upon Open PODs operated by the state, and increase the continuity and resilience of key businesses and sectors during a public health emergency (i.e. infectious disease outbreak)					
	<b>Challenges:</b>	Limited HDOH staff resources available for rapid distribution and staffing of PODs					
	<b>Opportunities:</b>	Continue to build partnerships and establish Closed PODs for major industries and sectors necessary to maintain critical functions of government and commerce necessary for emergency response and recovery efforts. Expand inventory of locations capable of supporting Open PODs and agreements with other agencies for staffing.					
	<b>Effect on Future Conditions:</b>	None identified.					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Health and Medical; Hazardous Material; Safety and Security					
	<b>Hazards:</b>	Health Risks (Infectious disease/ chemical-biological attack response)					
	<b>State HMP Goals:</b>	3		◆	◆		
<b>Hospital Preparedness Program (HPP)</b>	<b>Capability Category and Description:</b>	Disaster Response/Recovery Supports the continuity of healthcare system operations during emergencies that exceed the day-to-day capacity of health and emergency response systems through the development and sustainment of a regional health care coalition that incentivizes healthcare organizations to work together to maintain essential capabilities of statewide healthcare services.					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	Unstable federal funding					
	<b>Opportunities:</b>	None identified.					
	<b>Effect on Future Conditions:</b>	None identified.					
	<b>Equitable Outcomes:</b>	Continues access to medical assistance if needed					
	<b>Community Lifelines:</b>	Health and Medical; Safety and Security					





Capability			Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
			Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
	<b>Hazards:</b>	Health Risks						
	<b>State HMP Goals:</b>	2, 3	◆	◆		◆		◆

Table C-13. Office of Environmental Quality Control Capabilities

Capability			Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
			Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<b>Hawai'i Environmental Policy Act (HEPA)</b>	<b>Capability Category and Description:</b>	Planning and Regulatory Requires an environmental review process for state agency actions. This review process includes consideration of sensitive areas (such as floodplains and geologically hazardous areas).						
	<b>Notable Changes:</b>	None identified						
	<b>Challenges:</b>	None identified						
	<b>Opportunities:</b>	None identified						
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	Safety and Security						
	<b>Hazards:</b>	Flood, Earthquake, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire						
	<b>State HMP Goals:</b>	1, 2	◆		◆			

a. Support is defined as programs, plans, policies, regulations, funding, or practices that help the implementation of mitigation actions, while facilitate is defined as programs, plans, policies, regulations, funding, or practices that make implementing actions easier.





## C.1.7 DEPARTMENT OF LABOR AND INDUSTRIAL RELATIONS

The tables below includes information on hazard mitigation related capabilities for the Department of Labor and Industrial Relations (DLIR). Table C-14 includes information for the Office of Community Services (OCS) and Table C-15 includes information for the State Fire Council (SFC).

*Table C-14. Office of Community Services Capabilities*

Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<b>Weatherization Assistance Program</b>	<b>Capability Category and Description:</b>	Financial The OCS administers the Weatherization Assistance Program (WAP) under a grant from the U.S. Department of Energy (DOE). WAP helps low-income families and individuals reduce their energy bill by installing weatherization measures into their homes and by providing education to the participants and community about energy efficiency.					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	Low-flow showerheads and faucet aerators are pre-approved on the Hawaii’s Weatherization Assistance Program Priority List for Single-Family Homes.					
	<b>Effect on Future Conditions:</b>	None identified.					
	<b>Equitable Outcomes:</b>	Provides community members with funds to reduce their energy bill by installing weatherization measures into their homes					
	<b>Community Lifelines:</b>	Energy; Food, Water, Shelter					
	<b>Hazards:</b>	Drought					
<b>State HMP Goals:</b>	7	◆		◆	◆		◆ (F)

a. Support is defined as programs, plans, policies, regulations, funding, or practices that help the implementation of mitigation actions, while facilitate is defined as programs, plans, policies, regulations, funding, or practices that make implementing actions easier.  
 b. (F) = Federal grant funding supports in full or in part





Table C-15. State Fire Council Capabilities

Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
State Fire Council	<b>Capability Category and Description:</b>	<p>Administrative and Technical</p> <p>The State Fire Council (SFC) is an administrative agency attached to the State of Hawai'i, Department of Labor and Industrial Relations and recognized, for all intents and purposes, as Hawaii's equivalent of the State Fire Marshal's Office. Comprised of the four county Fire Chiefs and an administrative support staff, the SFC's primary mission is to develop and support a comprehensive fire service emergency management network for the protection of life, property, and the environment for the State. Through a collaborative and unified approach, the SFC promotes the standardization of fire service reporting, training, sharing of technology, resources, and best practices.</p> <p>In accordance with Hawai'i Revised Statutes (HRS) §132, the SFC is tasked with the adoption of the State Fire Code and the support and assistance with federal grant programs for the fire service in Hawai'i. The SFC may advise and assist the county fire departments where appropriate; prescribe standard procedures and forms related to inspections, investigations, and reporting of fires; and advise the Governor and State Legislature on issues relating to fire prevention and protection, life safety, and other functions or activities of the various county fire departments.</p>					
	<b>Notable Changes:</b>	None identified					
	<b>Challenges:</b>	None identified					
	<b>Opportunities:</b>	<p>The SFC has identified several continuous improvement initiatives including several that are particularly relevant for hazard mitigation:</p> <ul style="list-style-type: none"> <li>• Develop or adopt a Statewide Interagency Wildfire Mitigation Plan, which may include mutual aid agreements, hazard identification and monitoring systems, training, and public awareness/education programs</li> <li>• Develop or update as needed mutual aid plans and agreements to assist the fire service during statewide technological and/or natural disasters.</li> </ul>					
	<b>Effect on Future Conditions:</b>	None identified					
	<b>Equitable Outcomes:</b>	None identified					
	<b>Community Lifelines:</b>	Safety and Security; Communications					
	<b>Hazards:</b>	Wildfire					
<b>State HMP Goals:</b>	1, 2	◆	◆	◆	◆		

a. Support is defined as programs, plans, policies, regulations, funding, or practices that help the implementation of mitigation actions, while facilitate is defined as programs, plans, policies, regulations, funding, or practices that make implementing actions easier.





## C.1.8 DEPARTMENT OF LAND AND NATURAL RESOURCES

The Department of Land and Natural Resources is a large department with many mitigation-related capabilities. Table C-16 includes information on hazard mitigation related capabilities for the Commission on Water Resource Management (CWRM), Table C-17 includes information for the Division of Forestry and Wildlife, Table C-18 includes information for the Engineering Division, Table C-19 includes information for the Historic Preservation Division (SHPD), Table C-20 includes information on the Land Division, Table C-21 includes information on the Office of Conservation and Coastal Lands, and Table C-22 includes information on the State Board of Land and Natural Resources.

*Table C-16. Commission on Water Resources Management Capabilities*

Capability	Type of Hazard Management Capability	Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation	
		Pre-Disaster	Post-Disaster	Support		Facilitate
<b>Commission on Water Resources Management</b>	<b>Capability Category and Description:</b>	Administrative and Technical The CWRM works to preserve and enhance water resources. It provides staffing and technical support for the Hawai'i Drought Council and its various task forces and committees and works with the Board of Water Supply, the counties, and the DOFAW to develop drought and wildland fire response, preparedness, and mitigation plans.				
	<b>Notable Changes:</b>	The Hawai'i Drought Plan was updated in 2017				
	<b>Challenges:</b>	None identified.				
	<b>Opportunities:</b>	None identified.				
	<b>Effect on Future Conditions:</b>	None identified				
	<b>Equitable Outcomes:</b>	None identified				
	<b>Community Lifelines:</b>	Food, Water, Shelter				
	<b>Hazards:</b>	Drought, Wildfire				
<b>State HMP Goals:</b>	1, 2, 3	◆	◆	◆		

a. Support is defined as programs, plans, policies, regulations, funding, or practices that help the implementation of mitigation actions, while facilitate is defined as programs, plans, policies, regulations, funding, or practices that make implementing actions easier.





Table C-17. Division of Forestry and Wildlife

Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<b>Description:</b> The mission of DLNR’s Division of Forestry and Wildlife is to responsibly manage and protect watersheds, native ecosystems, and cultural resources and provide outdoor recreation and sustainable forest products opportunities, while facilitating partnerships, community involvement and education. Mālama i ka ‘āina.							
<b>FORESTRY PROGRAM</b>							
Forest Reserve System (FRS)	<b>Capability Category and Description:</b>	Education, Outreach, and Capacity Building The Forest Reserve System (FRS) was created by the Territorial Government of Hawai‘i through Act 44 on April 25, 1903. It accounts for more than 678,612 acres of state management land. The Division of Forestry and Wildlife (DOFAW) provides recreational and hunting opportunities; aesthetic benefits; watershed restoration; native, threatened, and endangered species habitat protection and management; cultural resources; and fire protection among many other things. Freshwater replenishment is a key component of the FRS.					
	<b>Notable Changes:</b>	Growth in FRS through acquisitions of private lands.					
	<b>Challenges:</b>	Nearly half of Hawaii’s native forests have been lost due to invasive species (DOFAW 2017). Forest loss continues due to conversion to other uses and/or impact by grazing animals.					
	<b>Opportunities:</b>	Carbon sequestration for climate change mitigation. Protection of watersheds					
	<b>Effect on Future Conditions:</b>	None identified					
	<b>Equitable Outcomes:</b>	None identified					
	<b>Community Lifelines:</b>	Safety and Security					
	<b>Hazards:</b>	Climate Change, Drought, Hurricane, Wildfire					
	<b>State HMP Goals:</b>	2	◆		◆		
Hawai‘i Forest Action Plan	<b>Capability Category and Description:</b>	Planning and Regulatory The DLNR-DOFAW is the lead agency in the development of the Hawai‘i Forest Action Plan. The plan identifies nine priority areas for Hawaii’s forests that include: water quality and quantity; forest health, invasive species, insects and disease; wildfire; urban and community forestry; climate change and sea level rise; conservation of native biodiversity; hunting, nature-based recreation, and tourism; forest products and carbon sequestration; and US tropical island state and territorial issues (DOFAW, 2016).					
	<b>Notable Changes:</b>	The Hawai‘i Statewide Assessment of Forest Conditions and Trends (2010) was updated and renamed the Hawai‘i Forest Action Plan (2016)					
	<b>Challenges:</b>	Data gaps					
	<b>Opportunities:</b>	Plan will be revisited in 2021.					
	<b>Effect on Future Conditions:</b>	Addresses reduction of wildfire threat					
	<b>Equitable Outcomes:</b>	None identified					
	<b>Community Lifelines:</b>	Safety and Security; Food, Water, Shelter					
<b>Hazards:</b>	Climate Change, Drought, Flood, Hurricane, Landslide and Rockfall, Tsunami, Wildfire						





Capability			Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
			Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
	<b>State HMP Goals:</b>	2	◆		◆			
<b>Conservation Reserve Enhancement Programs (CREP)</b>	<b>Capability Category and Description:</b>	Financial The Conservation Reserve Enhancement Program (CREP) is a federal-state natural resources conservation program that addresses state and nationally significant agricultural related environmental concerns. Through CREP, program participants receive financial incentives from U.S. Department of Agriculture (USDA) and the State to voluntarily enroll in the Conservation Reserve Enhancement Program in contracts of 15 years. Participants are asked to convert degraded lands to native trees, shrubs, and grasses. The primary goals of the project are to enhance wildlife habitat and control invasive species, as well as improve water quality and quantity, increase groundwater recharge, improve near shore coral reef health and diversity by filtering agricultural runoff and increasing water condensation in the uplands.						
	<b>Notable Changes:</b>	The program seeks to enroll 15,000 acres of eligible land in 15-year agreements within the following counties: Hawai'i, Maui, Kaua'i, and City and County of Honolulu. As of January 2017, 1,168 acres of land have been enrolled in the program.						
	<b>Challenges:</b>	Flooding, landslides, climate change						
	<b>Opportunities:</b>	Agricultural diversification, climate mitigation through carbon sequestration						
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	Safety and Security; Food, Water, Shelter						
	<b>Hazards:</b>	Drought, Flood, Wildfire						
	<b>State HMP Goals:</b>	1, 2, 3		◆			◆	◆ (F)
	<b>Hawai'i Forest Legacy Program</b>	<b>Capability Category and Description:</b>	Financial Protects private forestlands from being converted to non-forest uses via a federal grant program. This program provides willing private landowners the opportunity to sell fee simple property, or conservation easement use-rights on their land to the State of Hawai'i for the purpose of preserving or restoring uniquely forested areas. The Forest Legacy Program targets forest land as identified in the Assessment of Needs (AON).					
<b>Notable Changes:</b>		The AON was first established in 1994, amended in 2004 and again in 2017 and is in the final draft form at the time of the hazard mitigation plan update (DOFAW 2017b).						
<b>Challenges:</b>		Volunteer program, competing land uses, funding						
<b>Opportunities:</b>		Preservation of threatened forest land from conversion						
<b>Effect on Future Conditions:</b>		Reduces threat of wildfire to structures						
<b>Equitable Outcomes:</b>		None identified.						
<b>Community Lifelines:</b>		Food, Water, Shelter						
<b>Hazards:</b>		Climate Change, Wildfire						
<b>State HMP Goals:</b>		1, 2, 5		◆			◆	◆
<b>Kaulunai Urban &amp;</b>		<b>Capability Category</b>	Financial					





Capability			Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
			Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<b>Community Forestry Program</b>	<b>and Description:</b>	Focuses on improving the health and viability of trees in Hawai'i communities through educational programs; financial support in the form of cost-share grants; technical training; Arbor Day promotions and public/private partnerships. Funding comes from the State and Private Forestry Branch of the USDA Forest Service. Since its inception in Hawai'i as of 1992, Kaulunani has awarded more than \$2.6 million to more than 400 organizations across the state, in the form of cost-share grants that were matched with \$7.1 million in cash and in-kind contributions. The program is guided by the Forest Action Plan.						
	<b>Notable Changes:</b>	The Forest Action Plan details all of the notable changes in program strategies (Issue 4 pg. 128-155) including discussion on wildland-urban interface, emergency management and response, hazards, climate change.						
	<b>Challenges:</b>	Green Infrastructure and trees are often not considered in preparations for emergency response or during emergency response; significant loss of urban tree cover in the City and County of Honolulu in the past 4 years (approximately 5% loss)						
	<b>Opportunities:</b>	An urban Forestry Emergency operations Planning Guide for Storm Response is available and could be used to develop emergency response plans/procedures in Hawai'i - <a href="http://www.smarttreespacific.org/urban-forestry-emergency-operations-planning-guide/">http://www.smarttreespacific.org/urban-forestry-emergency-operations-planning-guide/</a> Increase urban forestry (i.e., Action 2023-007)						
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	None identified.						
	<b>Hazards:</b>	Climate Change, Drought, Tsunami, Wildfire, Windstorm						
	<b>State HMP Goals:</b>	2, 3, 5		◆		◆	◆	◆
<b>Forest Stewardship Program (FSP)</b>	<b>Capability Category and Description:</b>	Financial Hawaii's Forest Stewardship Program (FSP), administered by the Department of Land and Natural Resources, Division of Forestry and Wildlife (DLNR-DOFAW), provides technical and financial assistance to owners of nonindustrial private forest land that are interested in conservation, restoration, and/or timber production. Management objectives include fire pre-suppression, watershed, riparian, and/or wetland protection and improvement, windbreaks, among others.  The Forest Stewardship Program leverages from \$80,000 to \$200,000 per year in U.S. Forest Service funding support to administer the program. Further, since 1990 State funds for this program have leveraged a total of \$6,639,847 in private funds as a direct match spent on sustainable forest management.						
	<b>Notable Changes:</b>	In Fiscal year 2017, the State, through support by the Hawai'i Association of Conservation Districts, received a contribution agreement award from NRCS to continue the existing Hawai'i CREP Planner position. The Hawai'i CREP Planner position was created as a solution to address the need for dedicated positions to alleviate the backlog of potential projects, engage landowners, and increase participation in the program.						
	<b>Challenges:</b>	None identified.						
	<b>Opportunities:</b>	None identified.						
	<b>Effect on Future</b>	None identified.						







Capability			Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
			Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
	<b>Conditions:</b> <b>Equitable Outcomes:</b> <b>Community Lifelines:</b> <b>Hazards:</b> <b>State HMP Goals:</b>	None identified. Food, Water, Shelter Drought, Flood, Wildfire, Windstorm 1, 2, 3		◆		◆		◆
<b>Hawai'i Tree Canopy Viewer</b>	<b>Capability Category and Description:</b> Education, Outreach, and Capacity Building This map viewer displays a complete tree canopy layer for the state with other information—such as the extent of impervious surfaces, socioeconomic and health data, and urban heat severity maps, to name a few. These layers provide information to help us understand differences in canopy across communities. They can also aid in the process of prioritizing urban greening goals (e.g., tree planting and tree maintenance) through a lens of equity with the goal that all communities will experience the benefits that tree canopy offers. <a href="#">Division of Forestry and Wildlife: Forestry Program   Tree Canopy Viewer Hawai'i (hawaii.gov)</a> <b>Notable Changes:</b> This is a new capability identified for the 2023 SHMP. The canopy viewer aims to build upon previous understanding of tree canopy in Hawai'i. <b>Challenges:</b> None identified. <b>Opportunities:</b> Increase urban forestry (i.e., Action 2023-007) <b>Effect on Future Conditions:</b> Understanding the extent and location of a tree canopy can help a community design and implement sound management practices to maximize prioritizing locations for tree planting, establishing urban forestry master plans and sustainability plans, and managing threats to canopy loss to mitigate the effects of extreme heat, drought, and the impacts of severe storms. <b>Equitable Outcomes:</b> The viewer could also be used to prioritize tree planting and maintenance where it can have the most impact for communities disproportionately burdened by risks that urban tree cover may help ameliorate. <b>Community Lifelines:</b> Food, Water, Shelter; Energy <b>Hazards:</b> Climate Change, Drought, Flood, Hurricane, Wildfire, Windstorm <b>State HMP Goals:</b>	4, 5		◆	◆	◆		
<b>FIRE PROGRAM</b>								
<b>Fire Management Program</b>	<b>Capability Category and Description:</b> Planning and Regulatory DLNR-DOFAW is statutorily mandated by the Land Fire Protection Law, Chapter 185, Hawai'i Revised Statutes, to take measures for the prevention, control, and extinguishment of wildfires on lands managed by DOFAW, which accounts for 26% of the land statewide. DOFAW is also required to cooperate for these purposes with county fire departments and federal agencies to an additional 32% which is determined by Mutual Aid Agreements and Memoranda of Agreement or Understanding. DOFAW supports prevention, pre-suppression, and suppression activities, including mitigation, such as maintaining fire and fuel breaks/access roads, reducing and/or converting hazard fuels through the green breaks, living breaks, managed grazing, and as necessary, prescribed burns. DOFAW is also the State Liaison to the Firewise USA program, which encourages residents to work with neighbors to reduce home ignition potential and increase home survivability leading to the prevention of wildfire disasters. DOFAW							





Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
	<p>staff also participates in:</p> <ul style="list-style-type: none"> <li>Wildfire outreach and education events;</li> <li>CWPP development; and</li> <li>WUI Grant Program administration</li> <li>The maintenance of 25 Remote Automated Weather Stations (RAWS) for fire weather reporting</li> </ul>						
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	<ul style="list-style-type: none"> <li>Limited funds and staff capacity - although Chapter 185, HRS, mandates DLNR-DOFAW to prevent, control, and extinguish wildfires, DOFAW personnel are primarily natural resource managers, foresters, biologists, and technicians and do not focus solely on fire management activities, including mitigation. There is no permanent Wildfire Mitigation Specialist dedicated solely to wildfire risk reduction at the state level to coordinate multi-sector, interagency mitigation actions.</li> <li>Six water storage structures are needed for County of Maui.</li> <li>There may be a need to analyze prescribed fire liability laws in other states to determine if it would be appropriate to amend HRS.</li> <li>Some agencies lack prescribed fire training.</li> <li>Rainfall and mild temperatures that occur throughout the year contribute to a year-round growing season, thus requiring continual maintenance.</li> <li>Native ecosystems in Hawai'i evolved with little or no fire. Wildfire is a threat to native forests, including watersheds and threatened and endangered species. Hawai'i has the highest number of species listed as threatened and endangered in the U.S. Over 25% of the state is covered by invasive, fire prone grasses and shrubs. Each time fire burns into native forest, this percentage increases. Wildfires in the WUI have been carried rapidly by invasive grasses into forested watersheds, which recharge water supplies, control erosion and run off, and supply culturally important plants.</li> <li>There has also been an increase in the amount of fallow agricultural land. Abandoned agricultural land is susceptible to invasive, fire prone grasses and shrubs, thereby increasing fire risk to nearby communities and conservation land.</li> <li>Preventing ignitions through effective public education (nearly all fires in the State of Hawai'i are human caused).</li> </ul>					
	<b>Opportunities:</b>	<ul style="list-style-type: none"> <li>Establish DLNR-DOFAW fire crews at each district to focus solely on fire management activities, including mitigation.</li> <li>Establish a Wildfire Mitigation Specialist dedicated solely to wildfire risk reduction at the state level to coordinate multi-sector, interagency mitigation actions.</li> <li>Federal funding for fuel mitigation is available.</li> <li>Maintain and improve fire and fuel breaks and access roads on state land (i.e., Action 2023-2018-029)</li> <li>Reduce and/or convert hazardous fuels along roadsides (i.e., Action 2023-2018-055)</li> </ul>					
	<b>Effect on Future Conditions:</b>	None identified.					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Food, Water, Shelter; Safety and Security					
	<b>Hazards:</b>	Drought, Wildfire					
	<b>State HMP Goals:</b>	1, 2, 3, 5	◆		◆	◆	◆





Capability	Type of Hazard Management Capability	Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation	
		Pre-Disaster	Post-Disaster	Support		Facilitate
<b>Wildfire Related Public Education and Outreach Events</b>	<b>Capability Category and Description:</b> Education, Outreach, and Capacity Building A number of wildfire-related public outreach events are conducted on a regular basis including: <ul style="list-style-type: none"> <li>An all-agency, unified wildfire and drought awareness campaign was launched in 2016.</li> <li>An annual unified multi-agency Wildfire LOOKOUT! campaign was launched the following year to raise awareness about the threat of wildfire to Hawaii’s natural resources and to private and public property. Over two dozen state, county, and federal agencies have committed to this effort to educate and inform residents about the threat of wildfires in Hawai’i.</li> <li>Elected officials, government agencies, NGOs, and the public participate in the National Fire Protection Association’s (NFPA) national initiative to better prepare communities for wildfires by holding multiple Wildfire Community Preparedness Day events throughout the State, including a photo contest.</li> <li>Wildfire risk reduction workshops, trainings, and field tours are offered locally through the National Fire Academy, NFPA, HWMO, PFX, Hawai’i Conservation Conference, and Pacific Risk Management ‘Ohana Conference for government agencies, large landowners, and the public.</li> <li>DLNR-DOFAW features wildfire prevention information at Fire Prevention Week events alongside county and federal agencies.</li> <li>DLNR-DOFAW sponsors Smoky Bear visits and HWMO sponsored Kaleo the Pueo visits at schools.</li> </ul>					
	<b>Notable Changes:</b> None identified.					
	<b>Challenges:</b> Limited funds and staff capacity. <ul style="list-style-type: none"> <li>Some DLNR-DOFAW District Offices lack permanent Outreach and Education Specialists for the entire Division.</li> <li>Over 98% of wildfires in Hawai’i are human caused, which means many are preventable. Preventable wildfires cause losses which exceed the cost of prevention education. There is no permanent Wildfire Prevention Specialist at the state level to focus on prevention education.</li> <li>While under-publicized, the percentage of land area burned per year in Hawai’i exceeds the national average, and some years surpasses the western states.</li> </ul>					
	<b>Opportunities:</b> The US Forest Service can provide technical assistance in creating a statewide wildfire prevention plan. <sup>d</sup>					
	<b>Effect on Future Conditions:</b> None identified.					
	<b>Equitable Outcomes:</b> Education on the wildfire hazard					
	<b>Community Lifelines:</b> Safety and Security; Communications					
	<b>Hazards:</b> Drought, Wildfire					
<b>State HMP Goals:</b> 2, 3, 5		◆		◆		
<b>Community Wildfire Protection Plans (CWPPs)</b>	<b>Capability Category and Description:</b> Planning and Regulatory CWPPs help communities address wildfire response, hazard mitigation, and community preparedness as well as identify hazard reduction priorities. Newly established CWPPs have made additional lands eligible for funds available through the Wildland Urban					





Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
		Interface (WUI) Grant Program. There are 13 CWPPs established throughout the State of Hawai'i, which cover over half of the State. Each county has at least one CWPP.					
	<b>Notable Changes:</b>	One new plan, the North Shore O'ahu Community Wildfire Protection Plan was completed in 2021.					
	<b>Challenges:</b>	There is no permanent funding to develop CWPPs. HWMO has updated plans and created new plans with WUI grant funding.					
	<b>Opportunities:</b>	By establishing CWPPs to cover additional lands, those lands will be eligible for funds available through the WUI Grant Program (i.e., Action 2023-2018-030).					
	<b>Effect on Future Conditions:</b>	None identified.					
	<b>Equitable Outcomes:</b>	Help communities address wildfire response, hazard mitigation, and community preparedness as well as identify hazard reduction priorities					
	<b>Community Lifelines:</b>	Safety and Security					
	<b>Hazards:</b>	Drought, Wildfire					
	<b>State HMP Goals:</b>	1, 2, 5	◆		◆		
Firewise USA™	<b>Capability Category and Description:</b>	Education, Outreach, and Capacity Building Firewise USA™ is a recognition program that encourages residents to work with neighbors to reduce home ignition potential and increase home survivability leading to the prevention of wildfire disasters.					
	<b>Notable Changes:</b>	There are 14 Firewise USA recognized sites in the City and County of Honolulu, County of Maui, and County of Hawai'i.					
	<b>Challenges:</b>	There is no permanent funding to promote this program and establish new Firewise USA recognized sites. HWMO has increased the number of Firewise USA recognized communities with WUI grant funding. There is no permanent Wildfire Mitigation Specialist dedicated solely to wildfire risk reduction at the state level to coordinate multi-sector, interagency mitigation actions.					
	<b>Opportunities:</b>	None identified.					
	<b>Effect on Future Conditions:</b>	None identified.					
	<b>Equitable Outcomes:</b>	Education on home ignition potential					
	<b>Community Lifelines:</b>	Safety and Security					
	<b>Hazards:</b>	Wildfire					
	<b>State HMP Goals:</b>	2, 3, 5	◆		◆		
Wildland Urban Interface (WUI) Grant Program <sup>d</sup>	<b>Capability Category and Description:</b>	Financial U.S. Forest Service funds to mitigate risk from wildland fire within the WUI are available and awarded annually through a competitive process with emphasis on (1) hazardous fuel reduction in the WUI; (2) information and education; and (3) planning. In Hawai'i, funding is delivered through DOFAW to communities, organizations, and agencies to implement WUI risk reduction projects.					
	<b>Notable Changes:</b>	None identified.					





Capability			Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
			Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
	<b>Challenges:</b>	<ul style="list-style-type: none"> <li>Applications must be covered by a CWPP.</li> <li>There is no permanent Wildfire Mitigation Specialist dedicated solely to wildfire risk reduction at the state level to promote, write, review, and manages these grants.</li> <li>State funds must be available to match these grants.</li> <li>Hawai'i competes against the western states for these funds.</li> </ul>						
	<b>Opportunities:</b>	Multi-sectors are eligible for this grant program.						
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	Education on wildfire						
	<b>Community Lifelines:</b>	None identified.						
	<b>Hazards:</b>	Wildfire						
	<b>State HMP Goals:</b>	2, 3, 5		◆		◆	◆	
<b>Remote Automated Weather Stations (RAWS)</b>	<b>Capability Category and Description:</b>	Administrative and Technical Remote automated weather stations (RAWS) ensure that microclimate data is captured to help rate fire danger and monitor fuels. They also provide DOFAW with up to date data that can be used to close areas in event of hazardous weather conditions. RAWS are maintained on an ongoing basis. There are 66 RAWS statewide maintained by federal and state agencies, including 25 operated by DOFAW, 16 operated by the Department of Defense, 16 operated by the National Park Service, 6 operated by US Fish and Wildlife Service, 1 operated by Bureau of Land Management, and 2 operated by unidentified agencies.						
	<b>Notable Changes:</b>	None identified.						
	<b>Challenges:</b>	Some RAWS are located in remote area, which may make maintenance challenging.						
	<b>Opportunities:</b>	Six RAWS are needed for County of Maui; further data analysis (i.e., Action 2023-2018-032)						
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	Safety and Security						
<b>Hazards:</b>	Drought, Hurricane, Wildfire							
<b>State HMP Goals:</b>	3, 4		◆		◆			
<b>INVASIVE SPECIES</b>								
<b>Hawai'i Invasive Species Council</b>	<b>Capability Category and Description:</b>	Administrative and Technical; Planning and Regulatory; Education, Outreach, and Capacity Building The Hawai'i Invasive Species Council (HISC) is an inter-departmental collaboration comprised of the Departments of Land & Natural Resources (DLNR), Agriculture (DOA), Health (DOH), Transportation (HDOT), Business, Economic Development & Tourism (DBEDT), and the University of Hawaii (UH). The HISC was established in 2003 for the special purpose of providing policy level direction, coordination, and planning among state departments, federal agencies, and international and local initiatives for the control and eradication of harmful invasive species infestations throughout the State and for preventing the introduction of other invasive species that may be potentially harmful.						





Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
		The HISC has developed the <i>Hawai'i Interagency Biosecurity Plan 2017-2027</i> and the supporting document, <i>HISC and CGAPS 2025 Joint Strategy</i>					
	<b>Notable Changes:</b>	This is a new capability identified in the 2023 SHMP.					
	<b>Challenges:</b>	The State Legislature declared invasive species a major threat to the State's economy, natural environment, and health (State of Hawai'i 2015). Invasive species contribute to and exacerbate many statewide hazards.					
	<b>Opportunities:</b>	Hawai'i Interagency Biosecurity Plan identifies critical gaps in the State's biosecurity system and suggests policies, processes, and resources to address those gaps in regards to invasive species mitigation.					
	<b>Effect on Future Conditions:</b>	None identified.					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Food, Water, Shelter; Safety and Security; Transportation; Health and Medical; Energy; Transportation					
	<b>Hazards:</b>	Climate Change, Drought, Flood, Health Risks, Hurricane, Wildfire, Windstorm					
	<b>State HMP Goals:</b>	1, 2, 3, 5	◆		◆		
<b>NATIVE ECOSYSTEMS PROTECTION AND MANAGEMENT</b>							
<b>Legacy Lands Conservation Program</b>	<b>Capability Category and Description:</b>	Financial The State of Hawai'i dedicates a portion of its annual revenue from real estate conveyance taxes to the Land Conservation Fund. Each year the State Legislature provides the Legacy Land Conservation Program with some of the money held in the Fund. The Legacy Land Conservation Program distributes this money through a competitive grants process—for purchasing land and conservation easements and for paying the debt service on state financial instruments (such as bonds)—for the protection of land that shelters exceptional, unique, threatened, and endangered resources.					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	Natural resources can be damaged by hazards, such as wildfires. Native ecosystems in Hawai'i evolved with little or no fire. Wildfire is a threat to native forests, including watersheds and threatened and endangered species. Hawai'i has the highest number of species listed as threatened and endangered in the U.S. Over 25% of the state is covered by invasive, fire prone grasses and shrubs. Each time fire burns into native forest, this percentage increases. Wildfires in the WUI have been carried rapidly by invasive grasses into forested watersheds, which recharge water supplies, control erosion and run off, and supply culturally important plants.					
	<b>Opportunities:</b>	This program can prevent development in hazard-prone areas.					
	<b>Effect on Future Conditions:</b>	None identified.					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Food, Water, Shelter					
	<b>Hazards:</b>	Climate Change, Drought, Flood, Hurricane, Wildfire					
	<b>State HMP Goals:</b>	1, 2	◆		◆		◆





Capability	Type of Hazard Management Capability	Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation	
		Pre-Disaster	Post-Disaster	Support		Facilitate
<b>Watershed Partnership Program</b>	<b>Capability Category and Description:</b>	Financial				
		The Watershed Partnerships Program provides technical and financial support for the implementation of watershed management plans. The Watershed Partnerships Program is funded by the Natural Area Reserve Special Fund, established by HRS §195-9. These funds come from a portion of the conveyance tax, which is levied each time real estate property is bought or sold. The mission of the program is to “increase the effective management and protection of mauka watershed areas by raising the capacity of watershed partnerships, facilitating sharing of watershed management expertise, building public support for protecting watershed values, and developing sustainable funding sources.” Watershed protection measures relevant to mitigation goals include recharging water supplies, controlling erosion and runoff, mitigating flooding, and mitigating the impacts of climate change (DOFAW no date).				
	<b>Notable Changes:</b>	None identified.				
	<b>Challenges:</b>	Natural resources can be damaged by hazards, such as wildfires. Native ecosystems in the State of Hawai’i evolved with little or no fire. Wildfire is a threat to native forests, including watersheds and threatened and endangered species. The State of Hawai’i has the highest number of species listed as threatened and endangered in the U.S. Over 25% of the state is covered by invasive, fire prone grasses and shrubs. Each time fire burns into native forest, this percentage increases. Wildfires in the WUI have been carried rapidly by invasive grasses into forested watersheds, which recharge water supplies, control erosion and run off, and supply culturally important plants.				
	<b>Opportunities:</b>	By protecting forests, additional moisture is captured, preventing drought. Forest also absorb carbon, reducing climate change. Forests hold the soil, reducing erosion and flooding. The Governor’s Hawai’i Sustainable Initiative aims to protect 30% of priority watersheds by 2030 (i.e., Action 2023-2018-019)				
	<b>Effect on Future Conditions:</b>	None identified.				
	<b>Equitable Outcomes:</b>	None identified.				
	<b>Community Lifelines:</b>	Food, Water, Shelter				
	<b>Hazards:</b>	Climate Change, Drought, Flood, Hurricanes, Wildfires				
<b>State HMP Goals:</b>	1, 2	◆		◆		◆





Capability	Type of Hazard Management Capability	Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation	
		Pre-Disaster	Post-Disaster	Support		Facilitate
<b>Natural Area Partnership Program</b>	<b>Capability Category and Description:</b>	Financial The Natural Area Partnership Program (NAPP) was established in 1991 by the state Legislature and the Governor authorizing the Department of Land & Natural Resources (DLNR) to “provide state funds for the management of private lands that are dedicated to conservation.” Lands and waters that might qualify include areas with intact native Hawaiian ecosystems, essential habitat for endangered species, and areas within the protective (P) subzone of the Conservation District.				
	<b>Notable Changes:</b>	None identified.				
	<b>Challenges:</b>	Natural resources can be damaged by hazards, such as wildfires. Native ecosystems in the State of Hawai‘i evolved with little or no fire. Wildfire is a threat to native forests, including watersheds and threatened and endangered species. The State of Hawai‘i has the highest number of species listed as threatened and endangered in the U.S. Over 25% of the state is covered by invasive, fire prone grasses and shrubs. Each time fire burns into native forest, this percentage increases. Wildfires in the WUI have been carried rapidly by invasive grasses into forested watersheds, which recharge water supplies, control erosion and run off, and supply culturally important plants.				
	<b>Opportunities:</b>	By protecting forests, additional moisture is captured, preventing drought. Forest also absorb carbon, reducing climate change. Forests hold the soil, reducing erosion and flooding. This is a program that helps private landowners mitigate hazards. Fuel reduction in WUI areas will reduce the threat of wildfires (i.e., Action 2023-2018-025)				
	<b>Effect on Future Conditions:</b>	None identified.				
	<b>Equitable Outcomes:</b>	None identified.				
	<b>Community Lifelines:</b>	Food, Water, Shelter; Safety and Security				
	<b>Hazards:</b>	Climate Change, Drought, Flood, Hurricane, Wildfire				
	<b>State HMP Goals:</b>	1, 2, 3	◆		◆	◆
<b>Natural Area Reserves System (NARS)</b>	<b>Capability Category and Description:</b>	Planning and Regulatory The statewide NARS was established to preserve in perpetuity specific land and water areas which support communities, as relatively unmodified as possible, of the natural flora and fauna, as well as geological sites, of Hawai‘i. The system presently consists of 21 reserves on five islands, encompassing 123,810 acres of the State’s most unique ecosystems. The Strategic Plan for Hawaii’s Natural Area Reserves System (2008) includes objectives and sub-objectives that support mitigation goals, such as “employ appropriate fire management strategies” (DOFAW 2008).				
	<b>Notable Changes:</b>	None identified.				
	<b>Challenges:</b>	Natural resources can be damaged by hazards, such as wildfires. Native ecosystems in the State of Hawai‘i evolved with little or no fire. Wildfire is a threat to native forests, including watersheds and threatened and endangered species. The State of Hawai‘i has the highest number of species listed as threatened and endangered in the U.S. Over 25% of the state is covered by invasive, fire prone grasses and shrubs. Each time fire burns into native forest, this percentage increases. Wildfires in the WUI have been carried rapidly by invasive grasses into forested watersheds, which recharge water supplies, control erosion and run off, and supply culturally important plants.				







Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
	<b>Opportunities:</b>	By protecting forests, additional moisture is captured, preventing drought. Forest also absorb carbon, reducing climate change. Forests hold the soil, reducing erosion and flooding. Fuel reduction in WUI areas will reduce the threat of wildfires (i.e., Action 2023-2018-025)					
	<b>Effect on Future Conditions:</b>	None identified.					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Food, Water, Shelter; Safety and Security					
	<b>Hazards:</b>	Climate Change, Drought, Flood, Hurricane, Wildfire					
	<b>State HMP Goals:</b>	1, 2	◆		◆		◆

- a. Support is defined as programs, plans, policies, regulations, funding, or practices that help the implementation of mitigation actions, while facilitate is defined as programs, plans, policies, regulations, funding, or practices that make implementing actions easier.
- b. (F) = Federal grant funding supports in full or in part
- c. HWMO provides Ready Set Go!, preparedness, or hazard reduction workshops (6-12 workshops per island per year each on O’ahu and Kaua’i, 12-15 in County of Maui, and 20+ across the Island of Hawai’i. Total: 44-59 workshops a year on average the last couple of years).
- d. Identified by the department/agency as one of the most effective capabilities for achieving mitigation goals.

**Table C-18. Engineering Division Capabilities**

Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<b>DAM SAFETY PROGRAM</b>							
<b>Description:</b> <i>The objectives of the dam safety program include encouraging high safety standards and regulations in the practices and procedures for dam site investigation, design, construction, operation and maintenance and emergency preparedness; maintaining updated and accurate inventory of dams, physical conditions, and potential hazard classifications; promoting a continuous, dynamic process where guidelines, practices, and procedures are examined periodically and updated; cooperating with all public and private agencies involved in dam safety activities including owner training and dissemination of information to the public, and emergency preparedness, in order to protect the health, safety, and welfare of the citizens of the State by reducing the risk of failure of dams or reservoirs.</i>							
<b>Emergency Action Plans (EAP)</b>	<b>Capability Category and Description:</b>	Planning and Regulatory HRS 179D-30 requires the owners of State-regulated high and significant hazard potential dams and reservoirs to establish an EAP to assist the local community in effectively responding to a dam safety emergency. Owners are required to have established protocols for flood warning. The Dam Safety program works with owners to develop or update their EAPs. The program’s online database includes information and tools for dam owners, including an EZ-EAP instructional video, EAP development guidelines, EAP checklist, and EAP					





Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation	
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict		
		creation and maintenance application (DLNR Engineering 2017). <b>EAPs are provided to local emergency management agencies.</b>						
	<b>Notable Changes:</b>	None identified.						
	<b>Challenges:</b>	There are federal, state, county, and privately-owned dams in the State of Hawai'i.						
	<b>Opportunities:</b>	EAPs can be used to inform development of warning systems and outreach programs (i.e., Action 2023-2020-002)						
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	Safety and Security						
	<b>Hazards:</b>	Infrastructure Failure; Communications						
	<b>State HMP Goals:</b>	1, 2	◆		◆	◆		
<b>Dam Safety Permits</b>	<b>Capability Category and Description:</b>	Administrative and Technical The DLNR Engineering Division administers the State Dam and Reservoir Program as authorized under HRS Chapter 179D and HAR Title 13, Sub-Title 7, Chapter 190.1. A permit must be obtained from the Board of Land and Natural Resources for the construction, enlargement, repair, alteration or removal of dams (DLNR Engineering 2016).						
	<b>Notable Changes:</b>	None identified.						
	<b>Challenges:</b>	approximately 70% privately owned dams, and limited funding						
	<b>Opportunities:</b>	Dams and Reservoirs owners are able to apply for Special Purpose Revenue Bonds						
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	Safety and Security						
	<b>Hazards:</b>	Infrastructure Failure						
	<b>State HMP Goals:</b>	1, 2	◆		◆	◆		
<b>Certificate of Approval to Impound (CAI)</b>	<b>Capability Category and Description:</b>	Planning and Regulatory Requirements for obtaining a CAI for the impoundment of water at a dam or reservoir in the State of Hawai'i are outlined in HAR, Title 13, Sub-Title 7, Chapter 190.1. Completed applications are submitted to the Dam Safety Program.						
	<b>Notable Changes:</b>	None identified.						
	<b>Challenges:</b>	None identified.						
	<b>Opportunities:</b>	None identified.						
	<b>Effect on Future</b>	None identified.						





Capability		Type of Hazard		Effect on Loss Reduction			Provides Funding for Mitigation
		Management Capability		Pre-Disaster	Post-Disaster	Support	
	<b>Conditions:</b>						
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Safety and Security					
	<b>Hazards:</b>	Infrastructure Failure					
	<b>State HMP Goals:</b>	1, 2	◆			◆	◆
<b>Training Events and Materials</b>	<b>Capability Category and Description:</b>	Education, Outreach, and Capacity Building The Dam Safety program offers training events and materials including overview workshops and technical seminars on dam evaluation and rehabilitation, and operation and maintenance training.					
	<b>Notable Changes:</b>	Training topics are decided internally and are generally provided on a rotating basis on a 1-3 year frequency. Recent training activity includes: 2023 Dam Safety Basics; 2020 Dam Safety Failure Modes; 2019 presentation at the Hawai'i Floodplain Managers Conference; 2019 Dam Safety Emergency Interventions; 2017 Dam Safety technical seminar on dam evaluation and rehabilitation; 2015 Dam Safety EAP training; 2012 Dam Safety operation and maintenance training . A dam safety grant and special funds are used to hire contractors to do training for selected topics. Maui and Kaua'i have most dams and dam owners					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	Incorporate information from the hazard mitigation planning risk assessment into future trainings.					
	<b>Effect on Future Conditions:</b>	None identified.					
	<b>Equitable Outcomes:</b>	Provides individuals with education opportunity on the dam hazard					
	<b>Community Lifelines:</b>	Safety and Security					
	<b>Hazards:</b>	Infrastructure Failure					
	<b>State HMP Goals:</b>	1, 2, 5	◆			◆	
<b>Dam Inundation and Evacuation Maps</b>	<b>Capability Category and Description:</b>	Administrative and Technical DLNR in partnership with the US Army Corps, Pacific Disaster Center and County Emergency Management Agencies engaged in the development of dam failure inundation and evacuation maps and individual assessment reports for regulated dams within the State of Hawai'i. These inundation maps and reports were then released for the development of dam evacuation plans by the counties and incorporated into the Dam Safety Online Database and is available for public download. Flood and Dam Evacuation areas are searchable via the State DLNR Flood Hazard Assessment Tool.					
	<b>Notable Changes:</b>	As of 2023, all regulated dams have evacuation maps available online, except one low hazard dam.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	Additional outreach and public awareness (i.e., Action 2023-003)					





Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation	
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict		
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	Provides individuals with education opportunity on the dam hazard						
	<b>Community Lifelines:</b>	Safety and Security; Communications						
	<b>Hazards:</b>	Infrastructure Failure						
	<b>State HMP Goals:</b>	1, 2, 3, 5	◆		◆	◆		
<b>NATIONAL FLOOD INSURANCE PROGRAM (NFIP)</b>								
<i>Description: DLNR has been designated as the State Coordinating Agency responsible for assisting the coordination of the NFIP between the Federal and County agencies in the State of Hawai'i</i>								
<b>Flood Hazard Assessment Tool (FHAT)</b>	<b>Capability Category and Description:</b>	Education, Outreach, and Capacity Building The FHAT is an online map viewer where residents can view effective digital flood insurance rate map (DFIRM) information, historic FIRM and DFIRM information, obtain information on letter of map changes, and auto generate from fields for a FEMA elevation certificate. In addition, a report can be printed that provides parcel-specific flood hazard information as well as tsunami and dam evacuation zone information.						
	<b>Notable Changes:</b>	The FHAT expanded to include information on tsunami and dam failure evacuation hazard maps.						
	<b>Challenges:</b>	None identified.						
	<b>Opportunities:</b>	None identified.						
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	Provides individuals with education opportunity on flood related hazards						
	<b>Community Lifelines:</b>	Food, Water, Shelter; Safety and Security						
	<b>Hazards:</b>	Infrastructure Failure, Flood, Tsunami						
	<b>State HMP Goals:</b>	1, 2, 4, 5	◆		◆			
<b>Wai Halana Blog</b>	<b>Capability Category and Description:</b>	Education, Outreach, and Capacity Building Wai Halana Blog is a Floodplain Management blog maintained by the DLNR Engineering division. It is available at waihalana.hawaii.gov. The blog contains information on flood and flood related hazards including topics such as flood insurance, climate change, emergency warning information, dam safety and tips on hurricane season.						
	<b>Notable Changes:</b>	None identified.						
	<b>Challenges:</b>	None identified.						
	<b>Opportunities:</b>	Wai Halana could be used as a component in a state-wide Community Rating System program for public information. Public outreach						





Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation	
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict		
		could be conducted to expand the number of recipients.						
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	Provides individuals with education opportunity on flood related hazards						
	<b>Community Lifelines:</b>	Food, Water, Shelter; Safety and Security; Communications						
	<b>Hazards:</b>	Flood, Climate Change, Dam Failure, Hurricane						
	<b>State HMP Goals:</b>	1, 2, 4, 5	◆		◆			
<b>Maintenance of channels, streambeds, streambanks, and drainageways</b>	<b>Capability Category and Description:</b>	Capital Projects and Maintenance HRS § 46-11.5 stipulates that it is “the responsibility of the county to maintain all channels, streambeds, streambanks, and drainageways unless such channels, streambeds, streambanks, and drainageways are privately owned or owned by the State, in which event such channels, streambeds, streambanks, and drainageways shall be maintained by their respective owners.” County responsibility accounts for the vast majority of this maintenance and counties also bear responsibility for enforcement. If maintenance is needed on State owned land, the appropriate department is identified and the maintenance is conducted.						
	<b>Notable Changes:</b>	None identified.						
	<b>Challenges:</b>	None identified.						
	<b>Opportunities:</b>	None identified.						
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	Safety and Security						
	<b>Hazards:</b>	Flood						
	<b>State HMP Goals:</b>	1, 2	◆	◆	◆	◆		
	<b>Flood control and flood water conservation statutes</b>	<b>Capability Category and Description:</b>	Planning and Regulatory HRS § 179 sets forth flood control and flood water conservation statutes, the purpose of which is to “provide for the coordination by the State of all federal and state flood control projects undertaken in Hawai’i and for such technical or financial assistance to its political subdivisions as may be desirable or necessary to assure maximum benefits to the people of the State from the expenditure of state funds for flood control purposes.” These statutes designate the BLNR as the implementation authority for flood control and water conservation.					
<b>Notable Changes:</b>		None identified.						
<b>Challenges:</b>		None identified.						





Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation	
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict		
	<b>Opportunities:</b>	None identified.						
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	Safety and Security; Food, Water, Shelter						
	<b>Hazards:</b>	Drought, Flood						
	<b>State HMP Goals:</b>	1, 2, 3	◆			◆		
<b>Community Assistance Program –State Support Services Element (CAP-SSSE) <sup>c</sup></b>	<b>Capability Category and Description:</b>	Financial This program provides funding to states to provide technical assistance to communities in the National Flood Insurance Program (NFIP) and to evaluate community performance in implementing NFIP floodplain management activities. DLNR participates in this program for coordination of DLNR floodplain management, however, it does not receive FEMA CAP grant support. DLNR conducts the following activities which duplicates CAP activities:						
		<ul style="list-style-type: none"> <li>• Conduct Community Compliance Audits (a.k.a. CAVs)</li> <li>• Conduct Training Workshops and Public Outreach</li> <li>• Attend National and Regional NFIP related conferences</li> <li>• Maintain newsletter blog (Wai Halana)</li> <li>• Provide Technical Assistance to community officials and the public</li> <li>• Conduct V zone properties audits</li> <li>• Maintain an Internet Website dedicated to NFIP awareness</li> </ul>						
	<b>Notable Changes:</b>	None identified.						
	<b>Challenges:</b>	Extensive reporting and required by the CAP program exceed the DLNR resources and distract from our mission of reducing flood hazards and damages.						
	<b>Opportunities:</b>	None identified.						
	<b>Effect on Future Conditions:</b>	NFIP activities may change due to climate change impacts						
	<b>Equitable Outcomes:</b>	Receive education on NFIP activities						
	<b>Community Lifelines:</b>	Safety and Security; Food, Water, Shelter						
	<b>Hazards:</b>	Flood, Dam Failure, Hurricane, Tsunami						
	<b>State HMP Goals:</b>	1, 2, 3, 4, 5	◆		◆	◆		◆ (F)





Capability		Type of Hazard		Effect on Loss Reduction			Provides Funding for Mitigation
		Management Capability		Support	Facilitate	Conflict	
		Pre-Disaster	Post-Disaster				
<b>State General Flood Control Plan (SGFCP)</b>	<b>Capability Category and Description:</b>	Planning and Regulatory The SGFCP was developed in 1983 to coordinate floodplain management initiatives. The goal of the State General Flood Control Plan (SGFCP) is to assist the State in decision-making regarding flood hazards and prioritize areas to best focus limited resources. The last Statewide inventory of flood history and flood studies was performed in 1994. HRS 179 outlines the purpose, mandates and mission of the SGFCP.					
	<b>Notable Changes:</b>	The State General Flood Control Plan is currently being updated and will utilize digital database and website technologies to provide educational information and public awareness tools on flood risks, flood histories, hydrologic data, mitigation initiatives, a library for flood studies and post-flood reports, and other related information. In addition, through the update DLNR is interested in identifying building footprints within floodplains throughout the entire State.					
	<b>Challenges:</b>	None identified. There is limited funding to support this effort.					
	<b>Opportunities:</b>	The SGFCP update will also implement geospatial and internet technologies that will allow partner agencies to share, communicate, and utilize collected information.					
	<b>Effect on Future Conditions:</b>	Floodplains may need to be adjusted in upcoming years due to sea level rise impacts from climate change					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Safety and Security; Food, Water, Shelter					
	<b>Hazards:</b>	Flood					
	<b>State HMP Goals:</b>	1, 2, 4		◆		◆	◆
<b>RISK MAP</b>							
<b>Risk Mapping, Assessment, and Planning Program (Risk MAP)</b>	<b>Capability Category and Description:</b>	Administrative and Technical FEMA is working with federal, state, tribal and local partners across the nation to identify flood risk and promote informed planning and development practices to help reduce that risk through the Risk MAP program. Risk MAP provides high quality flood maps and information, tools to better assess the risk from flooding and planning and outreach support to communities to help them take action to reduce (or mitigate) flood risk. Each Risk MAP flood risk project is tailored to the needs of each community and may involve different products and services.					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	None identified.					
	<b>Effect on Future Conditions:</b>	Floodmaps may need to be adjusted in upcoming years due to sea level rise impacts from climate change					





Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation	
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict		
	<b>Equitable Outcomes:</b>	Risk MAP flood risk projects are tailored to the needs of each community and may involve different products and services						
	<b>Community Lifelines:</b>	Safety and Security						
	<b>Hazards:</b>	Flood, Hurricane, Tsunami						
	<b>State HMP Goals:</b>	1, 2, 3, 4	◆		◆	◆	◆ (F)	
<b>SILVER JACKETS</b>								
<i>Description: Silver Jackets teams in states across the country bring together multiple state, federal, and sometimes tribal and local agencies to learn from one another and apply their knowledge to reduce the risk of flooding and other natural disasters in the United States and enhance response and recovery efforts when such events do occur. Silver Jackets are supported by the USACE Flood Risk Management Program.</i>								
<b>Silver Jackets Interagency Projects</b>	<b>Capability Category and Description:</b>	Financial A competitive process through the Silver Jackets program where multiple Federal agencies are involved in contributing towards a shared outcome. No specific cost-share or funding limit, although there is an expectation that the non-Federal sponsor will contribute either cash or work in-kind. Submittal deadlines are typically in the spring, around February-March.						
	<b>Notable Changes:</b>	This is a new capability. State of Hawai'i Silver Jackets Program Coordination Meetings began in November 2017. The Hawai'i State Office of Planning will be leading meeting efforts.						
	<b>Challenges:</b>	None identified.						
	<b>Opportunities:</b>	None identified.						
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	None identified.						
	<b>Hazards:</b>	Flood, Climate Change, Infrastructure Failure, Hurricane, Tsunami						
	<b>State HMP Goals:</b>	2, 3	◆	◆	◆	◆	◆ (F)	

- a. Support is defined as programs, plans, policies, regulations, funding, or practices that help the implementation of mitigation actions, while facilitate is defined as programs, plans, policies, regulations, funding, or practices that make implementing actions easier.
- b. (F) = Federal grant funding supports in full or in part
- c. Identified by a stakeholder group as presenting an opportunity to improve effectiveness at meeting hazard mitigation goals.







**Table C-19. Historic Preservation Division Capabilities**

Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<p><b>Description:</b> <i>The Historic Preservation Division works to preserve and sustain reminders of earlier times which link the past to the present. SHPD's three branches, History and Culture, Archaeology, and Architecture, strive to accomplish this goal through many different activities.</i></p>							
Historic Preservation	<b>Capability Category and Description:</b>	Education, Outreach, and Capacity Building The division's work includes maintaining the State of Hawai'i Register of Historic Places and coordinating nomination procedures for the National Register of Historic Places. The division's statewide Inventory of Historic Properties contains information on more than 38,000 historic sites in the State of Hawai'i. The National Register contains more than 350 places in the State of Hawai'i.					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	Historic preservation objectives can conflict with mitigation goals as a historic designation may exempt structures from certain building requirements, such as local flood damage prevention ordinance requirements. In recent years there have been efforts to preserve the historic integrity of structures, while also incorporating mitigation strategies such as elevating or floodproofing structures in floodplains and conducting seismic retrofits.					
	<b>Opportunities:</b>	Federal tax incentives are available for mitigation of historic places in some instances. Support mitigation action 2023-2018-057 to coordinate access to SHPD-maintained cultural resource information.					
	<b>Effect on Future Conditions:</b>	None identified.					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Food, Water, Shelter					
	<b>Hazards:</b>	N/A					
<b>State HMP Goals:</b>	1	◆				◆	

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- b. (F) = Federal grant funding supports in full or in part





Table C-20. Land Division Capabilities

Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<p><b>Description:</b> The Land Division is responsible for the management of State-owned lands in ways that will promote the well-being of Hawaii’s people and insure that these lands are used in accordance with the goals, policies and plans of the State. Lands that are not set aside for use by other government agencies come within the direct purview of the division.</p>							
Shoreline Certification	<b>Capability Category and Description:</b>	Planning and Regulatory Applications for shoreline certification are submitted to the land division. Shoreline is defined as “the upper reaches of the wash of the waves, other than storm or seismic waves, at high tide during the season of the year in which the highest wash of the waves occurs, usually evidenced by the edge of vegetation growth, or the upper limit of debris left by the wash of the waves” in HAR §13-10. The certified shoreline establishes jurisdictional authority between the state and the county governments and establishes the line from which shoreline setbacks are established.					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	Dynamic shoreline certification may provide a mechanism through which to address some of the impacts of sea level rise.					
	<b>Effect on Future Conditions:</b>	Dynamic shoreline certification may provide a mechanism through which to address some of the impacts of sea level rise.					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Safety and Security					
	<b>Hazards:</b>	Flood, Climate Change					
<b>State HMP Goals:</b>	1	◆	◆	◆			

- a. Support is defined as programs, plans, policies, regulations, funding, or practices that help the implementation of mitigation actions, while facilitate is defined as programs, plans, policies, regulations, funding, or practices that make implementing actions easier.
- b. (F) = Federal grant funding supports in full or in part





Table C-21. Office of Conservation and Coastal Lands Capabilities

Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<b>COASTAL LANDS PROGRAM</b>							
<p><b>Description:</b> OCCL is responsible for management of coastal resources including beaches, dunes, and rocky shorelines seaward of county jurisdictions and/or within the State Conservation District. The Program supports the complementary long-term goals of conserving coastal resources and mitigating risks from natural and human-induced hazards for coastal communities. The Program develops and implements innovative shoreline management techniques, including alternatives for coastal erosion management through a long-standing cooperative relationship with the University of Hawai'i (UH) Sea Grant College Program.</p>							
<b>Coastal Erosion Management Program</b>	<b>Capability Category and Description:</b>	Education, Outreach, and Capacity Building The Coastal Lands Program supports sustainable alternatives for coastal erosion management including programs for beach and dune restoration and guidelines for other “soft” approaches to shoreline protection through the DLNR Coastal Erosion Management Plan (COEMAP), which identifies 7 broad goals, 20 recommendations and 21 implementing actions for improving the erosion management system in the State of Hawai'i. The Program works closely with coastal communities, resource management and regulatory agencies, and university researchers to improve management of coastal areas through science-based decision making. The Program also conducts public education, and outreach and distributes information and guidelines on best management practices, erosion control and construction practices for the State of Hawai'i's coastal areas in partnership with UH Sea Grant and other organizations.					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	None identified.					
	<b>Effect on Future Conditions:</b>	Beach and dune restoration may assist with the sea level rise, caused by climate change					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Safety and Security					
	<b>Hazards:</b>	Flood					
	<b>State HMP Goals:</b>	1, 2, 3, 5		◆			◆
<b>Small Scale Beach Nourishment (SSBN) Program</b>	<b>Capability Category and Description:</b>	Administrative and Technical The SSBN program is intended to provide a viable alternative to shoreline hardening through development and enhancement of beach restoration programs – encouraging landowners to consider beach restoration over hard shoreline armoring. The SSBN program provides a streamlined application process for beach restoration projects within the DLNR under a programmatic Conservation District Use Permit and Environmental Assessment. SSBN authorizations allow placement of compatible beach sand within the State Conservation District and may					





Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation	
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict		
		be submitted under one of two Categories: SSBN Category I – (up to 500 cubic yards of sand), or SSBN Category II – (up to 10,000 cubic yards).						
	<b>Notable Changes:</b>	None identified. The programmatic Environmental Assessment and Finding of No Significant Impact (FONSI) for an updated small scale beach restoration (SSBR) program was published. On July 1, 2021, the Governor of the State of Hawai'i approved Act 162, which amended Hawai'i Revised Statutes Chapter 342D as follows: <i>The Department [of Health] shall not require a water quality certification pursuant to Section 401 of the Federal Clean Water Act under this chapter for any applicant of the small-scale beach restoration program that has received notice of authorization to proceed from the Department of Land and Natural Resource's' Office of Conservation and Coastal Lands.</i>						
	<b>Challenges:</b>	None identified.						
	<b>Opportunities:</b>	OCCL completed an updated PEA and FONSI for the updated SSBR program and is exploring the possibility of an agreement with the U.S. Army Corps of Engineers, and Coastal Zone Management Program to re-establish a streamlined inter-agency programmatic permitting process for small scale beach restoration projects. The proposed SSBR program is anticipated to be approved in the next couple years.						
	<b>Effect on Future Conditions:</b>	Beach restoration may assist with the sea level rise, caused by climate change						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	Safety and Security; Food, Water, Shelter						
	<b>Hazards:</b>	Flood, Hurricane						
	<b>State HMP Goals:</b>	1, 3	◆	◆	◆	◆		
<b>CLIMATE 21C</b>								
<b>Description:</b> <i>The Hawai'i Climate Adaptation Initiative Act of 2014 (Act 83; House Bill 1714) is designed to address the effects of climate change through 2050 to protect the State's economy, health, environment, and way of life. The initial focus of the Initiative will be on the effects of sea level rise on the islands.</i>								
<b>Hawai'i Climate Change Portal</b>	<b>Capability Category and Description:</b>	Education, Outreach, and Capacity Building A website that includes a vast wealth of information on climate change and how it is impacting the State of Hawai'i and other coastal states and locations around the world as well as all things related to the Hawai'i Climate Change Mitigation & Adaptation Commission. The website includes links to the Hawai'i Sea Level Rise Vulnerability and Adaptation Report, Hawai'i Sea Level Rise Viewer, and announcements and archives of meetings for the State Interagency Climate Mitigation and Adaption Commission.						
	<b>Notable Changes:</b>	The website is updated to reflect new or updated reports and resources. <a href="https://climate.hawaii.gov/hi-adaptation/state-sea-level-rise-resources/">https://climate.hawaii.gov/hi-adaptation/state-sea-level-rise-resources/</a>						





Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	None identified.					
	<b>Effect on Future Conditions:</b>	Provides method of education on climate change and its potential impacts					
	<b>Equitable Outcomes:</b>	Provides method of education on climate change and its potential impacts					
	<b>Community Lifelines:</b>	Communications					
	<b>Hazards:</b>	Climate Change					
	<b>State HMP Goals:</b>	2, 4, 5	◆	◆			
<b>Hawai'i Climate Change Mitigation &amp; Adaptation Commission (Climate Commission)</b>	<b>Capability Category and Description:</b>	Planning and Regulatory The Climate Commission provides direction, facilitation, coordination, and planning among state and county agencies, federal agencies, and other partners about climate change mitigation (reduction of greenhouse gases) and climate change resiliency strategies, including but not limited to, sea level rise adaptation, water and agricultural security, and natural resource conservation.					
	<b>Notable Changes:</b>	The Climate Commission released a new statement on guidance for investment in resilient infrastructure, including nature-based solutions, green infrastructure, and carbon-smart practices. The Climate Commission is piloting an effort along with University of Hawai'i at Mānoa, stakeholders, and community members to develop a Climate Change Social Vulnerability Framework. <a href="#">Climate Change Portal   Social and Climate Vulnerability Framework Project (hawaii.gov)</a>					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	Provide support for mitigation action 2023-2018-048 (Infrastructure managed retreat and/or nature-based solutions engineering pilot project to protect threatened Hawai'i infrastructure)					
	<b>Effect on Future Conditions:</b>	Guidance issued incorporates mitigation to climate change					
	<b>Equitable Outcomes:</b>	Factors such as demographics, socioeconomic status, and limited access to resources can make it much harder to prepare for and recover from climate change. Because of these conditions, events such as extreme weather, sea level rise, heatwaves, flooding, and erosion might prove a hazard for some, but a disaster for others. The creation of a comprehensive, user-friendly data portal on social vulnerability and climate change will support decision-makers, non-profits, and community leaders in addressing social vulnerability throughout their work.					
	<b>Community Lifelines:</b>	Safety and Security; Food, Water, Shelter					
	<b>Hazards:</b>	Climate Change					





Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
	<b>State HMP Goals:</b>	2, 3	◆		◆		
<b>Hawai'i Sea Level Rise Vulnerability and Adaptation Report</b>	<b>Capability Category and Description:</b>	Administrative and Technical The Sea Level Rise Vulnerability and Adaptation Report (SLR Report) provides the first state-wide assessment of the State of Hawaii's vulnerability to sea level rise and recommendations to reduce exposure and sensitivity to sea level rise and increase the capacity to adapt.					
	<b>Notable Changes:</b>	An update to the SLR Report was completed in 2022 assessing the State and Counties' progress in addressing sea level rise risks and preparedness <a href="https://climate.hawaii.gov/hi-adaptation/state-sea-level-rise-resources/">https://climate.hawaii.gov/hi-adaptation/state-sea-level-rise-resources/</a>					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	None identified.					
	<b>Effect on Future Conditions:</b>	Provide description of vulnerability to sea level rise					
	<b>Equitable Outcomes:</b>	Provide description of vulnerability to sea level rise					
	<b>Community Lifelines:</b>	Safety and Security					
	<b>Hazards:</b>	Flood, Climate Change					
	<b>State HMP Goals:</b>	2	◆		◆	◆	
<b>Hawai'i Sea Level Rise Viewer</b>	<b>Capability Category and Description:</b>	Education, Outreach, and Capacity Building The Hawai'i Sea Level Rise Viewer was developed by through a partnership between UH Sea Grant, UH SOEST, PacIOOS, and DLNR. The Hawai'i Sea Level Rise Viewer is intended to provide an online atlas to support the Hawai'i Sea Level Rise Vulnerability and Adaptation Report. The Viewer provides map data depicting projections for future hazard exposure and assessing economic and other vulnerabilities due to rising sea levels.					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	None identified.					
	<b>Effect on Future Conditions:</b>	Provide visualization of vulnerability to sea level rise					
	<b>Equitable Outcomes:</b>	Provide visualization of vulnerability to sea level rise					





Capability			Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation
			Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
	<b>Community Lifelines:</b>	Safety and Security; Communications						
	<b>Hazards:</b>	Flood, Climate Change, Infrastructure Failure						
	<b>State HMP Goals:</b>	3, 4, 5	◆		◆			

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**Table C-22. State Board of Land and Natural Resources Capabilities**

Capability			Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation
			Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<b>Shoreline Determination Rules and Enforcement Rules</b>	<b>Capability Category and Description:</b>	Planning and Regulatory The BLNR is authorized by HRS §205A to adopt rules for determining the shoreline and appeals of shoreline determination and to enforce the established rules.						
	<b>Notable Changes:</b>	None identified.						
	<b>Challenges:</b>	None identified.						
	<b>Opportunities:</b>	Shoreline certification rules and procedures may present an opportunity to address some aspects of sea level rise.						
	<b>Effect on Future Conditions:</b>	Reduce likelihood of development in area susceptible to sea level rise						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	Safety and Security						
	<b>Hazards:</b>	Flood, Climate Change						





Capability	State HMP Goals:	1, 2	Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation
			Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
	State HMP Goals:	1, 2	◆	◆		◆		
Conservation District	<b>Capability Category and Description:</b>	Planning and Regulatory The Board of Land and Natural Resources has adopted and administered land use regulations for the Conservation District pursuant to the State Land Use Law (Act 187) of 1961. The Conservation District has five subzones: Protective, Limited, Resource, General and Special. The first four subzones are arranged in a hierarchy of environmental sensitivity, ranging from the most environmentally sensitive (Protective) to least sensitive (General). The Special subzones defines a unique land use on a specific site. The use of Conservation District lands is regulated by Title 13 Chapter 5 of the HARs and Chapter 183C of the HRS.						
	<b>Notable Changes:</b>	None identified.						
	<b>Challenges:</b>	None identified.						
	<b>Opportunities:</b>	None identified.						
	<b>Effect on Future Conditions:</b>	Reduce likelihood of development in hazardous and/or sensitive areas						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	None identified.						
	<b>Hazards:</b>	Flood, Drought						
	<b>State HMP Goals:</b>	1, 2		◆		◆		

- a. Support is defined as programs, plans, policies, regulations, funding, or practices that help the implementation of mitigation actions, while facilitate is defined as programs, plans, policies, regulations, funding, or practices that make implementing actions easier.
- b. (F) = Federal grant funding supports in full or in part







## C.1.9 DEPARTMENT OF TRANSPORTATION

Table C-23 includes information on hazard mitigation related capabilities for the Department of Transportation (HDOT). Table C-24 includes information on hazard mitigation related capabilities for the O’ahu Metropolitan Planning Organization (OahuMPO).

*Table C-23. Department of Transportation Capabilities*

Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<b>Description:</b> <i>The Hawai’i Department of Transportation (HDOT) is responsible to plan, design, construct, operate, and maintain State facilities in all modes of transportation, including air, water, and land. Coordination with other State, County, and Federal programs is maintained to achieve these objectives.</i>							
<b>Roadside Fuel Reduction Program</b>	<b>Capability Category and Description:</b>	Administrative and Technical HDOT has a program to reduce or convert fuel load along roadsides and community open areas.					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	None identified.					
	<b>Effect on Future Conditions:</b>	None identified.					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Transportation; Hazardous Material; Safety and Security					
	<b>Hazards:</b>	Wildfire					
<b>State HMP Goals:</b>	4	◆		◆	◆		
<b>Hazardous Materials Risk Management Program</b>	<b>Capability Category and Description:</b>	Administrative and Technical Information on unintentional releases of hazardous materials and the consequences are collected and analyzed.					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	Identifying low probability, high consequence events (which may not be apparent from incident data) and providing appropriate levels of protection are among the more demanding aspects of this risk management program. A further challenge is to strike a proper balance between levels of safety and costs that result from regulations, special permits, and approvals.					
	<b>Opportunities:</b>	None identified.					
	<b>Effect on Future Conditions:</b>	None identified.					
<b>Equitable Outcomes:</b>	Disadvantaged persons are more likely to live near facilities that produce hazardous waste.						





Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
	<b>Community Lifelines:</b>	Hazardous Material; Safety and Security					
	<b>Hazards:</b>	Hazardous Materials					
	<b>State HMP Goals:</b>	4, 5	◆		◆		
<b>Bridge Inspection Program</b>	<b>Capability Category and Description:</b>	Administrative and Technical The bridge inspection program creates reports on the conditions of all HDOT bridges every two years.					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	Implement mitigation action 2023-2013-028, for seismic retrofit performance evaluations.					
	<b>Effect on Future Conditions:</b>	Creates safer means of passage as sea levels rise and salinity increases.					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Safety and Security					
	<b>Hazards:</b>	Infrastructure Failure, Earthquake, Flood, Landslide and Rockfall, Tsunami					
	<b>State HMP Goals:</b>	4	◆		◆		
	<b>Statewide Highway Shoreline Protection Study</b>	<b>Capability Category and Description:</b>	Administrative and Technical Together with the Hawai'i Department of Transportation (HDOT), the University of Hawai'i Civil & Environmental Engineering (UH CEE) Department conducted a statewide field investigation for each island in the State of Hawai'i that identified shoreline locations requiring "immediate" mitigation measures, that is, imminent road failure affected by shoreline activity only, in order to reduce possible road closures during the next storm and hurricane season.				
<b>Notable Changes:</b>		None identified.					
<b>Challenges:</b>		None identified.					
<b>Opportunities:</b>		Implement mitigation measures outlined in the Statewide Highway Shoreline Protection Study (i.e., Action 2023-2018-058)					
<b>Effect on Future Conditions:</b>		Mitigate road flooding and road closures.					
<b>Equitable Outcomes:</b>		None identified.					
<b>Community Lifelines:</b>		Transportation; Safety and Security					
<b>Hazards:</b>		Flood, Climate Change and Sea Level Rise, Hurricane					
<b>State HMP Goals:</b>		2	◆		◆	◆	

a. Support is defined as programs, plans, policies, regulations, funding, or practices that help the implementation of mitigation actions, while facilitate is defined as programs, plans, policies, regulations, funding, or practices that make implementing actions easier.





**Table C-24. O’ahu Metropolitan Planning Organization Capabilities**

Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<p><b>Description:</b> OahuMPO is responsible for coordinating transportation planning on O’ahu. Although OahuMPO serves as the metropolitan planning organization for the two urbanized areas on O’ahu (Honolulu and Kailua-Kaneohe), OahuMPO coordinates transportation planning for the entire island.</p>							
<p><b>Transportation Asset Climate Change Risk Assessment Project</b></p>	<p><b>Capability Category and Description:</b></p>	<p>Administrative and Technical OahuMPO was selected by the Federal Highway Administration (FHWA) as one of five pilots nationwide to perform and evaluate a risk assessment of climate change on important transportation assets. Inventory assets were integrated with climate information and vulnerability was determined in two dimensions: the impact to the asset itself and, importantly, the socioeconomic consequences of that impact (SSFM 2011). While the report focuses on only several essential components of the Island of O’ahu’s transportation infrastructure, the workshops, field work, and assessment looked at a far broader range of both transportation assets as well as climate change factors. Those assets selected for the report were deemed by those senior engineers, senior planners, and climate change experts, involved in the study to be the most at risk in 2011.</p>					
	<p><b>Notable Changes:</b></p>	<p>Climate change science has advanced since the assessment. Near-term risks to assets should now be assumed to be understated by the project. The study focused primarily on shoreline transportation assets and later advancements make it clear that the effects of climate change in the Hawaiian Islands are not limited to the shoreline.</p>					
	<p><b>Challenges:</b></p>	<p>Climate change science has advanced since the assessment and near-term risks to assets may now be understated by the project.</p>					
	<p><b>Opportunities:</b></p>	<p>Updated sea level rise information is available to reevaluate and plan for near and long-term risks not only to those assets identified in the study, but a broader range of effects that will result from temperature and rainfall (rockfall hazards), the need to address not only harbor infrastructure (Honolulu Harbor gantries) but also wastewater systems, oil refinery, and visitor industry assets, all of which are currently at shoreline.</p>					
	<p><b>Effect on Future Conditions:</b></p>	<p>Risk assessment of climate change on important transportation assets.</p>					
	<p><b>Equitable Outcomes:</b></p>	<p>Risk assessment takes socioeconomic consequences of the climate change impact.</p>					
	<p><b>Community Lifelines:</b></p>	<p>Transportation; Safety and Security</p>					
	<p><b>Hazards:</b></p>	<p>Climate Change</p>					
	<p><b>State HMP Goals:</b></p>	<p>2, 4</p>	◆		◆		

a. Support is defined as programs, plans, policies, regulations, funding, or practices that help the implementation of mitigation actions, while facilitate is defined as programs, plans, policies, regulations, funding, or practices that make implementing actions easier.





**C.1.10 HAWAI'I EMERGENCY MANAGEMENT AGENCY**

Table C-25 includes information on hazard mitigation related capabilities for the Hawai'i Emergency Management Agency (HI-EMA).

*Table C-25. Hawai'i Emergency Management Agency Capabilities*

Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<p><b>Description:</b> <i>The Hawai'i Emergency Management Agency (HI-EMA) is the emergency management agency for the State of Hawai'i. HI-EMA serves as the coordinating agency between the four county emergency management agencies (County of Hawai'i Civil Defense, County of Maui Emergency Management Agency, City and County of Honolulu Department of Emergency Management, and Kaua'i Emergency Management Agency) and as State Warning Point. The five core capabilities that guide HI-EMA are Prevention, Protection, Mitigation, Response, and Recovery. The branches in the HI-EMA organization address these capabilities: Preparedness, Operations, Telecommunications, Logistics, and Finance/Administration.</i></p>							
<p><b>Hawai'i Earthquake &amp; Tsunami Advisory Committee (HETAC)<sup>b</sup></b></p>	<p><b>Capability Category and Description:</b></p>	<p>Administrative and Technical            HETAC is a volunteer peer group of scientists who has served as an advisory body to HI-EMA for over 25 years (est. September 1990). HETAC meets quarterly to promote activities such as research, project development and management, and mitigation (HI-EMA 2014). HETAC also supports the Pacific Tsunami Museum in their public outreach efforts.</p>					
	<p><b>Notable Changes:</b></p>	<p>No significant changes over reporting period</p>					
	<p><b>Challenges:</b></p>	<p>None identified.</p>					
	<p><b>Opportunities:</b></p>	<p>None identified.</p>					
	<p><b>Effect on Future</b></p>	<p>None identified.</p>					
	<p><b>Conditions:</b></p>	<p>None identified.</p>					
	<p><b>Equitable Outcomes:</b></p>	<p>None identified.</p>					
	<p><b>Community Lifelines:</b></p>	<p>Safety and Security</p>					
	<p><b>Hazards:</b></p>	<p>Earthquake, Tsunami</p>					
<p><b>State HMP Goals:</b></p>	<p>3</p>	◆		◆			◆ (F)
<p><b>Western States Seismic Policy Council (WSSPC)</b></p>	<p><b>Capability Category and Description:</b></p>	<p>Planning and Regulatory            Hawai'i is a member of the WSSPC, which develops seismic policies and shares information to promote programs intended to reduce earthquake related losses. WSSPC also hosts a Tsunami Center.</p>					
	<p><b>Notable Changes:</b></p>	<p>WSSPC continues to support several mitigation initiatives in Hawai'i including HHARP, printing 3,000 copies of the Natural Hazards Preparedness Wheel, and general outreach initiatives.</p>					
	<p><b>Challenges:</b></p>	<p>None identified.</p>					
	<p><b>Opportunities:</b></p>	<p>None identified.</p>					
	<p><b>Effect on Future</b></p>	<p>None identified.</p>					





Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation	
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict		
	<p><b>Conditions:</b></p> <p><b>Equitable Outcomes:</b> None identified.</p> <p><b>Community Lifelines:</b> Safety and Security</p> <p><b>Hazards:</b> Earthquake, Tsunami</p> <p><b>State HMP Goals:</b> 2, 3</p>		◆		◆	◆		◆
Hawai'i Advisory Council on Emergency Management (HACEM)	<p><b>Capability Category and Description:</b> Administrative and Technical Hawai'i Revised Statutes §127A-4 authorizes HACEM. Originally established in 1951, the Advisory Council was known as the Civil Defense Advisory Council until July 1, 2014 when HRS 127A became effective. The council consists of seven members nominated by the Governor and serves as a resource to the Governor and the Director of the Emergency Management Agency.</p>							
	<b>Notable Changes:</b> None identified.							
	<b>Challenges:</b> None identified.							
	<b>Opportunities:</b> None identified.							
	<b>Effect on Future Conditions:</b> None identified.							
	<b>Equitable Outcomes:</b> None identified.							
	<b>Community Lifelines:</b> Safety and Security							
	<p><b>Hazards:</b> Flood, Climate Change, Infrastructure Failure, Drought, Earthquake, Hazardous Materials, Health Risks, Windstorm, Hurricane, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire</p> <p><b>State HMP Goals:</b> 3</p>		◆	◆	◆	◆		
Get Ready Website	<p><b>Capability Category and Description:</b> Education, Outreach, and Capacity Building This website is a key outreach tool that provides links and information to county specific Get Ready Hawai'i websites; information on preparing for hurricane, tsunami, flash flood, earthquake, and wildfire; and tips for preparing your family, home, and business.</p>							
	<b>Notable Changes:</b> None identified.							
	<b>Challenges:</b> None identified.							
	<b>Opportunities:</b> Expand website to provide information on all hazards addressed by the hazard mitigation plan.							
	<b>Effect on Future Conditions:</b> None identified.							
	<b>Equitable Outcomes:</b> Provides disadvantaged communities with education on hazards.							
	<b>Community Lifelines:</b> Safety and Security; Communications							





Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation	
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict		
Hawai'i Hazards Awareness and Resilience Program (HHARP) <sup>b</sup>	<b>Hazards:</b>	Earthquake, Flood, Hurricane, Tsunami, Volcanic Hazards, Wildfire						
	<b>State HMP Goals:</b>	4, 5	◆			◆		
	<b>Capability Category and Description:</b>	Education, Outreach, and Capacity Building The aim of HHARP is to help communities prepare to be self-reliant during and after natural hazard events, improve their ability to take care of their own needs, and reduce the negative impacts of disasters. HHARP can enhance community resilience through education and outreach sessions that build awareness and understanding of hazard mitigation, preparedness, response and recovery.						
	<b>Notable Changes:</b>	This was established in 2014. As of December 2017, six communities have reached recognition level in the program and another six communities are on the verge of program recognition. This program won the <i>2016 National Award in Excellence for Educational Outreach to the General Public</i> from WSSPC.						
	<b>Challenges:</b>	None identified.						
	<b>Opportunities:</b>	Engage more communities to participate in and complete the program.						
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	Provides disadvantaged communities with education on hazards and how to become more resilient.						
	<b>Community Lifelines:</b>	Safety and Security; Communications						
	<b>Hazards:</b>	Flood, Climate Change, Infrastructure Failure, Drought, Earthquake, Hazardous Materials, Health Risks, Windstorm, Hurricane, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire						
<b>State HMP Goals:</b>	2, 5	◆			◆			
State of Hawai'i Emergency Operations Plan (HI-EOP)	<b>Capability Category and Description:</b>	Planning and Regulatory The HI-EOP establishes the shared framework for the state's response to, and initial recovery from emergencies and disasters. It outlines the state's hazard vulnerabilities and planning assumptions, and establishes the authorities, responsibilities, operational priorities and general strategies for state emergency operations that apply regardless of the specific type of emergency or disaster.						
	<b>Notable Changes:</b>	None identified.						
	<b>Challenges:</b>	None identified.						
	<b>Opportunities:</b>	The hazard mitigation plan is considered the hazard assessment section of the HI-EOP. The information on the State of Hawaii's hazard profile can be updated once the 2023 SHMP Update is completed.						
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	Safety and Security; Communications						





Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation	
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict		
	<b>Hazards:</b>	Flood, Climate Change, Dam Failure, Drought, Earthquake, Hazardous Materials, Health Risks, Windstorm, Hurricane, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire						
	<b>State HMP Goals:</b>	2, 4		◆		◆		
<b>Hawai'i Catastrophic Hurricane Plan</b>	<b>Capability Category and Description:</b>	Planning and Regulatory The 2015 Hawai'i Catastrophic Hurricane Plan/FEMA Region IX Hawai'i outlines scalable and coordinated strategies to execute a joint state and federal response to catastrophic damage before, during, and following a catastrophic hurricane event (HI-EMA and FEMA Region IX 2015).						
	<b>Notable Changes:</b>	This is a new capability. The plan was developed in 2015.						
	<b>Challenges:</b>	None identified.						
	<b>Opportunities:</b>	The Cat Plan provides the basis for the development of other operational plans (e.g. Critical Systems Vulnerability Assessment) that highlight mitigation opportunities.						
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	Safety and Security; Communications						
	<b>Hazards:</b>	Hurricane						
	<b>State HMP Goals:</b>	2, 3, 4		◆		◆		
	<b>Training &amp; Exercise Plan (TEP)</b>	<b>Capability Category and Description:</b>	Planning and Regulatory The TEP is updated annually. It is the product of the Training and Exercise Planning Workshop (TEPW), which is hosted by HI-EMA and attended by stakeholders from all levels of government, the non-profit and private sectors. The TEP is informed by the input provided by this diverse group of agencies and is the roadmap for the State of Hawai'i to accomplish the training, exercise and planning priorities described within this document.					
<b>Notable Changes:</b>		None identified.						
<b>Challenges:</b>		None identified.						
<b>Opportunities:</b>		The annual hurricane (Makani Pahili) exercise hot-wash provide an opportunity to discuss mitigation opportunities of identified vulnerabilities						
<b>Effect on Future Conditions:</b>		None identified.						
<b>Equitable Outcomes:</b>		None identified.						
<b>Community Lifelines:</b>		Safety and Security; Communications						





Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation	
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict		
	<b>Hazards:</b>	Flood, Climate Change, Infrastructure Failure, Drought, Earthquake, Hazardous Materials, Health Risks, Windstorm, Hurricane, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire						
	<b>State HMP Goals:</b>	2, 3, 4		◆		◆		
<b>Department Emergency Operations Plan Template</b>	<b>Capability Category and Description:</b>	Planning and Regulatory Each state department is required to have a Department Emergency Operations Plan that is consistent with the state plan. A template is provided by HI-EMA.						
	<b>Notable Changes:</b>	None identified.						
	<b>Challenges:</b>	Significant out-reach required for Departments that do not regularly participate in emergency exercises and events.						
	<b>Opportunities:</b>	Out-reach provides opportunity to discuss mitigation actions						
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	Safety and Security; Communications						
	<b>Hazards:</b>	Flood, Climate Change, Infrastructure Failure, Drought, Earthquake, Hazardous Materials, Health Risks, Windstorm, Hurricane, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire						
	<b>State HMP Goals:</b>	2, 3		◆		◆		
<b>Department Operations Center (DOC) Planning Guidance and Resources</b>	<b>Capability Category and Description:</b>	Planning and Regulatory Every state department should have a DOC, which is the location where their key personnel will gather in an emergency to coordinate support requested by the State Emergency Operations Center, and to address impacts to critical agency functions. This document provides guidance on supplies and back-up communications assets a DOC should be equipped with and contains templates that can be used to organize operations when the DOC is activated.						
	<b>Notable Changes:</b>	This is an operations/response plan.						
	<b>Challenges:</b>	None identified.						
	<b>Opportunities:</b>	Post-event Hot-wash provides an opportunity to discuss mitigation opportunities of identified vulnerabilities.						
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	Safety and Security; Communications						
	<b>Hazards:</b>	Flood, Climate Change, Dam Failure, Drought, Earthquake, Hazardous Materials, Health Risks, Windstorm, Hurricane, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire						







Capability			Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation
			Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
	<b>State HMP Goals:</b>	2, 3	◆	◆	◆	◆		
<b>State Mitigation Forum (Forum)</b>	<b>Capability Category and Description:</b>	Administrative and Technical The Hawai'i State Hazard Mitigation Forum was formerly established in 1998. The forum serves in an advisory capacity relative to the incorporation of hazard mitigation in policy in the State of Hawai'i. Forum members (17 in total) come from a broad spectrum of State and County agencies, and the private sector. The Forum also includes ex officio representatives from all four County Emergency Management Agencies, and FEMA. Two of the most important Forum duties are to assist in the development of the State Hazard Mitigation Plan, and to make mitigation project recommendations to the Emergency Management Agency Director. Two committees of the forum have been established: education and emergency shelter criteria. The Form bylaws can be found in Appendix B (State Hazard Mitigation Forum Bylaws).						
	<b>Notable Changes:</b>	None identified.						
	<b>Challenges:</b>	None identified.						
	<b>Opportunities:</b>	Support mitigation action 2023-2018-056 to evaluate and update the SHMP on an annual basis.						
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	Safety and Security; Communications						
	<b>Hazards:</b>	Flood, Climate Change and Sea Level Rise, Infrastructure Failure, Drought, Earthquake, Hazardous Materials, Health Risks, Windstorm, Hurricane, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire						
	<b>State HMP Goals:</b>	2, 3, 4	◆	◆	◆	◆		
	<b>Critical Systems Vulnerability Assessment</b>	<b>Capability Category and Description:</b>	Administrative and Technical The Critical Systems Vulnerability Assessment is a holistic systems evaluation (rather than component by component) of the implications of a large natural disaster on key systems (e.g., ports, food & water, power). The gap analysis leads to a 9-step resiliency strategy, that lead to response, recovery and mitigation actions strengthen those systems and reduce response/recovery times					
<b>Notable Changes:</b>		None identified.						
<b>Challenges:</b>		None identified.						
<b>Opportunities:</b>		None identified.						
<b>Effect on Future Conditions:</b>		Identifies weaknesses on key systems which need improvement.						
<b>Equitable Outcomes:</b>		None identified.						
<b>Community Lifelines:</b>		Safety and Security						





Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation	
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict		
Natural Disaster Economic Recovery Strategy	<b>Hazards:</b>	Earthquake, Hurricane, Tsunami						
	<b>State HMP Goals:</b>	1, 2, 3, 6	◆		◆	◆		
	<b>Capability Category and Description:</b>	Planning and Regulatory This Hawai'i Natural Disaster Economic Recovery Strategy (NDERS) addresses pre-disaster business continuity planning and post-disaster recovery actions for both public and private sectors. This strategy especially focuses on small business and economic recovery since small businesses are the major driver of the State of Hawaii's economy. The process to develop a strategy sought input from multiple stakeholders and resulted in 49 recommended implementation strategies grouped in four types (1) State or Federal legislative action is needed to change statutes and ordinances, or provide funding; (2) State government agency action could change administrative rules, policies, or programs; (3) public-private partnerships; and (4) private sector initiatives and actions (OP 2014a).						
	<b>Notable Changes:</b>	None identified.						
	<b>Challenges:</b>	None identified.						
	<b>Opportunities:</b>	Coordinated planning efforts for economic recovery (i.e., Actions 2023-004 and 2023-2018-006)						
	<b>Effect on Future Conditions:</b>	Provide business owners with knowledge on business continuity and recovery.						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	Safety and Security						
	<b>Hazards:</b>	Flood, Climate Change, Dam Failure, Drought, Earthquake, Hazardous Materials, Health Risks, Windstorm, Hurricane, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire						
Threat Hazard Identification and Risk Assessment (THIRA)	<b>State HMP Goals:</b>	1, 2, 3, 5, 6	◆	◆	◆			
	<b>Capability Category and Description:</b>	Administrative and Technical The THIRA process helps communities identify capability targets and resource requirements necessary to address anticipated and unanticipated risks.						
	<b>Notable Changes:</b>	None identified.						
	<b>Challenges:</b>	None identified.						
	<b>Opportunities:</b>	The 2023 SHMP Update will be integrated into future THIRA updates.						
	<b>Effect on Future Conditions:</b>	Identifies hazards and risks within a selected area.						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	Safety and Security						
<b>Hazards:</b>	Earthquake, Flood, Health Risks, Hurricane, Tsunami, Volcanic Hazards							





Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
	<b>State HMP Goals:</b>	1, 3, 6	◆		◆	◆	
<b>Stakeholder Preparedness Review (SPR)</b>	<b>Capability Category and Description:</b>	Administrative and Technical The SPR assesses the State’s ability to meet the capability targets established in the THIRA.					
	<b>Notable Changes:</b>	New FEMA guidance has been issued for report development.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	HI-EMA will be conducting a comprehensive update to the SPR in 2023. The 2023 SHMP Update will be integrated into the 2023 SPR.					
	<b>Effect on Future Conditions:</b>	None identified.					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Safety and Security					
	<b>Hazards:</b>	Flood, Climate Change, Infrastructure Failure, Drought, Earthquake, Hazardous Materials, Health Risks, Windstorm, Hurricane, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire					
	<b>State HMP Goals:</b>	4, 6	◆		◆	◆	
<b>HI-EMA Strategic Plan</b>	<b>Capability Category and Description:</b>	Planning and Regulatory Strategic Plan for HI-EMA.					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	None identified.					
	<b>Effect on Future Conditions:</b>	None identified.					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Safety and Security					
	<b>Hazards:</b>	Flood, Climate Change, Dam Failure, Drought, Earthquake, Hazardous Materials, Health Risks, Windstorm, Hurricane, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire					
	<b>State HMP Goals:</b>	6	◆		◆		
<b>Makani Pahili 2017 Emergency Power Prioritization Workshop Series</b>	<b>Capability Category and Description:</b>	Education, Outreach, and Capacity Building The Hawai’i Emergency Management Agency (HI-EMA) conducted a series of workshops in preparation for Makani Pahili 2017 to identify power generation requirements in accordance with the 2015 Hawai’i Catastrophic Hurricane Plan.					
	<b>Notable Changes:</b>	None identified.					





Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation	
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict		
	<b>Challenges:</b>	None identified.						
	<b>Opportunities:</b>	Information from this workshop series was integrated into the 2023 SHMP Update, as appropriate, and formed the basis for the critical facility data base used for the risk assessment.						
	<b>Effect on Future Conditions:</b>	Identify power generation needs for hurricane preparedness.						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	Safety and Security; Communications; Energy						
	<b>Hazards:</b>	Infrastructure Failure, Earthquake, Flood, Windstorm, Hurricane, Tsunami, Volcanic Hazards, Wildfire						
	<b>State HMP Goals:</b>	1, 3, 4	◆	◆	◆	◆		
<b>HAWAI'I WING CIVIL AIR PATROL</b>								
<i>Description: Hawai'i Wing Civil Air Patrol (CAP) has three primary missions: emergency services, cadet programs, and aerospace education. Hawai'i Wing Units are located on O'ahu, Hawai'i, Kaua'i, and Maui.</i>								
<b>Aircraft Alert System</b>	<b>Capability Category and Description:</b>	Disaster Response/Recovery CAP aircraft are capable of night flights with instrument-rated pilots equipped with speakers and sirens on the islands of Kaua'i, O'ahu, Maui, and Hawai'i are deployed to alert areas where any land-based sirens have malfunctioned. CAP has eleven aircrafts.						
	<b>Notable Changes:</b>	None identified.						
	<b>Challenges:</b>	None identified.						
	<b>Opportunities:</b>	None identified.						
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	May notify disadvantaged populations of an impending hazard.						
	<b>Community Lifelines:</b>	Safety and Security; Communications						
	<b>Hazards:</b>	Tsunami						
	<b>State HMP Goals:</b>	1, 3, 5	◆			◆		

- a. Support is defined as programs, plans, policies, regulations, funding, or practices that help the implementation of mitigation actions, while facilitate is defined as programs, plans, policies, regulations, funding, or practices that make implementing actions easier.
- b. Identified by the department/agency as one of the most effective capabilities for achieving mitigation goals.
- c. (F) = Federal grant funding supports in full or in part; HETAC tsunami work is funded by NOAA





### C.1.11 HAWAI'I STATE LEGISLATURE

Table C-26 includes information on hazard mitigation related capabilities for the Hawai'i State Legislature

*Table C-26. Hawai'i State Legislature Capabilities*

Capability	Type of Hazard Management Capability	Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation		
		Pre-Disaster	Post-Disaster	Support		Facilitate	Conflict
<b>Hawai'i State Legislature Grant-in-Aid (GIA) Program</b>	<b>Capability Category and Description:</b>	Financial Pursuant to Chapter 42F, Hawai'i Revised Statutes (HRS), the Legislature may award state funds on an annual basis as a grant by an appropriation to a specified recipient, to support the activities of the recipient and permit the community to benefit from those activities. These activities may include hazard mitigation. An appropriation for a grant shall be disbursed by a contract between the state agency designated the expending agency for the appropriation by the legislature, and the recipient of the grant. During the Regular Legislative Session of 2016, the Hawai'i State Legislature appropriated \$158,000 as a grant to Hawai'i Wildfire Management Organization (HWMO) to support wildfire prevention and hazardous fuel reduction measures, including: <ul style="list-style-type: none"> <li>• Create all-agency unified wildfire prevention messaging, related materials, and a public awareness campaign to maximize public protection and preparedness; and</li> <li>• Develop cross-boundary fuel reduction priorities, maps, and projects for all four counties in the State of Hawai'i.</li> <li>• DLNR-DOFAW was the designated expending agency for the grant to HWMO.</li> </ul>					
	<b>Notable Changes:</b>	Funds were appropriated to HWMO as a grant pursuant to Chapter 42F, HRS, during the Regular Legislative Session of 2016. A contract was executed and funds were encumbered in 2017. The contract is currently open and the Statewide initiative is ongoing. This grant was used to distribute wildfire outreach materials endorsed by all fire agencies to schools on all islands and help to coordinate the annual unified multi-agency Wildfire LOOKOUT! campaign to raise awareness about the threat of wildfire to Hawaii's natural resources and to private and public property. This grant will also fund HWMO to develop cross-boundary fuel reduction priorities, maps, and projects for all four counties in the State of Hawai'i. HWMO has started holding workshops on County of Maui and County of Hawai'i to develop these fuel reduction priorities, maps, and projects.  There may be other grants pursuant to Chapter 42F, HRS, that are funding other hazard mitigation projects with other state agencies designated as expending agencies.					
	<b>Challenges:</b>	The Hawai'i State Legislature decides on which recipients and the type of activities to fund as long as the grants support the activities of the recipient and permit the community to benefit from those activities.					
	<b>Opportunities:</b>	This is a funding source for mitigation activities performed by the non-governmental sector					
	<b>Effect on Future Conditions:</b>	May fund projects to assist with climate change adaptations.					
	<b>Equitable Outcomes:</b>	Funded projects may benefit disadvantaged communities.					
	<b>Community Lifelines:</b>	Safety and Security					





Capability		Type of Hazard Management Capability	Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation		
			Pre-Disaster	Post-Disaster	Support		Facilitate	Conflict
	<b>Hazards:</b>	Flood, Climate Change, Infrastructure Failure, Drought, Earthquake, Hazardous Materials, Health Risks, Windstorm, Hurricane, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire						
	<b>State HMP Goals:</b>	1, 2, 3, 5	◆	◆	◆			◆
Hawai'i State Legislature Senate Resolution 35	<b>Capability Category and Description:</b>	Financial Designating Hawaii's Coral Reefs as Critical Natural Infrastructure and Strongly Supporting Nature-based Solutions Such as Coral Reef Restoration for Risk Reduction. Healthy coral reef ecosystems can help to mitigate the effects of climate change and natural disasters by absorbing up to ninety-seven percent of wave energy brought about by storms and extreme weather events. One study has estimated that Hawaii's coral reefs protect and save coastal infrastructure from \$836,000,000 in costs and damages annually due to destructive flooding and similar events.						
	<b>Notable Changes:</b>	Resolution adopted on April 5, 2023						
	<b>Challenges:</b>	The Hawai'i State Legislature decides on which recipients and the type of activities to fund.						
	<b>Opportunities:</b>	This is a new funding source which will allow for unique coral reef restoration projects (i.e., Action 2023-009)						
	<b>Effect on Future Conditions:</b>	May fund projects to assist with climate change adaptations.						
	<b>Equitable Outcomes:</b>	Funded projects may benefit disadvantaged coastal communities.						
	<b>Community Lifelines:</b>	Food, Water, Shelter; Safety and Security; Communication; Transportation; Energy; Health and Medical; Hazardous Material						
	<b>Hazards:</b>	Climate Change and Sea Level Rise, Flood, Hurricane, Tsunami						
	<b>State HMP Goals:</b>	1, 2, 3	◆	◆	◆			◆

a. Support is defined as programs, plans, policies, regulations, funding, or practices that help the implementation of mitigation actions, while facilitate is defined as programs, plans, policies, regulations, funding, or practices that make implementing actions easier.

b. (F) = Federal grant funding supports in full or in part





### C.1.12 UNIVERSITY OF HAWAI'I

Table C-27 includes information on hazard mitigation related capabilities for the University of Hawai'i (UH). The Pacific Disaster Center (PDC) is managed under a Cooperative Agreement with the Office of the Undersecretary of Defense and its capabilities are included in Table C-28. Table C-29 includes information on the Pacific Regional Integrated Sciences and Assessments (Pacific RISA) program. Table C-30 includes information on the Pacific Risk Management 'Ohana (PRiMO).

*Table C-27. University of Hawai'i Capabilities*

Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<b>SCHOOL OF OCEAN AND EARTH SCIENCE TECHNOLOGY</b>							
<i>Description: The School of Ocean and Earth Science and Technology (SOEST) at the University of Hawai'i at Mānoa is a world-class research and academic institution focused on informing solutions to some of the world's most vexing problems. Through an integrated, comprehensive, and sustained system of Earth and planetary observations, research, and education, SOEST staff work to transform the way people live on Earth by enabling a healthy public, economy, and planet.</i>							
<b>SOEST Public Resources</b>	<b>Capability Category and Description:</b>	Education, Outreach, and Capacity Building SOEST's website includes a number of publicly available resources including a video archive, publications, K-12 resources, and a data access portal. Among the programs generating hazard related information are: <ul style="list-style-type: none"> <li>• Mauna Kea Weather Center provides realtime data, model output, and forecasts for Mauna Kea including blizzard conditions and high winds at the summits. The model output covers the <u>state</u> at a 900 meter resolution and provides 2-day forecast output of clouds, winds, and storm conditions, including hurricanes and kona lows, etc.</li> <li>• VMAP, a weather modeling program provides 2-day web-based ongoing forecasts of atmospheric concentrations of sulfur dioxide and sulfate aerosols using initial conditions from the Flyspec Array developed by Keith Horton of SOEST and maintained by the USGS.</li> <li>• The Hawai'i Beach Safety website was developed by Dr. Fletcher. Using current weather, surf, public safety alerts and beach conditions we calculate hazard levels at thirty-three O'ahu beaches. Hazard ratings may vary between nearshore and offshore.</li> <li>• Pacific Islands Ocean Observing System (PacIOOS) empowers ocean users and stakeholders in the Pacific Islands by providing web-based and on-demand accurate and reliable coastal and ocean information, tools, and services that are easy to access and use, including products wave hazard, currents, shoreline impacts, water characteristics, and weather (see details below).</li> <li>• The Department of Meteorology maintains the Weather Server (Department of Meteorology 2017), which provides real time weather observations and forecasts for the State of Hawai'i, the central Pacific region and the US Mainland.</li> </ul>					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	Supported internally and through grant funds; subject to availability of agency funding					





Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation	
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict		
	<b>Opportunities:</b>	None identified.						
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	Provides educational opportunities on hazards and their risks.						
	<b>Community Lifelines:</b>	Safety and Security; Communications						
	<b>Hazards:</b>	Flood, Climate Change, Windstorm, Hurricane, Volcanic Hazards						
	<b>State HMP Goals:</b>	1, 2, 3, 4, 5	◆		◆	◆		
<b>SOEST Research</b>	<b>Capability Category and Description:</b>	Administrative and Technical SOEST faculty and staff are recognized as international leaders in research, innovation, and education on topics as varied as renewable energy, oceanography, coral reef ecology, volcanology, remote sensing, cosmochemistry, tropical meteorology and climate modeling, and projection of future climate change for the State of Hawai'i. SOEST faculty work with community groups and agencies at local, state, and federal levels, to perform the fundamental research that underlies policy development in water quality, renewable energy, natural hazard management, natural hazards and climate variability (e.g., El Niño, Pacific Decadal Oscillation), climate change impacts, and sustainable ecosystems. SOEST includes several research centers, labs, programs and groups. Particularly relevant for hazard mitigation goals include: <ul style="list-style-type: none"> <li>• The Sea Level Center</li> <li>• The Coastal Geology Group</li> <li>• The State Climatologist</li> <li>• The Department of Ocean and Resources Engineering maintains tsunami modeling capabilities for determination of tsunami inundation and run-up projections as well as for modeling ocean and harbor currents and water levels over the course of tsunami events.</li> <li>• The Department of Geology and Geophysics maintains research programs on public risk perception, volcano hazards management and training programs for crisis response.</li> </ul>						
	<b>Notable Changes:</b>	None identified.						
	<b>Challenges:</b>	None identified.						
	<b>Opportunities:</b>	Support mitigation action 2023-2013-121 with data to develop harbor maps for tsunami evacuation.						
	<b>Effect on Future Conditions:</b>	Knowledge from faculty and staff may assist in planning for climate change impacts.						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	Safety and Security						
	<b>Hazards:</b>	Flood, Climate Change and Sea Level Rise, Drought, Windstorm, Hurricane, Tsunami, Volcanic Hazards, Wildfire						
	<b>State HMP Goals:</b>	3, 4	◆		◆	◆		







Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
Sea Grant	<b>Capability Category and Description:</b>	Financial Hawai'i Sea Grant supports an innovative program of research, extension, education, and communication services directed to the improved understanding and stewardship of coastal and marine resources. Realizing the necessity of collaboration to address coastal resource issues, Hawai'i Sea Grant also provides links between academia, federal, state, and local government agencies, industries, and local community members. Hawai'i Sea Grant has five focus areas: (1) sustainable coastal development, (2) hazard resilience in coastal communities (3) sustainable coastal tourism (4) indigenous cultural heritage (5) water resource sustainability; and six centers of excellence: (1) smart building and community design (2) sustainable coastal tourism (3) marine science education (4) coastal and climate science and resilience (5) integrated science, knowledge, and culture; and (6) water resource sustainability. With capacity and concentration working in these focal areas for more than 10 years, the Center for Coastal and Climate Science and Resilience (CCCSR) was formally established in 2016 to increase support for collaborative and transdisciplinary coastal and climate research, outreach, and education in the service of communities and decision-makers to understand and address impacts of coastal hazards, climate change, and sea-level rise in Hawai'i and the Pacific region. University of Hawai'i researchers and Hawai'i Sea Grant extension faculty working through the CCCSR significantly amplify project impacts and outcomes through increased collaboration and involvement of multidisciplinary center faculty. The CCCSR engages a broad range of regional stakeholders involved in coastal community resilience and coastal ecosystem management to inform the CCCSR's research agenda, advise decision-makers on potential impacts of climate change and the implementation of adaptation measures, and improve sustainable management of public coastal resources and shoreline land use.					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	Partnerships leveraged between counties, state departments (e.g. DLNR) and the University to support staff in county planning agencies that participate directly in hazard mitigation activities and planning.					
	<b>Effect on Future Conditions:</b>	Hazard mitigation activities are correlated to climate change.					
	<b>Equitable Outcomes:</b>	Hazard mitigation activities could improve community resilience.					
	<b>Community Lifelines:</b>	Safety and Security; Communications					
	<b>Hazards:</b>	Flood, Climate Change, Earthquake, Hurricane, Tsunami					
<b>State HMP Goals:</b>	1, 2, 3, 4, 5	◆	◆	◆	◆		
Pacific Islands Ocean Observing System (PacIOOS)	<b>Capability Category and Description:</b>	Administrative and Technical The Pacific Islands Ocean Observing System (PacIOOS) provides coastal and ocean data and information to promote a safe, healthy, and productive ocean and resilient coastal zone. PacIOOS collects real-time data on ocean conditions, forecasts future events, and develops user-friendly tools to access this information. Based within the School of Ocean and Earth Science and Technology (SOEST) at the University of Hawai'i at Mānoa, PacIOOS is part of the U.S. Integrated Ocean Observing System (IOOS).					
	<b>Notable Changes:</b>	<ul style="list-style-type: none"> <li>Installed a number of wave buoys around the islands; 10 wave buoy locations now maintained by PacIOOS around the Islands of</li> </ul>					





Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation	
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict		
		Kauaʻi, Oʻahu, Maui, Lānaʻi, and Hawaiʻi. <ul style="list-style-type: none"> <li>• Provides six-day High Sea Level forecasts for six harbors in the islands.</li> <li>• Provides two 6-day wave run-up forecasts provided: for Waikiki and North Shore, Oʻahu.</li> <li>• Provides the Haleiwa Harbor Surge Forecast.</li> <li>• Provides high resolution wave and wind forecasts for the islands.</li> <li>• Developed and hosts the Hawaiʻi Sea Level Rise Viewer as the online atlas to support the Hawaiʻi Sea Level Rise Vulnerability and Adaptation report.</li> <li>• Developed and now hosts a map viewer for Honolulu Sea Level Rise Inundation Risk, which illustrates risk of inundation from a Hurricane and/or Tsunami with 1-meter of sea level rise.</li> <li>• Developed the Hawaiʻi Shoreline Change tool, which displays scenarios of sea level rise, historical shorelines, and erosion rates by parcel.</li> </ul>						
	<b>Challenges:</b>	PacIOOS is mostly federally funded, and while funding has been fairly level for the past decade, it is insufficient to address all the needs expressed by stakeholders.						
	<b>Opportunities:</b>	Advancements in the wave run-up forecast are currently being made with funding from multiple agencies and organizations.						
	<b>Effect on Future Conditions:</b>	Could notify scientists and the public of changing coastal and oceanic conditions which may be correlated to climate change.						
	<b>Equitable Outcomes:</b>	Provides disadvantaged communities with the opportunity to access real-time information on coastal and ocean data.						
	<b>Community Lifelines:</b>	Safety and Security; Communications						
	<b>Hazards:</b>	Flood, Climate Change and Sea Level Rise, Earthquake, Windstorm, Hurricane, Tsunami						
	<b>State HMP Goals:</b>	1, 2, 3, 4, 5	◆		◆			
<b>THE CENTER FOR THE STUDY OF ACTIVE VOLCANOES</b>								
Description: <i>The Center for the Study of Active Volcanoes (CSAV) operates out of the University of Hawaiʻi at Hilo. The Center is a training and outreach program founded by Robert W. Decker. CSAV's mission is to provide information on volcanic and natural hazards that occur in Hawaiʻi and worldwide. CSAV has been operating since 1989, and is a cooperative program of the University of Hawaiʻi at Hilo, the Hawaiian Volcano Observatory (HVO), and the Hawaiʻi Institute of Geophysics and Planetology at the University of Hawaiʻi at Mānoa (UHM).</i>								
<b>CSAV Public Education and Outreach Program on Natural Hazards</b>	<b>Capability Category and Description:</b>	Education, Outreach, and Capacity Building Includes website with information on natural hazards, YouTube and Vimeo channels, Facebook page, Visiting Schools Program, Public Seminar, Community Association Visits, and Teacher Training Workshops						
	<b>Notable Changes:</b>	None identified.						
	<b>Challenges:</b>	Outreach program is funded on an annual basis and will vary according to agency funding available in a given year.						
	<b>Opportunities:</b>	There is a significant need for comprehensive, web-based on-demand hazard mitigation guidance that could be met with University capabilities if resources were available for their development.						
	<b>Effect on Future Conditions:</b>	None identified.						





Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation	
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict		
CSAV Cooperative Research Program	<b>Equitable Outcomes:</b>	Provides educational opportunities for disadvantaged communities.						
	<b>Community Lifelines:</b>	Safety and Security; Communications						
	<b>Hazards:</b>	Earthquake, Flood, Hurricane, Tsunami, Volcanic Hazards						
	<b>State HMP Goals:</b>	1, 2, 4, 5	◆		◆			
	<b>Capability Category and Description:</b>	Administrative and Technical Includes monitoring and assessment of volcanoes, internship program, deformation studies, seismic analysis, volcanic hazards and society, geotechnical monitoring, geology and mapping, and public outreach						
	<b>Notable Changes:</b>	None identified.						
	<b>Challenges:</b>	Funded annually and subject to resource availability from funding agency.						
	<b>Opportunities:</b>	None identified.						
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	May provide educational opportunities for disadvantaged communities through public outreach.						
<b>Community Lifelines:</b>	Safety and Security; Communications							
<b>Hazards:</b>	Volcanic Hazards							
<b>State HMP Goals:</b>	1, 2, 4, 5	◆		◆	◆			
<b>GEOGRAPHY DEPARTMENT</b>								
Hawai'i Climate Data Websites	<b>Capability Category and Description:</b>	Administrative and Technical Hosts a family of websites that provides data on the climate of Hawai'i including Rainfall Atlas, Evapotranspiration, Solar Radiation and Climate (Geography Department 2014).						
	<b>Notable Changes:</b>	None identified.						
	<b>Challenges:</b>	None identified.						
	<b>Opportunities:</b>	None identified.						
	<b>Effect on Future Conditions:</b>	May provide insight to climatic changes.						
	<b>Equitable Outcomes:</b>	Provides educational opportunities for disadvantaged communities.						
	<b>Community Lifelines:</b>	Safety and Security; Communications						
	<b>Hazards:</b>	Flood						
<b>State HMP Goals:</b>	2, 4, 5	◆		◆				
<b>HAWAII' I INSTITUTE OF GEOPHYSICS AND PLANETOLOGY</b>								
<i>Description: The Hawai'i Institute of Geophysics and Planetology is a research institute within the School of Ocean and Earth Sciences and Technology specializing in basic and applied research in earth and space sciences</i>								





Capability		Type of Hazard Management Capability	Effect on Loss Reduction			Provides Funding for Mitigation			
			Pre-Disaster	Post-Disaster	Support		Facilitate	Conflict	
HIGP Research	<b>Capability Category and Description:</b>	Administrative and Technical Research faculty conduct research in a variety of technologies related to natural and technological hazards including: <ul style="list-style-type: none"> <li>Satellite remote sensing and quantification of volcanic and trace gases and aerosols</li> <li>Multispectral remote sensing of lava flows</li> <li>Geodetic modeling and tsunami detection</li> <li>Remote sensing and spectroscopy of contaminants in the atmosphere and oceanic environment</li> <li>Infrasound (acoustic) monitoring of volcanic events and nuclear testing for nuclear test ban treaty verification</li> <li>Engineering and development of satellite instrumentation for remote sensing of earth and atmospheric processes.</li> </ul>							
	<b>Notable Changes:</b>	None identified.							
	<b>Challenges:</b>	Supported extramurally through grant funds; subject to availability of agency funding							
	<b>Opportunities:</b>	None identified.							
	<b>Effect on Future Conditions:</b>	None identified.							
	<b>Equitable Outcomes:</b>	None identified.							
	<b>Community Lifelines:</b>	Safety and Security							
	<b>Hazards:</b>	Tsunami, Volcanic Hazards, Technological (nuclear and chemical) hazards							
	<b>State HMP Goals:</b>	4	◆		◆				
State Climatologist	<b>Capability Category and Description:</b>	Administrative and Technical Research focus on the impact of climate variability and climate change on natural hazards such as hurricane, flood, drought, vog, and wild fire in Hawai'i. Use a high-resolution regional climate model and advanced statistical methods for studying future changes in natural hazards. <ul style="list-style-type: none"> <li>Hurricane risk assessment</li> <li>Hurricane intensity forecasts</li> <li>Seasonal hurricane frequency forecasts</li> <li>El Niño, La Niña, and rainfall changes in the State of Hawai'i</li> <li>A high resolution numerical model for assessing current and future weather hazards in the State of Hawai'i</li> <li>Projection of future flooding and drought events for the State of Hawai'i using dynamical and statistical downscaling approaches</li> <li>Estimating return levels of extreme precipitation using an extreme value theory</li> <li>Long-term changes in trade winds over the Hawaiian islands and their impact on society</li> <li>Vog dispersion under various weather systems using numerical models</li> </ul>							





Capability		Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation	
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict		
		<ul style="list-style-type: none"> <li>Seasonal and monthly prediction of temperature and precipitation using the Bayesian inference</li> <li>Seasonal prediction of wildland fire activity for the State of Hawai'i</li> <li>Sea level forecasting</li> </ul>						
	<b>Notable Changes:</b>	None identified.						
	<b>Challenges:</b>	Funded internally but need extramural funds to carry out the tasks outlined in Description; subject to availability of agency funding						
	<b>Opportunities:</b>	None identified.						
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	Safety and Security						
	<b>Hazards:</b>	Flood, Climate Change, Infrastructure Failure, Drought, Health Risks, Windstorm, Hurricane, Volcanic Hazards						
	<b>State HMP Goals:</b>	4	◆		◆			
<b>NATIONAL DISASTER PREPAREDNESS TRAINING CENTER (NDPTC)</b>								
<p><b>Description:</b> <i>The NDPTC is a member of the National Domestic Preparedness Consortium (NDPC), which was expanded in 2007 to address all-hazards capabilities by the addition of the University of Hawai'i. The NDPTC is authorized to develop and deliver training and educational programs related to homeland security and disaster management, with a specific focus on natural hazards, coastal communities, and the special needs and opportunities of islands and territories. The NDPTC actively engages internally with FEMA and the University of Hawai'i, as well as with external partners across the region to integrate the delivery of its trainings, products, and services.</i></p>								
<b>NDPTC Training Programs</b>	<b>Capability Category and Description:</b>	Administrative and Technical The Center has trained more than 35,000 first responders across the nation. In addition to emergency managers and first responders, the Center works closely with urban planners and transportation agencies. The Center has built a nationwide network of subject matter experts, instructors, and training support personnel to facilitate training and adoption of new technologies.						
	<b>Notable Changes:</b>	None identified.						
	<b>Challenges:</b>	None identified.						
	<b>Opportunities:</b>	None identified.						
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	Safety and Security						
	<b>Hazards:</b>	Flood, Climate Change, Infrastructure Failure, Drought, Earthquake, Hazardous Materials, Health Risks, Windstorm, Hurricane, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire						





Capability	State HMP Goals:	4	Type of Hazard Management Capability		Effect on Loss Reduction			Provides Funding for Mitigation
			Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
			◆	◆	◆	◆		

a. *Support is defined as programs, plans, policies, regulations, funding, or practices that help the implementation of mitigation actions, while facilitate is defined as programs, plans, policies, regulations, funding, or practices that make implementing actions easier.*





Table C-28. Pacific Disaster Center Capabilities

Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<p><b>Description:</b> PDC provides the most powerful, global decision support technology, as well as risk and vulnerability assessments, preparedness expertise, training and exercise support, and response capabilities. Our early warning and decision support technology, DisasterAWARE, is being used by decision makers and disaster management practitioners in the State of Hawai'i and worldwide for disaster risk reduction, planning and preparedness, operational response, and recovery. PDC provides a number of technical capabilities described below.</p>							
DisasterAWARE™ <sup>b</sup>	<b>Capability Category and Description:</b>	Administrative and Technical Through DisasterAWARE, practitioners have access to PDC's vast data holdings and tools, in a single platform, including: <ul style="list-style-type: none"> <li>▪ Customizable early warning notifications and real-time hazard updates</li> <li>▪ Mapping and visualizations for at-a-glance decision making</li> <li>▪ Impact, damage, and needs assessment</li> <li>▪ Risk and vulnerability analysis</li> <li>▪ Civilian/Military/Interagency sharing and collaboration capabilities</li> <li>▪ Hundreds of State of Hawai'i-specific data layers and thousands globally (e.g. hazard risk areas, critical infrastructure, vulnerable populations, observations and forecasts, etc.)</li> <li>▪ Historical hazard impact information</li> </ul> Custom version for disaster management and humanitarian assistance practitioners: <a href="https://emops.pdc.org/emops/">https://emops.pdc.org/emops/</a> Version accessible to the public: <a href="https://disasteralert.pdc.org/disasteralert/">https://disasteralert.pdc.org/disasteralert/</a>					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	None identified.					
	<b>Effect on Future Conditions:</b>	Can provide analysis on predictions for climate change impacts					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Safety and Security; Communications					
	<b>Hazards:</b>	Flood, Climate Change, Infrastructure Failure, Drought, Earthquake, Hazardous Materials, Health Risks, Windstorm, Hurricane, Tsunami, Volcanic Hazards, Wildfire					
	<b>State HMP Goals:</b>	4	◆	◆	◆		
	<b>Risk and Vulnerability Assessment <sup>b</sup></b>	<b>Capability Category and Description:</b>	Administrative and Technical PDC's RVA enhances the ability of decision makers to anticipate and characterize potential risk and shocks by making visible the socioeconomic, political, cultural, and environmental factors that contribute to risk and resilience. Our RVA methodology is hazard independent and can be run for any hazard type.				





Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation	
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict		
	<b>Notable Changes:</b>	None identified.						
	<b>Challenges:</b>	None identified.						
	<b>Opportunities:</b>	None identified.						
	<b>Effect on Future Conditions:</b>	Provides risk assessments for hazards						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	Safety and Security						
	<b>Hazards:</b>	Flood, Climate Change, Infrastructure Failure, Drought, Earthquake, Hazardous Materials, Health Risks, Windstorm, Hurricane, Tsunami, Volcanic Hazards, Wildfire						
	<b>State HMP Goals:</b>	4	◆		◆			
<b>Training and Exercise Support <sup>b</sup></b>	<b>Capability Category and Description:</b>	Administrative and Technical PDC provides DisasterAWARE™ training and exercise support to help disaster managers coordinate and test complex networks of response activities—simulating real-world events to ensure stakeholders respond effectively under high-pressure circumstances. We support scenario-based training, tabletop exercises, functional exercises, and full-scale exercises. Exercise capabilities include: <ul style="list-style-type: none"> <li>▪ Scenario development, design, and simulation</li> <li>▪ Event scripting and data integration</li> <li>▪ Communications and information sharing through DisasterAWARE™</li> <li>▪ Subject matter expertise (e.g. best practices, hazard risk, etc.)</li> </ul>						
	<b>Notable Changes:</b>	None identified.						
	<b>Challenges:</b>	None identified.						
	<b>Opportunities:</b>	None identified.						
	<b>Effect on Future Conditions:</b>	None identified.						
	<b>Equitable Outcomes:</b>	None identified.						
	<b>Community Lifelines:</b>	Safety and Security; Communications						
	<b>Hazards:</b>	Flood, Infrastructure Failure, Drought, Earthquake, Hazardous Materials, Health Risks, Windstorm, Hurricane, Tsunami, Volcanic Hazards, Wildfire						
	<b>State HMP Goals:</b>	1, 4	◆		◆			
	<b>Response Support <sup>b</sup></b>	<b>Capability Category</b>	Administrative and Technical					







Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
	<b>and Description:</b>	With a global mission, PDC supports disaster managers in the State of Hawai'i and worldwide with timely and accurate hazard information. Through custom products, PDC can assess potential impact and needs allowing communities to quickly mobilize the right resources to protect lives and reduce losses. Response capabilities include: <ul style="list-style-type: none"> <li>▪ Early warning notification (Email &amp; SMS)</li> <li>▪ Decision support (DisasterAWARE™)</li> <li>▪ Custom mapping and products</li> <li>▪ Hazard modeling</li> <li>▪ Pre-impact needs assessments</li> <li>▪ Interagency and civilian/military information sharing</li> <li>▪ Subject matter expertise (SME; e.g. Comprehensive Disaster Management (CDM), Risk and Vulnerability Assessment (RVA), and Global health hazard evaluation)</li> </ul> Decision makers and disaster management practitioners may request PDC response support at <a href="mailto:response@pdc.org">response@pdc.org</a> .					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	None identified.					
	<b>Effect on Future Conditions:</b>	Can provide insight into future needs to increase community resilience to climate change					
	<b>Equitable Outcomes:</b>	Can increase a community's resilience to hazards and climate change					
	<b>Community Lifelines:</b>	Safety and Security; Communications					
	<b>Hazards:</b>	Flood, Infrastructure Failure, Drought, Earthquake, Hazardous Materials, Health Risks, Windstorm, Hurricane, Tsunami, Volcanic Hazards, Wildfire					
	<b>State HMP Goals:</b>	1, 4	◆	◆	◆		
	<b>Pre- and post-impact modeling <sup>b</sup></b>	<b>Capability Category and Description:</b>	Administrative and Technical Access modeled data through DisasterAWARE™ layers and analytical reports, including pre- and post-impact data, estimated losses and needs estimates for a variety of hazards including but not limited to tsunami travel times, earthquake shaking and intensity, tropical cyclone storm surge, rainfall, and wind impacts, and volcanic ash cloud impacts. PDC's Hazus modeling expertise includes earthquakes, hurricane, flood inundation, and tsunami events. Our capabilities include Hazus modeling for damage and loss estimates, impacts to infrastructure and population, and direct economic losses. We also leverage Hawai'i-specific data for Hazus earthquake modeling that incorporates information about the state's unique built environment.				





Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	None identified.					
	<b>Effect on Future Conditions:</b>	Can provide insight into future needs to increase community resilience to climate change					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Safety and Security; Communications					
	<b>Hazards:</b>	Earthquake, Flood, Hurricane, Tsunami, Volcanic Hazards, Wildfire					
	<b>State HMP Goals:</b>	1, 4	◆	◆	◆		

- a. Support is defined as programs, plans, policies, regulations, funding, or practices that help the implementation of mitigation actions, while facilitate is defined as programs, plans, policies, regulations, funding, or practices that make implementing actions easier.
- b. Identified by the department/agency as one of the most effective capabilities for achieving mitigation goals.





**Table C-29. Pacific Regional Integrated Sciences and Assessments Capabilities**

Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<p><b>Description:</b> The RISA program created in 1995 to pioneer innovative mechanisms for enhancing the value of climate information and products for understanding and responding to a variety of challenges associated with climate variability and change at the regional scale. The Pacific RISA program supports Pacific island and coastal communities in adapting to the impacts of climate variability and change. We strive to enhance Pacific communities’ abilities to understand, plan for, and respond to changing climate conditions. Our work is conducted through interdisciplinary research and partnerships with local, national, and regional stakeholders.</p>							
Pacific RISA Projects	<b>Capability Category and Description:</b>	Administrative and Technical Pacific RISA is engaged in many projects to support mitigation goals including but not limited to work on regional climate projections, human dimensions of drought, and integrating climate and disaster risk assessments.					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	None identified.					
	<b>Effect on Future Conditions:</b>	Provides regional climate projections					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Safety and Security					
	<b>Hazards:</b>	Climate Change, Drought					
<b>State HMP Goals:</b>	2, 4	◆		◆			
Pacific RISA Education & Outreach	<b>Capability Category and Description:</b>	Education, Outreach, and Capacity Building The Pacific RISA website includes a number of education and outreach materials including case studies, “documentos,” and a newsletter.					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	None identified.					
	<b>Effect on Future Conditions:</b>	None identified.					
	<b>Equitable Outcomes:</b>	Provides education opportunity for disadvantaged communities					
	<b>Community Lifelines:</b>	Safety and Security; Communications					
	<b>Hazards:</b>	Climate Change, Drought, Wildfire					
<b>State HMP Goals:</b>	1, 5	◆		◆			

a. Support is defined as programs, plans, policies, regulations, funding, or practices that help the implementation of mitigation actions, while facilitate is defined as programs, plans, policies, regulations, funding, or practices that make implementing actions easier.





**Table C-30. Pacific Risk Management ‘Ohana Capabilities**

Capability		Type of Hazard Management Capability		Effect on Loss Reduction <sup>a</sup>			Provides Funding for Mitigation
		Pre-Disaster	Post-Disaster	Support	Facilitate	Conflict	
<p><b>Description:</b> PRIMO began in 2003 as an effort to explore opportunities to enhance communication and collaboration among the “Ohana, or family, of local, national, and regional organizations involved in risk management. PRIMO has since transformed into a true collaborative effort governed by a coordinating council of navigators. These key representatives from the region provide leadership, resources, and policy guidance to PRIMO as well as seek institutional support for PRIMO from within their respective organizations.</p>							
<b>Hui</b>	<b>Capability Category and Description:</b>	Administrative and Technical Hui members are experts in their field and together the members bridge the information gaps between science and service providers, decisions makers and other stakeholders. These working groups represent the heart of the PRIMO effort, where the various organizations come together to develop and implement actions plans that improve the resilience of the Pacific region. Hui include: Communications, Health Security, Indigenous Knowledge and the Environment, Information Access and Geospatial technology, Risk Assessment and Planning, and Training and Education.					
	<b>Notable Changes:</b>	None identified.					
	<b>Challenges:</b>	None identified.					
	<b>Opportunities:</b>	None identified.					
	<b>Effect on Future Conditions:</b>	Implemented actions may improve resiliency to climate change					
	<b>Equitable Outcomes:</b>	None identified.					
	<b>Community Lifelines:</b>	Safety and Security; Health and Medical; Communications					
	<b>Hazards:</b>	Flood, Climate Change, Infrastructure Failure, Drought, Earthquake, Hazardous Materials, Health Risks, Windstorm, Hurricane, Landslide and Rockfall, Tsunami, Volcanic Hazards, Wildfire					
<b>State HMP Goals:</b>	3	◆		◆	◆		

a. Support is defined as programs, plans, policies, regulations, funding, or practices that help the implementation of mitigation actions, while facilitate is defined as programs, plans, policies, regulations, funding, or practices that make implementing actions easier.





## C.2 State Funding Capabilities Detailed Tables

The following sections provide detailed information presented in Section 5 (Capability Assessment) of the 2023 SHMP Update.





**C.2.1 PROJECTS SUBMITTED FOR FEMA FUNDING**

Table C-31 shows projects submitted for funding during the performance period of the 2018 SHMP. Table C-32 shows the evaluation of federal funding resources that the state has access to or is eligible to use to fund mitigation efforts.

*Table C-31. Projects Submitted for Funding during Performance Period of 2018 SHMP*

Grant	DR# or Fiscal Year	Project Name	Subapplicant	Activity Type	Status	Total Project Cost
HMGP	4365	Maui Food Bank Emergency Generator	Maui Food Bank	Generator	Closed	\$125,000.00
HMGP	4365	Lāhainā Wastewater Treatment Facility Emergency Generator Replacement	Maui County, Department of Environmental Management	Generator	Open	\$845,000.00
HMGP	4365	Volcanic Emission Public Alert	County of Hawai‘i, Department of Health-UH	Telemetry System	Open	\$566,920.00
HMGP	4365	Hawai‘i State Wiring Code Update	Structural Engineers Association of Hawai‘i	Hardening	Open	\$276,667.00
HMGP	4365	7% Shoreline & Special Management Area Regulations	City and County of Honolulu Office of Climate Change	Planning	Open	\$298,409.00
HMGP	4365	Kaua‘i War Memorial Hardening, Phased	Kaua‘i County Department of Parks and Recreation	Envelop Hardening	Open	\$35,000.00
HMGP	4365	Honolulu Fire Station Safety Fire Station 7 - Bay Doors Hardening	City and County of Honolulu Fire Department	Envelop Hardening	Open	\$321,775.00
HMGP	4366	Planning & Technical Assistance Assessment of the Volcanic Hazard	Hawai‘i County, Department of Research & Development	Advance Assistance	Closed	\$300,000.00
HMGP	4366	7% Long Term Disaster Recovery & Post Disaster Mitigation	City and County of Honolulu Office of Climate Change	Planning	Open	\$580,000.00
HMGP	4366	5% High Resolution Numerical Simulation	University of Hawai‘i Office of Research	Technical Study	Open	\$402,022.00
HMGP	4366	5% Near Real Time Wildfire Protection System	University of Hawai‘i Office of Research	Technical Study	Open	\$1,310,281.00
HMGP	4366	5% Shoreline and Riparian Setbacks for Hawai‘i County Analysis	County of Hawai‘i, Planning Department	Technical Study	Open	\$260,968.00
HMGP	4366	7% Multi-Hazard Mitigation Plan Online Outreach	County of Maui, Emergency Management Agency	Planning	Open	\$145,329.00





Grant	DR# or Fiscal Year	Project Name	Subapplicant	Activity Type	Status	Total Project Cost
HMGP	4366	7% Integration of Climate Change Adaption into the 2020 Hazard Mitigation Plan Update	County of Hawai'i Civil Defense Agency	Planning	Open	\$100,000.00
HMGP	4395	Advance Assistance, Energy & Critical Infrastructure Vulnerability & Resiliency Assessment	State of Hawai'i Energy Office	Advance Assistance	Open	\$800,000.00
HMGP	4395	7% O'ahu Resilience Hub Action Plan	City and County of Honolulu	Planning	Open	\$285,000.00
HMGP	4365	O'ahu Tsunami Signage Installation and Educational Outreach - Revised	City and County of Honolulu	Signage and Public Outreach	Open	\$822,900.00
HMGP	4365	Advance Assistance, Planning & Technical Assistance Assessment of the Volcanic Hazard	County of Hawai'i	Advance Assistance	Closed	\$300,000.00
HMGP	4366	County of Hawai'i, Public Safety Building Floodproofing	County of Hawai'i, Police Department	Dry Floodproofing	Open	\$216,254.00
HMGP	4604	Hardening of Parker No. 2, Waiaha and Lalamilo B Wells	County of Hawai'i, Department of Water Supply	Transfer switches	Open	\$315,000.00
HMGP	4366	Pacific Tsunami Museum Advance Assistance Dry Flood Proofing	Pacific Tsunami Museum	Dry Floodproofing	Open	\$45,500.00
HMGP	4366	Komohana Research and Extension Center Retrofits, Phased	University of Hawai'i	Envelop Hardening	Open	\$606,343.88
HMGP	4366	Waianuenue Bridge Modernization, Phased	County of Hawai'i, Department of Public Works	Seismic Hardening	Open	\$2,070,000.00
HMGP	4366	Wastewater Treatment Facility Generators	County of Hawai'i	Generator	Open	\$1,834,757.00
HMGP	4395	County Honolulu Department of Water Supply Miliani Well Generator	City and County of Honolulu, Board of Water Supply	Generator	Open	\$1,050,000.00
HMGP	4549	Hanalei Hill Emergency Access Road Phased	Kaua'i Emergency Management Agency	Hardening	Under FEMA Review	\$204,443.00
HMGP	4604	Wailuku Wastewater Pump Station Hardening	County of Maui	Hardening	Under FEMA Review	\$964,645.00
BRIC	2020	Kaimuki Middle School Microgrid, with Kapiolani Community College Resilient Power System	Honolulu Office of Climate Change, Sustainability and Resiliency	Microgrid	Open	\$375,000.00





Grant	DR# or Fiscal Year	Project Name	Subapplicant	Activity Type	Status	Total Project Cost
BRIC	2020	Board of Water Supply Emergency Power Master Plan	City and County of Honolulu, Board of Water Supply	Planning	Open	\$75,000.00
BRIC	2020	Wastewater Options for Sea Level Rise	Honolulu Office of Climate Change, Sustainability and Resiliency	Technical Study	Open	\$150,000.00
PDM	2019	Advance Assistance - City Facilities	Honolulu Office of Climate Change, Sustainability and Resiliency	Planning	Open	\$166,667.00
PDM	2019	State Hazard Mitigation Plan Update	HI-EMA	HM Plan Update	Open	\$267,000.00
BRIC	2021	C&C Multi-Hazard Mitigation Plan Update	Honolulu Office of Climate Change, Sustainability and Resiliency	HM Plan Update	Under FEMA Review	\$262,500.00
BRIC	2021	Kapalama Canal Flood Control Project Scoping	Honolulu Office of Climate Change, Sustainability and Resiliency	Scoping	Under FEMA Review	\$393,750.00
BRIC	2021	Hawai'i Department of Transportation Scoping Activity - Airport Microgrids and Transportation Resilience	Hawai'i Department of Transportation, Airports	Scoping	Under FEMA Review	\$492,187.50
HMGP	5404	Community Defensible Space and Hazardous Fuels Reduction Phased	County of Hawai'i	Fire Mitigation	Under FEMA Review	\$778,777.00
HMGP	4510	Moloka'i High School Gym Retrofit	HI-EMA	Wind Retrofit	Under FEMA Review	\$7,217,780.52
HMGP	4510	Waiialua High School Shelter Retrofit	HI-EMA	Wind Retrofit	Under FEMA Review	\$5,761,290.51
HMGP	4510	Laupāhoehoe School Wind Retrofit	HI-EMA	Wind Retrofit	Under FEMA Review	\$2,102,149.81
HMGP	4510	Advance Assistance, Residential Retrofit Program	HI-EMA	Advance Assistance	Under FEMA Review	\$899,815.50
HMGP	4510	Emergency Power Transfer Switching Capability for Critical Water Infrastructure	County of Hawai'i, Department of Water Supply	Transfer switches	Under FEMA Review	\$702,000.00
HMGP	4510	7% Flood Forecast System	University of Hawai'i	Planning	Under FEMA Review	\$985,300.00
HMGP	4510	Advance Assistance, Maui Dune Restoration	University of Hawai'i	Advance Assistance	Under FEMA Review	\$235,760.00
HMGP	4510	5% Aloha Safe Homes Education and Outreach	University of Hawai'i	5% Initiative	Under FEMA Review	\$210,785.00
HMGP	4510	5% Aloha Safe Homes Community Behavior	University of Hawai'i	5% Initiative	Under FEMA Review	\$214,925.00
HMGP	4510	Pali Momi Hospital Generators	Pali Momi Medical Center	Generator	Under FEMA Review	\$6,516,000.00







Grant	DR# or Fiscal Year	Project Name	Subapplicant	Activity Type	Status	Total Project Cost
HMGP	4510	Adventist Health Castle Hospital Generator	Adventist Health Castle	Generator	Under FEMA Review	\$5,497,545.00
HMGP	4510	County of Hawai'i Fire Department Station Generators	County of Hawai'i Fire Department	Generator	Under FEMA Review	\$2,557,045.21
HMGP	4510	7% Climate Change Community Resilience	County of Kaua'i Planning Department	Planning	Under FEMA Review	\$363,960.00
HMGP	4510	County of Kaua'i Coco Palms Resort Acquisition	Kaua'i Emergency Management Agency	Acquisition	Under FEMA Review	\$9,000,000.00

Table C-32. Evaluation of Funding Resources for Mitigation Efforts

Funding Program	Funding Agency	Pre-Disaster	Post-Disaster
<b>Hazard Mitigation Grant Program (HMGP)</b>	FEMA <i>Description: To provide funds to states, territories, Indian tribal governments, and communities to significantly reduce or permanently eliminate future risk to lives and property from natural hazards. HMGP funds projects in accordance with priorities identified in state or local hazard mitigation plans, and enables mitigation measures to be implemented during the recovery from a disaster.</i>		◆
<b>Building Resilient Infrastructure and Communities (BRIC)</b>	FEMA <i>Description: To provide funds to states, territories, tribal governments, and communities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations.</i>	◆	
<b>Flood Mitigation Assistance Grant (FMA)</b>	FEMA <i>Description: To implement cost-effective measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insured under the National Flood Insurance Program (NFIP).</i>	◆	
<b>Post-Disaster Economic Recovery Grants and Assistance</b>	Economic Development Administration <i>Description: Grant funding to assist with the long-term economic recovery of communities, industries, and firms adversely impacted by disasters.</i>		◆
<b>U.S. Small Business Administration Loan Programs</b>	Small Business Administration <i>Description: Small Business Administration (SBA) provides low-interest disaster loans to homeowners, renters, business of all sizes, and most private nonprofit organizations. SBA disaster loans can be used to repair or replace the following items damaged or destroyed in a declared disaster: real estate, personal property, economic injury, machinery and equipment, and inventory and business assets. Funding: Homeowners may apply for up to \$200,000 to replace or repair their primary residence. Renters and homeowners may borrow up to \$40,000 to replace or repair personal property-such as clothing, furniture, cars, and appliances – damaged or destroyed in a disaster. Physical disaster loans of up to \$2 million are available to qualified businesses or most private nonprofit organizations.</i>		◆





Funding Program	Funding Agency	Pre-Disaster	Post-Disaster
Public Assistance Grants	FEMA <i>Description: Grants for the repair, replacement, or restoration of disaster-damaged, publicly owned facilities and the facilities of certain private nonprofit organizations. Mitigation funding is available for work related to damaged components of eligible buildings/structures.</i>		◆
Community Development Block Grants Program (Non-entitled Counties)	U.S. HUD <i>Description: In the State of Hawai'i, three counties qualify for this program - Hawai'i, Kaua'i, and Maui. Funds are allocated using a formula based on population, poverty, and housing overcrowding, with the poverty factor carrying a double weight. CDBG funds may be used for activities which include, but are not limited to:</i> <ul style="list-style-type: none"> <li>▪ Acquisition of real property</li> <li>▪ Relocation and demolition</li> <li>▪ Rehabilitation of residential and non-residential structures</li> <li>▪ Construction of public facilities and improvements, such as water and sewer facilities, streets, neighborhood centers, and the conversion of school buildings for eligible purposes</li> <li>▪ Public services, within certain limits</li> <li>▪ Activities relating to energy conservation and renewable energy resources</li> <li>▪ Provision of assistance to nonprofit and profit-motivated businesses to carry out economic development and job creation/retention activities</li> </ul> <i>Each activity must meet one of the following national objectives for the program: benefit low- and moderate-income persons, prevention or elimination of slums or blight, or address community development needs having a particular urgency because existing conditions pose a serious and immediate threat to the health or welfare of the community for which other funding is not available</i>	◆	
Community Development Block Grants/ Entitlement Grants	U.S. HUD <i>Description: The City and County of Honolulu qualifies for this program. Grants to entitled cities and urban counties to develop viable communities (e.g., decent housing, suitable living environments, expanded economic opportunities), principally for low- and moderate-income persons. Activities as the same as for the non-entitled counties.</i>	◆	
Community Development Block Grant Disaster Recovery Program	U.S. HUD <i>Description: HUD provides flexible grants to help cities, counties, and States recover from Presidentially declared disasters, especially in low-income areas, subject to availability of supplemental appropriations. In response to Presidentially declared disasters, Congress may appropriate additional funding for the Community Development Block Grant (CDBG) Program as Disaster Recovery grants to rebuild the affected areas and provide crucial seed money to start the recovery process.</i>		◆
Public Housing Capital Fund Emergency/Natural Disaster Funding	U.S. HUD <i>Description: Funding to public housing agencies that confront an emergency situation or a natural disaster.</i>		◆
Single Family Housing Repair Loans and Grants (Section 504 Rural Housing Loans and Grants)	U.S. Department of Agriculture <i>Description: Repair loans, grants, and technical assistance for very low-income homeowners living in rural areas to repair their homes and remove health and safety hazards.</i>	◆	◆





Funding Program	Funding Agency	Pre-Disaster	Post-Disaster
<b>Guaranteed Single Family Housing Loans (Section 502 Rural Housing Loans)</b>	U.S. Department of Agriculture <i>Description: Also known as the Section 502 Direct Loan Program, this program assists low- and very-low-income applicants obtain decent, safe and sanitary housing in eligible rural areas by providing payment assistance to increase an applicant’s repayment ability.</i>	◆	
<b>Farm Ownership Loans</b>	U.S. Department of Agriculture <i>Description: Direct loans, guaranteed/insured loans, and technical assistance to farmers to develop, construct, improve, or repair farm homes, farms, and service buildings and to make other necessary improvements.</i>	◆	
<b>HOME Investment Partnerships Program</b>	U.S. HUD <i>Description: Grants to states, local government, and consortia for permanent and transitional housing (including support for property acquisition, improvements, demolition, and relocation) for very low and low-income persons.</i>	◆	
<b>Rural Development Assistance—Housing</b>	U.S. Department of Agriculture <i>Description: Grants, loans, and technical assistance for addressing rehabilitation and health and safety needs in primarily low-income rural areas. Declaration of major disaster necessary.</i>		◆
<b>Rural Development Assistance—Utilities</b>	U.S. Department of Agriculture <i>Description: Direct and guaranteed rural economic loans and business enterprise grants to address utility issues and development needs.</i>	◆	
<b>Assistance—Community Facility Direct Loans/Grants</b>	U.S. Department of Agriculture <i>Description: Grants, direct and guaranteed loans, and technical assistance to construct, enlarge, or improve community facilities for healthcare, public safety, and public services in primarily low-income rural areas.</i>	◆	
<b>Community Development Block Grant—Section 108 Loan Guarantees</b>	U.S. HUD <i>Description: Loan guarantees to public entities for economic development, housing rehabilitation, public facilities, and large-scale physical development projects (including mitigation measures).</i>	◆	
<b>Homeland Security Grant Program</b>	FEMA <i>Description: Grants to enhance the ability of states, territories, and urban areas to prepare for, prevent, and respond to terrorist attacks and other major disasters. Includes State Homeland Security Program, Urban Areas Security Initiative, Law Enforcement Terrorism Prevention Program, Metropolitan Medical Response System, and Citizen Corps Program grant programs.</i>	◆	
<b>Infrastructure Protection Program</b>	FEMA <i>Description: Grants to strengthen the nation’s ability to protect critical infrastructure facilities and systems. Includes Transit Security Grant Program, Port Security Grant Program, Intercity Bus Security Grant Program, Trucking Security Program, and Buffer Zone Protection Program grant programs.</i>	◆	
<b>Assistance to Firefighters Grant Program</b>	FEMA <i>Description: Grants to local fire departments to protect citizens and firefighters against the effects of fire and fire-related incidents</i>	◆	
<b>Fire Prevention and Safety Grant</b>	FEMA	◆	





Funding Program	Funding Agency	Pre-Disaster	Post-Disaster
<b>Program</b>	<i>Description: Grants for projects that enhance the safety of the public and firefighters from fire and related hazards. The primary goal is to target high-risk populations and mitigate high incidences of death and injury.</i>		
<b>Fire Management Assistance Grant Program</b>	FEMA		◆
	<i>Description: Grants for the mitigation, management, and control of fires on publicly or privately owned forests or grasslands, which threaten such destruction as would constitute a major disaster.</i>		
<b>Hazardous Materials Emergency Preparedness Program</b>	U.S. Department of Transportation	◆	
	<i>Description: Project grants and technical assistance to enhance hazardous materials emergency planning and training</i>		
<b>Nonstructural Alternatives to Structural Rehabilitation of Damaged Flood Control Works</b>	U.S. Army Corps of Engineers		◆
	<i>Description: Direct planning and construction grants for nonstructural alternatives to the structural rehabilitation of flood control works damaged in floods or coastal storms.</i>		
<b>Reimbursement for Firefighting on Federal Property</b>	U.S. Fish and Wildlife Service		◆
	<i>Description: Provides reimbursement only for direct costs and losses over and above normal operating costs.</i>		
<b>National Dam Safety Program</b>	FEMA	◆	
	<i>Description: National Dam Safety Program (NDSP). The NDSP, which is led by FEMA, is a partnership of the states, federal agencies, and other stakeholders to encourage individual and community responsibility for dam safety. Grant assistance to the States: Provides vital support for the improvement of the State dam safety programs that regulate most of the dams in the United States.</i>		
<b>Land and Water Conservation Fund</b>	Land and Water Conservation Fund	◆	
	<i>Description: Funding to states for outdoor recreational development, renovation, land acquisition, and planning. Funding: The fund is authorized at \$900 million annually, a level that has been met only twice during the program's 40-year history. The program is divided into two distinct funding pots: state grants and federal acquisition funds.</i>		
<b>The Forest Legacy Program</b>	U.S. Forest Service	◆	
	<i>Description: Federal program in partnership with states supports efforts to protect environmentally sensitive forest lands. Designed to encourage the protection of privately owned forest lands, Forest Legacy is an entirely voluntary program. To maximize the public benefits it achieves, the program focuses on the acquisition of partial interests in privately owned forest lands. Forest Legacy helps states develop and carry out their forest conservation plans. It encourages and supports acquisition of conservation easements, legally binding agreements transferring a negotiated set of property rights from one party to another, without removing the property from private ownership. Most Forest Legacy Program conservation easements restrict development, require sustainable forestry practices, and protect other values. Funding: To qualify, landowners are required to prepare a multiple resource management plan as part of the conservation easement acquisition. The federal government may fund up to 75% of project costs, with at least 25% coming from private, state, or local sources. In addition to gains associated with the sale or donation of property rights, many landowners also benefit from reduced taxes associated with limits placed on land use.</i>		
<b>Transportation Trust</b>	Federal Highway Administration	◆	





Funding Program	Funding Agency	Pre-Disaster	Post-Disaster
<b>Fund</b>	<p><b>Description:</b> Transportation Trust Fund funds grants through a competitive application-based process administered by the Local Aid District Offices. County Aid Program- Administer the County Aid Program for road and bridge infrastructure improvements under county jurisdiction. Each County receives an annual formula based allotment that takes into consideration county road lane mileage and population. The County Aid Program is funded through the Transportation Trust Fund and provides funding for eligible costs of projects included in the county's approved Annual Transportation Program.</p>		
<b>Department of Homeland Security Grant Program (HSGP)</b>	Department of Homeland Security	◆	
	<p><b>Description:</b> The Homeland Security Grant Program (HSGP) plays an important role in the implementation of the National Preparedness System by supporting the building, sustainment, and delivery of core capabilities essential to achieving the National Preparedness Goal of a secure and resilient nation. HSGP is composed of three interconnected grant programs including the State Homeland Security Program (SHSP), Urban Areas Security Initiative (UASI), and the Operation Stonegarden (OPSG). Together, these grant programs fund a range of preparedness activities, including planning, organization, equipment purchase, training, exercises, and management and administration.</p>		
<b>Emergency Management Performance Grant Program (EMPG)</b>	Department of Homeland Security	◆	
	<p><b>Description:</b> Grants are available to State, local, territorial, and tribal governments in preparing for all hazards. The Federal Government, through the EMPG Program, provides necessary direction, coordination and guidance, and provides necessary assistance, as authorized so that a comprehensive emergency preparedness system exists at all levels for all hazards.</p>		
<b>Coastal Resilience Grants</b>	NOAA	◆	
	<p><b>Description:</b> The NOAA Coastal Resilience Grants program supports projects that increase coastal resilience and restore habitat.</p>		
<b>Small Civil Works Projects; Continuing Authorities Program (CAP)</b>	U.S. Army Corps of Engineers	◆	
	<p><b>Description:</b> The Secretary of the Army has been delegated the authority to plan, design, and construct certain types of water resource and environmental restoration projects without specific Congressional authorization. Each authority has its own requirements and strict limits on responsibilities and financial contributions of the federal partners: (Section 14—Emergency Streambank and Shoreline Erosion; (2) Section 103—Hurricane and Storm Damage Reduction; (3) Section 107—Small Navigation Improvements; (4) Section 111—Shore Damage Attributable to Federal Navigation Projects; (5) Section 204—Regional Sediment Management &amp; Beneficial Uses of Dredges Materials; (6) Section 205—Small Flood Damage Reduction Projects; (7) Section 206—Aquatic Ecosystem Restoration; (8) Section 208—Snagging and Clearing for Flood Control; (9) Section 1135—Project Modification for Improvement of the Environment (USACE no date). Submittal deadlines are typically in May-June. Cost shares are typically 50% for feasibility and 65% for construction. Most projects are less than \$15,000,000.</p>		
<b>Cooperative Forestry State Fire Assistance</b>	US Forest Service	◆	
	<p><b>Description:</b> The Cooperative Forestry program manages a number of programs including The Forest Stewardship Program, The Forest Legacy Program, The Community Forest Program, The Urban and Community Forestry Program, Ecosystem Services and Markets, and Wood Innovations</p>		
<b>Tsunami Mitigation Program</b>	NOAA	◆	





Funding Program	Funding Agency	Pre-Disaster	Post-Disaster
	<p><b>Description:</b> The National Tsunami Hazard Mitigation Program (NTHMP) is a Federal and State program designed to protect people and reduce property losses in the event of a tsunami. Led by the National Oceanic and Atmospheric Administration (NOAA), the NTHMP consists of other primary participants, including FEMA. This program is currently expanding to include 17 new coastal U.S. States, territories, and commonwealths at some level of risk to tsunamis along the Atlantic and the Gulf of Mexico, and elsewhere in the Pacific Ocean.</p>		
<p><b>Cooperating Technical Partners (CTP) Program</b></p>	<p>FEMA</p> <p><b>Description:</b> With over 20,000 communities in the National Flood Insurance Program (NFIP), there is a significant challenge keeping flood hazard maps current. The CTP Program is an innovative approach to creating partnerships between FEMA and participating NFIP communities, regional agencies, state agencies, tribes and universities that have the interest and capability to become more active participants in the FEMA flood hazard mapping program. Each fiscal year, FEMA issues a Notice of Funding Opportunity (NOFO) document to announce the availability of the CTP cooperative agreement funding opportunity. The NOFO describes the available funding, priorities, requirements and process for eligible applicants to request funding for program activities.</p>	<p>◆</p>	
<p><b>Earthquake Hazards Reduction State Assistance Program</b></p>	<p>FEMA, National Earthquake Hazards Reduction Program (NEHRP)</p> <p><b>Description:</b> The Earthquake Hazards Reduction State Assistance Program is one part of FEMA’s activities under the NEHRP Reauthorization Act of 2004, which directs the agency to support state efforts to mitigate seismic risks and thereby reduce future losses from earthquakes. FEMA provides program funds annually to states and U.S. territories that face serious earthquake hazards and that develop ways to effectively reduce risks posed by these hazards.</p>	<p>◆</p>	
<p><b>Justice 40</b></p>	<p>Executive Order</p> <p><b>Description:</b> Executive Order 14008 established the Justice40 Initiative, making it a goal that 40-percent of the overall benefits of certain Federal investments flow to disadvantaged communities that are marginalized, underserved, and overburdened by pollution. The categories of investment are: climate change, clean energy and energy efficiency, clean transit, affordable and sustainable housing, training and workforce development, remediation and reduction of legacy pollution, and the development of critical clean water and wastewater infrastructure.</p>	<p>◆</p>	<p>◆</p>
<p><b>Infrastructure Investment and Jobs Act (IIJA)</b></p>	<p>Public Law</p> <p><b>Description:</b> The IIJA, most commonly known as the Bipartisan Infrastructure Bill and originally in the House as the INVEST in America Act (H.R. 3684) was signed into law by President Biden in November 2021. Various funds are expected to be made available through this Act to support hazard mitigation, including funding and programs related to carbon reduction.</p>	<p>◆</p>	<p>◆</p>





## C.3 State Pre- and Post-Disaster Capabilities and Core Mitigation Capabilities

The National Preparedness Goal (FEMA 2020) identifies seven core capabilities for the mitigation mission area:

- **Threats and Hazard Identification**—Identify the threats and hazards that occur in the geographic area; determine the frequency and magnitude; and incorporate this into analysis and planning processes so as to clearly understand the needs of a community or entity
- **Risk and Disaster Resilient Assessment**—Assess risk and disaster resilience so that decision makers, responders, and community members can take informed action to reduce their entity’s risk and increase their resilience
- **Planning**—Conduct a systematic process engaging the whole community as appropriate in the development of executable strategic, operational, and/or tactical-level approaches to meet defined objectives
- **Community Resilience**—Enable the recognition, understanding, communication of, and planning for risk and empower individuals and communities to make informed risk management decisions necessary to adapt to, withstand, and quickly recover from future incidents
- **Public Information & Warning** —Deliver coordinated, prompt, reliable, and actionable information to the whole community through the use of clear, consistent, accessible, and culturally and linguistically appropriate methods to effectively relay information regarding any threat or hazard and, as appropriate, the actions being taken and the assistance being made available
- **Long-term Vulnerability Reduction**—Build and sustain resilient systems, communities, and critical infrastructure and key resources lifelines so as to reduce their vulnerability to natural, technological, and human-caused threats and hazards by lessening the likelihood, severity, and duration of the adverse consequences
- **Operational Coordination**—Establish and maintain a unified and coordinated operational structure and process that appropriately integrates all critical stakeholders and supports the execution of core capabilities.
- 
- Table C-33 shows the State of Hawai’i mitigation capabilities and the mitigation mission area core capability that they support. This information is included to support the development and enhancement of the State of Hawai’i THIRA and State Preparedness Report.
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Table C-33. State of Hawai'i Mitigation Capabilities by Mitigation Core Capability

Capability	Mitigation Core Capabilities						
	Threats & Hazard Identification	Risk & Disaster Resilient Assessment	Planning	Community Resilience	Public Information & Warning	Long-term Vulnerability Reduction	Operational Coordination
Aircraft Alert System (HI-EMA)					◆		
Building Code Committee (SEAOH)						◆	
Building Code Council (DAGS)						◆	◆
Capital Improvements Budget (DBF)			◆			◆	
Clean Water Act Section 401 Water Quality Certifications (DOH EHA)					◆		
Climate 21C (OCCL)	◆	◆	◆	◆	◆	◆	
Coastal Lands Program (OCCL)		◆		◆		◆	
Coastal Zone Management Program (OP)	◆		◆	◆		◆	
Commission on Water Resources Management (CWRM)	◆	◆	◆			◆	◆
Community Development District Program (HCDA)			◆				
Critical Systems Vulnerability Assessment (HI-EMA)	◆	◆	◆			◆	
Dam Safety Program (Engineering)		◆	◆		◆	◆	
Damage Assessments (DAGS)		◆		◆			
Department Emergency Operations Plan Template (HI-EMA)			◆				
Department of Hawaiian Home Lands Land Trust (DHHL)	◆		◆	◆			
Department of Health All-Hazards Training and Exercise Program (DOH HRA)	◆	◆					◆
Department Operations Center (HI-EMA) Planning Guidance and Resources (HI-EMA)			◆				
Disaster Response Committee (SEAOH)		◆		◆			
Energy Assurance Program (HSEO)	◆	◆	◆			◆	
Epidemiological Surveillance (DOH HRA)	◆	◆					◆







Capability	Mitigation Core Capabilities						
	Threats & Hazard Identification	Risk & Disaster Resilient Assessment	Planning	Community Resilience	Public Information & Warning	Long-term Vulnerability Reduction	Operational Coordination
Fire Program (DOFAW)	◆	◆	◆	◆	◆	◆	
Forestry Program (DOFAW)	◆	◆	◆	◆		◆	
Geography Department (UH)	◆				◆		
Get Ready Website (HI-EMA)				◆	◆		
GoHawai'i Mobile App (HTA)					◆		
Hawai'i Environmental Policy Act (DOH OEQC)			◆			◆	
Hawai'i Emergency Planning and Community Right to Know Act (DOH EHA)				◆	◆		
Hawai'i Advisory Council on Emergency Management (HI-EMA)	◆	◆					◆
Hawai'i Catastrophic Hurricane Plan (HI-EMA)			◆				◆
Hawai'i Earthquake & Tsunami Advisory Committee (HI-EMA)		◆				◆	◆
Hawai'i Hazards Awareness and Resilience Program (HI-EMA)		◆	◆	◆	◆		
Hawai'i Institute of Geophysics and Planetology (UH)	◆	◆			◆		
Hawai'i State Legislature Grant-in-Aid Program (HSL)		◆	◆	◆		◆	
Hawai'i State Legislature Senate Resolution 35 (HSL)		◆	◆	◆		◆	
Hawai'i State Planning Act (OP)			◆	◆		◆	◆
Hawai'i Statewide Geographic Information System Program (OPSD)	◆	◆	◆				◆
Hazardous Materials Risk Management Program (HDOT)					◆		
Hazardous Waste Section Regulations (DOH EHA)	◆						◆
Hospital Preparedness Program (DOH HRA)		◆	◆				◆
Immunization Programs (DOH HRA)				◆	◆		
Laboratory Preparedness and Response Program		◆	◆				◆





Capability	Mitigation Core Capabilities						
	Threats & Hazard Identification	Risk & Disaster Resilient Assessment	Planning	Community Resilience	Public Information & Warning	Long-term Vulnerability Reduction	Operational Coordination
(DOH HRA)							
Land Acquisition Program (DAGS)						◆	
Mandatory Seller Disclosures in Real Estate Transactions (DCCA)	◆				◆		
Mass Feeding Operations (DOH EHA)							◆
Medical Countermeasure Points of Distribution (DOH HRA)			◆				◆
National Disaster Preparedness Training Center (UH)				◆			◆
National Flood Insurance Program (Engineering)	◆	◆	◆	◆		◆	◆
Native Ecosystems and Management (DOFAW)				◆		◆	
Natural Disaster Economic Recovery Strategy (HI-EMA)		◆	◆	◆			
NPDES Wastewater Discharge Permits (DOH EHA)						◆	
Pacific Disaster Center Technical Capabilities (PDC)	◆	◆	◆	◆			
Pacific Risk Management 'Ohana (PRiMO)	◆	◆	◆	◆		◆	
Pacific RISA (Pacific RISA)	◆	◆			◆		
Polluted Runoff Control Program (DOH EHA)						◆	
Radiation Section- Radiation Assessment Team (DOH EHA)		◆					
Risk MAP (Engineering)	◆	◆	◆			◆	
Roadside Fuel Reduction Program (HDOT)				◆			
Safe Drinking Water Emergency FAQs (DOH EHA)					◆		
School of Ocean and Earth Science Technology (UH)	◆	◆	◆	◆	◆		
Shelter Upgrade Program (DAGS)				◆			
Shoreline Certification (Land Division)						◆	
Silver Jackets (Engineering)			◆				◆





Capability	Mitigation Core Capabilities						
	Threats & Hazard Identification	Risk & Disaster Resilient Assessment	Planning	Community Resilience	Public Information & Warning	Long-term Vulnerability Reduction	Operational Coordination
State Board of Land and Natural Resources (BLNR)						◆	
State Fire Council (SFC)	◆					◆	◆
State Land Use Law (OPSD)			◆			◆	
State Mitigation Forum (HI-EMA)		◆	◆			◆	◆
State of Hawai'i Emergency Operations Plan (HI-EMA)			◆				◆
State-owned Building Insurance (DAGS)				◆			
The Center for the Study of Active Volcanoes (UH)	◆				◆		
Threat Hazard Identification and Risk Assessment (HI-EMA)	◆		◆				
Training & Exercise Plan (HI-EMA)			◆		◆		◆
Transportation Asset Climate Change Risk Assessment Project (O'ahu MPO)			◆				
Underground Storage Tank Section Regulations (DOH EHA)	◆						
Vector Control Program (DOH EHA)		◆					
Weatherization Assistance Program (OCS)				◆	◆		
Western States Seismic Policy Council (HI-EMA)		◆				◆	

Acronym in parenthesis refers to the state department detail table under which the capability is discussed (see Section C.1 (State Capability Assessment Detailed Tables)). Listing under a particular department or agency should not be construed to imply that the department is the sole administrator of the capability. Additionally, in some instances the capability is associated with the duties of the department but the department does not have administrative authority over the capability.





## C.4 Criteria for Prioritizing Planning and Project Grants

- HI-EMA and the State Hazard Mitigation Forum (Forum) recognized the need to implement a new method of funding prioritization with this 2023 SHMP Update. The updated funding prioritization method clearly identifies potential scoring to make the prioritization process easier to understand for the subapplicants and the reviewers at HI-EMA and on the Forum.





### C.4.1 SUBAPPLICATION/APPLICATION REVIEW

HI-EMA issues a Notice of Interest (NOI) soliciting proposals from potential State, local or non-profit entities interested in Hazard Mitigation Assistance (HMA) funding. These subapplications are part of the overall State application to FEMA. HI-EMA reviews the NOI proposals to ensure they are complete, technically feasible, and fall within the HMA program priorities. After HI-EMA completes its eligibility review, including clarifying follow-up questions, the Administrator invites all eligible subapplicants to proceed with the full application process. HI-EMA staff members provide technical assistance and guidance in completing a full, eligible subapplication within the allotted timeframe. The Forum reviews all complete, eligible submissions and performs a funding prioritization analysis. The resultant ranked subapplications are included in the State application and are submitted to the Administrator for concurrence before submission to FEMA.





## C.4.2 SUBAPPLICATION/APPLICATION PRIORITIZATION

HI-EMA requests that the County emergency management agencies review the HMA plan/project subapplications from their County prior to submitting to the State for review. Since these agencies have ex officio representatives on the Forum, they can provide guidance on County priorities. The Forum then utilizes the following tables to conduct its prioritization analysis of plan/project subapplications before submitting the full State application to FEMA. The following tables are based upon the current FEMA evaluation criteria for each funding program, and also reflects the priorities of the State.

*Table C-34. Summary of Total Potential Scores per Subapplication*

	BRIC	HMGP	FMA	HHPD
<b>Base Score</b>	100	100	100	100
<b>Additional Scoring</b>	20	15	10	25
<b>Total Potential Score</b>	<b>120</b>	<b>115</b>	<b>110</b>	<b>125</b>

*Table C-35. Funding Prioritization Base Table for FEMA BRIC, HMGP, FMA, and HHPD Subapplications*

	Topic	Criteria	Score
1	<b>Capacity to Implement</b>	The subapplication describes that the subapplicant has the capacity needed to implement and manage the plan/project.	25
2	<b>Alignment with SHMP Objectives</b>	The subapplication describes which State HMP objectives the plan/project aligns with.	20
3	<b>Socially Vulnerable Population Impacted</b>	The plan/project advances mitigation for socially vulnerable populations, identified by using the social vulnerability index in the SHMP.	15
4	<b>Climate Change and Future Conditions</b>	The subapplication describes how the plan/project will enhance climate adaptation and resilience, details how the project is being responsive to the effects of climate change and other future conditions (population, demographic, land use, or location, intensity, and frequency of hazard events), and cites data sources, assumptions, and models. If a project, incorporates anticipated future changes into the project design.	10
5	<b>Community Engagement and Outreach</b>	The subapplication describes how outreach was conducted to the public and stakeholders discussing the plan/project prior to application.	10





	Topic	Criteria	Score
6	<b>Nature-based Solutions</b>	If the project is structural, the subapplication describes how it incorporates nature-based solutions.	10
7	<b>Advanced Assistance</b>	Was the plan/project awarded FEMA funding to support project scoping through advanced assistance?	10

*Table C-36. Additional Scoring for Building Resilient Infrastructure and Communities (BRIC) Subapplications*

	Topic	Criteria	Score
1	<b>Risk Reduction/Resilience Effectiveness</b>	The subapplication shows how the project will reduce risk and advance resiliency through innovative methods while addressing inequities and support to those with the greatest need.	10
2	<b>Community Engagement and Other Outreach Activities</b>	The subapplication describes the outreach strategy and supporting activities that advance mitigation, including engagement of diverse stakeholders and socially vulnerable communities.	5
3	<b>Leveraging Partners</b>	The project subapplication incorporates partnerships (e.g., state, native, private, local community, etc.) that will ensure the project meets community needs, including those of vulnerable populations, and show the outcome of those partnerships (e.g., leveraging resources such as financial, material, and educational resources, coordinating multijurisdictional projects, focus on equity related issues, etc.)	5

*Table C-37. Additional Scoring for Hazard Mitigation Grant Program (HMGP) Subapplications*

	Topic	Criteria	Score
1	<b>Project Area</b>	The plan/project will benefit the region impacted by the federal disaster declaration.	10
2	<b>Previous Submittal</b>	The plan/project subapplication was previously submitted under another FEMA grant program but not awarded; and still considered a priority.	5

*Table C-38. Additional Scoring for Flood Mitigation Assistance (FMA) Subapplications*

	Topic	Criteria	Score
1	<b>Repetitive Loss Properties</b>	The subapplication includes substantially damaged, repetitive, and severe repetitive loss properties	10





	Topic	Criteria	Score
		that will be mitigated by the project.	

*Table C-39. Additional Scoring for High Hazard Potential Dam (HHPD) Subapplications*

	Topic	Criteria	Score
1	<b>Project Benefitting Area—Residential Homes</b>	The project provides increased protection and safety to residential homes	10
2	<b>Project Benefitting Area—Community Lifelines</b>	The project provides increased protection and safety to community lifelines	10
3	<b>Project Benefitting Area—Economic Centers</b>	The project provides increased protection to economic centers	5







## C.5 Local Capability Assessment Detailed Table

County policies, programs, funding, and other capabilities are used to support and accomplish hazard mitigation goals and objectives. A list of foundational capabilities for hazard mitigation was developed based on FEMA local mitigation planning guidance, professional judgement, and suggestions from the State Hazard Mitigation Forum. This list was not intended to be inclusive of every capability discussed in the local HMPs or every capability that may be used to support hazard mitigation at the local level.

Table C-40 includes a summary of foundational capabilities relevant for hazard mitigation in the State and if these capabilities were identified and discussed in the County local HMPs. The text included provides details on how the capability was discussed/addressed in the local plan and does not account for inaccuracies in this discussion. It is important to note that the absence of a capability does not mean that the capability does not exist in the county. It simply means that no discussion was found describing or identifying the capability in the local HMP. This suggests that the capability may not be used to its full potential to support mitigation within the County or it may suggest that the department or agency responsible for implementing the capability may not have been fully involved in the local HMP planning process. In addition, it is important to note that codes, regulations, and/or plans may have been updated since the time of their publication. Notes are provided below the table on some such updates. In addition, please note that some of the capabilities included are local level capabilities, while others are state programs and/or regulations.

*Table C-40. Foundational Capabilities as Identified and Reflected in County Local Hazard Mitigation Plans*

Foundational Capability	County of Kaua'i	City and County of Honolulu	County of Maui	County of Hawai'i
<b>Building Code <sup>a</sup></b>	<b>Yes</b> 2018 IBC/IRC	<b>Yes</b> Based on the 2006 IBC with amendment provisions relating to hurricane and flood preventative design measures	<b>Yes</b> 2006 IBC and IRC as amended	<b>Yes</b> County in process of adopting 2012 IBC as per HAR State Building Code
<b>Capital Improvement Program</b>	<b>Yes</b> Considering ways to leverage resources for improving facilities and to partner for improving communication systems in the county	<b>Yes</b> Discusses including hazard mitigation projects in CIP	<b>Yes</b> Maui County Code Title 3, Chapter 3.04.040 – Capital Program	<b>Yes</b> Discusses including hazard mitigation projects in CIP





Foundational Capability		County of Kaua'i	City and County of Honolulu	County of Maui	County of Hawai'i
<b>Climate Action/Resilience Plan</b>		<b>Yes</b> County of Kaua'i Climate Adaptation Plan – ongoing County of Kaua'i Multi-Hazard Mitigation and Resilience Plan (2021); Hanalei Watershed Hui Community Disaster Resilience Plan	<b>Yes</b> O'ahu's Resilience Strategy which will include the City's first-ever climate action and adaptation plan	<b>No</b>	<b>No</b>
<b>Community Development Plans</b>		<b>Yes</b> Climate change and coastal hazards assessment to be incorporated into three community development plans	<b>Yes</b> Natural hazard policies for Community Development Plans	<b>Yes</b> Risk assessment results presented at Community Plan level so that information can be integrated as appropriate	<b>Yes</b> The HMP is incorporated into Community Development Plans to make all natural hazards explicit factors for planning
<b>Community Protection Plan</b>	<b>Wildfire</b>	<b>Yes</b> Community Wildfire Protection Plan for Kaua'i County (2016);	<b>Yes</b> West O'ahu Community Wildfire Protection Plan	<b>Yes</b> Currently CWPPs are in place for Moloka'i, South Maui, Upcountry, and Western Maui	<b>Yes</b> Plans for Ka'u, South Kona, North Kona, Northwest Hawai'i, Ocean View, and Hawai'i Volcanoes National Park
<b>Continuity of Operations Plan</b>		<b>Yes</b> Trainings offered to Kaua'i Visitor and Business Industry, considering training for county agency being considered	<b>No</b>	<b>No</b>	<b>Yes</b>
<b>County Owned Building Insurance</b>		<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>





Foundational Capability	County of Kaua'i	City and County of Honolulu	County of Maui	County of Hawai'i
<b>Economic Development Plan</b>	<p><b>Yes</b></p> <p>Kaua'i Comprehensive Economic Development Plan 2022-2026: Kauai's Comprehensive Economic Development Strategy (CEDS) Report (2021)</p> <p>Kaua'i Agricultural Economic Development Plan 2023 (almost done)</p> <p>Kaua'i Tourism Strategic Plan/ Destination Management Action Plan 2021-2023</p>	<p><b>No</b></p>	<p><b>Yes</b></p> <p>Maui General Plan 2030, Economic Development Elements; Hawai'i Comprehensive Economic Development Strategy, 2010</p>	<p><b>Yes</b></p> <p>County Comprehensive Economic Development Strategy</p>
<b>Emergency Operations Plan</b>	<p><b>Yes</b></p> <p>County of Kaua'i has begun to update its Emergency Operations Plan-Basic Plan (2007); Kaua'i County Hurricane Response Logistics Concept of Operations (CONOPS) 2013</p>	<p><b>Yes</b></p> <p>City &amp; County Emergency Operations Plan (2007)</p>	<p><b>Yes</b></p> <p>County of Maui Emergency Operations Plan (2009)</p>	<p><b>Yes</b></p> <p>County of Hawai'i Emergency Operations Plan (2011)</p>
<b>Firewise</b>	<p><b>No</b></p> <p>State Firewise Coordinator mentioned</p>	<p><b>No</b></p> <p>Action included to assist communities to become Firewise Communities</p>	<p><b>Yes</b></p> <p>Participating sites include: Kahikinui, Kula; Launiupoko, Lahaina; Paniolo Hale, Maunaloa; and Waiohuli, Kula</p>	<p><b>Yes</b></p> <p>Participating sites include: Honokoa, Kanehoa, Kohala by the Sea, Kohala Waterfront, Pu'ukapu, Waialea, Waiki'i Ranch, Waikoloa Village</p>
<b>Flood Damage Prevention Ordinance</b>	<p><b>Yes</b></p> <p>Includes higher standards</p>	<p><b>Yes</b></p> <p>The FHAT tool is discussed as a decision support tool to enable better compliance with flood regulations</p>	<p><b>Yes</b></p> <p>Maui County's 2020 Multi-Hazard Mitigation Plan will continue to serve as a CRS-credited Floodplain Management Plan.</p>	<p><b>Yes</b></p> <p>Includes higher standards; Participates in CRS</p>





Foundational Capability	County of Kaua'i	City and County of Honolulu	County of Maui	County of Hawai'i
<b>General Plan</b>	<b>Yes</b> County of Kaua'i General Plan 2015 technical information used to inform the local HMP and hazard mitigation was incorporated into the General Plan update	<b>Yes</b> Natural hazard policies for General Plan	<b>Yes</b> General Plan 2030: Countywide Policy Plan, Maui Island Plan, Community Plans discusses integration of hazard mitigation into General Plan	<b>Yes</b> Discusses integration of hazard mitigation into General Plan
<b>Get Ready Website</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>
<b>Hawai'i Hazards Awareness and Resilience Program</b>	<b>Yes</b> Hanapēpē/'Ele'ele is a HHARP community	<b>No</b>	<b>Yes</b> West Maui is a HHARP community	<b>No</b>
<b>Hawai'i State Legislature Grant-in-Aid (GIA) Program</b>	<b>No</b>	<b>Yes</b> Discussed in ongoing wildfire mitigation activities	<b>Yes</b> Only the capital improvement project portion is discussed	<b>No</b>
<b>Legacy Lands Conservation Program</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>
<b>Land Acquisition Plan / Willing Seller Program</b>	<b>No</b>	<b>Yes</b> Discussed in relation to policy analysis	<b>Yes</b> Action identified to develop a flood acquisition/elevation plan	<b>Yes</b> Action included for the volcanic risk home buyout program
<b>Post-Disaster Recovery</b>	<b>Yes</b> County of Kaua'i Disaster Debris Action Manual (2001) County of Kaua'i partnered with Hawai'i Sea Grant to develop pre-disaster recovery authority and re-development scenarios (on-going)	<b>No</b> Action included to develop a master plan to implement sustainable design in post-disaster rebuilding	<b>Yes</b> Hawai'i Revised Statutes Title 10. Public Safety and Internal Security, 127; Title 13. Planning and Economic Development, 209	<b>No</b>
<b>Public Health Preparedness Plan<sup>b</sup></b>	<b>Yes</b> State of Hawai'i Health Risk and Vulnerability Assessment (2017) DOH Pandemic Plan (Pending)	<b>No</b>	<b>No</b>	<b>No</b>
<b>Real Estate Disclosure<sup>c</sup></b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>





Foundational Capability	County of Kaua'i	City and County of Honolulu	County of Maui	County of Hawai'i
Rehabilitation of High Hazard Potential Dams (HHPD)	No Relies on DLNR for HHPD policies, programs, and capabilities	No Relies on DLNR for HHPD policies, programs, and capabilities	No Relies on DLNR for HHPD policies, programs, and capabilities	No Relies on DLNR for HHPD policies, programs, and capabilities. One HHPD-specific mitigation action is included in the HMP.
Risk MAP Program	No	Yes Honolulu participating as a FEMA Risk MAP community	No	No
Sea Level Rise Study/Plan	Yes A technical study on sea level rise scenarios was commissioned to inform the General Plan and Community Development Plans; Kaua'i Climate Change and Coastal Hazard Assessment and West Kaua'i Community Vulnerability Assessment Island Wide Climate Change Vulnerability & Equity Assessment conducted for the on-going Climate Adaptation Plan	No Discussed generally	Yes Sea level rise exposure assessment conducted as part of planning process, Parks Department and Department of Environmental Management are planning studies.	No Discussed generally
Shoreline Setbacks	Yes Erosion-based shoreline setback ordinance has been adopted based on historical erosion rates and future sea level rise	Yes 60-foot setback for new subdivisions; otherwise, the standard setback is 40-feet	Yes Maui has shoreline setbacks to account for sea level rise	Yes Standard 40-foot setback is required; action included to update policies to include coastal erosion
Site Plan Review	No	Yes Site Development Division	Yes Maui County Code, Title 12 – Landscape Planting and Beautification; Title 16 – Buildings and Construction, Chapter 16.26B Building Code	Yes County of Hawai'i Building Code, County Ordinance Chapter 5





Foundational Capability	County of Kaua'i	City and County of Honolulu	County of Maui	County of Hawai'i
<b>Special Management Area Permits<sup>d</sup></b>	<b>Yes</b> Erosion planning and management activities through administration of the SMA	<b>Yes</b> Erosion planning and management activities through administration of the SMA	<b>No</b> Discusses Coastal Zone Management Program generally	<b>Yes</b> Limited discussion
<b>State Hazard Mitigation Forum</b>	<b>Yes</b> Kaua'i currently has 3 voting and 2 ex officio Forum Members	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
<b>StormReady®/TsunamiReady®</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
<b>Stormwater Management / Low Impact Development</b>	<b>No</b> Drainage systems discussed in limited fashion	<b>Yes</b> Drainage systems approaches discussed	<b>Yes</b> Maui Storm Water Management Program Plan; prepared in accordance with Hawai'i Administrative Rules, Chapter 11-55 Appendix K for Kahului, Maui Maui County Code, Title 18, Chapter 20.135 – Post-Construction Stormwater Quality Best Management Practices; Title 16, Chapter 26B.3900 – Postconstruction Stormwater Quality Best Management Practices	<b>Yes</b> Hilo Drainage and Flood Control Report; Drainage Master Plan for the County of Hawai'i (1971); Current drainage standards are based on a 10-year storm
<b>Subdivision Requirements<sup>e</sup></b>	<b>Yes</b>	<b>Yes</b> Site Development Division; Uniform Land Sales Practices Act	<b>Yes</b> Maui County Code Title 18 – Subdivisions	<b>Yes</b> Notes Memorandum of Agreement between County of Hawai'i and Department of Hawaiian Home Lands
<b>Threat &amp; Hazard Identification &amp; Risk Assessment (THIRA)<sup>f</sup></b>	<b>No</b>	<b>No</b>	<b>Yes</b> Maui County's THIRA is maintained by the State (HI-EMA)	<b>No</b>
<b>Water Management Plan</b>	<b>Yes</b> County of Kaua'i Drought Mitigation Strategies document (2004)	<b>Yes</b> Honolulu Board of Water Supply	<b>No</b> Action included to develop a water conservation ordinance	<b>Yes</b> Hawai'i Drought Plan (2017)





Foundational Capability	County of Kaua'i	City and County of Honolulu	County of Maui	County of Hawai'i
Zoning Code or Land Use Ordinance <sup>8</sup>	Yes Two Zoning Districts	Yes Last update was 2004	Yes Maui County Code Title 19 – Zoning, Article 1. Interim Zoning Provisions; Article II. Comprehensive Zoning Provisions	Yes Existing mechanisms within the General Plan and Zoning Code allow the County to direct new development proposals away from known natural hazard locations

Note: Yes =Capability discussed in hazard mitigation plan, No = capability not discussed in hazard mitigation plan; Information presented in this table reflects information as it is presented in the County hazard mitigation plans unless otherwise noted. Codes, regulations, and/or plans may have been updated since the time of their publication.

- a. The State Building Code is included in HAR §3-180 State Building Code; Counties may make local amendments.
- b. There are no county equivalent public health agencies within the state; however, plans have been developed for all counties either directly by the Department of Health (for O’ahu) or via the District Health Offices of the Neighbor Islands (County of Kaua’i, County of Maui, and County of Hawai’i). In addition, the State of Hawai’i Health Risk and Vulnerability Assessment pertains to the entire state.
- c. Disclosure of hazard risk is required in some real estate transactions by State law (see HRS 508D, Mandatory Seller Disclosures in Real Estate Transactions).
- d. Special Management Area Permits are part of the State Coastal Zone Management Program and are administered at the County level.
- e. State law includes requirements as part of the Uniform Land Sales Practices Act (HRS Chapter 484).
- f. County representatives have participated in the development of the State THIRA.
- g. County government have regulatory authority over Urban District lands and shared authority over Agricultural and Rural District Lands. Conservation District lands are reserved for the State.





# Appendix D. Map Atlas





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<sup>1</sup> Section Cover Photo: Pālāʻau State Park, Molokaʻi. Photo courtesy of DLNR





## APPENDIX D. MAP ATLAS

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The 2023 HMP Update streamlined the information included in the State Profile (Section 3) and the Risk Assessment (Section 4). This appendix includes additional maps to support each section, as appropriate.





# D.1 State Profile

Figure D-1. State Buildings in the County of Kaua'i

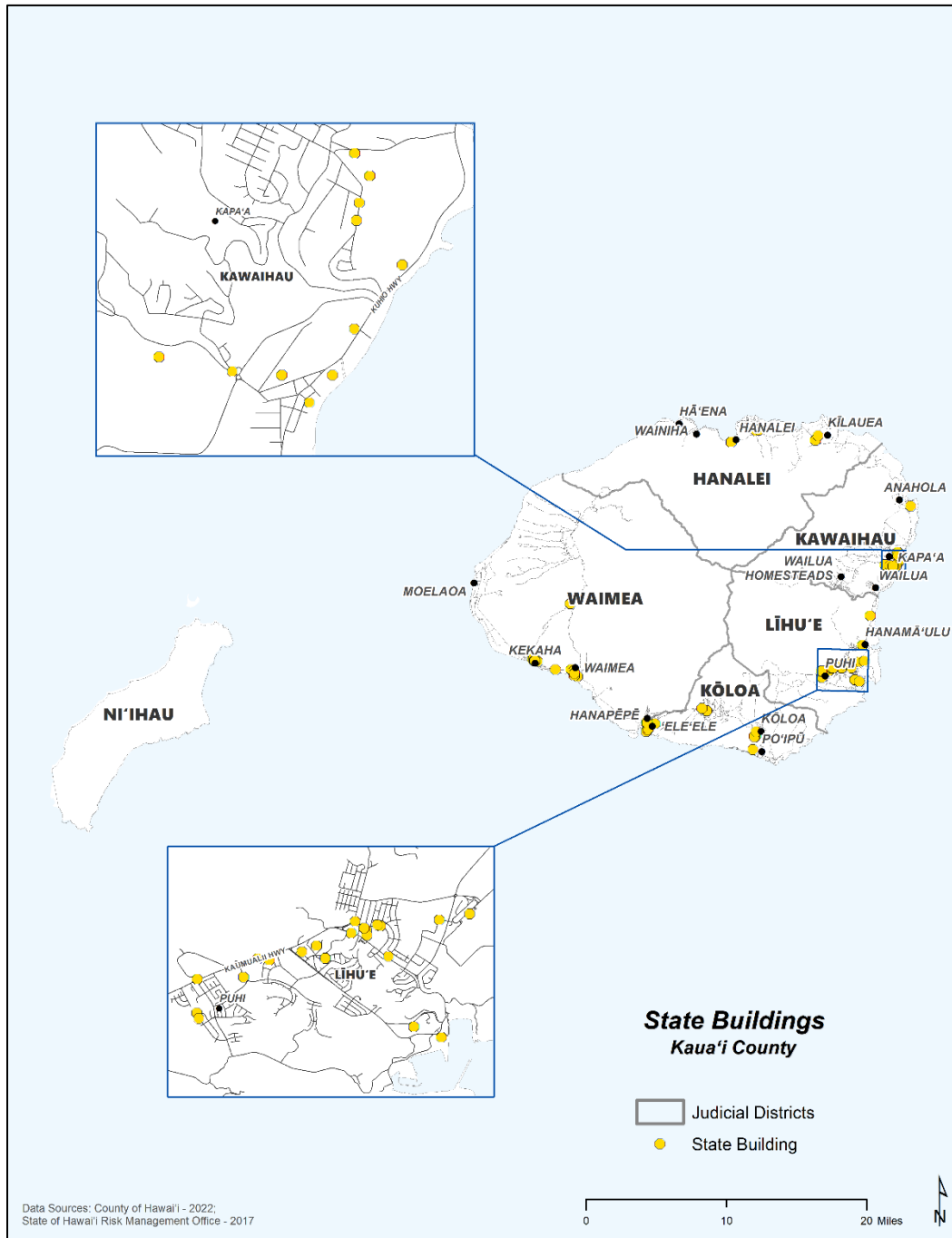




Figure D-2. State Buildings in the City and County of Honolulu

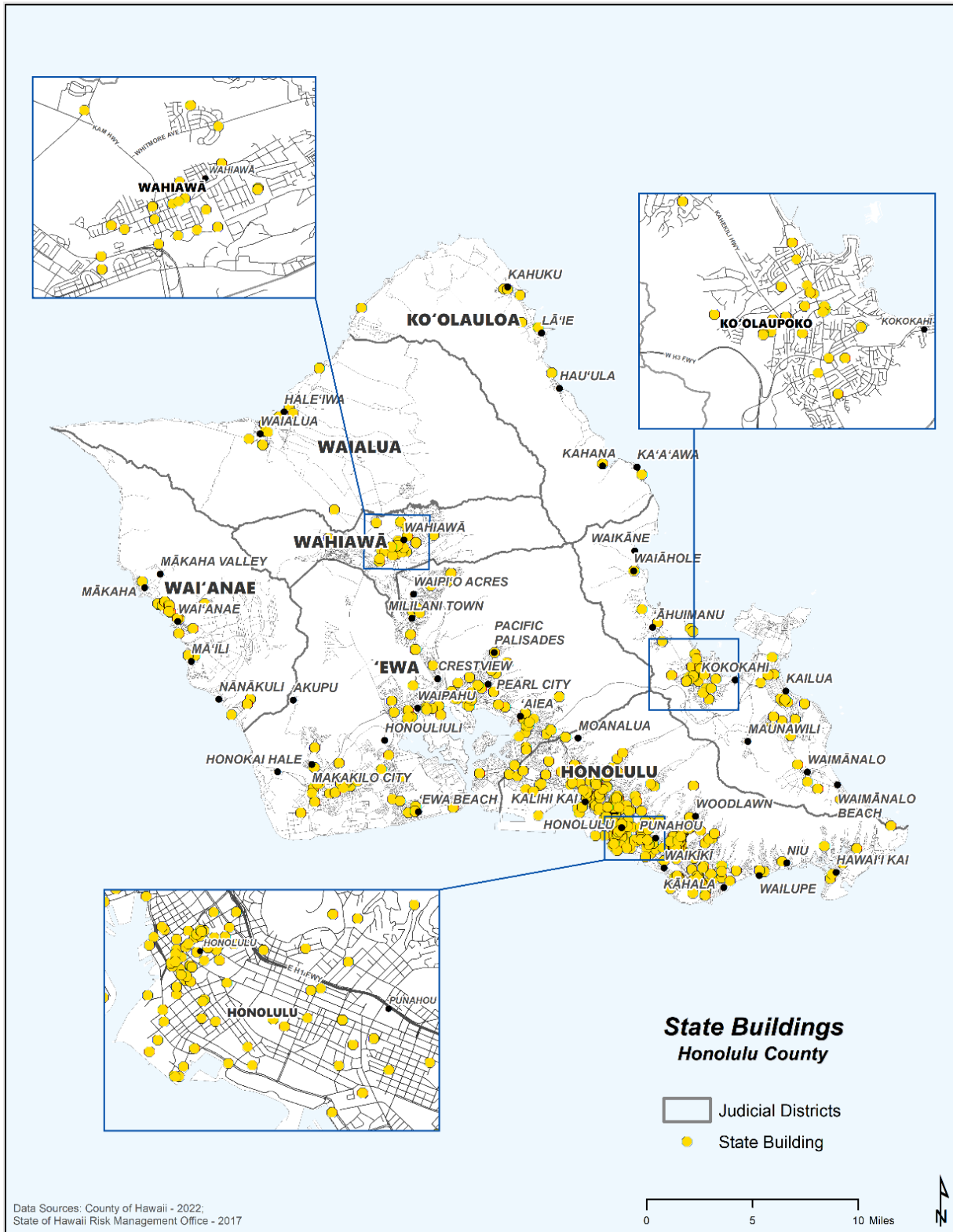




Figure D-3. State Buildings in the County of Maui

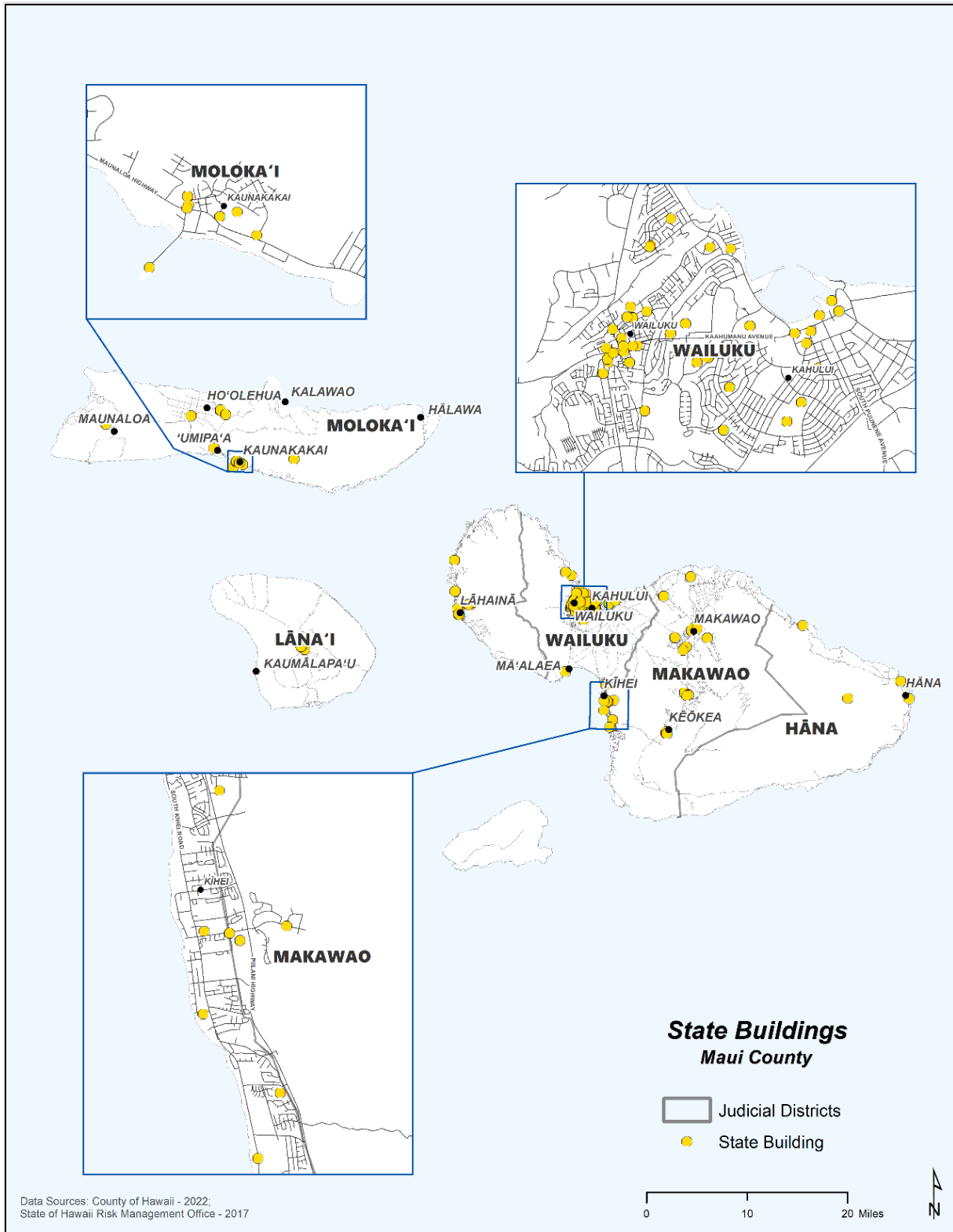




Figure D-4. State Buildings in the County of Hawai'i

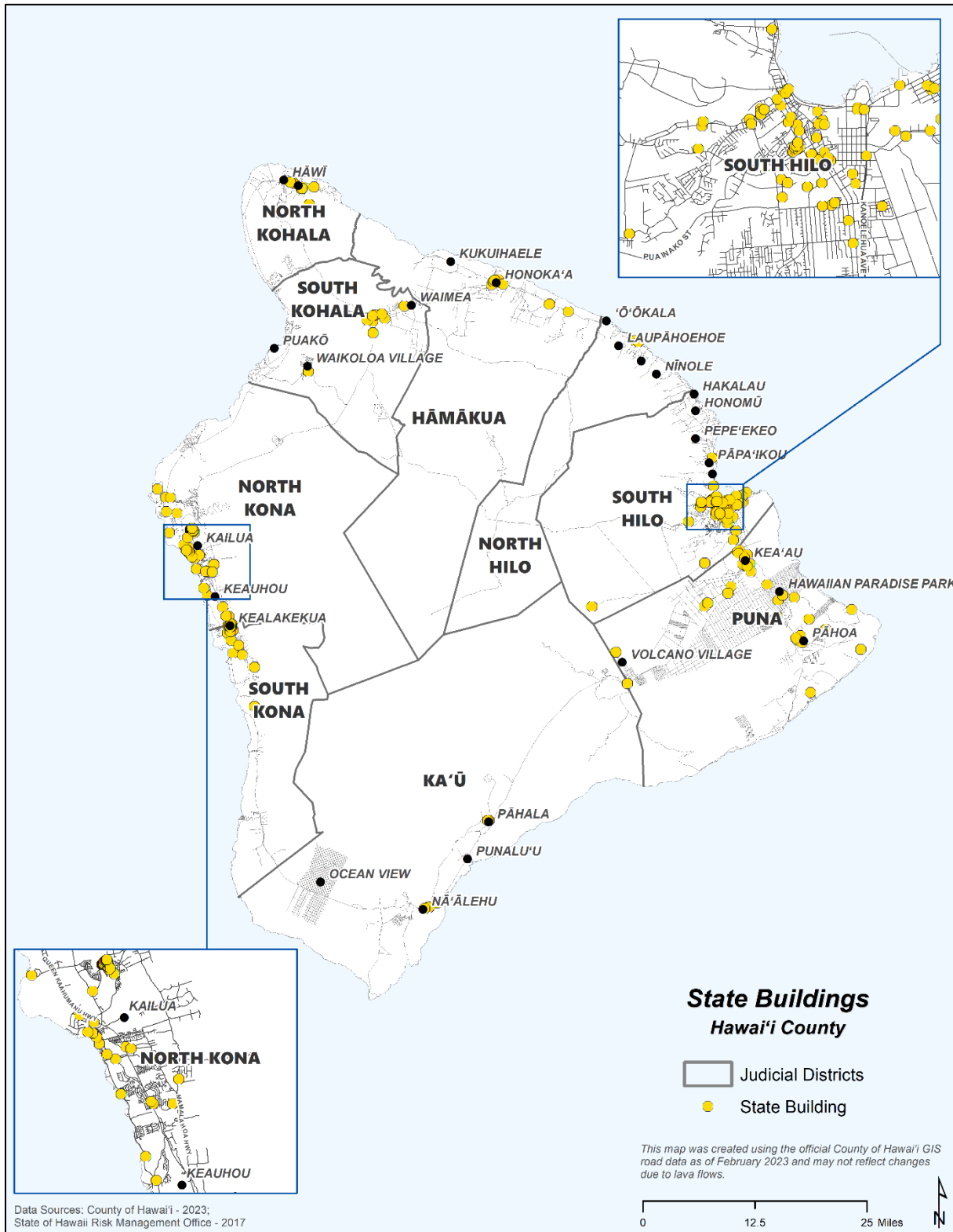
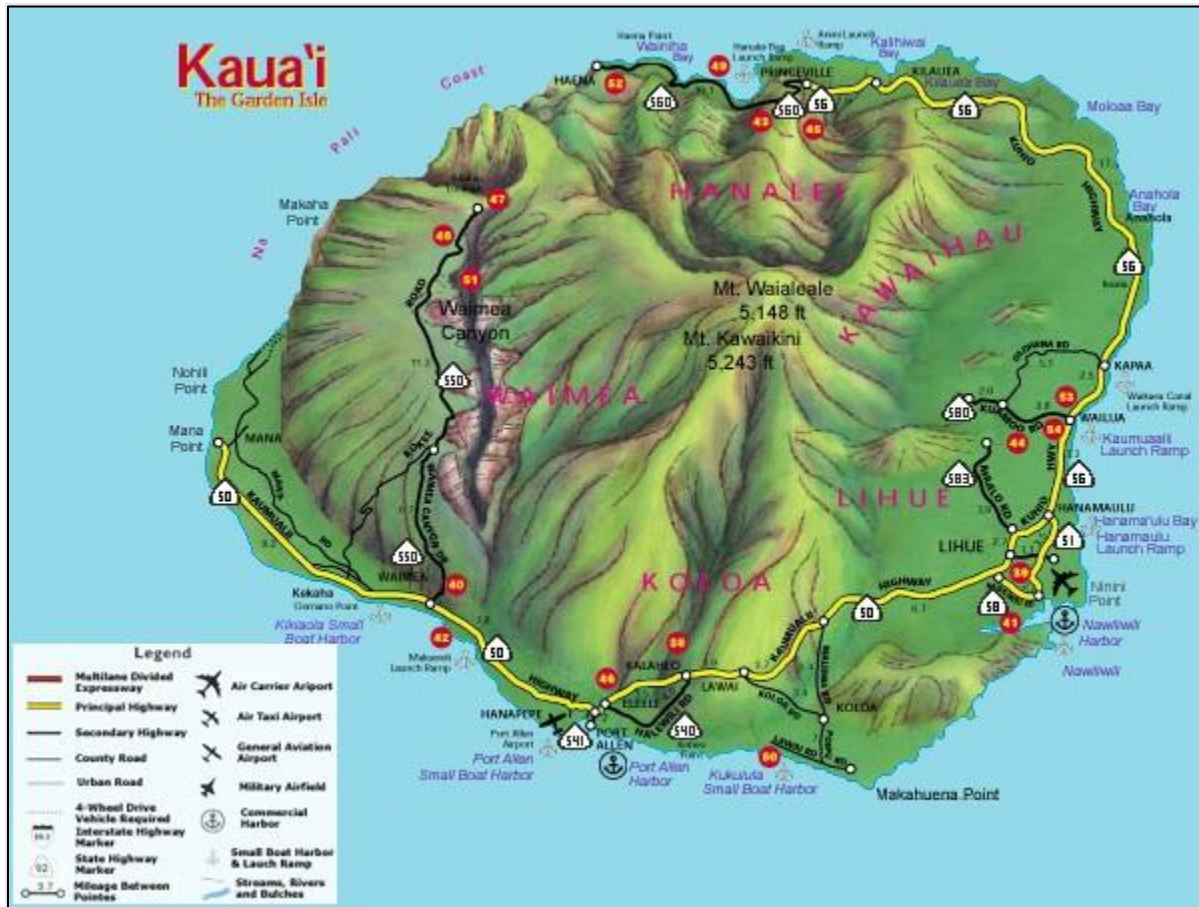




Figure D-5. Transportation Assets in the County of Kaua'i



Source: State of Hawai'i Department of Transportation 2018







Figure D-6. Transportation Assets in the City and County of Honolulu

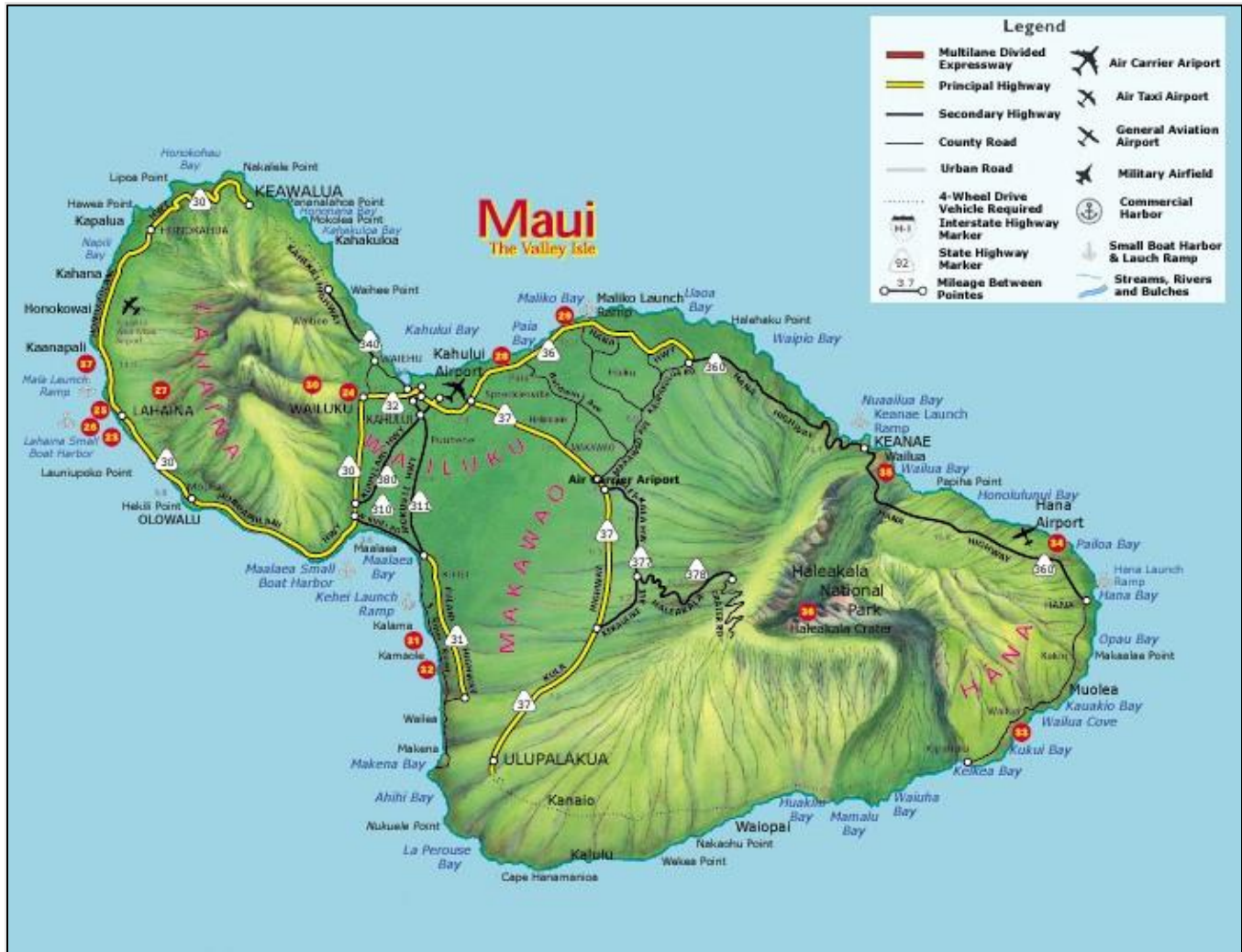


Source: State of Hawai'i Department of Transportation 2018





Figure D-7. Transportation Assets on the Island of Maui



Source: State of Hawai'i Department of Transportation 2018





Figure D-8. Transportation Assets on the Island of Moloka'i



Source: State of Hawai'i Department of Transportation 2018

Figure D-9. Transportation Assets on the Island of Lāna'i

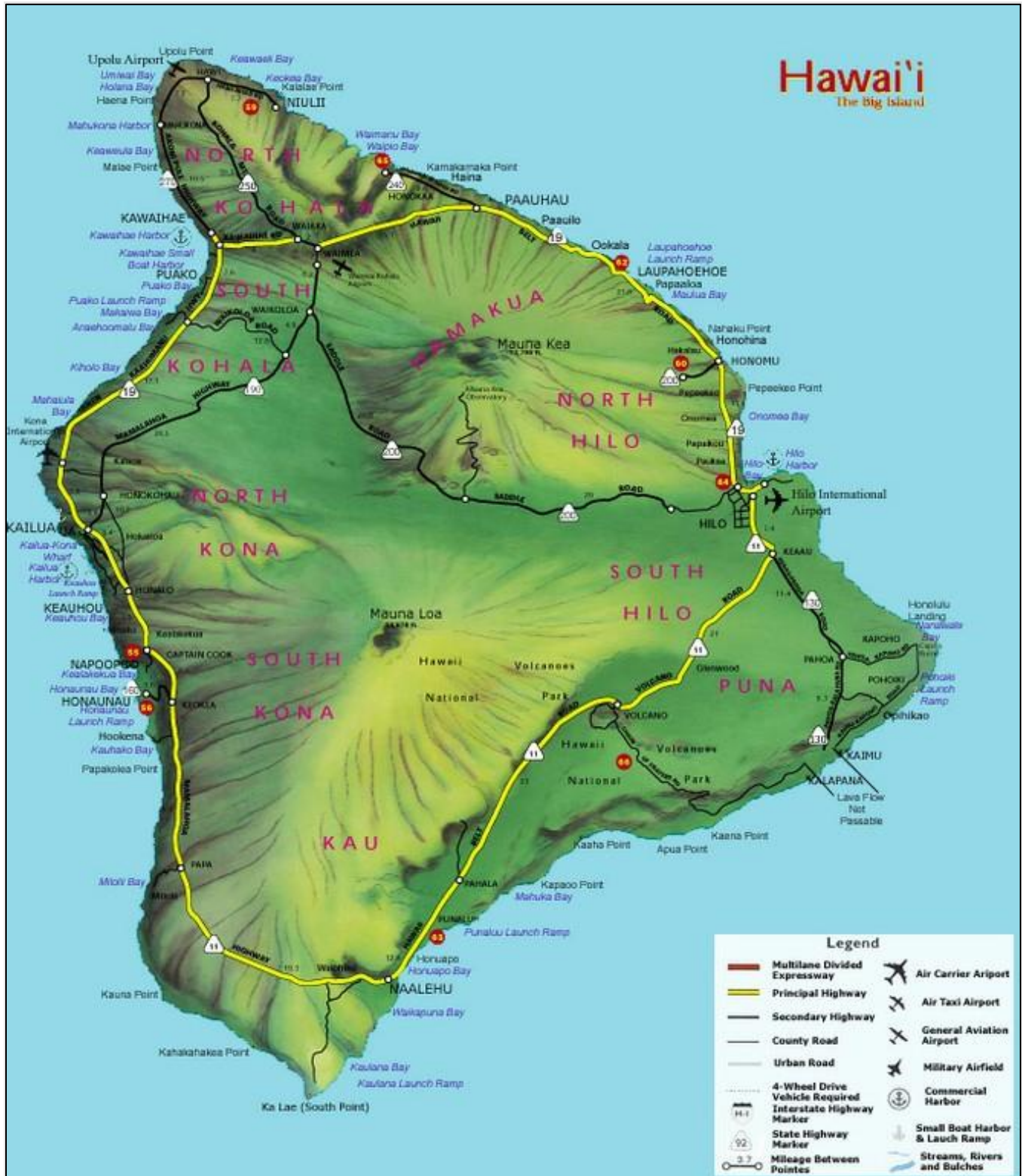


Source: State of Hawai'i Department of Transportation 2018





Figure D-10. Transportation Assets in the County of Hawai'i



Source: State of Hawai'i Department of Transportation 2018





Figure D-11. Critical Facilities in the County of Kaua'i

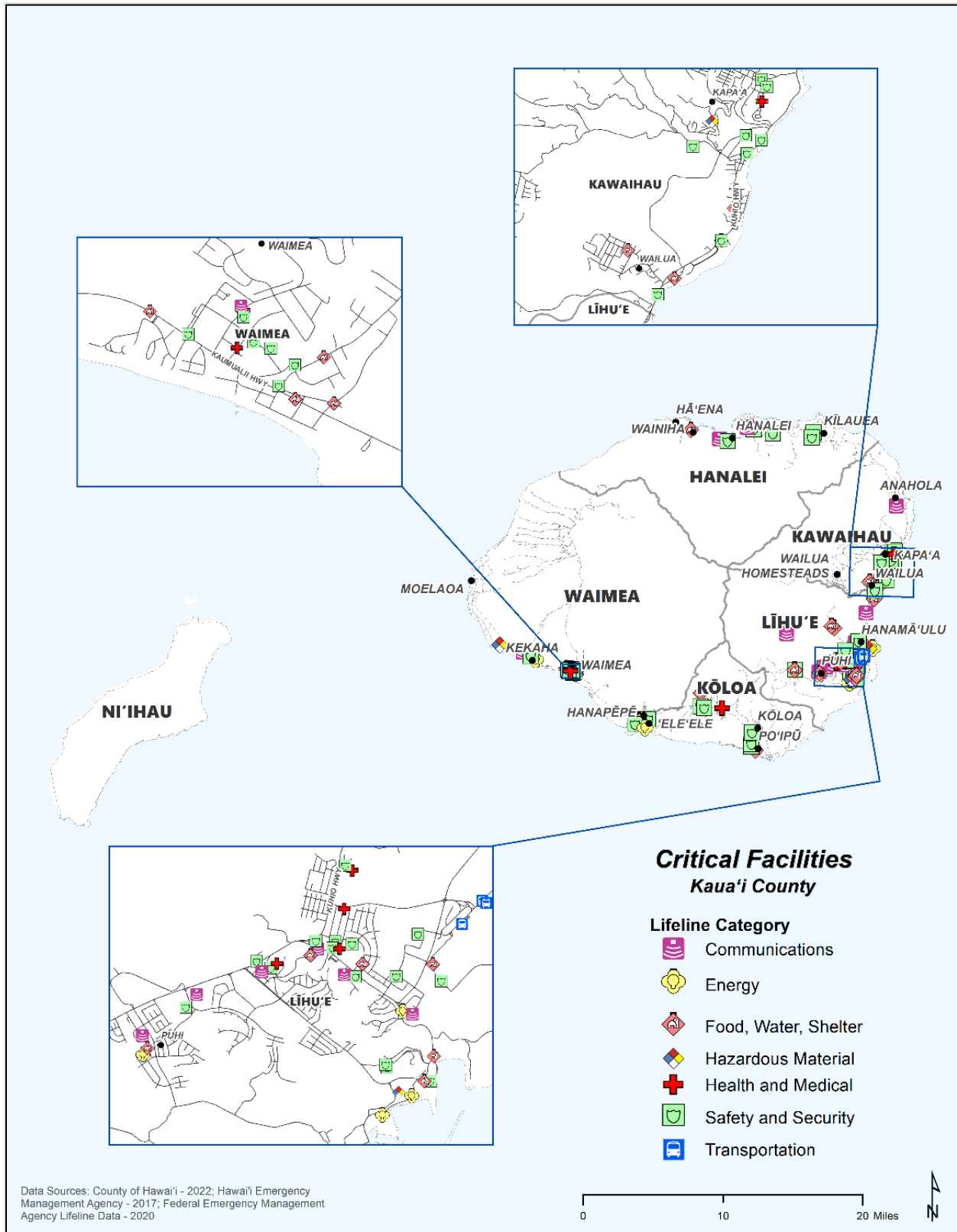




Figure D-12. Critical Facilities in the City and County of Honolulu

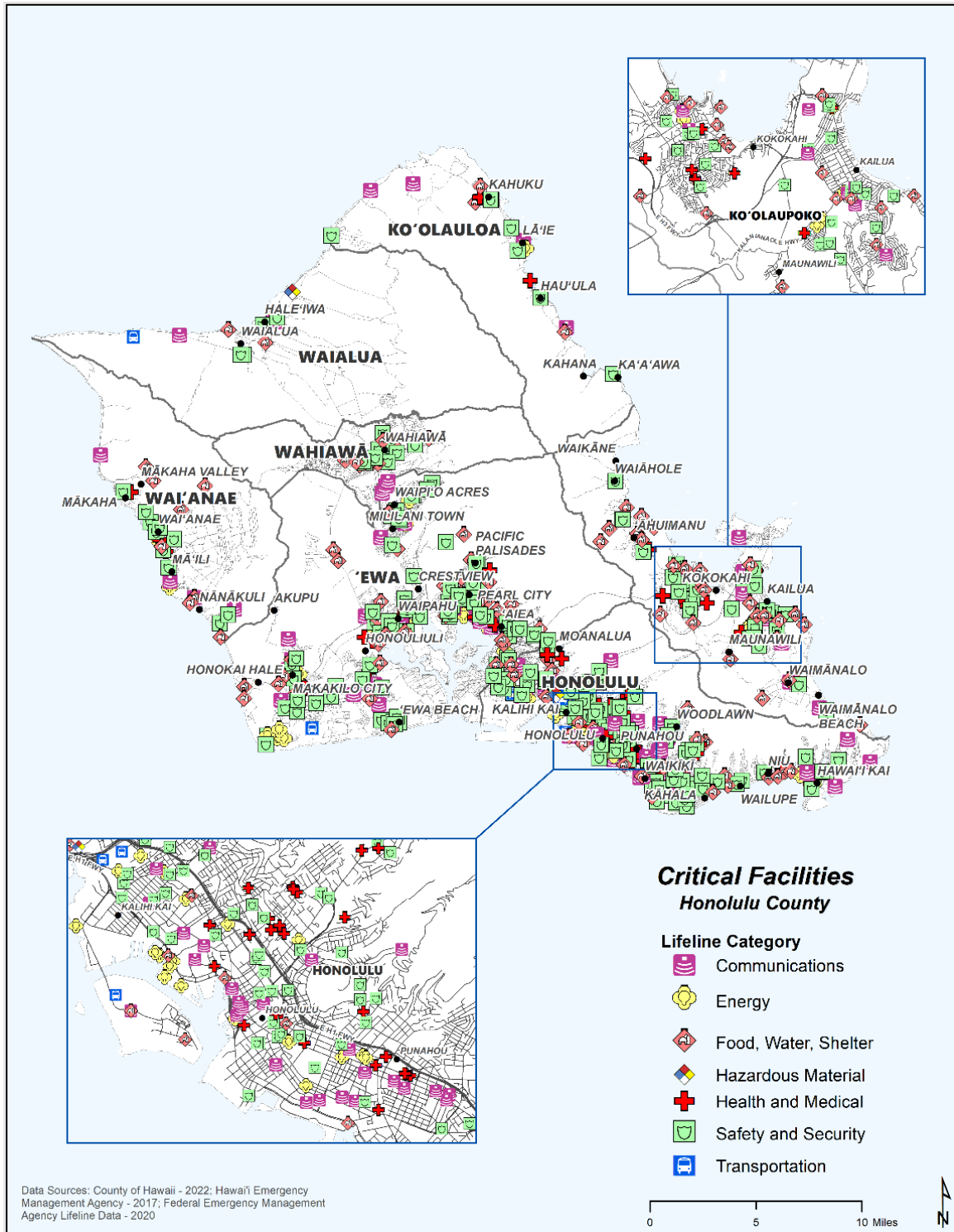




Figure D-13. Critical Facilities in the County of Maui

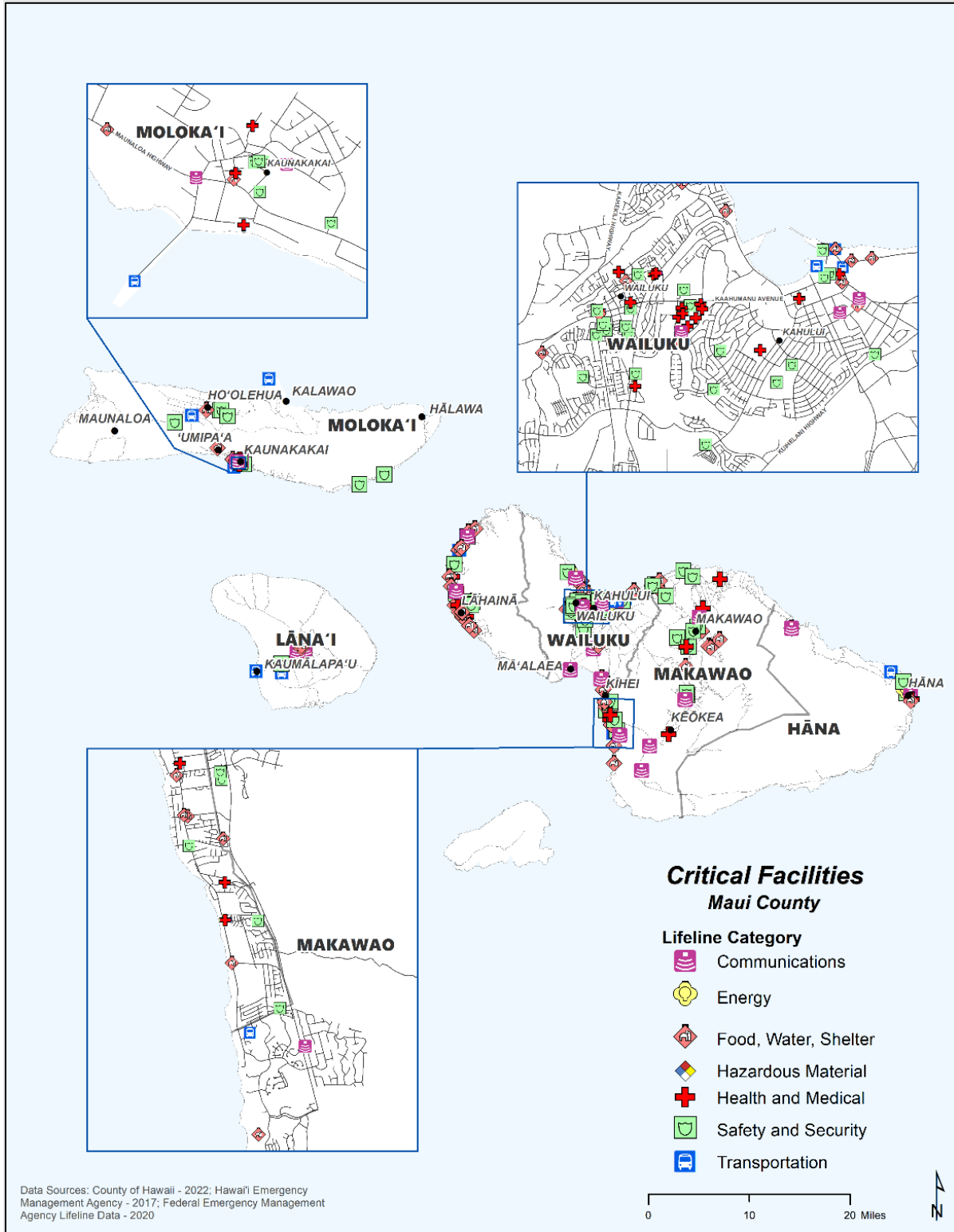




Figure D-14. Critical Facilities in the County of Hawai'i

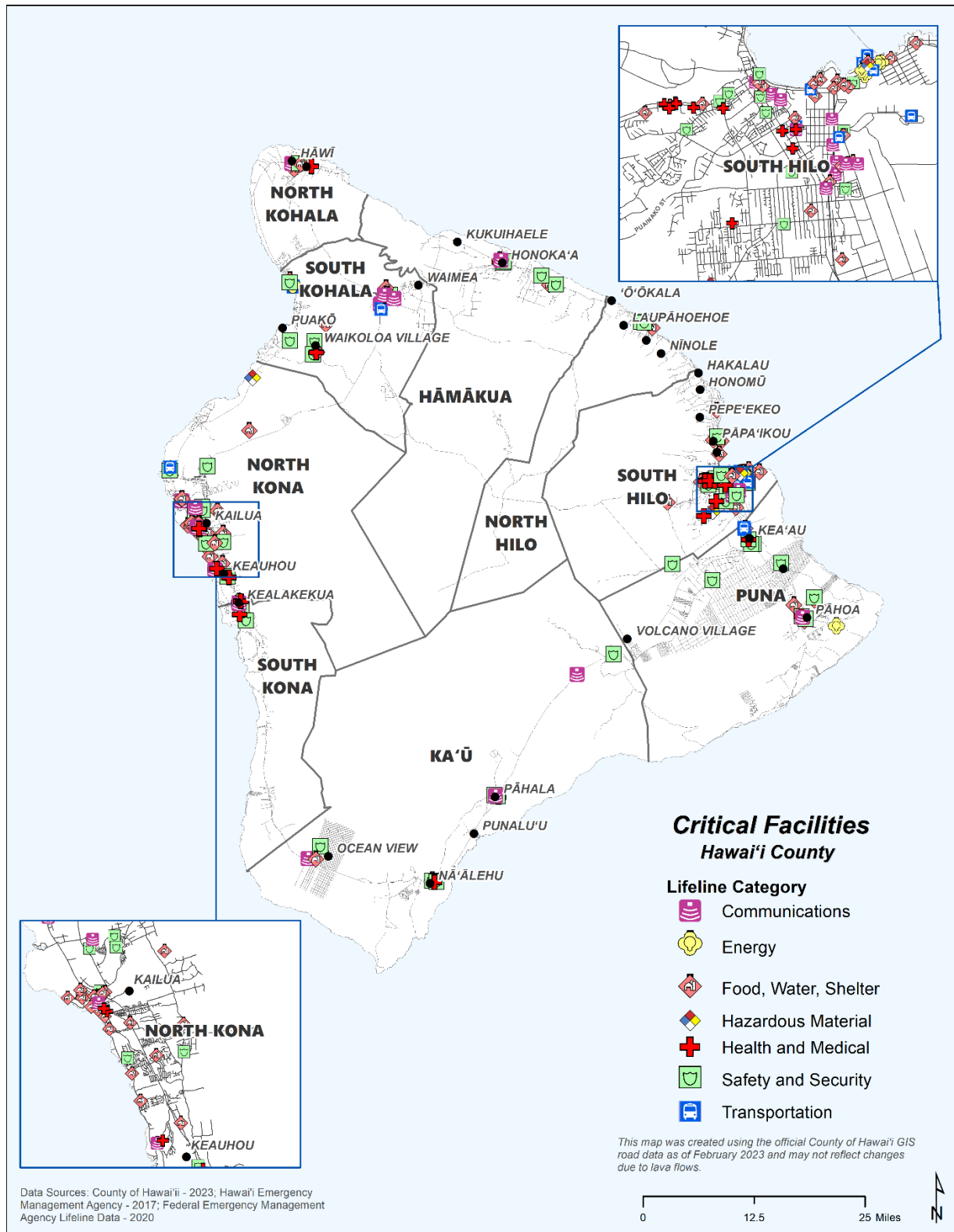






Figure D-15. Environmental Resource Areas in the County of Kaua'i

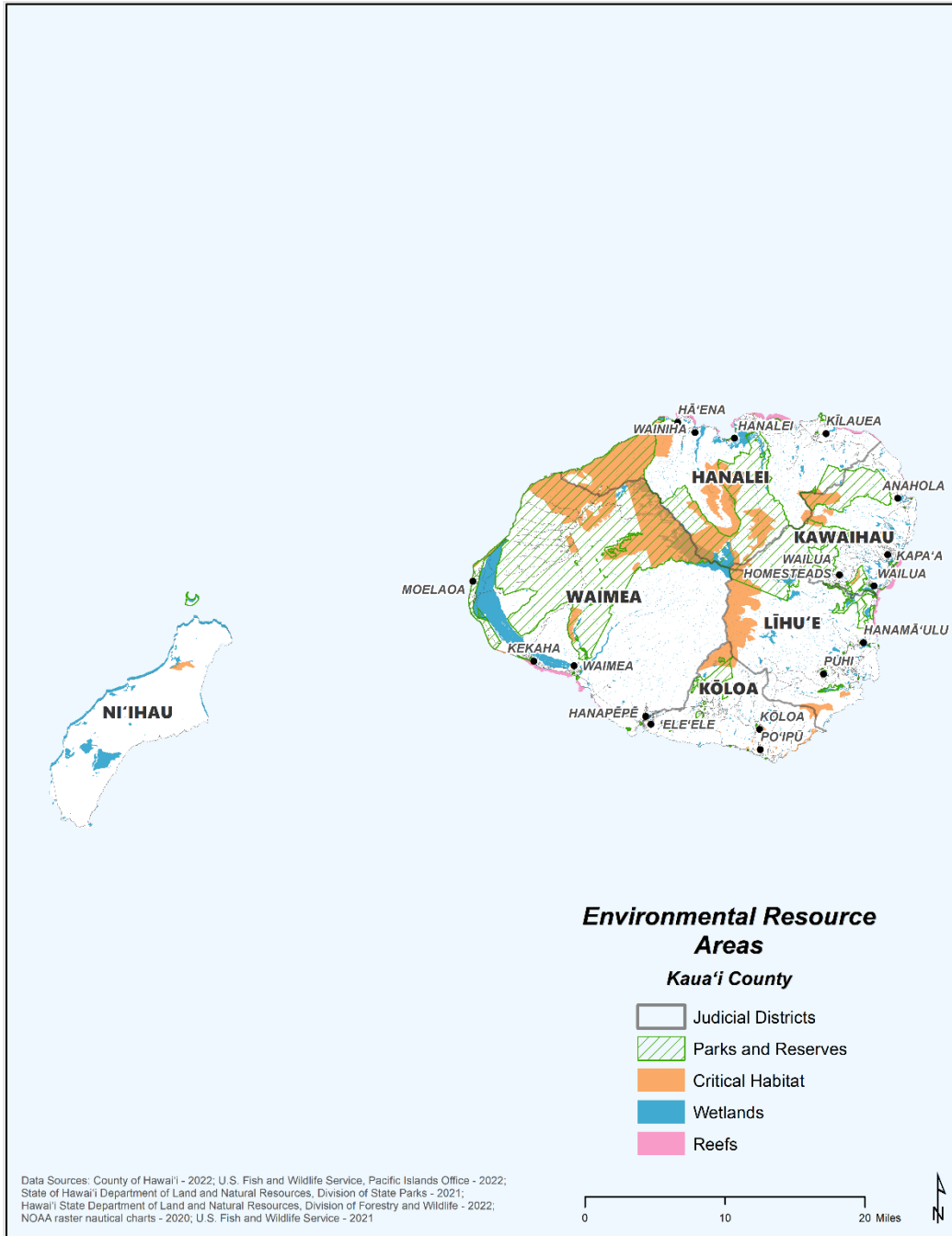




Figure D-16. Environmental Resource Areas in the City and County of Honolulu

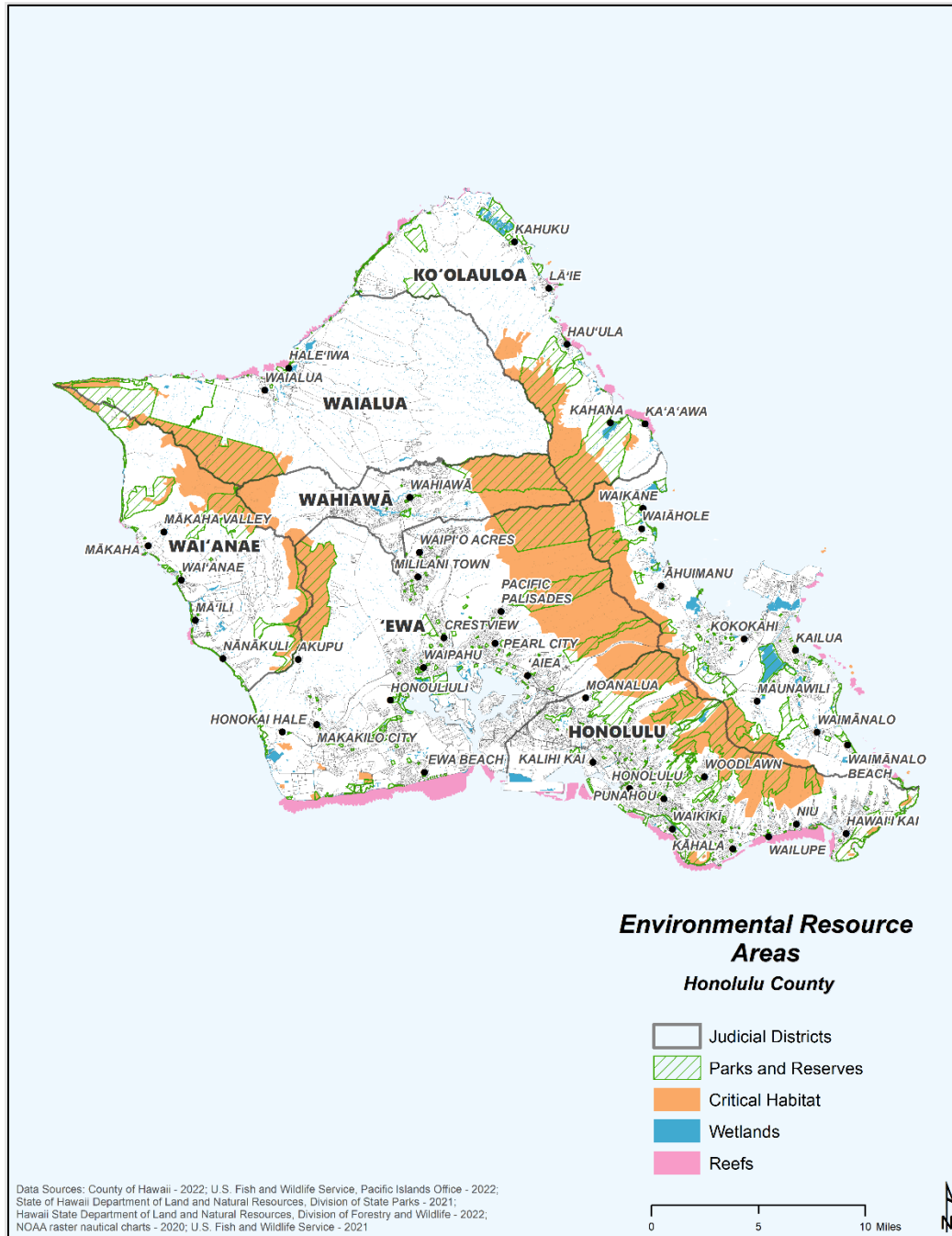




Figure D-17. Environmental Resource Areas in the County of Maui

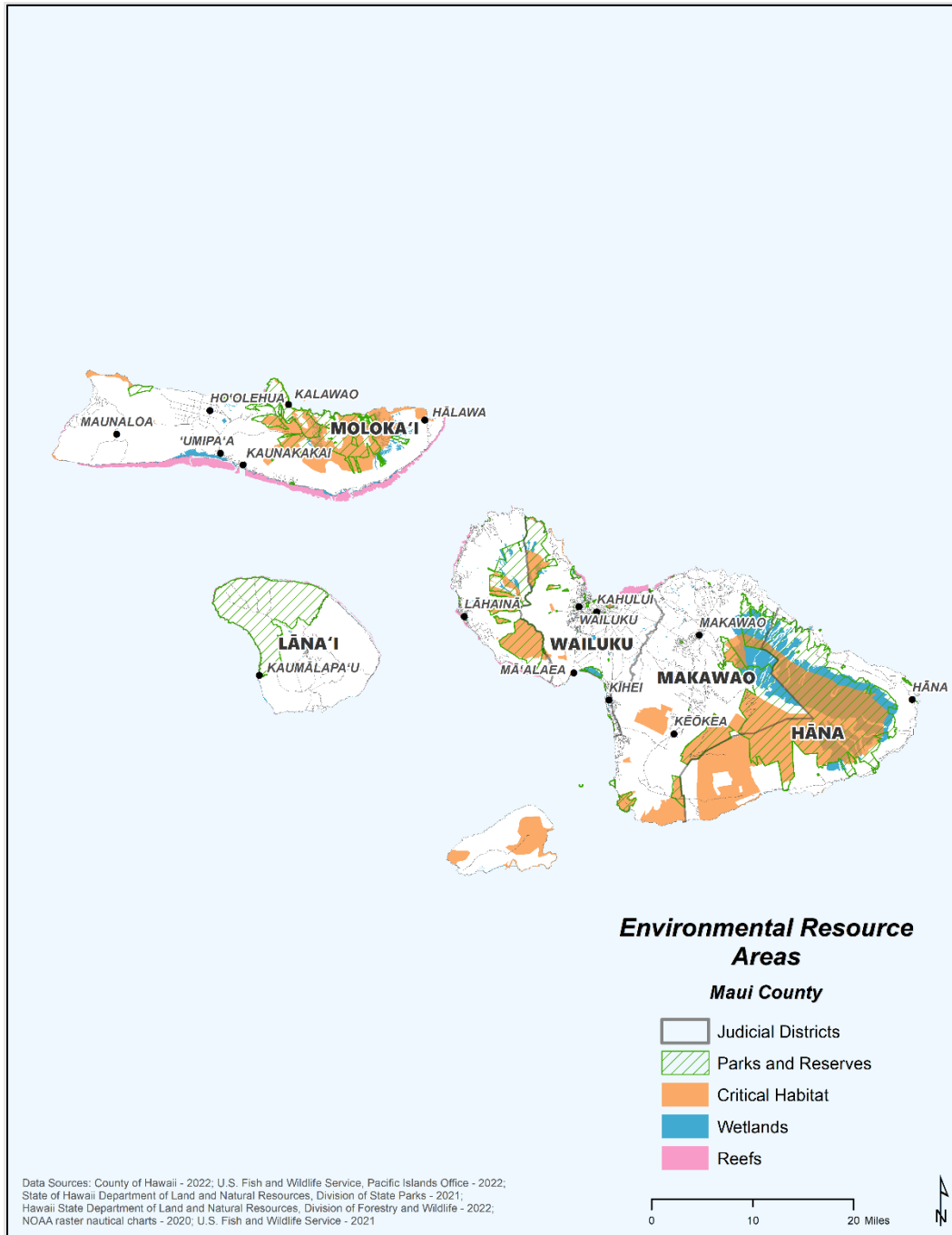




Figure D-18. Environmental Resource Areas in the County of Hawai'i

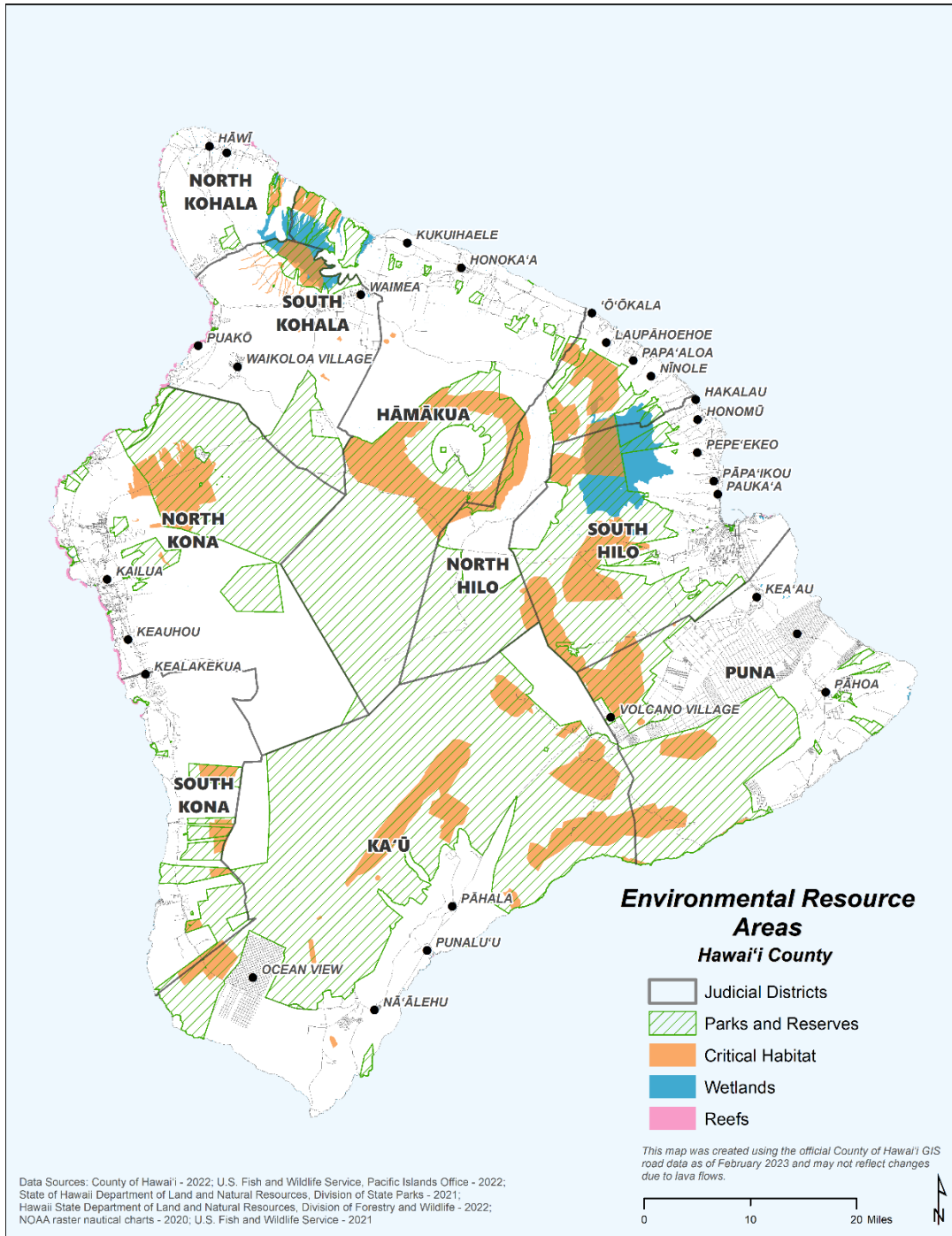




Figure D-19. Projected Development Areas in the County of Kaua'i

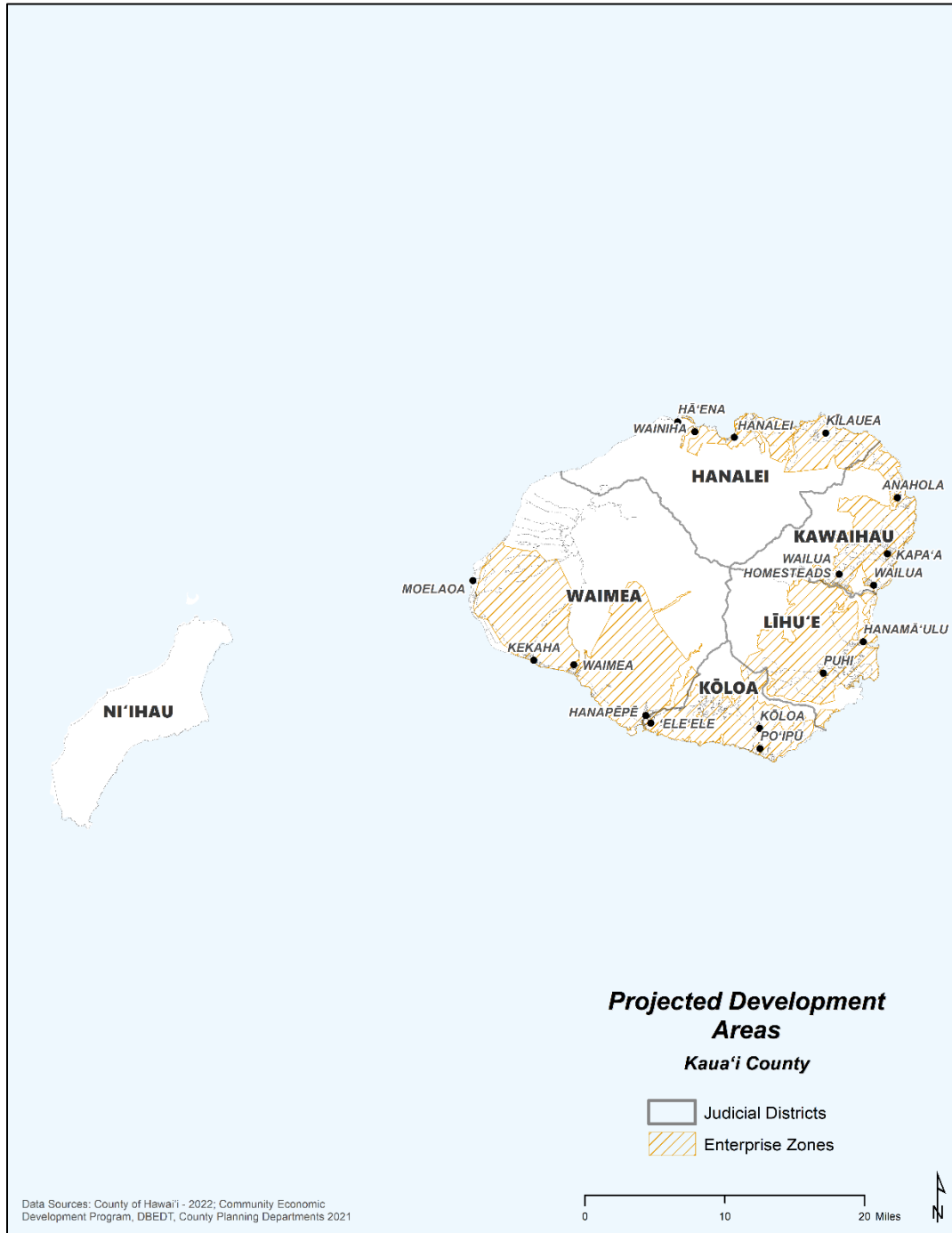




Figure D-20. Projected Development Areas in the City and County of Honolulu

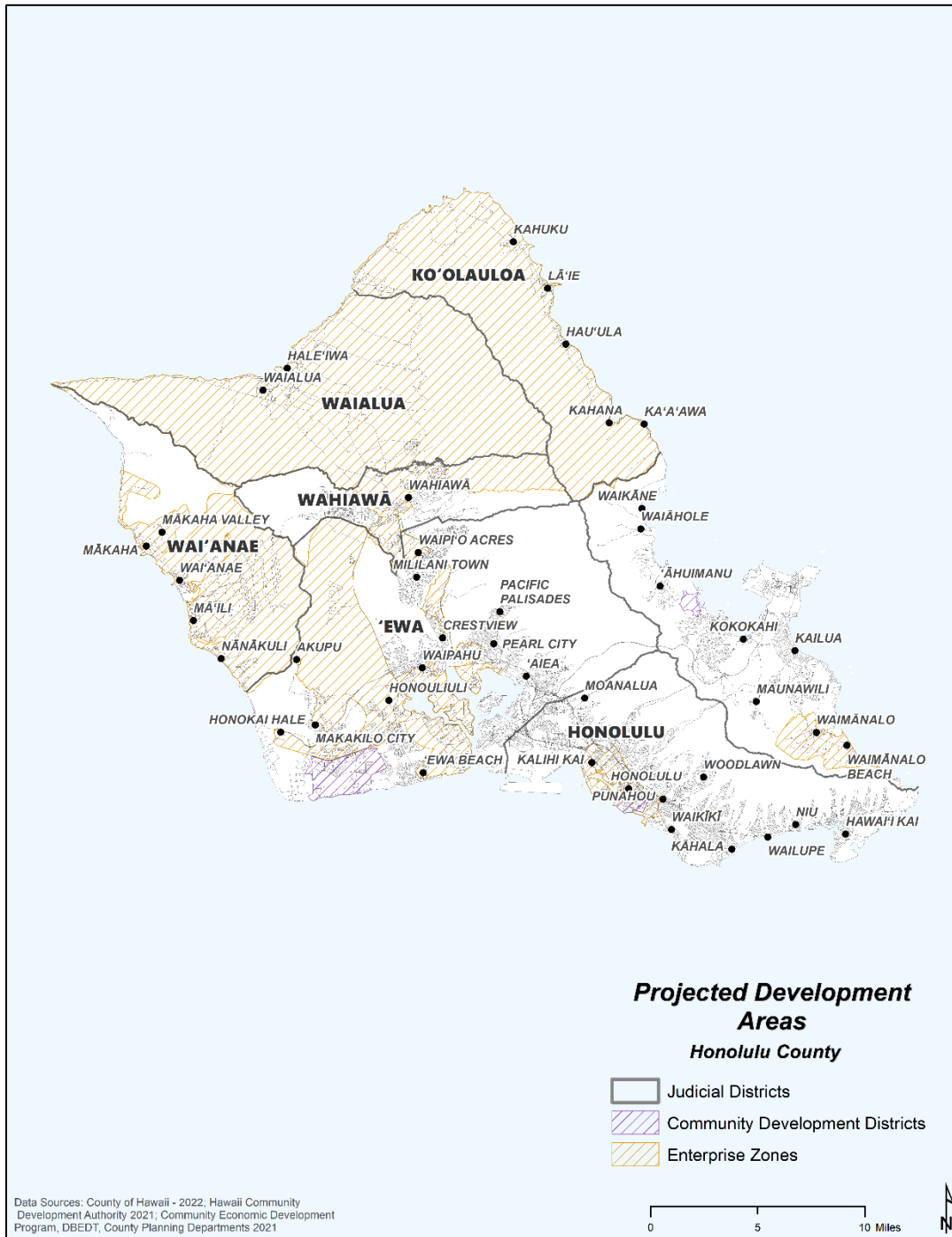


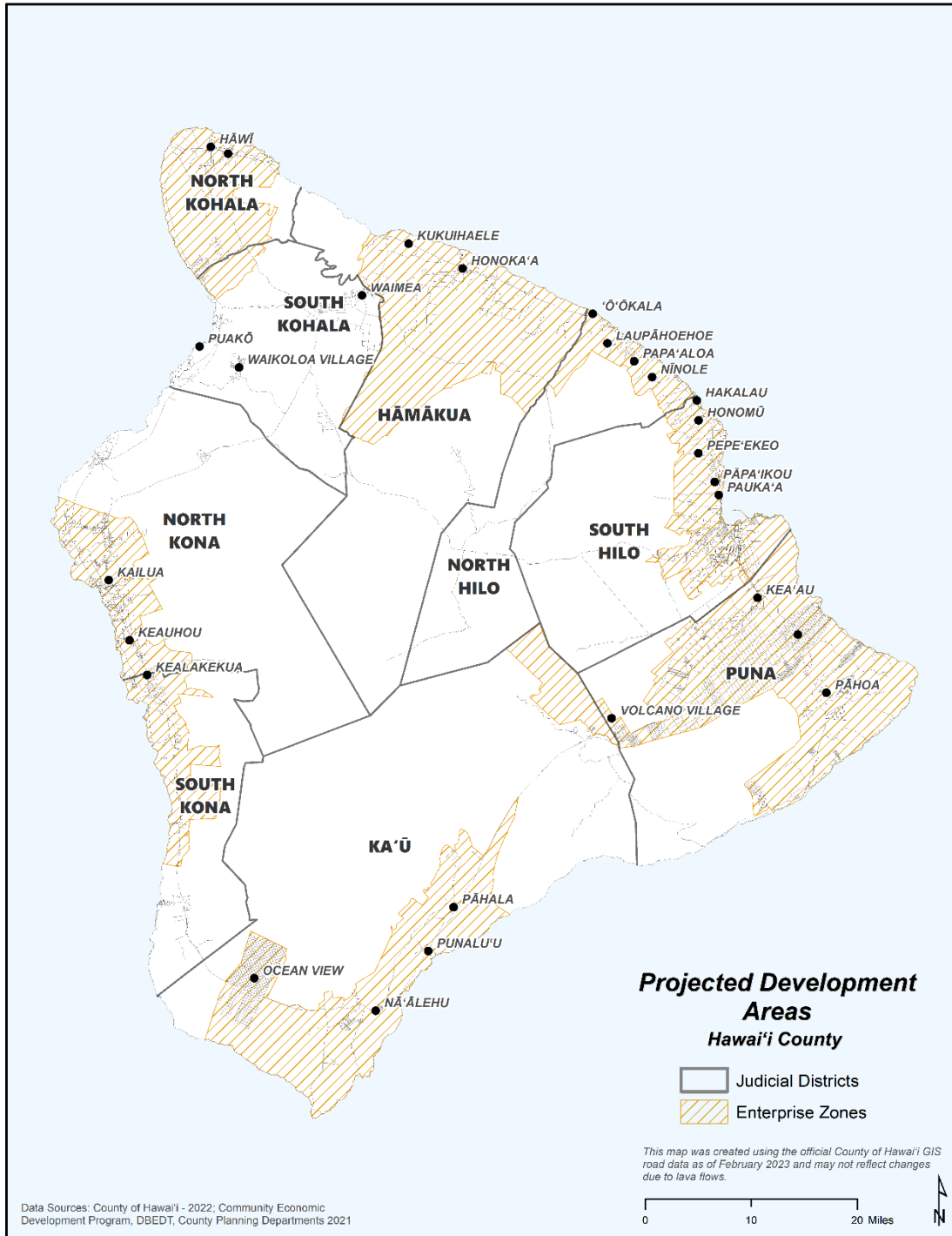


Figure D-21. Projected Development Areas in the County of Maui





Figure D-22. Projected Development Areas in the County of Hawai'i







## D.2 Climate Change and Sea Level Rise

There are no additional maps to support Section 4.2 (Climate Change and Sea Level Rise). Additional maps may be viewed on the Hawai'i Sea Level Rise Viewer located at: <http://www.pacioos.hawaii.edu/shoreline/slr-hawaii/>.

## D.3 Cyber Threat

There are no additional maps to support Section 4.3 Cyber Threat.

## D.4 Drought

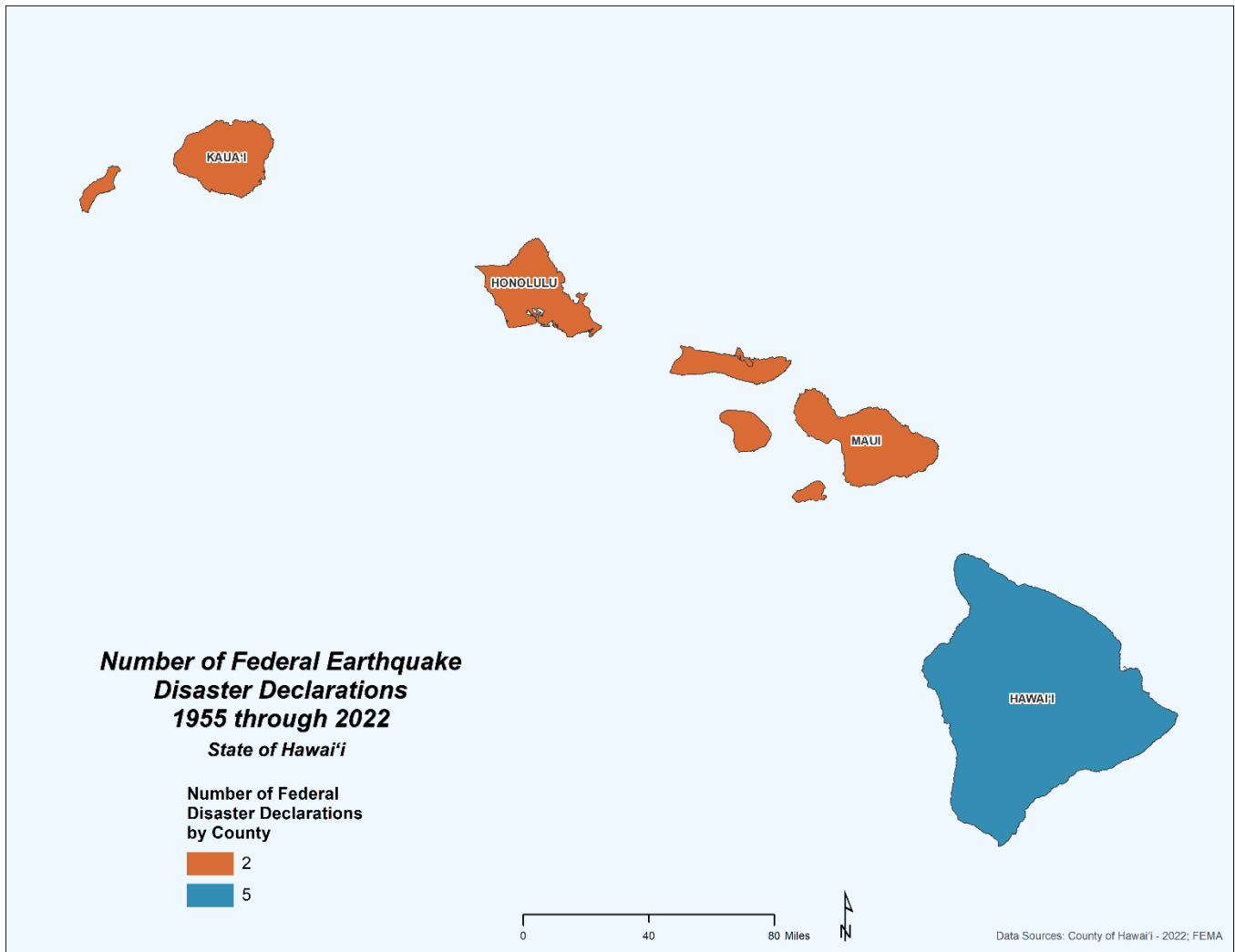
There are no additional maps to support Section 4.5 (Drought).

## D.5 Earthquake





Figure D-23. Number of Federal Earthquake Declarations in the State of Hawai'i (1955 through 2022)



Note: The figure illustrates the Federal declarations (DR) or emergencies (EM) declared for the State of Hawai'i associated with earthquakes. The FEMA Disaster Declarations Summary Open Government Dataset was queried for the earthquake hazard event. While earthquake was used to query the dataset, the incident type and title of declaration included one or a combination of the following hazard types: volcanic eruption, earthquake, seismic waves, and volcanic disturbances. More than one hazard type may be named and associated with earthquake Federal declarations.





## D.6 Flood

Figure D-24. Chronic Coastal Flood Hazard Area (SLR-XA-1.1) for the County of Kaua'i

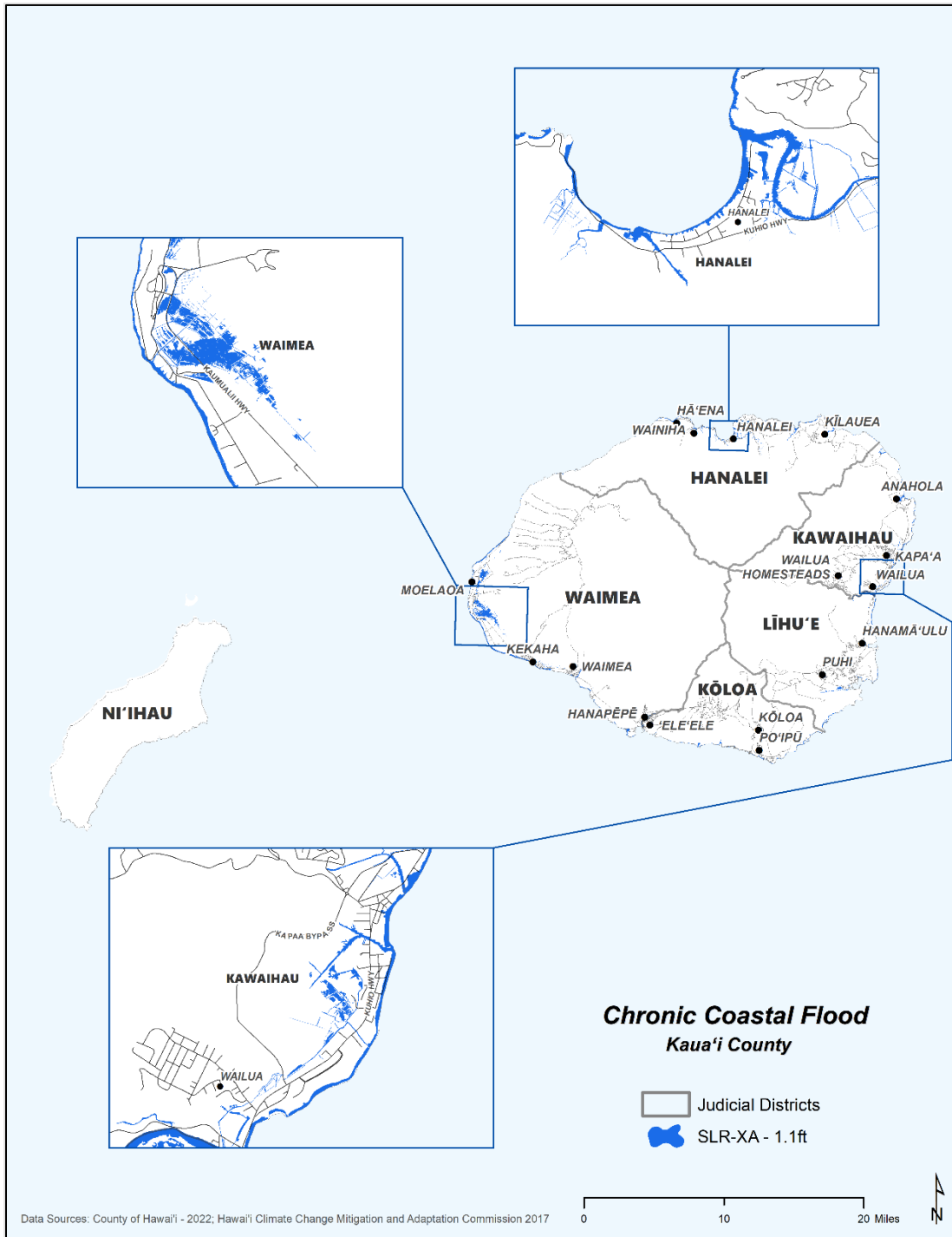




Figure D-25. Chronic Coastal Flood Hazard Area (SLR-XA-1.1) for the City and County of Honolulu

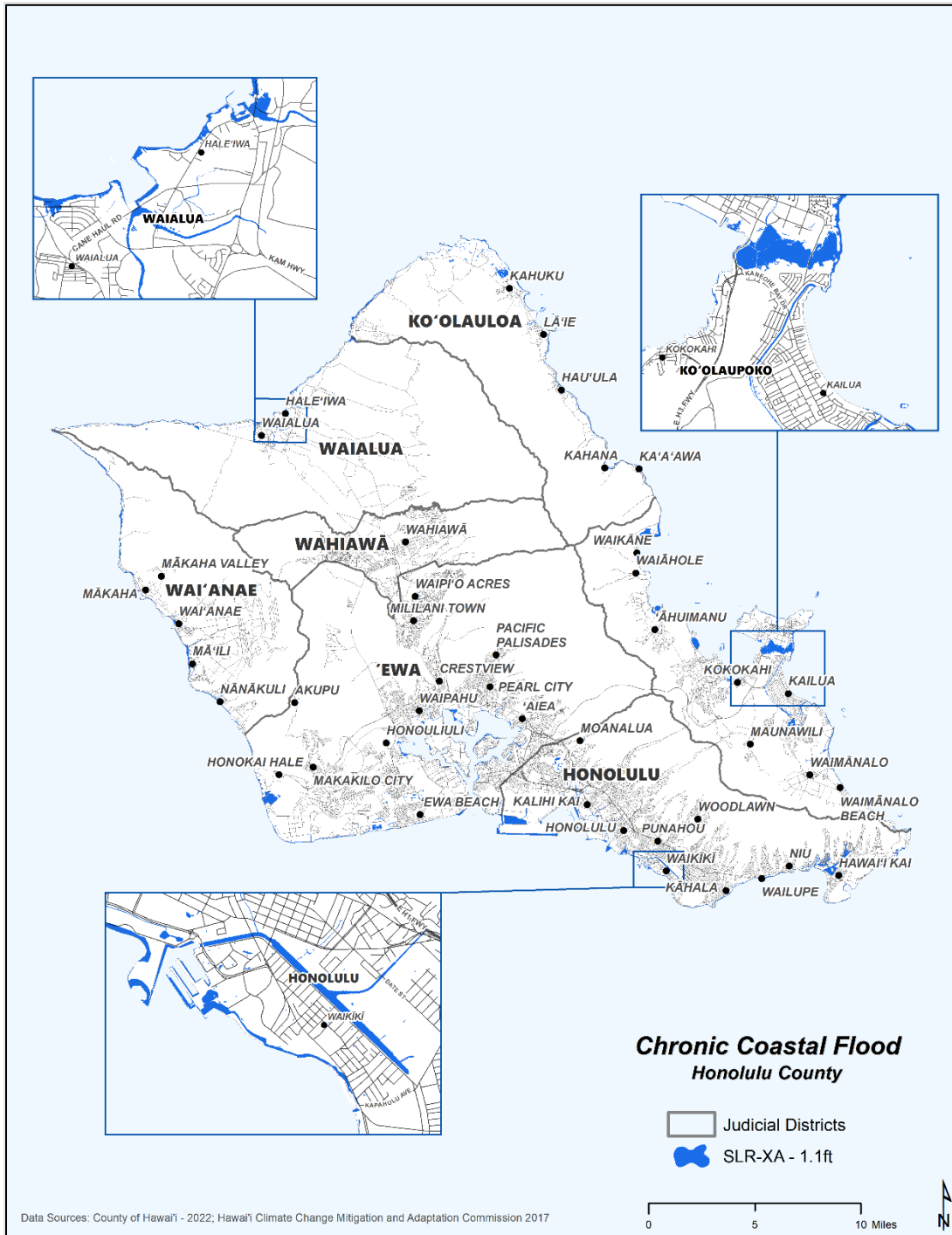




Figure D-26. Chronic Coastal Flood Hazard Area (SLR-XA-1.1) for the County of Maui

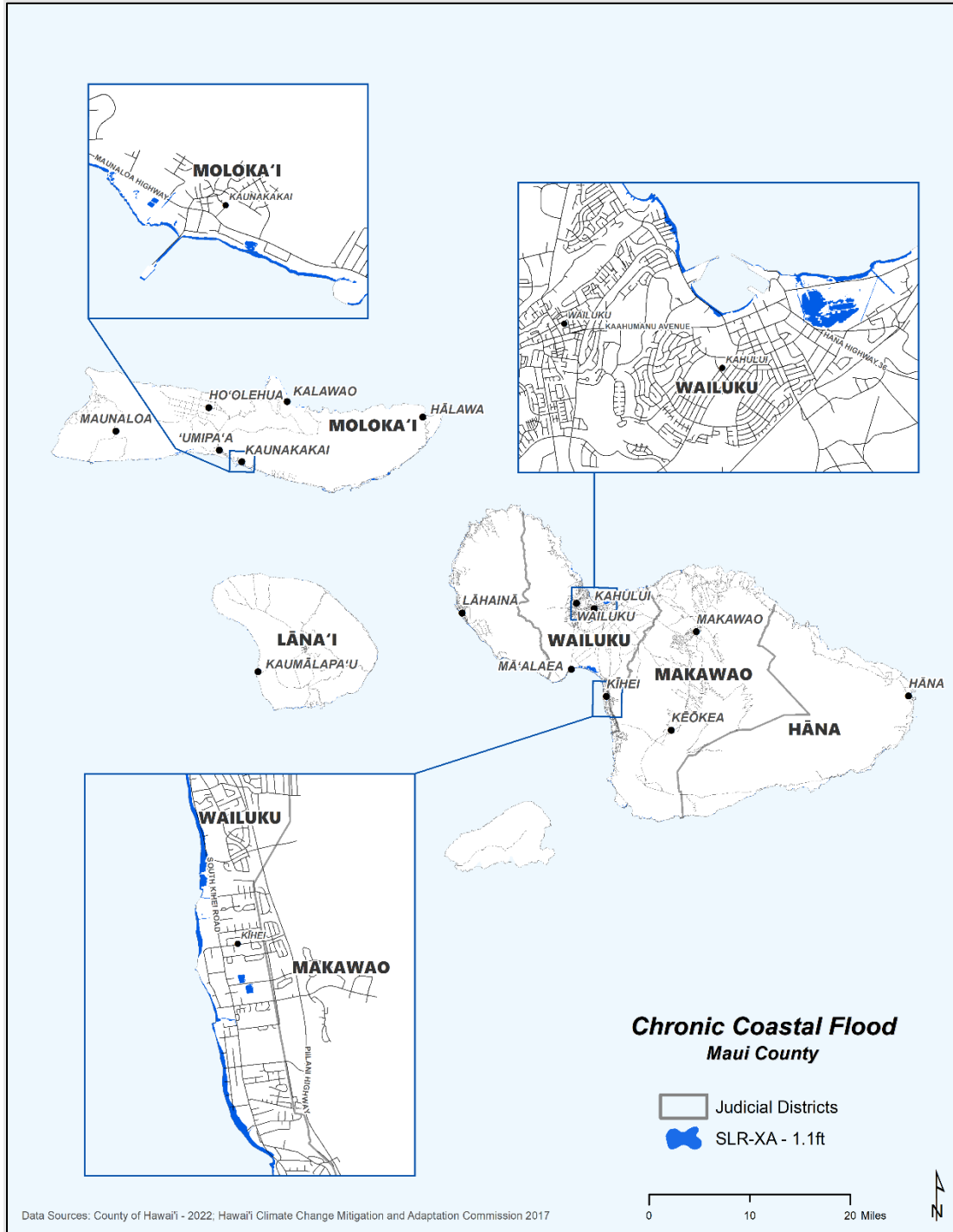




Figure D-27. Chronic Coastal Flood Hazard Area (SLR-XA-1.1) for the County of Hawai'i

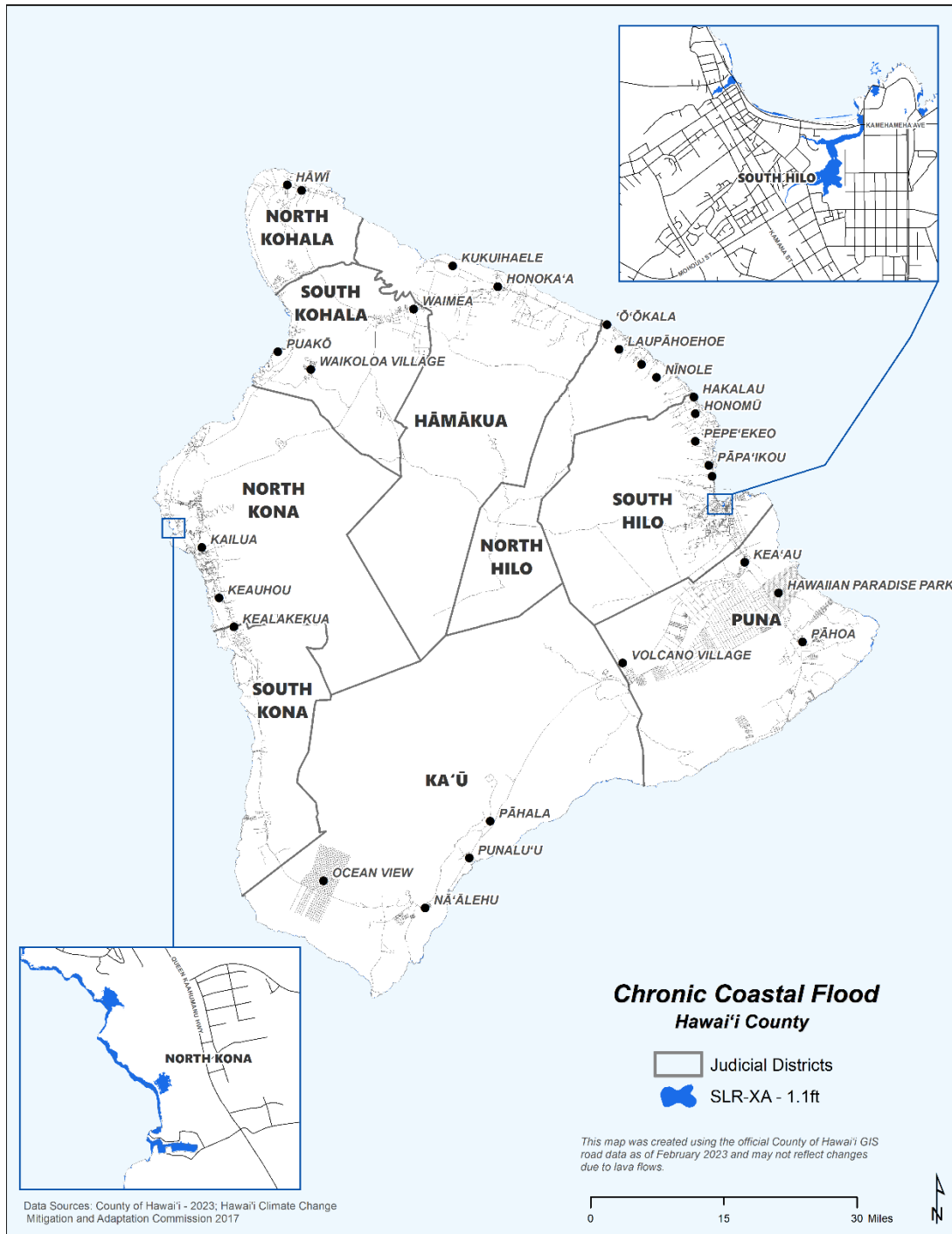
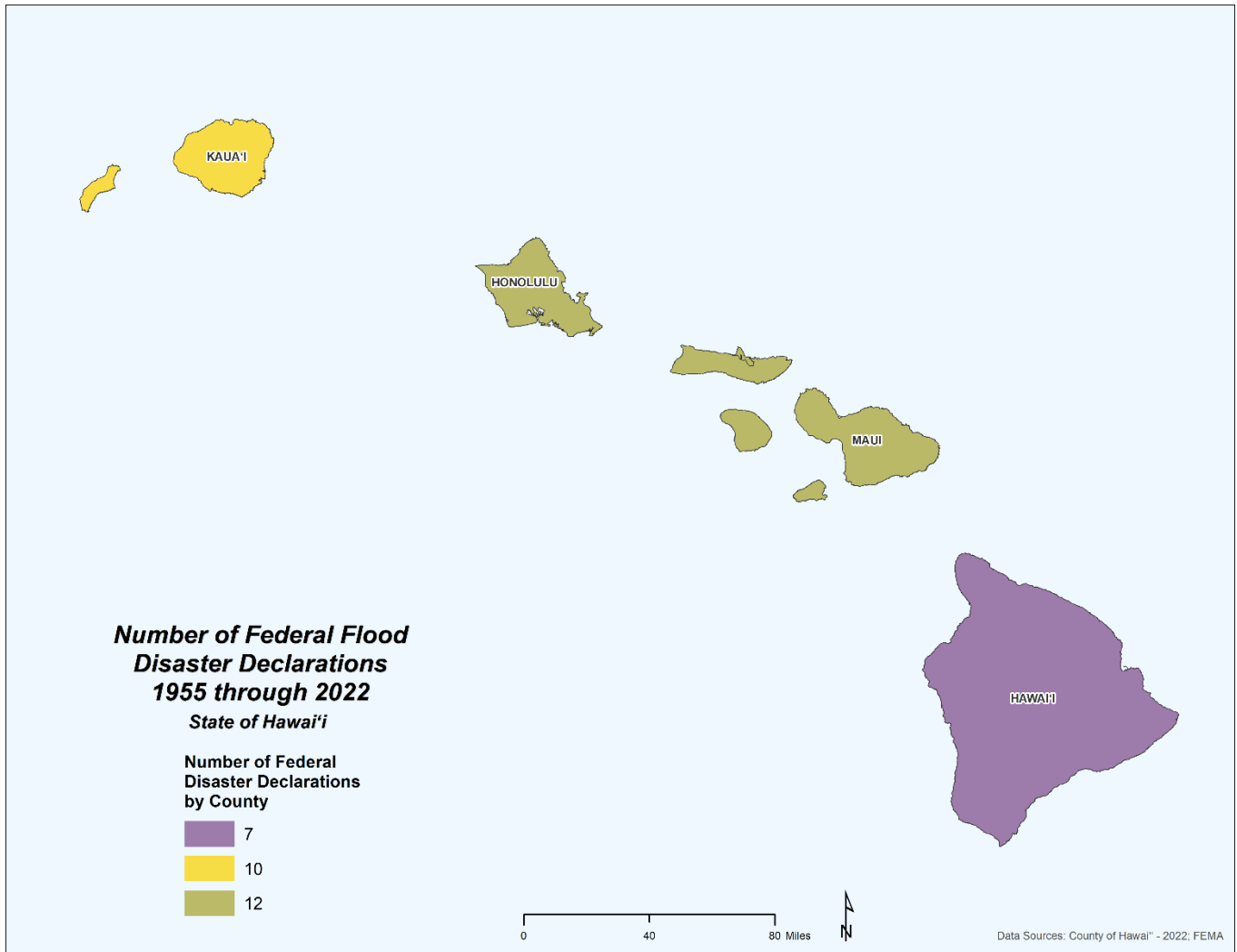




Figure D-28. Number of Federal Flood Declarations in the State of Hawai'i (1955 through 2022)



Note: The figure illustrates the Federal declarations (DR) or emergencies (EM) declared for the State of Hawai'i associated with chronic coastal flooding. The FEMA Disaster Declarations Summary Open Government Dataset was queried for events associated with chronic coastal flooding, including high surf. The Federal declarations associated with chronic coastal flooding include one or a combination of the following: severe storms, high wave flooding, flooding, heavy rains, and land/mudslides. One or more other hazard types, such as mudslides and landslides, may be named and associated with these disaster events.

## D.7 Hazardous Materials

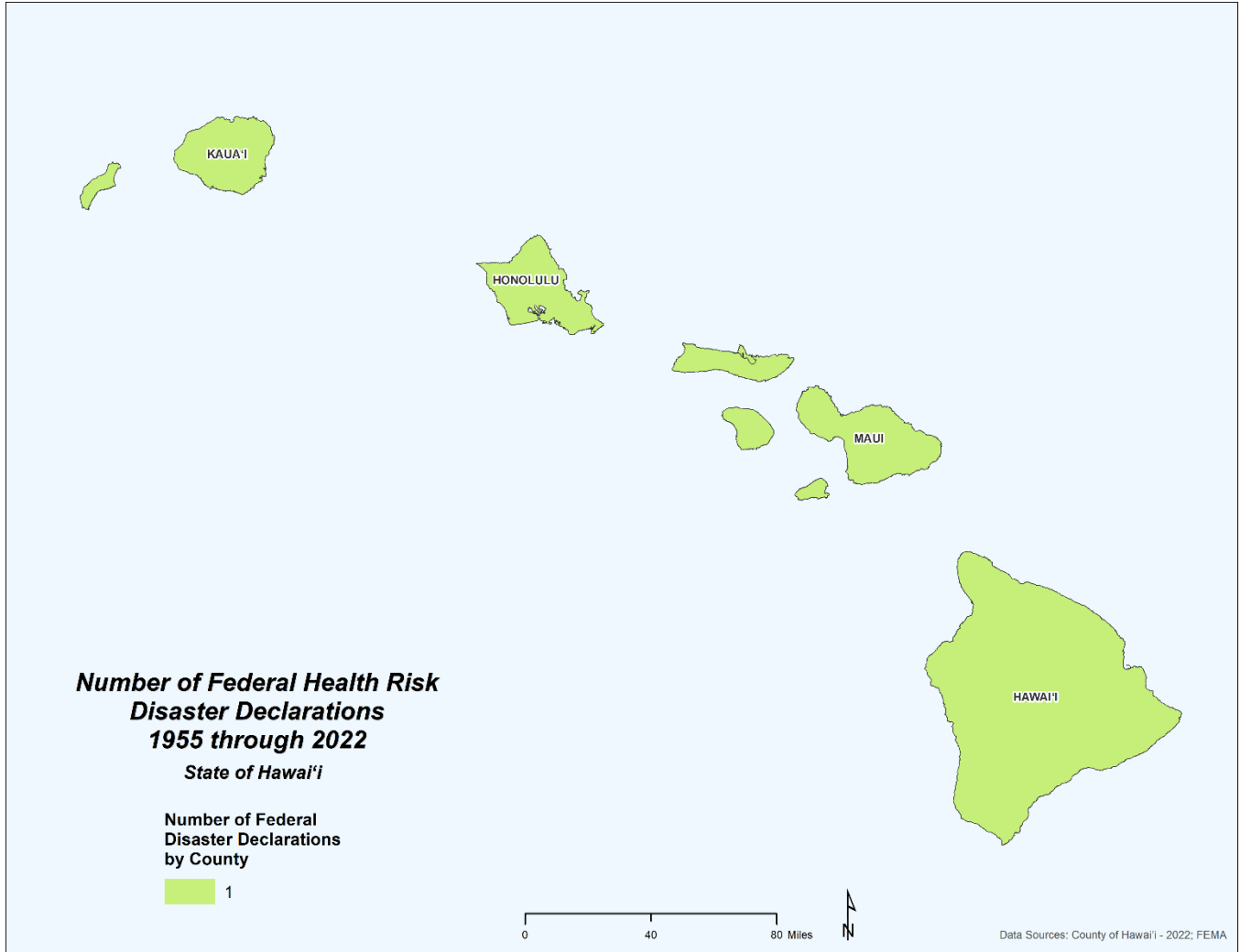
There are no additional maps to support Section 4.7 (Hazardous Materials).





## D.8 Health Risks

Figure D-29. Number of Federal Health Risk Declarations in the State of Hawai'i (1955 through 2022)

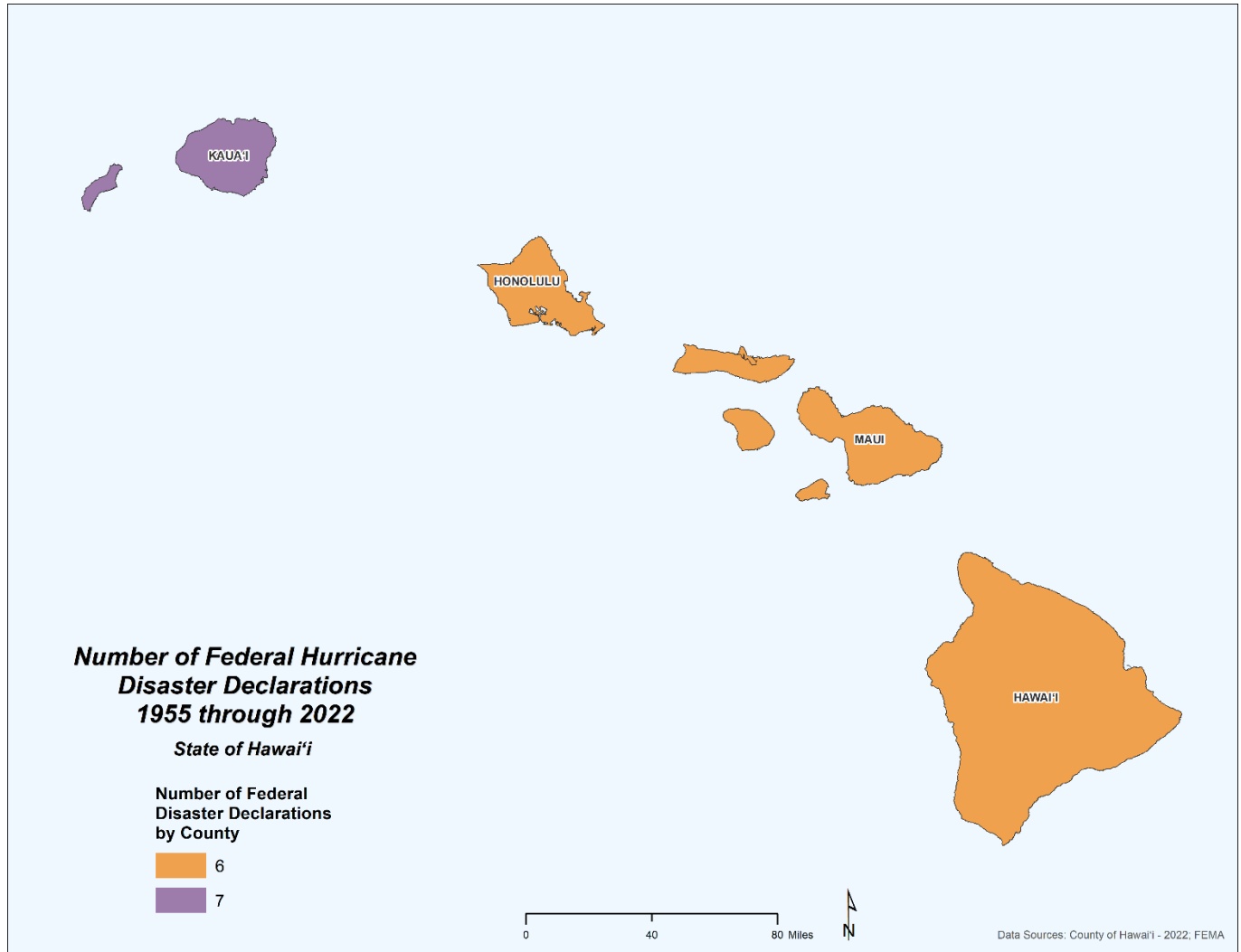






## D.9 Hurricane

Figure D-30. Number of Federal Hurricane Declarations in the State of Hawai'i (1955 through 2022)



Note: The figure illustrates the Federal declarations (DR) or emergencies (EM) declared for the State of Hawai'i associated with hurricanes and tropical storms. The FEMA Disaster Declarations Summary Open Government Dataset was queried for events that resulted in hurricanes and tropical storms. These events included those described as tropical storms or hurricanes. More than one hazard type may be named and associated with Federal declarations.

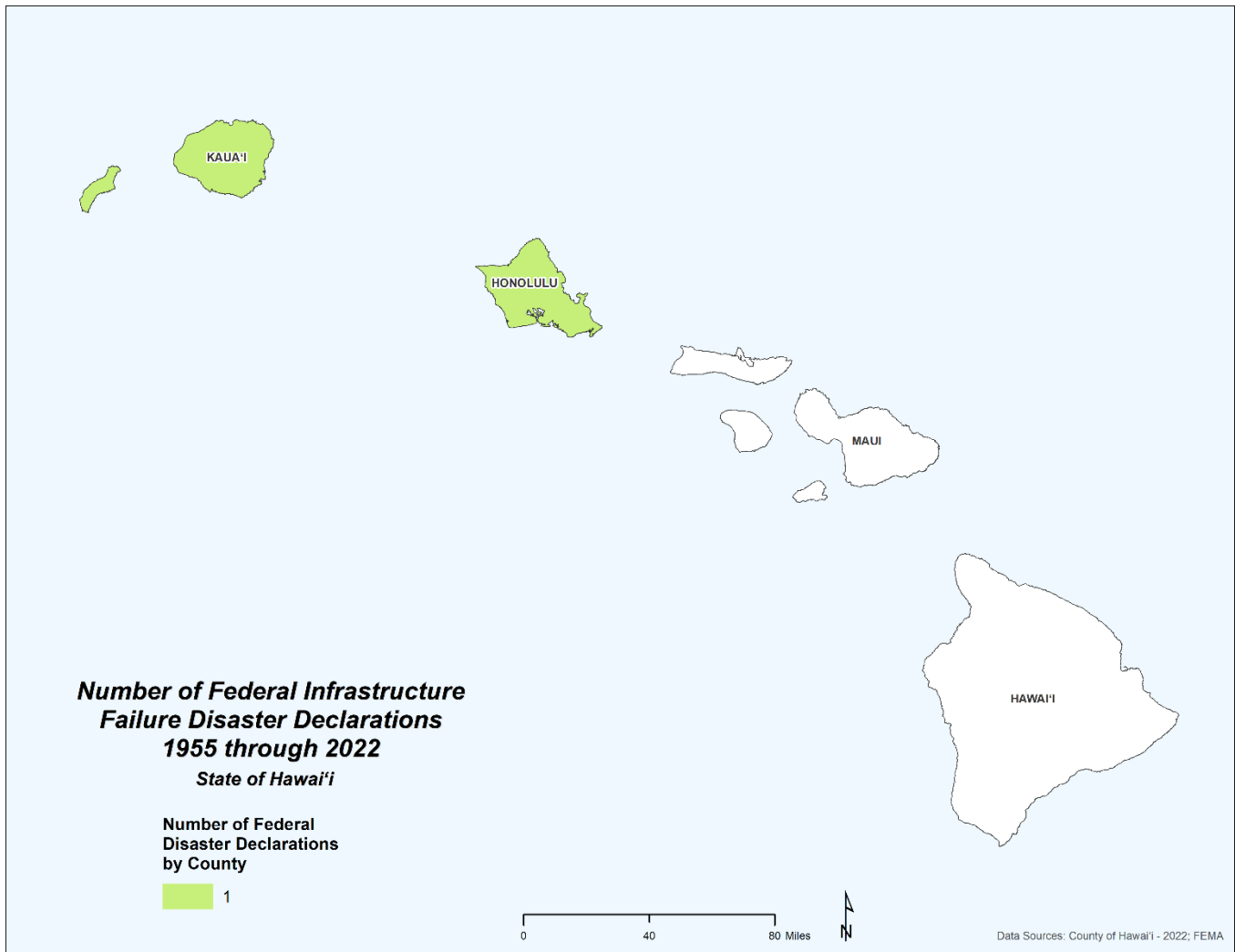
## D.10 Infrastructure Failure

Infrastructure failure maps focus on dam failure.





Figure D-31. Number of Federal Declarations that included Infrastructure Failure in the State of Hawai'i (1955 through 2022)



Note: The figure illustrates the Federal declarations (DR) or emergencies (EM) declared for the State of Hawai'i associated with a dam failure. Other hazard types are named and associated with this disaster event (DR-1640, Severe Storms, Flooding, Landslides, and Mudslides); however, it involved a dam failure event.





Figure D-32. Dam Failure Inundation Area Assessed for the County of Kaua'i

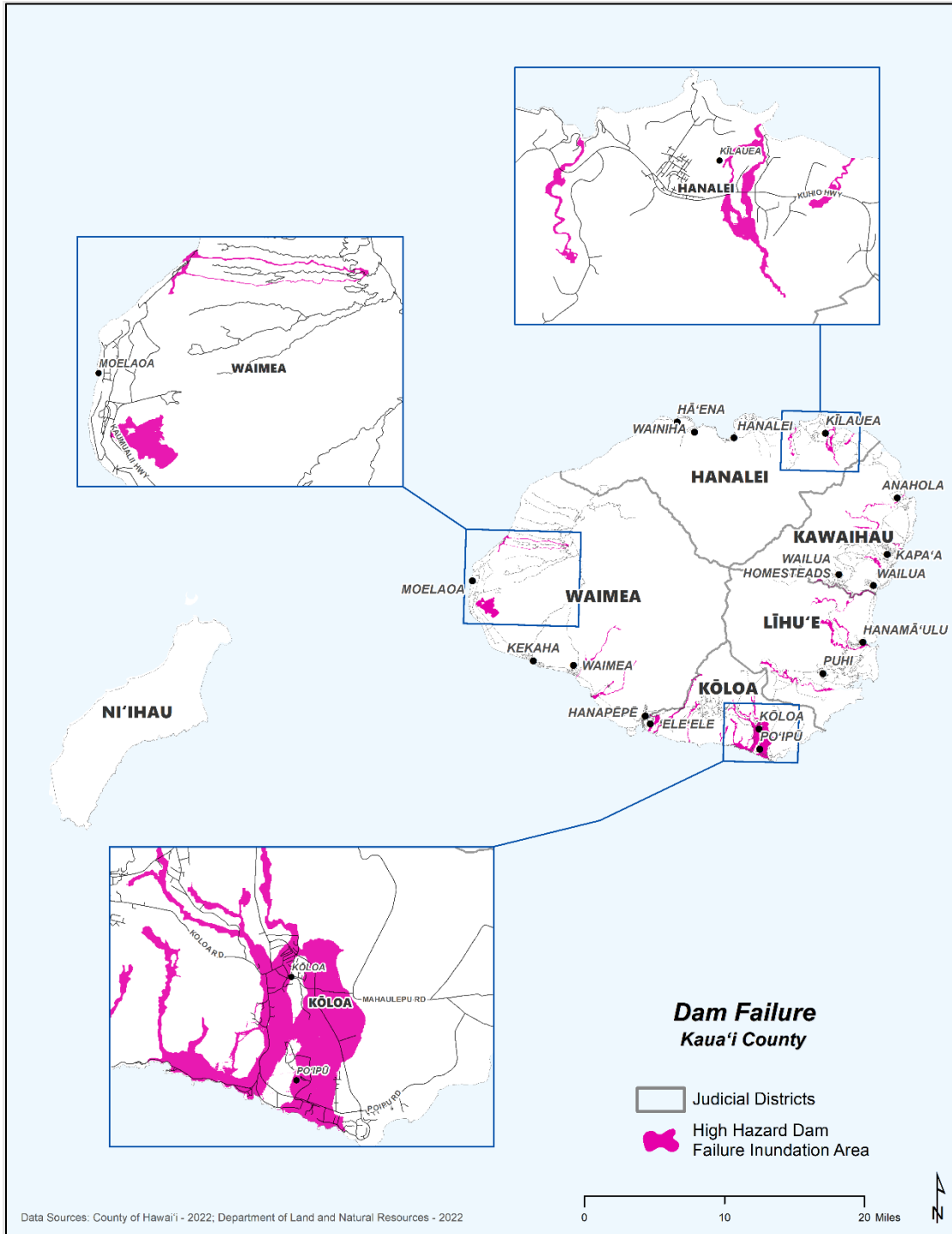




Figure D-33. Dam Failure Inundation Area Assessed for the City and County of Honolulu

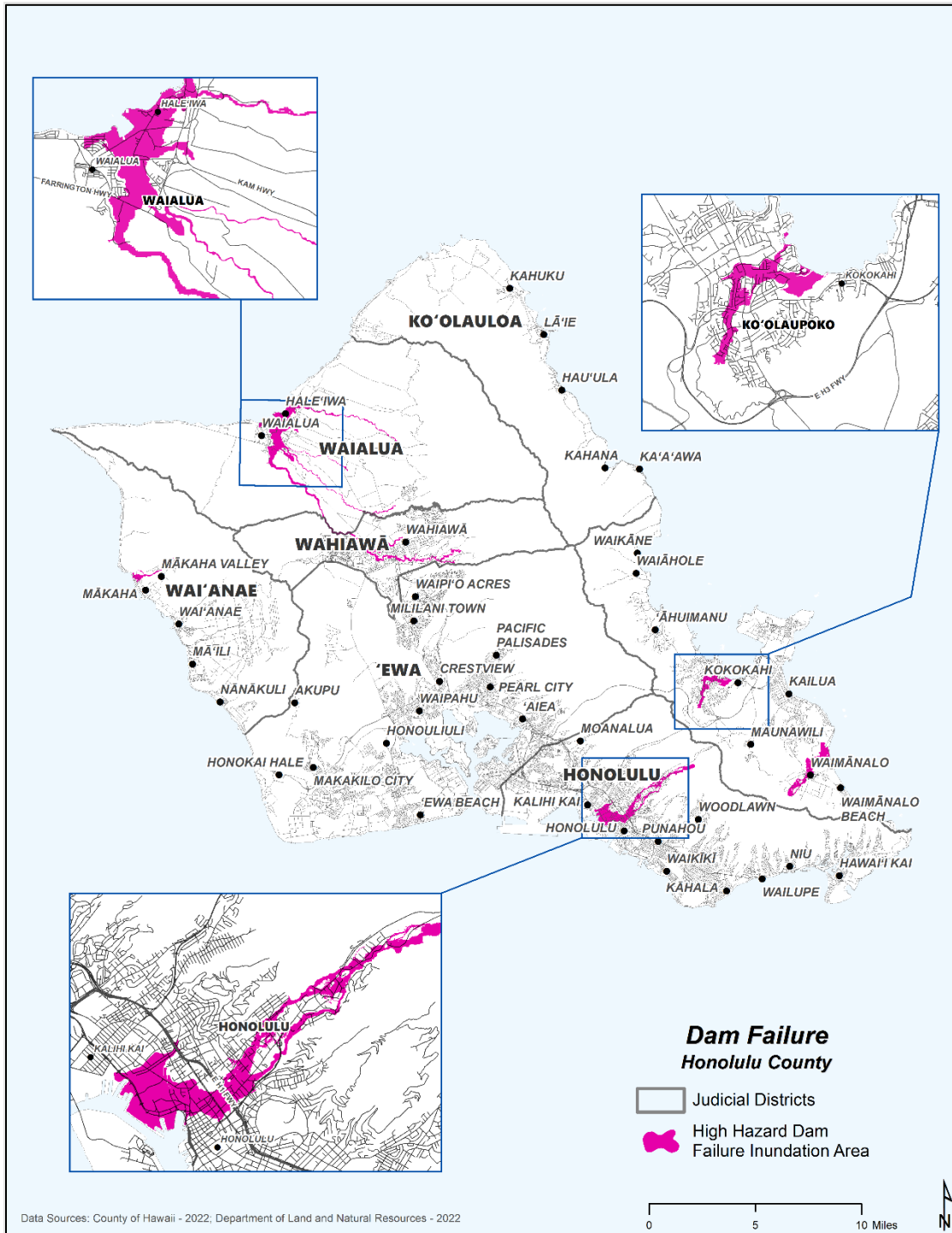




Figure D-34. Dam Failure Inundation Area Assessed for the County of Maui

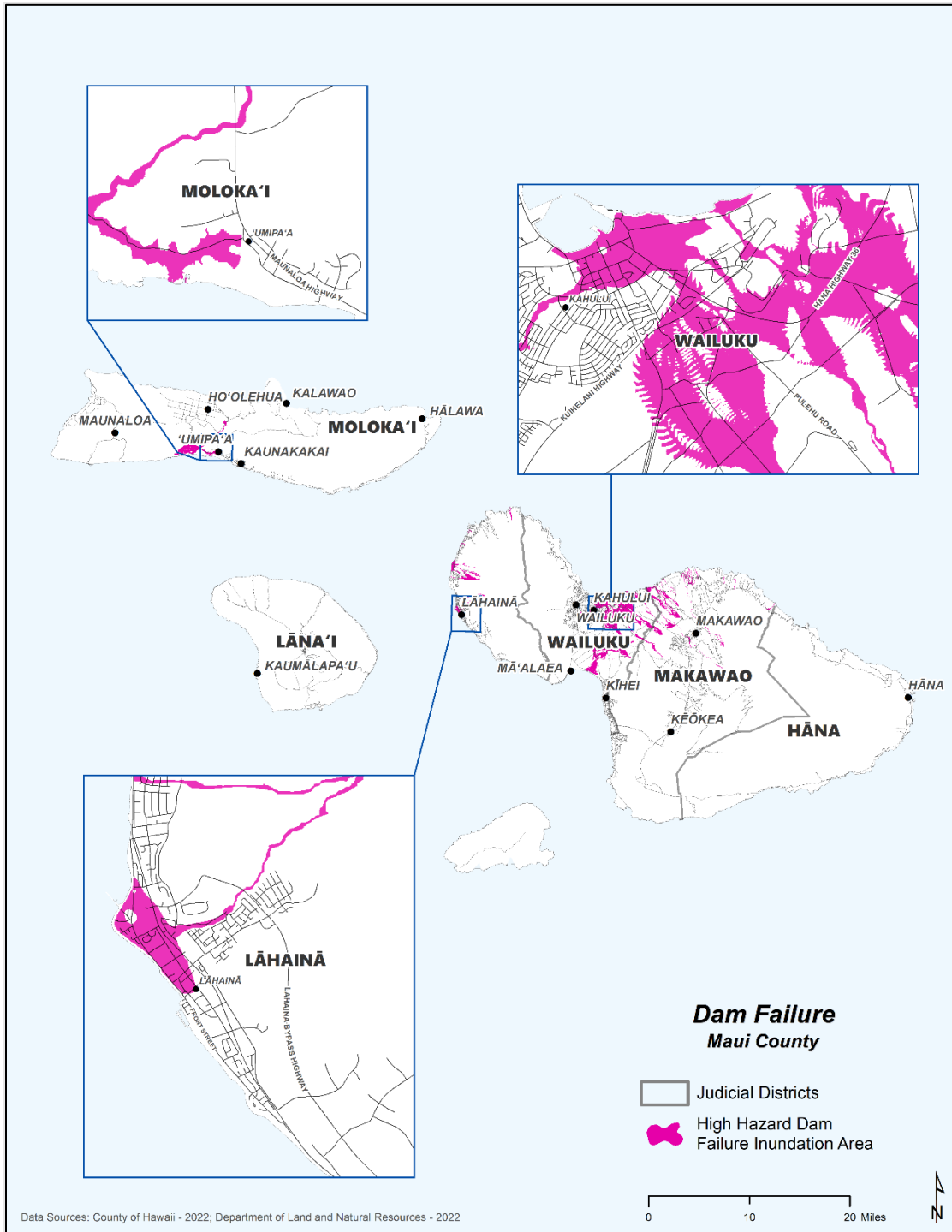
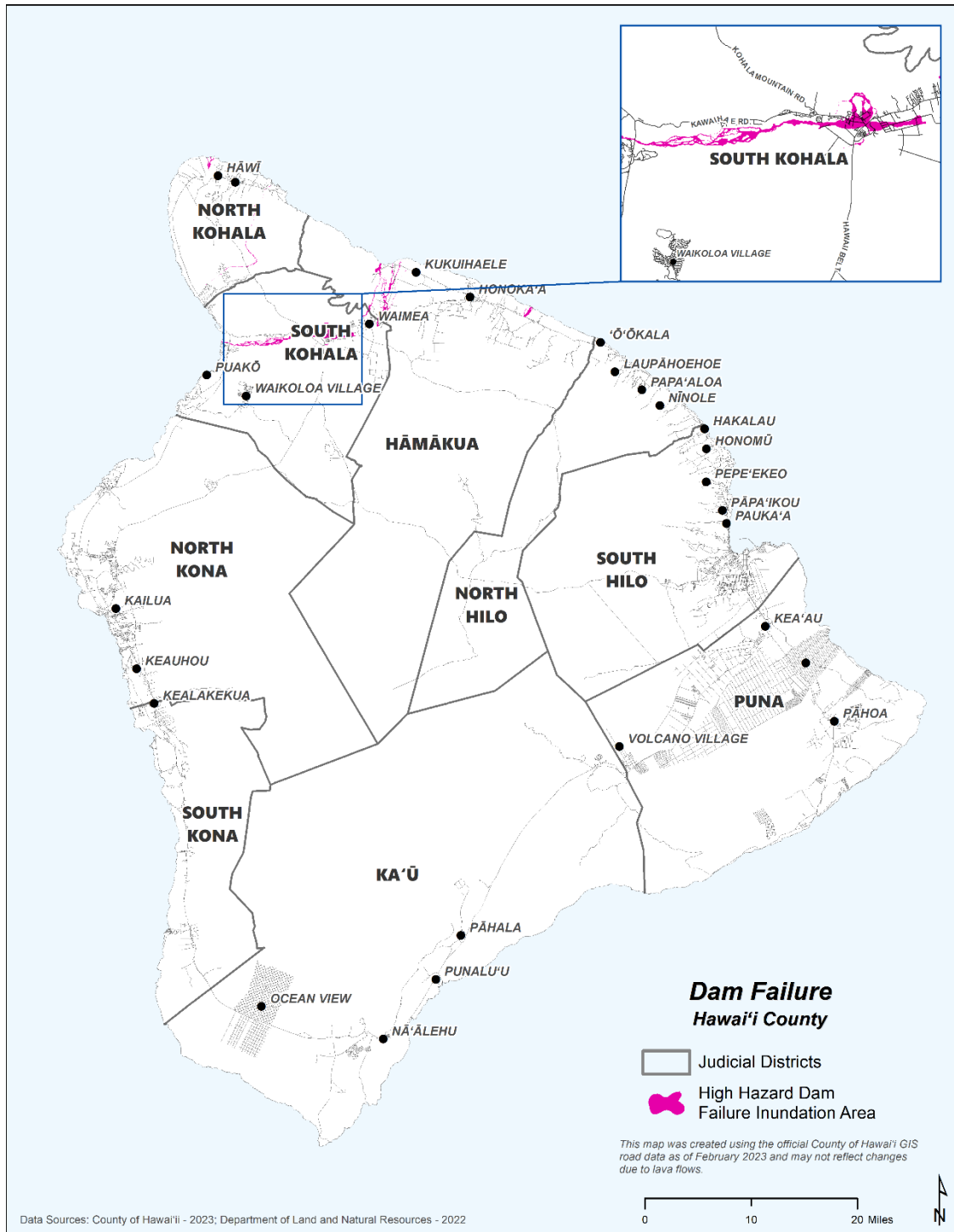




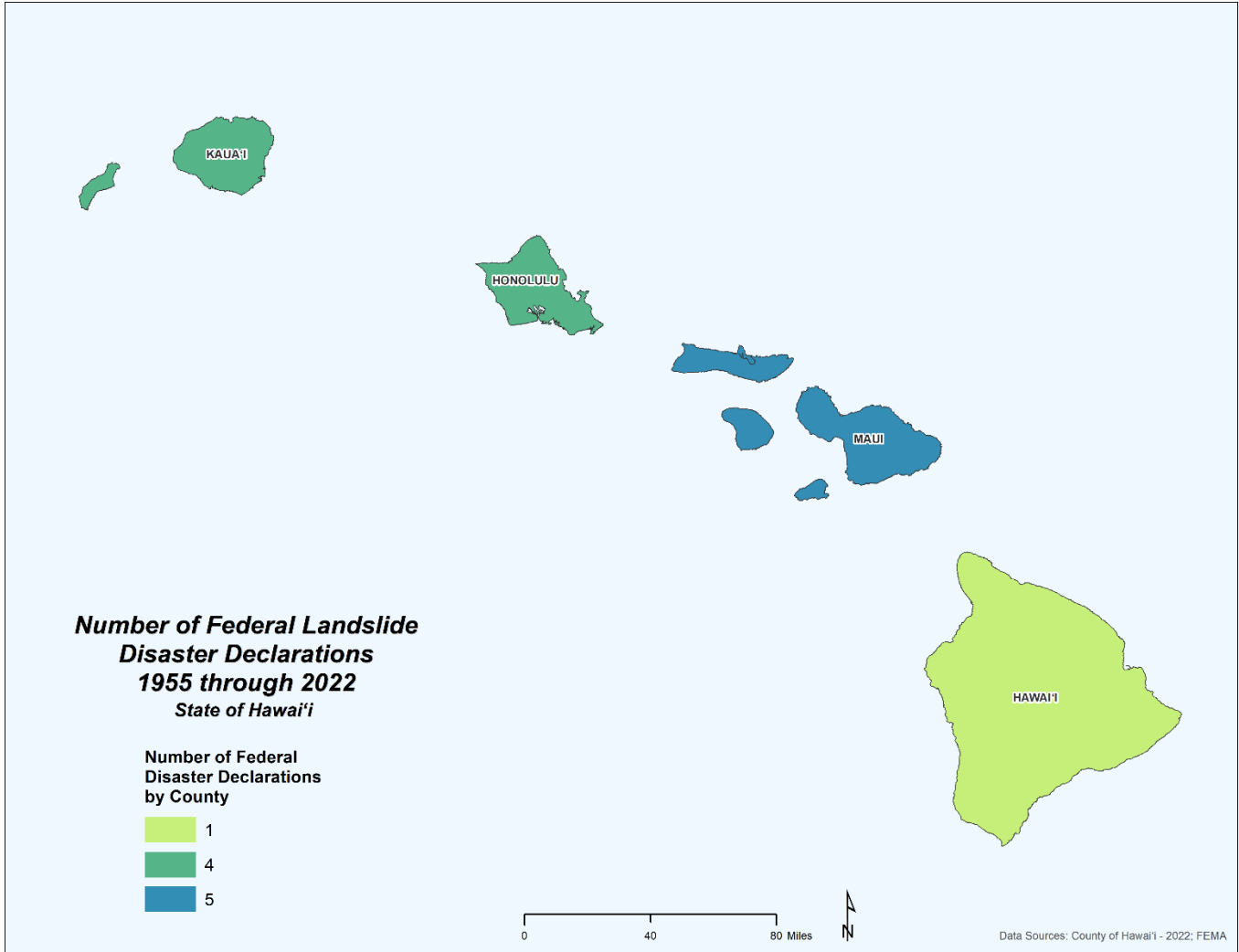
Figure D-35. Dam Failure Inundation Area Assessed for the County of Hawai'i





## D.11 Landslide and Rockfall

Figure D-36. Number of Federal Landslide Declarations in the State of Hawai'i (1955 through 2022)



Note: The figure illustrates the Federal declarations (DR) or emergencies (EM) declared for the State of Hawai'i associated with landslides. The FEMA Disaster Declarations Summary Open Government Dataset was queried for hazard events associated with landslides, including landslides and mudslides. While landslide and mudslide events were used to query the dataset, the incident type and title of declaration included one or a combination of the following hazard types: heavy rains, high surf, flooding, severe storms, landslides, and mudslides. More than one hazard type may be named and associated with landslide Federal declarations.

## D.12 Terrorism

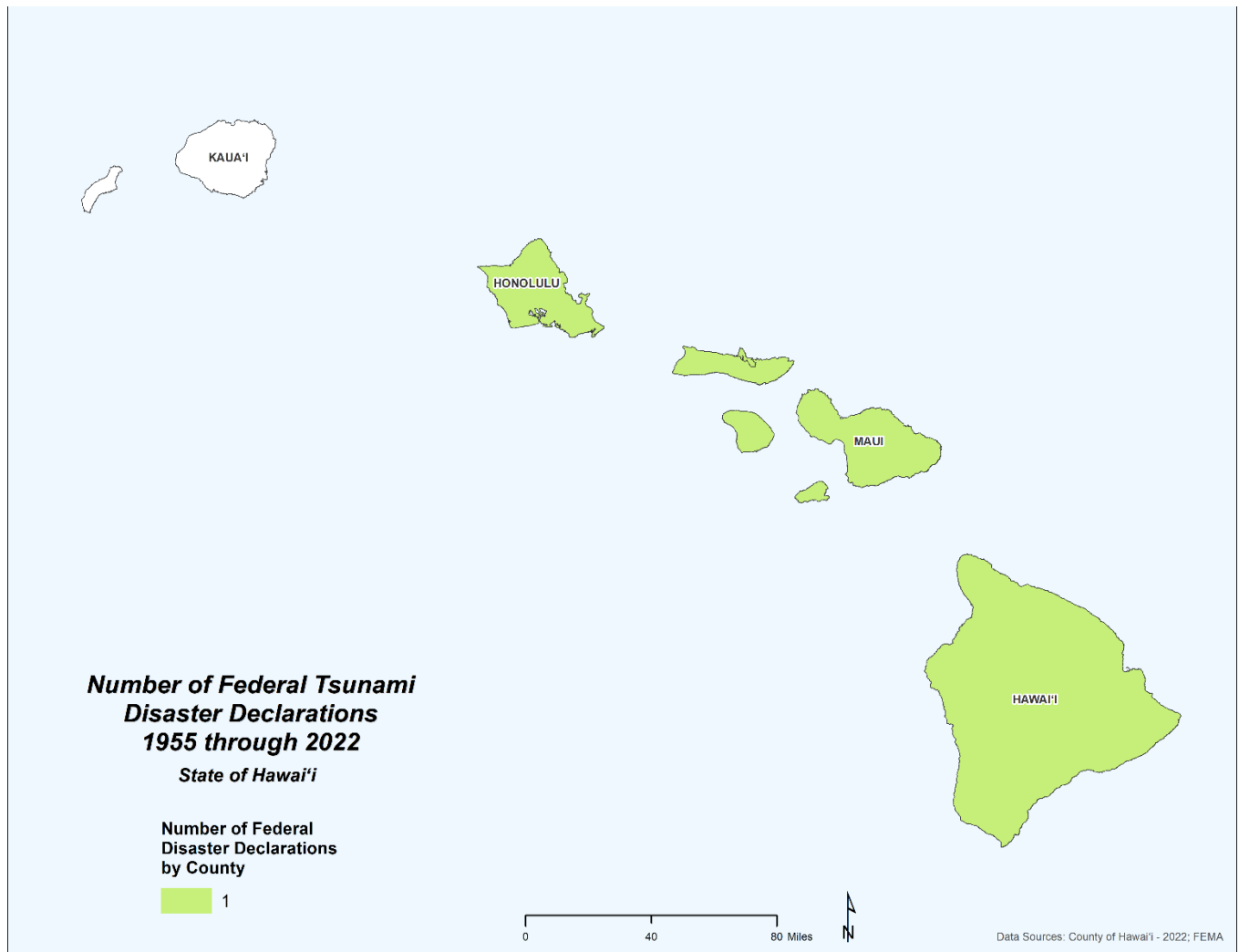
There are no additional maps to support Section 4.12 (Terrorism).





# D.13 Tsunami

Figure D-37. Number of Federal Tsunami Declarations in the State of Hawai'i (1955 through 2022)



Note: The figure illustrates the Federal declarations (DR) or emergencies (EM) declared for the State of Hawai'i associated with tsunamis. The FEMA Disaster Declarations Summary Open Government Dataset was queried for the tsunami hazard event. While tsunami was used to query the dataset, the incident type and title of declaration included one or a combination of the following hazard types: tsunami waves and tsunami. More than one hazard type may be named and associated with tsunami Federal declarations.

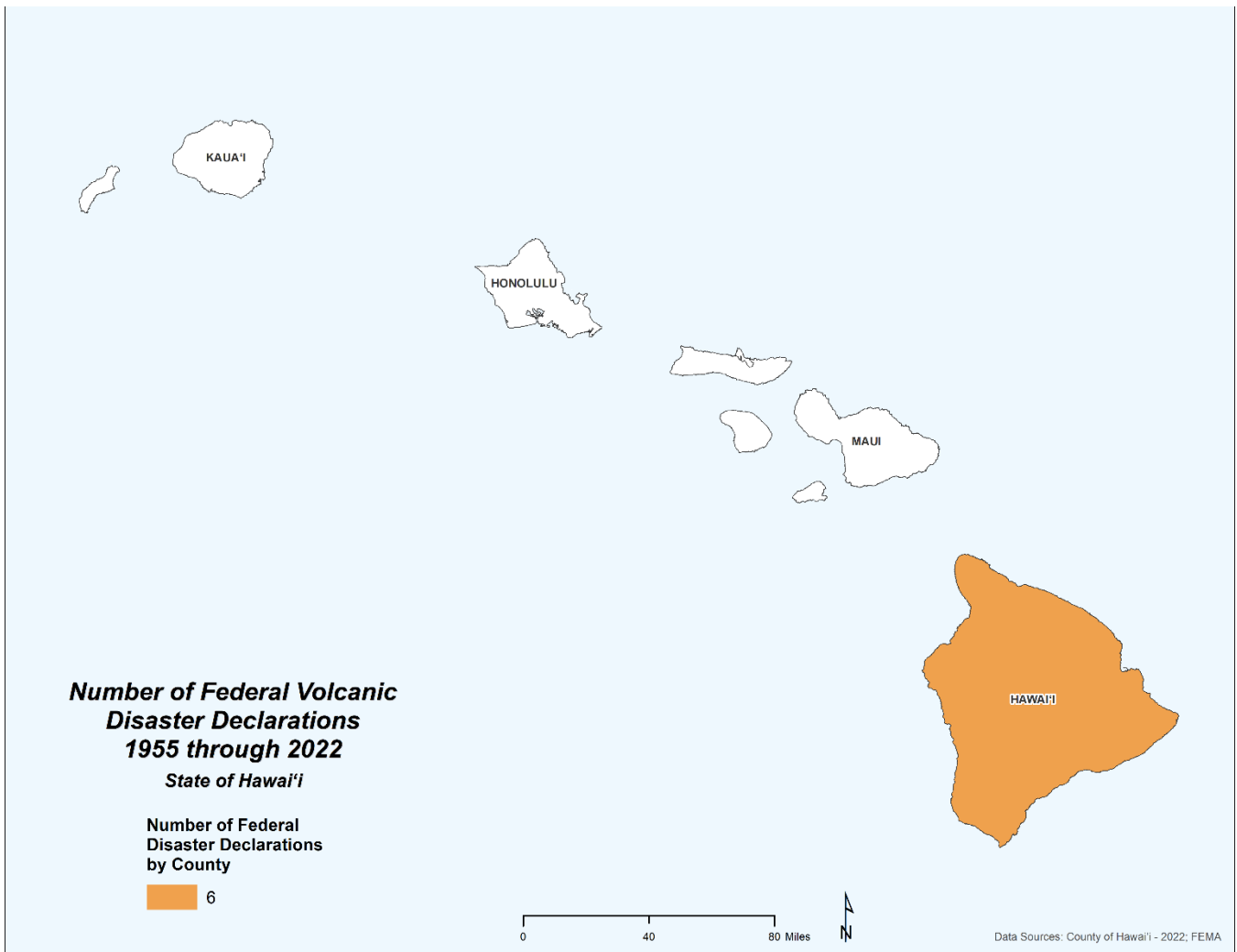






## D.14 Volcanic

Figure D-38. Number of Federal Volcanic Declarations in the State of Hawai'i (1955 through 2022)



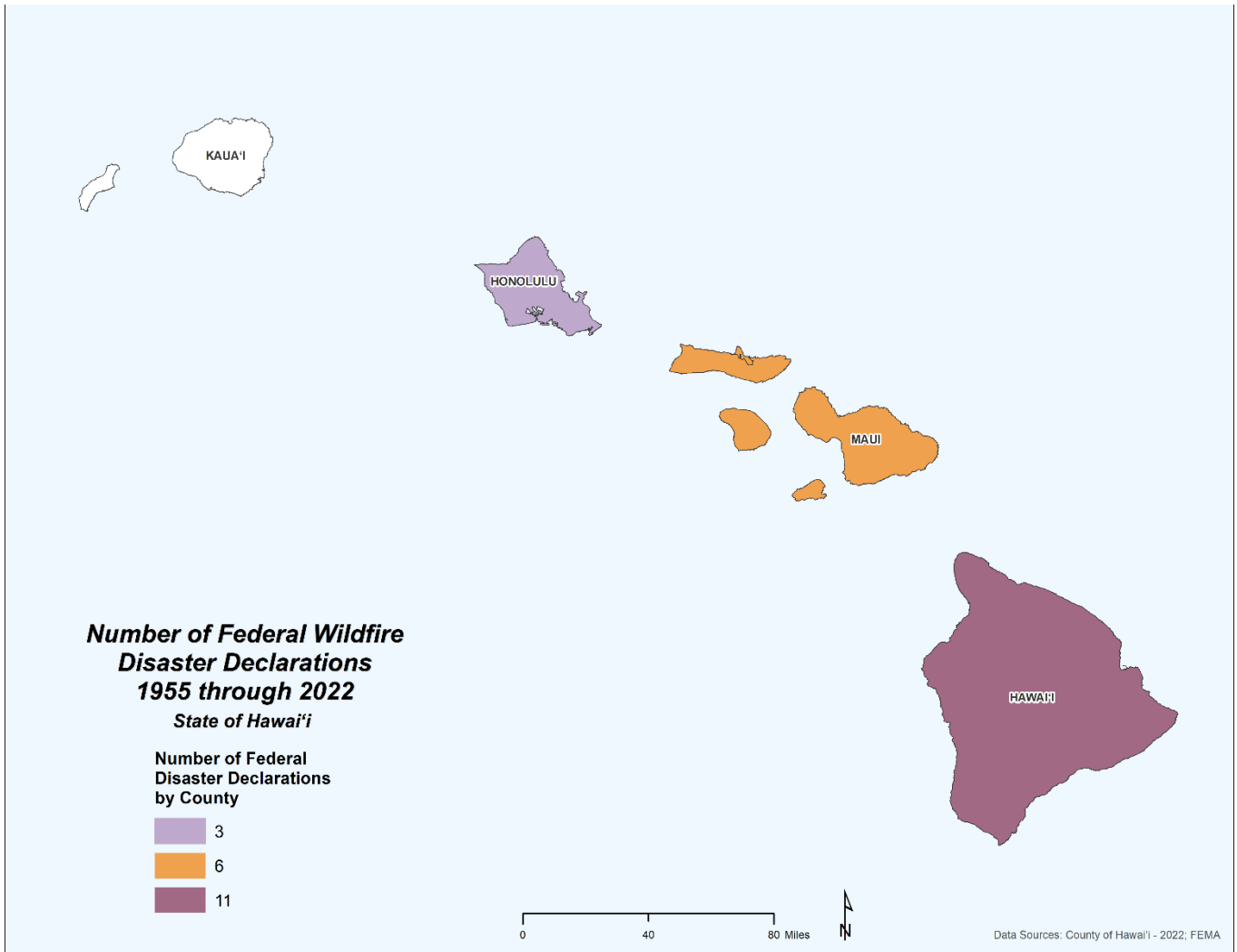
Note: The figure illustrates the Federal declarations (DR) or emergencies (EM) declared for the State of Hawai'i associated with volcanic events. The FEMA Disaster Declarations Summary Open Government Dataset was queried for the volcano hazard. While the term volcano was used to query the dataset, the incident type and title of declaration included one or a combination of the following hazard types: volcanic eruption, earthquakes, lava flow, seismic waves, and volcanic disturbances. More than one hazard type may be named and associated with volcano Federal declarations.





# D.15 Wildfire

Figure D-39. Number of Federal Wildfire Declarations in the State of Hawai'i (1955 through 2022)



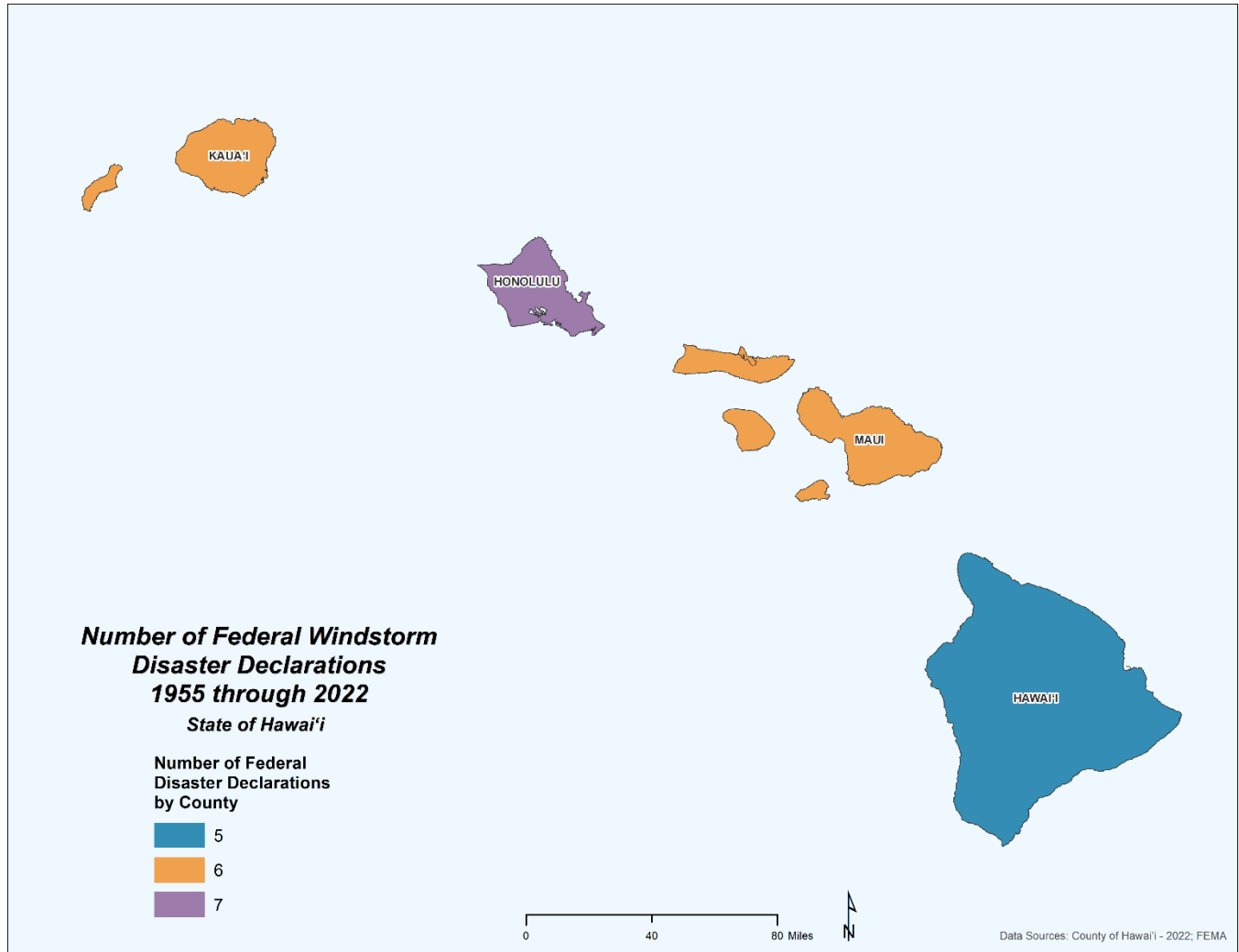
Note: The figure illustrates the Federal declarations (DR) or emergencies (EM) declared for the State of Hawai'i associated with wildfire events. The FEMA Disaster Declarations Summary Open Government Dataset was queried for the wildfire hazard.





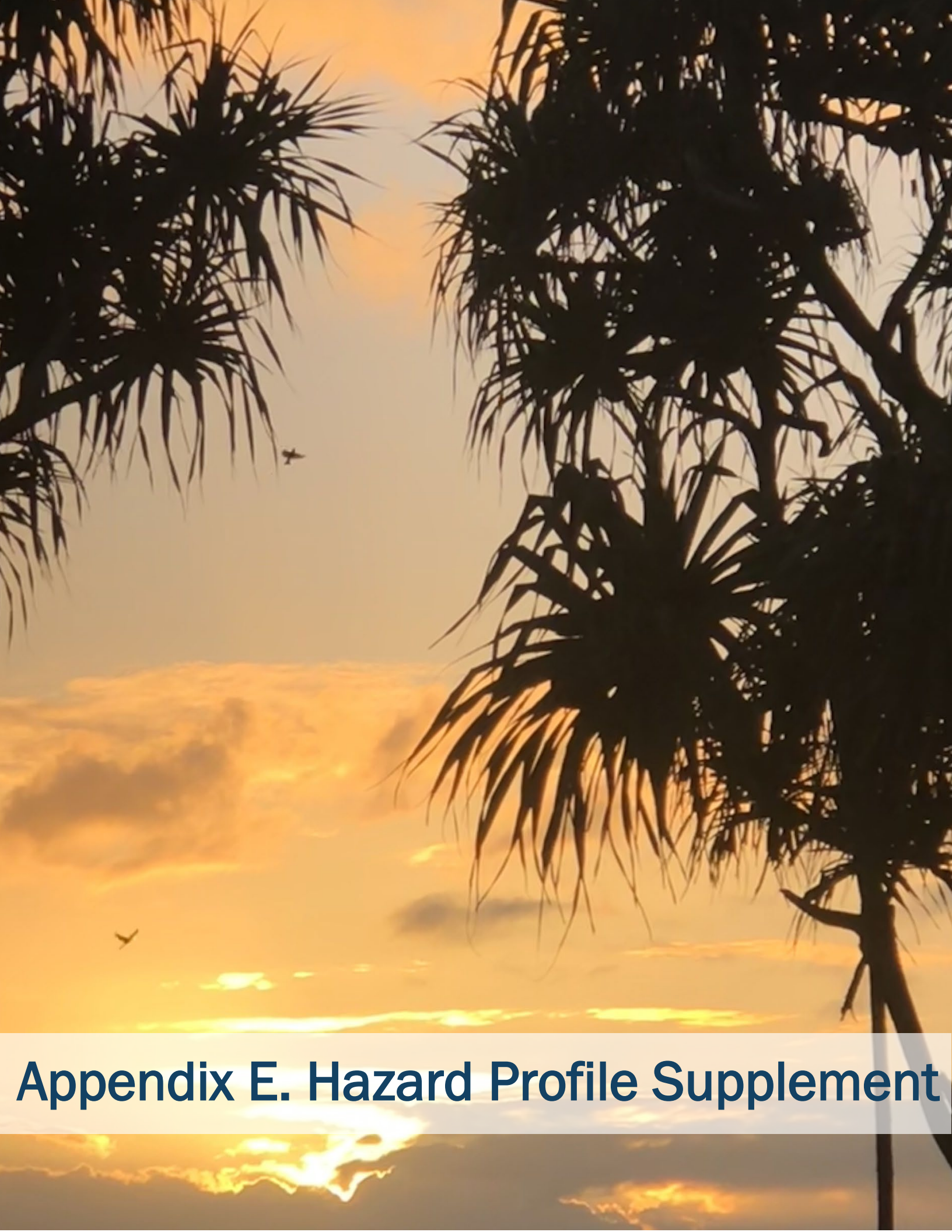
## D.16 Windstorm

Figure D-40. Number of Federal Windstorm Declarations in the State of Hawai'i (1955 through 2022)



Note: The figure illustrates the Federal declarations (DR) or emergencies (EM) declared for the State of Hawai'i associated with high wind events. The FEMA Disaster Declarations Summary Open Government Dataset was queried for hazard events associated with high wind events, including severe storms. While 'severe storms' was used to query the dataset, the incident type and title of declaration included one or a combination of the following hazard types: flooding, heavy rain, high surf, mudslides, landslides, and severe storms. More than one hazard type may be named and associated with event-based flooding Federal declarations. Additionally, it should be recognized that Federal declarations may not specify the event as a "windstorm" and may refer to the event type as a severe storm, making it challenging to distinguish whether or not the declaration is associated with tropical cyclones.





# Appendix E. Hazard Profile Supplement



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<sup>1</sup> Section Cover Photo: Puna sunrise. Photo by Megan Brotherton





## APPENDIX E. HAZARD PROFILE SUPPLEMENT

This appendix contains excerpts of previous events as described in the 2013 and 2018 SHMPs. This information is compiled into one appendix for ease of reference; and is reproduced as documented in the 2013 and 2018 plans.

### E.1 Climate Change and Sea Level Rise

The following presents climate change events that occurred in the State of Hawai'i between 1993 and 2017, as presented in the 2013 and 2018 HMPs. The information is reproduced as documented in the 2013 and 2018 plans.

#### E.1.1 RECOGNIZING EL NIÑO

In December 1993, the sea surface temperatures and the winds were near normal, with warm water in the Western Pacific Ocean (in red on the top panel of December 1993 plot), and cool water, called the "cold tongue" in the Eastern Pacific Ocean (in green on the top panel of the December 1993 plot). The winds in the Western Pacific are very weak (see the arrows pointing in the direction the wind is blowing towards), and the winds in the Eastern Pacific are blowing towards the west (towards Indonesia). The bottom panel of the December 1993 plot shows anomalies, the way the sea surface temperature and wind differs from a normal December. In this plot, the anomalies are very small (yellow/green), indicating a normal December. December 1997 was near the peak of a strong El Niño year. In December 1997, the warm water (red in the top panel of the December 1997 plot) has spread from the western Pacific Ocean towards the east (in the direction of South America), the "cold tongue" (green color in the top panel of the December 1997 plot) has weakened, and the winds in the western Pacific, usually weak, are blowing strongly towards the east, pushing the warm water eastward. The anomalies show clearly that the water in the center of Pacific Ocean is much warmer (red) than in a normal December.

December 1998 was a strong La Niña (cold) event. The cold tongue (blue) is cooler than usual by about 3° Centigrade. The cold La Niña events sometimes (but not always) follow El Niño events. The most recent El Niño appeared throughout 2010 with contributions to drought impacts.

#### E.1.2 SEA LEVEL RISE

Sea level has been rising in the State of Hawai'i for the past century or more (refer to Table E-1). Rates of rise vary amongst the islands due to differing rates of subsidence based on distance from the actively-growing Island of Hawai'i. Other observations related to climate change and sea level rise in the State of Hawai'i include 70% of the beaches in the State of Hawai'i are undergoing chronic erosion (landward retreat) and over 13 miles of beach have been completely lost to erosion over the past century fronting seawalls and other shoreline structures. This dominant trend of beach erosion appears to be driven in part by local sea level rise (Romine et al., 2013).





**Table E-1. Linear Mean Sea Level Trends and 95% Confidence Intervals**

Station Name	First Year	Year Range	MSL Trend (mm/year)	+/- 95% Confidence Interval	Equivalent To
Nāwiliwili	1955	61	1.65	0.45	0.54 feet in 100 years
Mokuolo'e	1957	59	1.43	0.54	0.47 feet in 100 years
Honolulu	1905	111	1.48	0.21	0.49 feet in 100 years
Kahului	1947	69	2.21	0.42	0.73 feet in 100 years
Hilo	1927	89	3.08	0.3	1.01 feet in 100 years

Source: NOAA 2018

Notes:

mm/year millimeter per year

MSL Mean Sea Level

Shoreline retreat, wetland migration, and cliff collapse due to erosion are occurring on many of the coastlines in the State of Hawai'i. Groundwater tables in the state's low-lying coastal plains will rise with sea level rise and increasingly contribute to chronic coastal flooding and flooding (i.e. reduced drainage) with heavy rainfall events (e.g., Habel et al., 2017). In addition, rising sea level will reduce the effectiveness and cause flooding through the state's coastal storm water drainage infrastructure.

## E.2 Cyber Threat

Specific events involving cyber threat incidents were not discussed in the 2013 and 2018 SHMPs.

## E.3 Dam Failure (now called Infrastructure Failure in the 2023 HMP Update)

The following presents dam failure events that occurred in the State of Hawai'i through 2006, as presented in the 2013 HMP. The information is reproduced as documented in the 2013 plan. No new dam failure incidents occurred to include in the 2018 plan.

### E.3.1 KA LOKO RESERVOIR DAM FAILURE

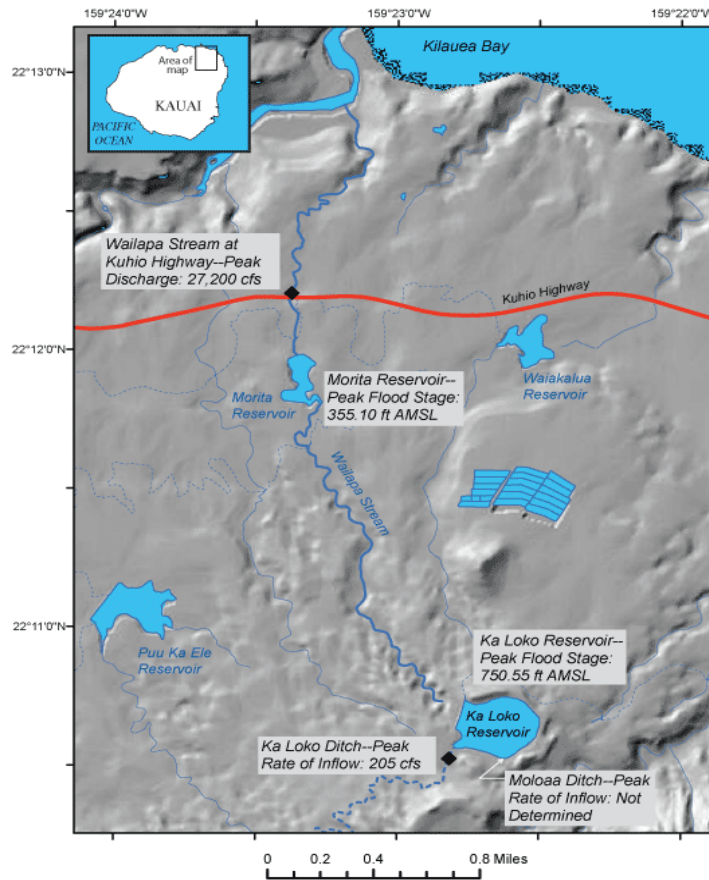
Ka Loko Reservoir created by an earthen dam, on the island of Kaua'i is located on the north side of the island, at 22°10'55"N, 159°22'56"W. The Ka Loko Dam – created to store water for sugar cane irrigation – was built on the north shore of the island of Kaua'i, County of Kaua'i, between 1890 and 1920. Figure E-1 shows a shade relief map of the Ka Loko Dam and its vicinity.

On March 14, 2006, a 120-foot long portion of the dam breached following an unusually prolonged period of torrential rain. In an independent civil investigation of the Ka Loko Dam failure by Robert Godbey, it is acknowledged that starting February 18, 2006, the National Weather Service (NWS) issued flash flood watches for parts of the State of Hawai'i for 31 of the next 42 days. The Ka Loko Reservoir rainfall data from this period indicates very unusual, but not unprecedented, rainfall.





**Figure E-1. Shaded Relief of Ka Loko Dam and Vicinity, Island of Kaua'i**



The approximately 300-million-gallon flood and debris generated by the breach rushed downstream and destroyed several homes, devastated a 300-foot long portion of Kūhiō Highway (State Highway 56), overturned several utility poles and lines, and killed seven people. The flood generated by the Ka Loko Dam failure also affected another dam located downstream from the breach zone – the Morita dam. On March 15, 2006, State of Hawai'i Civil Defense officials evacuated the area downhill from Morita Dam and forced search and rescue teams to leave the area. According to a press statement by Major General Robert Lee, “the Morita Dam could go any time since half of the width of the dam’s wall was gone along the downslope side”. Luckily, the Morita Dam did not fail and thus subsequent damage to property and loss of life was avoided.

According to Godbey’s independent civil investigation of the Ka Loko Dam failure, the breach of the dam could be attributed several possible conditions and practices: inadequate inspections of the dams by the State of Hawai'i, non-permitted grading operations at the dam site by the owner, inadequate maintenance of the dam by the owner, and non-enforcement of regulations by the County of Kaua'i. A civil lawsuit by the victim’s surviving family resulted in a \$25 million settlement to which the State of Hawai'i contributed \$1.5 million.





### E.3.2 KĪHOLO BAY EARTHQUAKE DAMAGE TO DAMS

Following the 2006 Kīholo Bay Earthquake some damage occurred to dams and irrigation ditches in the Waimea-Kamuela area of the Island of Hawai‘i where recorded peak ground acceleration exceeded 1.0g (soil depths are greater in that region than along the rocky coast nearest the epicenter). At least two dams experienced cracks along their crests; at least two others showed evidence of incipient slope failure on their embankments. The Pacific Disaster Center performed dam break simulations for the County of Hawai‘i Civil Defense. Two dams located above Waimea were drained after excessive seepage and “water boils” were observed five days following the earthquakes. The Hawai‘i State Department of Land and Natural Resources (DLNR) had in place post-earthquake dam inspection procedures. Since the Hawai‘i Dam Safety Guidelines: Seismic Analysis & Post-Earthquake Inspections calls for inspections of dams within 75 miles of the source of an earthquake of magnitude between 6.0 and 7.0. The United States Army Corps of Engineers undertook these comprehensive inspections.

## E.4 Drought

The following presents drought events that occurred in the State of Hawai‘i between 1901 and 2017, as presented in the 2013 and 2018 HMPs. The information is reproduced as documented in the 2013 and 2018 plans.

The most severe drought to affect the Hawaiian Islands since recordkeeping of stream flows began extended from the late 1930’s through most of the 1940’s, and the effects were felt on all of the main islands. A moderate to severe drought affected the entire state from 1983 to 1986. Although not as intense on some islands as either the 1938-1947 or the 1970-1979 droughts, or as long, this drought caused cumulative stream flow deficits at some gaging stations that rank second for the period of record.

The period between late 1997 and early 1998 was also a year of severe drought across the state. In January 1998, for example, 36 out of 73 rain gages set up by the National Weather Service on all islands registered less than 25 percent of the norm for that period. According to the 2005 State of Hawai‘i Drought Plan, parts of the island of Hawai‘i (County of Hawai‘i) received less than 10% of the average rainfall until May 1998. Similarly, rainfall was lower than the average across the island of O‘ahu, with many areas receiving less than 30 percent of normal levels. The severe drought of the late 1990’s extended well into the first few years of the twenty first century.

The next period of severe drought to affect the State of Hawai‘i was declared in 2008. El Niño conditions in the latter part of 2009 and into 2010 resulted in fewer winter storms putting the islands in severe drought conditions. On July 21, 2010, the United States Department of Agriculture designated all counties in the State of Hawai‘i a primary disaster area due to drought that began in January 2010. In 2010, the State of Hawai‘i was designated as the state with the worst drought in the nation. During the 2012-2013 wet season, increased rainfall helped the western half of the state (County of Kaua‘i and City and County of Honolulu) to emerge from drought conditions. However, in the County of Hawai‘i, extreme drought conditions have persisted for five seasons, and on Maui for seven.

Table E-2 provides a summary of drought events that have impacted the State of Hawai‘i between 1901 and 2017.





**Table E-2. Drought Events and Impacts, 1901-2017**

Year	Area	Remarks
1901	North Hawai'i	Severe drought, destructive forest fires.
1905	Kona, Hawai'i	Serious drought and forest fires.
1908	Hawai'i and Maui	Serious drought.
1912	Kohala, Hawai'i	Serious drought and severe sugarcane crop damage for two years.
1952	Kaua'i	Long, severe dry spell.
1953	Hawai'i, Kaua'i, Maui and O'ahu	Water rationing on Maui; Water tanks in Kona almost empty; 867 head of cattle died; Pineapple production on Moloka'i reduced by 30 percent; Rainfall in the islands had been 40 percent less than normal.
1962	Hawai'i and Maui	State declared disaster for these islands; Crop damage, cattle deaths, and sever fire hazards; Losses totaled \$200,000.
1965	Hawai'i	State water emergency declared; Losses totaled \$400,000.
1971	Hawai'i and Maui	Irrigation and domestic water users sharply curtailed.
1975	Kaua'i and O'ahu	Worst drought for sugar plantations in 15 years.
1977-1978	Hawai'i and Maui	Declared State disaster for these islands.
1980-81	Hawai'i and Maui	State declared disaster; Heavy agricultural and cattle losses; Damages totaling at least \$1.4 million.
1983-1985	Hawai'i	El Niño effect; State declared disaster; Crop production reduced by 80 percent in Waimea and Kamuela areas; \$96,000 spent for drought relief projects.
1996	Hawai'i, Maui, and Moloka'i	Declared drought emergency; heavy damages to agriculture and cattle industries; Losses totaling at least \$9.4 million.
1998-1999	Hawai'i and Maui	State declared drought emergency for Maui; County declared emergency for Hawai'i due to water shortages; heavy damages to agriculture and cattle industries; Statewide cattle losses alone estimated at \$6.5 million.
2000-2002	Hawai'i, Maui, Moloka'i, O'ahu, Kaua'i	Counties declare drought emergencies; Governor proclaims statewide drought emergency (2000); Secretary of the US Department of Interior designates all Counties as primary disaster areas due to drought (2001); East Maui streams at record low levels; Statewide cattle losses alone projected at \$9 million.
2003-2004	Hawai'i, Maui, Moloka'i, O'ahu, Kaua'i	Governor proclaims statewide drought emergency (2003); County of Hawai'i Mayor issues drought emergency proclamation (2003); Secretary of the U.S. Department of the Interior designates all counties as a primary disaster area due to drought (2004).
2007-2008	Hawai'i, Maui, Moloka'i, O'ahu, Kaua'i	Counties experience drought emergencies and wildfires associated with drought. County of Hawai'i Mayor issues drought emergency proclamation (2007); County of Maui Department of Water Supply places 10% mandatory water conservation on Upcountry customers.
2009	Hawai'i, Maui	Drought lessens in some places, but continues in other areas.
2010	Hawai'i, Maui, Moloka'i, O'ahu, Kaua'i	U.S. Drought Monitor records Hawai'i State as worst drought area in country. <a href="#">USDA Designates Four Counties in Hawai'i as Primary Disaster Areas</a> . All Hawai'i Counties designated due to losses caused by drought that began January 1, 2010, and continues. The USDA Farm Service Agency is making loan and assistance programs available to qualified farmers and ranchers. All counties implement various water conservation measures ( <a href="http://www.hawaiidrought.com">www.hawaiidrought.com</a> ).
2012-2013	Hawai'i, Maui, Moloka'i,	Increased rainfall helped islands in the western half of the state to emerge from drought during the 2012-2013 wet season. According to the National Weather Service, rainfall produced by late-season cold fronts improved vegetation conditions and remedied what had been a drought. Several rain gauges in West O'ahu recorded their highest April rainfall totals in more than 20 years, the weather service reported.





Year	Area	Remarks
2012-2014	Hawai'i, Maui, Moloka'i, O'ahu, Kaua'i	All portions of the state experienced abnormally dry to extreme drought conditions, particularly Hawai'i and Maui Counties. In 2012, the Counties of Maui, Kaua'i, and Hawai'i were declared Primary Natural Disaster Area (USDA) due to drought. Between 2013 and 2014, Maui and Hawai'i Counties were designated Drought Disaster Areas (USDA).
2014- 2015	Hawai'i, Maui, Moloka'i, O'ahu, Kaua'i	All portions of the state experienced abnormally dry to extreme drought conditions, particularly Hawai'i and Maui Counties. In 2015, the County of Hawai'i was in moderate drought. Less than one-fifth the normal average of rainfall fell at Hilo Airport in Hawai'i County.
2015-2017	Hawai'i, Maui, Moloka'i, O'ahu, Kaua'i	All portions of the state experienced abnormally dry to extreme drought conditions, particularly in the Counties of Hawai'i and Maui. In 2016, wildfires developed on Diamond Head on O'ahu (City and County of Honolulu) and voluntary water reductions were encouraged in certain locations in the County of Maui.

## E.5 Earthquake

The following presents earthquake events that occurred in the State of Hawai'i between 1868 and 2017, as presented in the 2013 and 2018 HMPs. The information is reproduced as documented in the 2013 and 2018 plans.

The Island of Hawai'i has experienced 13 damaging earthquakes of magnitude 6 or greater since 1868. The largest of these occurred in 1868 in the Ka'u district on the southeast flank of Mauna Loa with an estimated magnitude of 7.5 to 8.0. Although the 1868 earthquake caused damage island-wide, the devastation was greatest in Ka'u where the earthquake triggered a mudflow killing 31 people and coastal subsidence generated a tsunami that destroyed several villages. Approximately 79 people were killed as a result of the earthquake of 1868 with most of the casualties resulting from the mudslide and the tsunami.

In February 19, 1871, the Lāna'i Earthquake had a magnitude of 7 or greater. Massive rock falls and cliff collapse occurred on Lāna'i as well as damages to homes. A house and several churches were flattened on the islands of Maui and Moloka'i. Two houses were reported to have split open on the island of O'ahu. Also, ground fractures and land slippages were reported in Wai'ānae (island of O'ahu ) and Lahaina (island of Maui).

The 1938 magnitude 6.9 earthquake with epicenter north of the island of Maui has been another of the most significant seismic events to affect the County of Maui. This earthquake was of tectonic nature, resulting from loading and bending of the earth's crust by the immense weight of the islands. The earthquake occurred on January 22 and had submarine hypocenter located about 12 miles northeast of Ke'ānae Point in East Maui. Of all the Hawaiian Islands, the island of Maui suffered the greatest damage. Damage on Moloka'i and Lāna'i was small and resulted from a few ground cracks. The Hawai'i Volcano Observatory describes the damage in the island of Maui as follows:

*“Landslides blocked the roads to Hāna [Pi'ilani Highway] and completely severed communications for several days. Two large oil tanks near Hāna shattered, and 30,000 gallons of oil flowed into the ocean. Ranches in southeastern Maui suffered heavy damage as water tanks and stone walls were razed. Fortunately, no lives were lost, and injuries were few. No tsunami accompanied the shock. Central and west Maui were not spared from damage. Concrete buildings cracked from Kahului to Lahaina. The fire station tower in Kahului shifted half an inch.”*





The O‘ahu Earthquake of 1948 was measured between 4.8 and 5.0 and resulted in broken store windows, plaster cracks, ruptures in building walls, and a broken underground water main.

A large earthquake, unrelated to volcanic activity, was located 25 miles beneath Honomū in the South Hilo district in 1973. This earthquake had a magnitude of 6.2 and caused \$5.6 million worth of damage and injured 11 people.

The largest earthquake on the island during the 20th century occurred on the south flank of Kīlauea in 1975. This earthquake had a magnitude of 7.2 and caused coastal subsidence at Kalapana, generated a tsunami that killed 2 people in the Hawai‘i Volcanoes National Park, destroyed houses in the Ka‘ū district, sank fishing boats in Keauhou Bay within the North Kona district, and damaged boats and piers in Hilo, within the South Hilo district.

The most recent large magnitude earthquakes to affect the Hawaiian Islands were the Kīholo Bay and Māhukona earthquakes of October 2006. Both earthquakes, with epicenters in the Island of Hawai‘i, were felt throughout the state. These two earthquakes, and the damage caused by them, will be discussed in further detail later in this chapter.

Two other moderate magnitude earthquakes have been recorded since the 2006 Kīholo Bay and Māhukona earthquakes, both having epicenter in Island of Hawai‘i. The M5.4 earthquake with the epicenter at 19.346°N, 155.066°W on August 14, 2007 and the M5.2 earthquake with the epicenter at 19.328°N, 155.210°W on April 14, 2009, however, did not cause any damage. Table E-3 presents a list of earthquakes with magnitude 6.0 or greater that have occurred in the Hawaiian Islands since the mid 1800’s.

**Table E-3. History of Earthquakes in Hawai‘i, Magnitude 4.0 and Greater, 1868–June 2018**

Year	Date	Richter Magnitude	Source / Epicenter
1868	28-Mar	6.5 – 7.0	Mauna Loa south flank
1868	2-Apr	7.5 – 8.1	Mauna Loa south flank
1871	19-Feb	7	South of Lāna‘i Island
1908	20-Sep	6.7	Kīlauea South Flank
1918	2-Nov	6.2	Ka‘ōiki, between Mauna Loa & Kīlauea
1919	14-Sep	6.1	District, Mauna Loa south flank
1926	19-Mar	>6.0	NW of Hawai‘i Island
1927	20-Mar	6	NE of Hawai‘i Island
1929	25-Sep	6.1	Hualālai
1938	22-Jan	6.9	North of Maui Island
1940	16-Jun	6	North of Hawai‘i Island
1941	25-Sep	6	Ka‘ōiki
1948	28-Jun	4.6	South of O‘ahu Island
1950	29-May	6.4	Kona
1951	22-Apr	6.3	Lithospheric
1951	21-Aug	6.9	Lithospheric
1952	23-May	6	Kona
1954	30-Mar	6.5	Kīlauea south flank
1955	14-Aug	6	Lithospheric
1962	27-Jun	6.1	Ka‘ōiki
1973	26-Apr	6.3	Lithospheric
1975	29-Nov	7.2	Kīlauea south flank
1983	16-Nov	6.6	Ka‘ōiki
1989	25-Jun	6.1	Kīlauea south flank
2006	15-Oct	6.7	Kīholo Bay, Hawai‘i Island





Year	Date	Richter Magnitude	Source / Epicenter
2006	15-Oct	6	Māhukona, Hawai'i Island
2012	23-Jan	4.8	Hawai'i region, Hawai'i
2012	24-Feb	4.1	Hawai'i region, Hawai'i
2012	24-Feb	4.5	Hawai'i region, Hawai'i
2012	24-Mar	4.6	Hawai'i region, Hawai'i
2012	25-Nov	4.3	Hawai'i region, Hawai'i
2013	05-Jan	4.3	Hawai'i region, Hawai'i
2013	13-Apr	4.3	50 km northeast of Honoka'a, Hawai'i
2013	05-Jun	5.3	54 km southeast of Pāhala, Hawai'i
2013	21-Jun	4.5	48 km north of Kualapu'u, Hawai'i
2013	11-Aug	4.9	10 km south-southwest of Volcano, Hawai'i
2014	07-Jun	4.1	34 km southwest of Kaunakakai, Hawai'i
2014	07-Aug	4.5	14 km west-northwest of Waimea, Hawai'i
2014	12-Aug	4	30 km east-northeast of Honoka'a, Hawai'i
2014	22-Aug	4.2	74 km west-northwest of Lāna'i City, Hawai'i
2014	22-Aug	4.2	61 km south of Waimānalo Beach, Hawai'i
2014	13-Oct	4	13 km west-southwest of Pāhala, Hawai'i
2014	13-Oct	4	13 km west-southwest of Pāhala, Hawai'i
2014	13-Dec	4.2	53 km west-northwest of Kalaoa, Hawai'i
2015	09-Feb	4.25	12 km west-southwest of Volcano, Hawai'i
2015	05-Apr	4.5	12 km west of Kalaoa, Hawai'i
2015	09-May	4.46	13 km west-southwest of Pāhala, Hawai'i
2015	23-Jun	5.2	11 km south-southeast of Volcano, Hawai'i
2016	12-Feb	4.1	18 km south of Fern Acres, Hawai'i
2016	20-Mar	4.59	14 km southeast of Waikoloa, Hawai'i
2016	01-Apr	4.2	72 km north-northeast of Honoka'a, Hawai'i
2016	23-Jul	4.32	3 km west-southwest of Honalo, Hawai'i
2016	06-Sep	4.05	28 km east of Hōnaunau-Nāpo'opo'o, Hawai'i
2016	18-Dec	4.5	77 km south-southeast of Hawaiian Ocean View, Hawai'i
2017	17-Feb	4.66	28 km west-northwest of Waikoloa Village, Hawai'i
2017	09-Mar	4.71	75 km north-northeast of Kualapu'u, Hawai'i
2017	23-Mar	4.49	17 km south-southeast of Volcano, Hawai'i
2017	08-Jun	5.28	16 km southeast of Volcano, Hawai'i
2017	21-Jun	4.51	28 km east-southeast of Hawaiian Ocean View, Hawai'i
2017	30-Jun	4.21	33 km west-northwest of Hawi, Hawai'i
2017	19-Aug	4.1	107 km east-northeast of Hawaiian Beaches, Hawai'i
2018	May-Jun	0.5-6.9	Kilauea Volcanic Eruption and Earthquakes (DR-4366)

### E.5.1 KĪHOLO BAY AND MĀHUKONA EARTHQUAKES

The most recent major earthquakes in the State of Hawai'i were the Magnitude 6.7 Kīholo Bay and Magnitude 6.0 Māhukona earthquakes that occurred on October 15, 2006 at 7:07am and 7:14 am respectively. Within a 48-hour period of these earthquakes, several aftershocks of varying magnitude occurred. Figure E-2 and Figure E-3 depict the location, magnitude, and depth of the two initial earthquakes and their aftershock. As can be seen on the figures, both the Kīholo Bay and Māhukona earthquakes were centered near the Kona coastline of the island of Hawai'i.





Figure E-2 Earthquakes within 48 hours of the Kīholo Bay and Māhukona Earthquakes

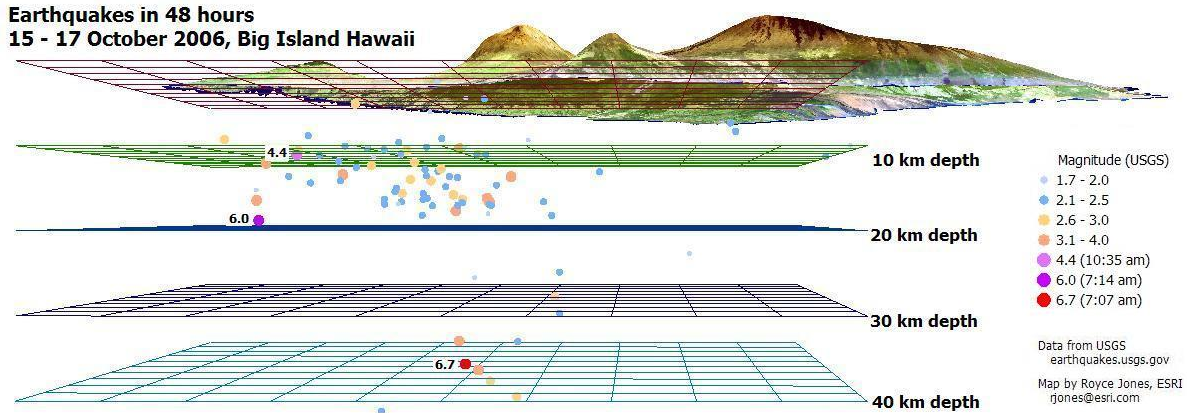
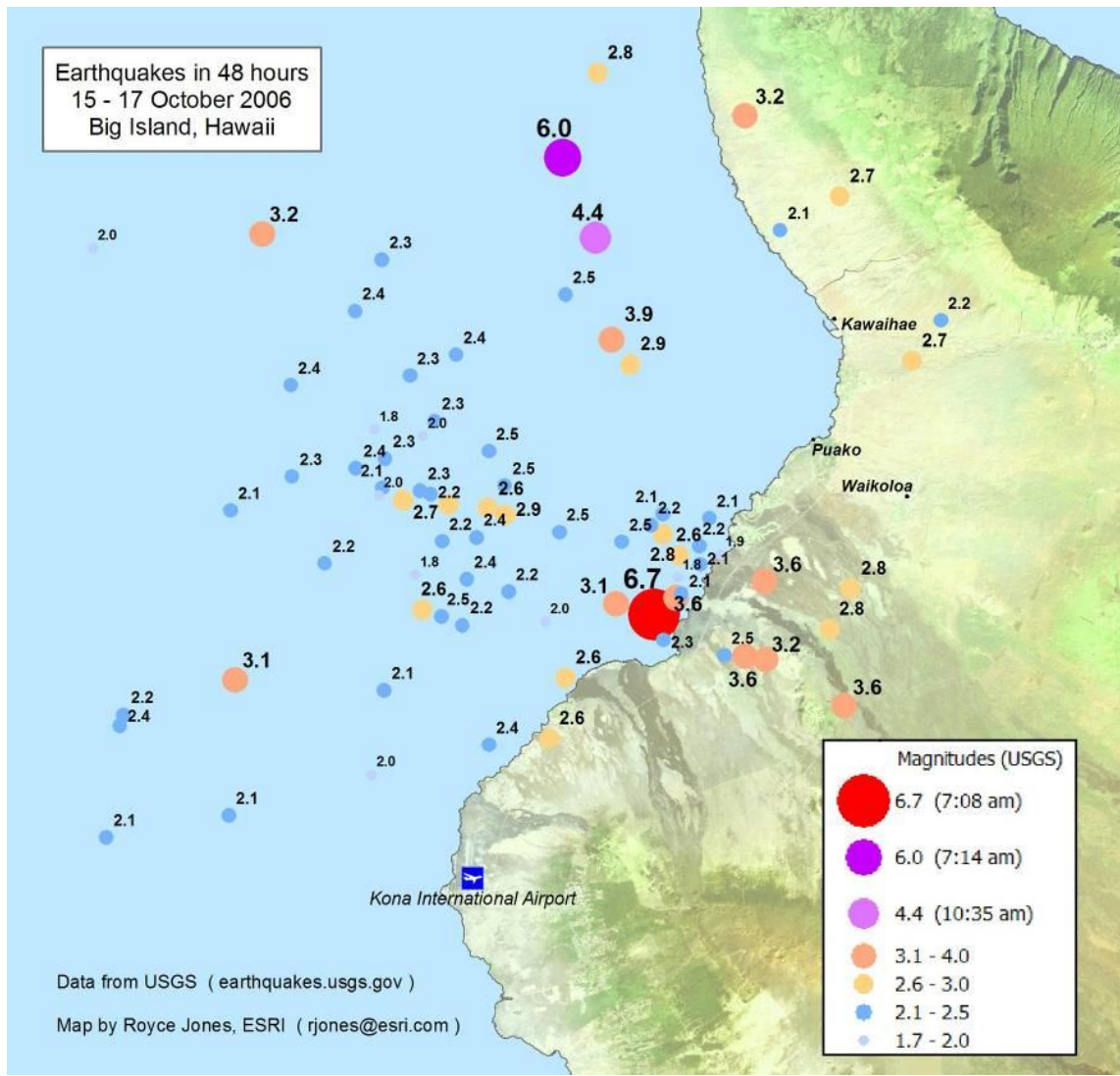


Figure E-3. Earthquakes within 48 hours of the Kīholo Bay and Māhukona Earthquakes





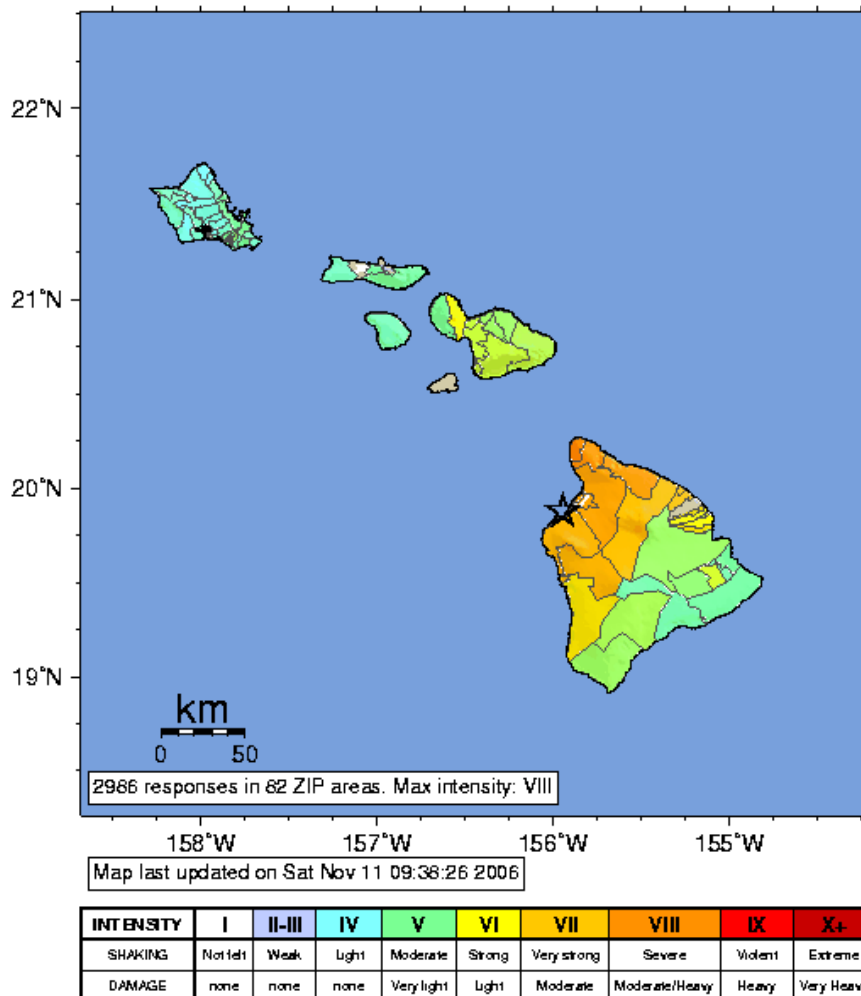


The largest ground shaking for these earthquakes was at the northern end of the island, but did not directly coincide with the epicenters of the earthquakes. The largest ground motions were recorded at the towns of Waimea and Hāwī. These areas had amplified ground motion due to softer soil conditions at these locations. The most heavily damaged buildings were concentrated in the Waimea and Hāwī areas with some damage also in the Honoka'a and Kona areas. There was very little damage at the south end of the island. For reference, an intensity map of the Hawaiian Islands for the Kīholo Bay Earthquake is included in Figure E-4.

**Figure E-4. USGS Community Internet Intensity Map for the Kīholo Bay Earthquake**

USGS Community Internet Intensity Map (10 miles NNW of Kailua Kona, Hawai'i, Hawaii)

ID:twbh\_06 07:07:48 HST OCT 15 2006 Mag=6.7 Latitude=N19.88 Longitude=W155.94



The main October 15 Kīholo Bay earthquake probably reflected the long-term accumulation and release of lithospheric flexural stresses. The long-term stresses consist in part of stresses generated in the crust and mantle by the weight of the volcanic rock that composes the islands. Such deeper mantle earthquakes at approximately 30 to 40 km depth result from flexural fracture of the underlying lithosphere in long-term geologic response to the load of the island mass. This is one of the seismotectonic mechanisms for damaging (but not the largest)





earthquakes in the Hawaiian Islands. Past examples of such “mantle” earthquakes include the 1973 M6.2 Honomū (on the northeast coast of the island of Hawai‘i), the 1938 M7 Maui, and the 1871 M7 Lāna‘i earthquakes.

The Kīholo earthquake was the first earthquake greater than 6.0-magnitude in almost twenty years. It was not actually a single earthquake, and several aftershocks of lower magnitude followed for more than a month after the major tremors on October 15, 2007.

## E.6 Flood

The following presents flood events that occurred in the State of Hawai‘i between 1900 and 2008, as presented in the 2013 and 2018 HMPs. The information is reproduced as documented in the 2013 and 2018 plans.

### E.6.1 COUNTY OF KAUA‘I

Flash floods resulting from a storm on December 14, 1991 that dropped over 20 inches of rain in 12 hours over Anahola, caused five deaths, intense flooding, bank failures, erosion, and slides, totaling more than \$5 million in property damages. During recent recorded history, such events are not uncommon. On January 24-25, 1956, 42 inches of rain fell in 30 hours on the northeast side of Kaua‘i leading to 10 feet of floodwaters in the streams between Kīlauea and Anahola. The Hanalei River, which most directly drains the wettest region of Mt. Wai‘ale‘ale, overflows its banks at the coast nearly every year.

On March 14, 2006, unprecedented thunderstorms and heavy rains resulted in the failure of the Ka Loko Dam on Kaua‘i, which killed seven people.

In September of 1996 for instance, 9 inches of rain were recorded in 12 hours along the coast, and an uncertain amount fell in the uplands. This event led to flooding of Hanalei town and temporary closure of the Hanalei Bridge, the residents’ sole access to the rest of the island. In the western portion of Kaua‘i, the flooding hazard is primarily due to overland flows, especially after storms. The Waimea River, for example, has a long record of flooding dating back to 1916 and includes numerous occasions where its channels overflowed after storm-fed precipitation in Waimea Canyon above.

Heavy rainfall in October 31 to November 2, 2006 across much of Hawai‘i during the period was the result of two systems. The first being left over moisture from an old front that pooled along the windward sides of the islands. The light easterly wind flow helped push the moisture over windward sections of the islands, resulting in some showers on October 30. By October 31, the destabilized further as an upper level trough of low pressure moved toward Hawai‘i. The more unstable conditions resulted in locally heavy rainfall that persisted into the afternoon hours of November 1. Rainfall amounts during the period were quite large, especially along windward sections of Kaua‘i and O‘ahu, with some locations receiving well over 15 inches of rainfall. Some locations received over 3 inches in just a matter of 1 or 2 hours. The excessive rains produced flooding over portions of windward Kaua‘i. Earlier in the year, during the unprecedented extended wet period across Hawai‘i (Feb 19 to April 2), several locations in Kaua‘i experienced flashflood and overflow of streams. Two subsequent High Winds and Flooding Rains weather events occurred on December 4-11, 2007 and December 10-14, 2008 causing widespread flooding in the county.





**Table E-4. County of Kaua’i Stream Flooding from Atlas of Natural Hazards in the Hawaiian Coastal Zone (updated with Events from the National Weather Service)**

Date	Details
<b>Island wide stream flood because of heavy rains</b>	
1963 Apr 15	
1968 Nov 28	24” in 24 hours
1972 Apr 15	
1974 Apr 19	10” rain
1975 Jan 30-31	
1978 Oct 30-31	8.5” in 4 hours
1980 June 16	
1981 Aug 3-4	5-10” rain
1981 Dec 25-26	Up to 12” in 24 hours
1982 Feb 11	
1982 Oct 26-30	15-20” in 5 days
1982 Dec 23-25	3-5” rain
1986 Nov 10-11	Flash flooding
1987 Oct 15	Flash flooding
1987 Nov 4	Flash flooding
1988 Jan 28-29	10” rain
1988 Aug 2-11	
1989 Jan 10-12	Flash flooding
1989 Apr 24	
1990 Nov 20	
1992 Feb 13-14	
1993 July 21-23	Flooding Hurricane Dora
2003 Nov 29 - Dec 8	Up to 27.10” rain
2004 Aug 3-4	Up to 8.02” rain due to remnants of Darby
2005 Sept 14	Flash floods; more than 10” rain, Hanalei bridge closed
2005 Oct 1	Flash floods, Hanalei bridge closed
2006 Feb 19 - Apr 2	Unprecedented extended wet period; up to 138.79” rain; flash flooding; Kuhio Hwy closed; Hanalei River overflowed; Ka Loko Reservoir breached
2006 Aug 7	Flash flooding; Hanalei bridge closed; Kuhio Hwy closed; Omao Road closed
2006 Oct 31- Nov 2	Up to 10.9” rain
2007 Feb 23	Flash flooding; Hanalei River overflowed; Hanalei bridge closed; Kuhio Hwy closed
2007 Nov 28	Flash flooding; Hanalei River rises about 12” on Nāwiliwili Road
2007 Dec 4-11	High winds (60-70 mph gusts) and widespread rains
2008 Feb 3-4	Flash flooding; Hanalei bridge closed; Wainiha bridge closed; Kuhio Hwy and many roadways closed
2008 Oct 28	Flash flooding; Kawaihau, Kahuna, and Kamalu Roads closed
2008 Dec 10-14	Several rounds of heavy rainfall
2008 Dec 31	Flash flooding; Kuhio Hwy closed
2009 Mar 9	Flash flooding; Kuhio Hwy closed; Hanalei River overflowed
<b>Western Watershed Flooding primarily due to overland flow</b>	
1963 Apr 15	2-3 feet
1969 Jan 5	
1975 Dec 1	Kekaha





Date	Details
<b>Wainiha/Lumaha'i - Since 1956, 6 damaging floods of 2-3 feet</b>	
1956 Feb	40,00cfs, 20' in 24 hours
1968 Nov/Dec	15" in 24 hours
1971 Apr 6-7	
1974 Apr 19	10" rain at Wainiha
1975 Jan 30-31	Wainiha
1978 June 7	16.2" in 2 days at Hanakapai Stream
1981 Oct 27-28	Wainiha River
1986 Nov 10-11	Lumaha'i River
1989 July 22-23	Wainiha
<b>Hanalei/Waioli, Waipā Streams</b>	
1868, 1877, 1885, 1905, 1921, 1948, 1952, 1963	serious floods
1893 Feb 14	Flash flood, Kilauea Stream
1946-1963	5 damaging floods
1955 Nov 11-12	26.1" rain, 8 ft. flooding
1956 Jan 24-25	7 ft. 44,900 cfs
1967 Dec 9	Hanalei River
1971 Apr 6-7	5 ft. at Hanalei River
1975 Jan 30-31	Hanalei
1981 Oct 27-28	Hanalei River
1982 Dec 6-7	
1986 Aug 11	Hanalei River
1988 Aug 4-11	
1989 July 22-23	
1990 Nov 16-17	
1994 Apr 12-13	10" Flash flood, mudslide
1996 Sep 7	9" in 12 hrs., Hanalei bridge closed
<b>Kahiliwai/ Anahola</b>	
1914 Sept	2 ft. at Anahola Stream
1932 Feb	Anahola Stream
1948 Apr 1	Anahola Stream
1956 Jan 24-25	42" in 30 hrs., 10 flooding at Kahiliwai, Aiani, Kilauea
1964 Dec	Anahola Stream
1965 May	Anahola Stream, 6 ft overland flows
1968 Nov 28	24" in 24 hours at Anahola Stream
1990 Nov 16-17	15" rain
1991 Dec 14	20" in 12 hrs at Anahola Stream
1992 Feb 13-14	Anahola Stream
1993 Oct 2	3-6" rain flash flood
1994 Apr 13	heavy rain, flash flood
<b>Kapa'a Stream, Wailua River</b>	
1916 Jan 7	Flash flood
1920 Jan	Wailua River
1940 May 13-14	Wailua River
1955 Nov 11-12	Kapa'a Stream, Wailua River 85,000 cfs





Date	Details
1956 Jan 24-25	Kapa'a Stream, Wailua River
1963 Apr 15	Wailua River
1965 Apr	Kapa'a Stream
1967 May	Kapa'a Stream, 5 ft
1967 Nov 24-27	Wailua River
1968 Dec 29-31	Kapa'a Stream, 12,800 cfs, 7 ft, 15-20" in 24 hours
1975 Jan 30-31	Wailua River
1981 Oct 27-28	Wailua River
1991 Dec 14	Kapa'a, flash flood
<b>Hanamā'ulu, Nāwiliwili, Hulē'ia Streams - Flooding is primarily due to runoff/overland flows</b>	
1965 Aug 2	4.5" in 1 hour at Hanamā'ulu Stream
1968 Dec 5	10 ft at Hanamā'ulu, Nāwiliwili, Hulē'ia Streams
1975 Jan 30-31	Nāwiliwili Stream
1978 Oct 30-31	8.5" in 24 hours at Nāwiliwili Stream
<b>Kōloa / Po'ipū - Flooding is due to overland flow</b>	
1954, 1955, 1957, 1963, thrice 1965, 1968	major floods
1965 Aug 13	Po'ipū
1972 Apr 15	Po'ipū
1989 Aug 20-21	Flash flood, Po'ipū
<b>Hanapēpē River, Wahiawa Stream, Kalāheo Gulch</b>	
1879 Jan	Hanapēpē
1924-1959	11 damaging floods at Hanapēpē River
1949 Dec 17	Flash flood, 4-5 ft. at Hanapēpē
1963 Apr 15	5-6 ft. at Hanapēpē River
1967 Nov 24-27	Hanapēpē River
1968 Dec 29-31	3-4 ft. at Hanapēpē
1975 Jan 30-31	
<b>Makaweli, Waimea - Flooding is due to overland flows after storms</b>	
1916, 1921, 1927, 1942	Major floods
1949 Feb 7	3-8 ft., 48,000 cf at Waimea River
1973 Dec 1	
1993 Oct 2	3-6 in, flash flood
2008 Dec 10-14	Flooding in Waimea town, and closing the highway to Hanalei.

### E.6.2 CITY AND COUNTY OF HONOLULU

The most frequent and severe flooding occurs where steep sloping hillsides abruptly meet flat or low-lying coastal plains, such as those found in Wāimanalo, Kailua, Kane'ohē (November 1992), and Lāi'e (April 1994). The heaviest rainfall during the last decade in Kane'ohē occurred in October 1991, when 15 inches fell in 48 hours leading to intense flash flooding.

During the first 15 days of November 1996, record-breaking rainfall occurred along the Wai'anae Coast, where 21 inches fell in an area where the average annual rainfall is 2 inches. In 'Ewa, 12.5 inches of rain fell in 7 hours on the 5th day of that month, inducing flooding of the low coastal plain. A series of slow moving storms with prolonged rains that saturated the soils of south-central O'ahu culminated on New Year's Day of 1988 in severe





runoff and hillside erosion, resulting in catastrophic damage to stream flood mitigation channels, homes, and roads in 'Āina Haina and Niu Valleys. Other recent severe events on O'ahu include October 1981 flooding of Wahiwā Stream after heavy rains that lead to \$786,000 damage and January 1968 flooding in Pearl City, which caused \$1.2 million damage.

During the last few days of November and the first week of December of 2003, several weather systems combined to bring several rounds of heavy rainfall to many parts of the state. A few locations in the Ko'olau Mountains of O'ahu likely received over 3 feet of rain in just a 10-day period causing flash flooding and stream overruns.

During August 2-4, 2004 the remnant swirl of Darby caused excessive rainfall in all Hawaiian Islands. On August 3, the remnants moved approached O'ahu, affecting the entire island of O'ahu and dumping several inches of rain in a few hours. A few streams overflowed their banks and minor landslides occurred, both resulting in some road closures. The main effect was significant ponding of water on the roads, which impacted the morning rush hour.

During the late afternoon on October 30, 2004 an area of showers being pushed west by the low level tradewind flow interacted with the Ko'olau Mountains on the windward (east) side of the island of O'ahu. As the air was pushed up over the mountains, the unstable environment allowed those showers to rapidly develop into a thunderstorm and remain focused over a small area of southeast O'ahu. This thunderstorm, locked into place due to the terrain, produced very heavy rainfall totals in just a few hours. The focus of the heaviest rain occurred over the southern portion of the Ko'olau Mountains on the island of O'ahu, resulting in Mānoa Stream overflowing its banks and causing significant flooding in Mānoa Valley, including the University of Hawai'i campus. At the height of the heavy rainfall around 7 pm, rainfall rates recorded at the gauge at the Mānoa Lyon Arboretum, in the upper portion of Mānoa Valley, were over 5 inches per hour. These large rainfall rates are estimated to occur with a return rate of almost 50 years. In other words, in any given year, there is only a 2% probability of such a heavy rainfall event like this occurring in upper Mānoa Valley.

In March 2006, O'ahu suffered heavy rains, flooding, and severe weather for a period that lasted approximately 40 days. A series of storms around the Hawaiian Islands drew war moist air from the tropics, resulting in continuous torrential rain falling on throughout all regions of the island of O'ahu. The intense rains resulted in the rupture of a 42-inch diameter sewer line in the tourist district of Waikīkī. As a result of the damaged sewer main, 48 million gallons of raw sewage were spilled into the Ala Wai canal, a canal that forms the northern and western boundary of the district. To repair the damage and to prevent more sewage from spilling over into the canal, an exposed new 48-inch diameter sewer line was installed in the middle and alongside the canal to serve as a temporary bypass line. Seven years later, installation of a secondary 72-inch diameter underground pipe has been completed. The new secondary pipe runs parallel to the temporary exposed bypass line. At a cost of \$90 million in 2013, this new secondary line can be used to divert the sewage in case the original main ruptures again. The temporary exposed bypass line is now scheduled to be removed.

Heavy rainfall in October 31 to November 2, 2006 produced flooding over portions of windward O'ahu and triggered a significant landslide that closed O'ahu's Pali Highway. Two subsequent High Winds and Flooding Rains weather events occurred on December 4-11, 2007 and December 10-14, 2008 causing widespread flooding throughout O'ahu. The December 2008 events caused severe damage in the north, west, and central sections of the island.





In January 12-13, 2011 an 11-inch rainfall caused a reservoir to overflow into O’ahu’s municipal landfill, sending medical waste (including syringes and vials) and debris into the ocean north of the Ko Olina Resort, and causing closure of their beaches. The landfill was weeks away from completing a bypass route that would have diverted the storm water from the upper reservoir straight into the drainage way, avoiding the landfill cells. Had the improvements been completed, water still would have ended up in the filtration basin at the base of the landfill, but it would not have gone through the landfill cells. Additional measures were required under the latest permit allowed by the State Land Use Commission. Granted in September 2009 after much debate and controversy, the permit allowed the landfill to expand and continue operating.

*Table E-5. City and County of Honolulu Stream Flooding from Atlas of Natural Hazards in the Hawaiian Coastal Zone (Updated)*

Date	Details
1900 Nov 14	
1921 Jan 16	
1935 Feb 27	
1947 Feb 7	
1948 Jan 23 – 26	
1949 Jan 15 – 17	
1951 Mar 26 – 27	
1954 Jan 21	
1954 Nov 27 – 28	
1956 Jan 24 – 25	
1957 Dec 1	
1958 Mar 5	
1958 Aug 6 – 7	
1959 Jan 17 – 18	
1959 Aug 4 – 7	
1960 May 12 – 13	
1961 Oct 27	
1962 Jan 7	
1963 Jan 15 – 17	
1964 Dec 19 – 23	
1965 Feb 4	
1965 Nov 10 – 15	
1966 Sept 10 – 12	
1966 Oct 10	
1967 July 4 – 8	2 to 3 Inches
1967 July. 5 – 18	
1967 July 11 – 21	
1967 Aug 10 – 14	
1967 Dec 9	
1967 Dec 17 – 18	
1969 Dec 27 – 28	
1972 Aug 8 – 20	
1974 Apr 19	





Date	Details
1975 Jan 30 – Feb. 1	
1975 Nov 23 – 27	
1976 Feb 5 – 7	
1976 Nov 6 – 7	
1978 June 26 – July 3	
1978 Oct 30 – 31	
1980 Mar 18 – 19	
1981 Aug 3 – 4	
1981 Dec 25 – 26	
1982 Sept 1	
1982 Oct 26 – 30	
1982 Dec 23 – 24	
1984 Dec 24 – 25	
1985 Jan 29 – 30	
1986 Nov 10 – 11	
1987 July 21 – 23	
1987 Sept 2	
1987 Dec 11 – 19	
1988 Jan 28 – 29	
1988 Aug 2 – 3	
1988 Sept 26 – 27	
1988 Dec 5 – 6	
1989 Mar 1 - 4	
1989 Apr 24	
1989 July 18 – 20	
1990 Jan 14 – 22	
1991 Oct 10 – 15	
1993 July 21 – 23	
1993 Oct 10	
1994 Apr 13 – 14	
1996 Nov 5	
1996 Nov 15	
2003 Nov 29 - Dec 8	Up to 32.98" rain
2004 Aug 3-4	Up to 9.04" rain due to remnants of Darby
2004 Oct 30 - 31	Up to 10.07" rain in 12 hours, Mānoa Stream overflowing its bank causing significant damage to UH Mānoa
2006 Feb 19 - Apr 2	Up to 87.18" rain
2006 Oct 31- Nov 2	Up to 22.39" rain
2007 Dec 4-11	High winds (60-70 mph gusts) and widespread rains
2008 Dec 10-14	Several O’ahu rain gauges recorded 10 to 13 inches in a 12-hour period.
<b>Hale’iwa: Since 1874 – 19 Floods</b>	
1932 Feb 28	Wailua Stream, Flash Flood 26 – 30" in 24 Hrs. at Poamoho, Kikii, Paukauila Stream
1935 Feb 27	20" in 24 Hrs.
1939 Mar 1 – 2	Lowland Flooding
1939 Oct 22 – 23	10 – 12" in 24 Hrs.
1956 Feb 25	Flash Flood, 14" at Wailua







Date	Details
1962 Mar 13 – 15	Flash Flood
1968 Mar 13 – 18	12” in 24 Hrs.
1969 Feb 28	21” in 24 Hrs. at Anahulu, Kaukonahua, Poamoho, Opaepala, Helemano Str.
1974 Apr 19	Opaepala, Helemano, Poamoho, Kaukonahua River
1976 Feb 5 - 7	
1976 Nov 6 – 7	
1982 Jan 6	Waialua
1987 Oct 11	
<b>Sunset Beach</b>	
1935 Feb 27	10.24” in 24 Hrs. at Waimea River
1956 Feb 25	Flash Flood
1962 Mar 13 – 15	Flash Flood
1968 Mar 13 – 15	Waimea River; 5,270 cfs
1969 Feb 1	Waimea River; 3,860 cfs
1996 Nov 14	Widespread Flooding
1975 Jan 30 – 31	Flooding
1987 Oct 11	
1989 July 18 – 20	Waimea River, Sunset Beach
1990 Nov 20	Waimea River
<b>Kahuku: 7 Major Floods</b>	
1962 Mar 13 – 15	
1963 Apr 15	
1982 Feb 21	Kahawainui
1985 Feb 14	5 – 10”
<b>Windward Coast</b>	
1918 Apr 11	Flash Flood, Windward Coast
1924 Oct 11	Flooding of Lowlands, 11” in 11 Hrs.
1927 Mar 5 – 6	Flash Flood, Windward Coast
1932 Feb 13	Flash Flood at Punalu’u
1956 Jan 26	Streams Overflowed
1959 Jan 17 – 18	Windward Side
1963 Apr 15	19” in 24 Hrs. at Makaua, Ka’a’awa, Waiahole Streams
1965 Feb 3 – 4	Flooding in Lowlands, 18” at Waiahole and Ka’a’awa Streams
1965 Mar 31	Flash Flood, 4.5” in 1.5 Hrs. at Punalu’u
1965 May 2-3	Flash Flooding, 8.75” in 3 Hrs. at Ka’a’awa
1971 Dec 31	Kaluanui Stream, Sacred Falls, Waiahole
1982 Jan 6	Flash Floods
1982 Sept 1	Flash Floods
1984 Mar 26 – 28	6 – 15”
1985 Feb 14	5 – 10”
1985 May 6	8 – 10”
1985 Nov 18	
1986 May 10	
1986 Sept 28	
1987 Mar 24	Flash Flood at Sacred Falls





Date	Details
1987 May 5	
1987 July 21 – 23	
1992 Oct 11	Windward O’ahu, Minor Flash Flooding
1994 Apr 12	6” in Kahuku, Flash Flooding
<b>Kahalu’u: Since 1936 – 20 Floods</b>	
1965 Feb 4	3 Ft.
1965 May 2 – 3	3 – 4 Ft.
1970 Nov 24 – 26	11.5” in 4 Hrs. from Kahalu’u to Wāimanalo
1976 Feb 5 - 7	
1994 Apr 13	HAU’ULA to Kahalu’u, Flash Floods, Heavy Rains, Road Closures
<b>Kāne’ohe: Since 1872 – 9 Major Floods</b>	
1963 Apr 15	Kāne’ohe
1965 Feb 4	Kamooalii Stream
1965 May 2 – 3	5,920 cfs at Ha’ikū, Lolekaa
1969 Feb 1	4 – 6 Ft.
1970 Nov 24 – 26	
1991 Oct 15 – 16	Kāne’ohe, 15” in 48 hrs., Flash Flooding
1992 Nov 26	Kāne’ohe, Heavy Rainfall, Flooding
<b>Kailua</b>	
1951 Mar 26 – 27	
1963 Mar 6	
1982 July 23	Flash Flooding
1987 Dec 31 – Jan 1	Slow Flood, 2 – 5 ft. at Kawainui Marsh
<b>Wāimanalo</b>	
1957 Feb 7	
1958 Mar 5	13.8” in 24 hrs., 3 Ft.
1963 Mar 6	
1967 Dec 9	
1967 Dec 17 - 18	
1970 Nov 24 – 26	11.5” in 4 Hrs.
1976 Feb 5 – 7	
1982 Jan 6	
<b>East O’ahu: 9 Major Floods</b>	
1957 Jan	Wai’alae, Niu Valley
1957 Feb 7	’Āina Haina
1958 Mar 5	2170 cfs at Wai’alae Iki Str., Wailupe Str.
1967 Aug 9	Wailupe
1967 Dec 17 – 18	3600 cfs at Wai’alae Iki Str., 11” in 8 hrs. at Niu Valley, ’Āina Haina, Kuliouou
1987 Dec31 – Jan. 1	Flash Flooding at Wai’alae Iki Str.
1990 Feb 28 – Mar 1	Niu Valley
<b>Mānoa and Pālolo: 12 major Floods</b>	
1904 Feb 10	Mānoa
1918 Dec 3 – 4	Mānoa
1927 May 16	Mānoa
1930 Apr 11	Pālolo





Date	Details
1948 Nov 17	Mānoa , Pālolo
1950 Dec 3	Mānoa
1977 Apr 19	Mānoa , Pālolo
<b>Honolulu</b>	
1898	Flash Flood at Honolulu
1911 Feb 4 – 5	Flash Flood at Waikīkī, Moiliili
1917 Mar 19	Flash Flood at Honolulu
1921 Jan 16	
1927 Dec 27	Flash Flood
1932 Feb 13	Pu‘unui
1943 Jan 4 – 5	Kaimukī, Kāhala, Diamond Head, Waikīkī
1957 Feb 7	
1965 May 2	
1968 Jan 27	
1968 Oct 19	
1971 Feb 1	
1974 July 17	Nu‘uanu, Pu‘unui Str.
1975 Nov 23 – 25	11” in 4 Days
1976 Feb 5 – 7	
1982 Dec 23 – 24	
1983 Feb 23	Nu‘uanu
1985 July 17	
1991 Sept 21	Kalihi to Hawai‘i Kai, Street Flooding
1992 Oct 21	Honolulu to Kaimukī, Localized Minor Flash Flooding
1993 Oct 25	Honolulu, 2 – 4” of Rain, Thunderstorms, Flash Flooding, Street Flooding
1996 Nov 14	Honolulu, Widespread Flooding
2004 Oct 30	Mānoa , Widespread Flooding - Up to 10.07” rain in 12 hours, Mānoa Stream overflowing its bank causing significant damage to UH Mānoa
<b>Pearl City and Barbers Point</b>	
1879	Waikele, Honouliuli, Kipapa Str.
1904 Feb 10	Pearl City, ‘Ewa
1921	Waikele, Kipapa, Honouliuli Str.
1935 Feb 27	Waikele, Kipapa Str.
1949 Dec 19	‘Ewa
1954 Nov 28	Waiawa Str, 13600 cfs, Waikele
1956 Feb 25	Waiawa Str.
1958 Mar 5	Pearl Harbor
1960 May 14	3710 cfs at Hālawa Str.
1963 May 14	1 Ft. at Pearl City
1967 May 30	Hālawa Str.
1967 Aug 2 – 11	Kipapa, Waiawa Str.
1967 Dec 9	Pearl City
1968 Jan 5	6 Ft. at Waiawa, Honouliuli
1972	Honouliuli Str.
1981 Oct 27 – 28	Waiawa Str.





Date	Details
1985 Oct 23	
1987 Sept 2	Pearl City, Waipāhu
1996 Nov 5	'Ewa, 12.5" in 7 Hrs.
<b>Wai'anae</b>	
1927 Dec 27	Flash Flood at Wai'anae, Wailuku
1954 Nov 24	Mākaha Str.
1962 Mar 13	Mākaha Str.
1964 Dec 12, 23	Mākaha Str.
1965 Nov 13	Mākaha Str.
1976 Feb 5 – 7	Wai'anae
1985 Jan 29 – 30	Nānākuli, Wai'anae
1991 Sept 8	Mā'ili Area, Minor Damage
1991 Oct 15 – 16	Nānākuli, 15" in 48 Hours, Flash Flooding
1996 Nov 5	Record Breaking 21" Rain for Nov. 1 – 5 (Average in 2")
1996 Nov 14	Flash Flood, Mudslide
<b>Wahiawā</b>	
1994 Jul 18	4.5" in 6 hrs.
1989 Feb 10 – 11	
1990 Mar 6	Heavy Rain
1992 Oct 14	Wahiawā to Wailua, Funnel Clouds and Flash Floods
1994 Apr 12	6" in Wahiawā and on the North Shore, Flash Flooding

### E.6.3 COUNTY OF MAUI

Two of the largest wave events occurred February 1993 and January 1998, when waves reached heights of 30 and 40 feet, respectively.

Of particular significance is the flash flood that occurred on April 2003 on Haleakalā National Park (Kīpahulu area) on the island of Maui. The flash flood, which occurred at the bottom of the 184-foot Makahiku Falls, resulted in the death a 39-year old man and an 8-year old girl as they were swept away by a 6-foot wall of water while crossing the stream at the bottom of the waterfall. The deaths led to a federal lawsuit by the family of the victims – ultimately the United States government agreed to pay the \$5 million in 2009. According to Haleakalā National Park officials, there have been nine deaths at the falls since 1983.

Several storm events in recent years have caused flash flooding in the island of Maui. During November 29 - December 8, 2003 several weather systems combined to bring several rounds of heavy rainfall to many parts of the state. In December 1, 2003, some locally heavy rains around Olowalu with radar estimating near 10 inches caused roads flooding in the area. Heavy rainfall in October 31 to November 2, 2006 produced flooding over portions of windward O'ahu. Along with O'ahu, the thunderstorms brought one last round of flooding to portions of and then to Moloka'i and Maui. Two subsequent High Winds and Flooding Rains weather events occurred on December 4-11, 2007 and December 10-14, 2008. While the December 2011 event caused widespread flooding, the December 2008 rainfall on those islands brought much needed drought relief.





**Table E-6. County of Maui Stream Flooding from Atlas of Natural Hazards in the Hawaiian Coastal Zone (Updated)**

Date	Details
<b>Moloka'i and Lāna'i - Island wide stream flood because of heavy rains</b>	
1971 Jan 27-28	Storm, flooding
1980 Jan 6-14	Flooding
1981 Oct 27-28	Flash floods
1981 Aug 3-4	Flooding
1981 Dec 25-26	Flooding
1982 Mar 17	Flooding
1982 Mar 30-31	Flooding
1982 Aug 14-16	H Kristy, flash floods
1983 Dec 24-25	Flash floods
1984 Dec 24-25	Flash floods
1985 Feb 14	Flooding
1985 Oct 17-18	Flash flooding
1986 Nov 10-11	Flash floods
1987 Apr 21-22	Flash floods
1987 May 5-6	Flooding
1988 Sep 26-27	Flooding
1988 Nov 4-5	Flooding, up to 10" rain
1988 Dec 5-6	Flooding, over 10" rain
1989 Feb 10-11	Flooding
1993 July 21-23	Flooding, remnants of H Dora
2003 Nov 29 - Dec 8	Up to 6.46" rain
2004 Aug 3-4	Up to 1.39" rain due to remnants of Darby
2006 Feb 19 - Apr 2	Up to 14.93" rain
2006 Oct 31- Nov 2	Up to 6.51" rain
<b>Kaunakakai, Moloka'i</b>	
1950 Nov 30	Flash flooding at Kaunakakai
1961 Oct 31-Nov 3	Storm, flash flooding
1997 Jan 19-20	Street flooding
<b>Kamalō, Moloka'i</b>	
1961 Oct 31-Nov 3	Flash flooding at Kamalō
1965 Apr 13	Flash flooding along SE Moloka'i
<b>Hālawā, Moloka'i</b>	
1961 Jan 1	Flooding, 10,900 cfs at Hālawā Stream
1961 Oct 31-Nov 3	Flooding at Kawela Gulch
<b>Kualapu'u Gulch, Moloka'i</b>	
1916 Jan 1	Flash floods at Kualapu'u Gulch
<b>Halepalaoa Landing, Lāna'i</b>	
1985 Oct 17-18	Flash flooding on Lāna'i
<b>Maui - Island wide stream flood because of heavy rains</b>	
1900 Nov 14	Flash flood
1906 Dec 23	Flash flood





Date	Details
1916 Jan 14	Flash flood
1918 Apr 18	Flash flooding
1930 Nov 18	Flash flooding
1946 Jan 2	Flood
1946 Dec 20	Flash flooding
1948 Apr 2	Flash flood
1950 Nov 30	Flash flood
1951 Feb 22	Flash flood
1960 May 12-13	Flooding
1961 Oct 24	Flash flooding
1963 Mar 13	Flooding
1965 Jan 23	Flash flood
1968 Mar 13-16	Flooding
1968 Nov 28	Minor Flooding
1971 Jan 28	Flooding
1974 Apr 19	Flash flooding
1980 Jan 6-14	Flooding
1981 Aug 3-4	Flooding
1981 Oct 27-28	Flooding
1982 Mar 30-31	Flooding
1982 Apr 1-3	Flooding
1982 July 16-17	Flooding
1982 Dec 23-24	3-5"rain
1984 May 23	Minor flash floods
1984 Dec 24-25	Flash flooding
1985 Oct 17-18	Flash floods
1985 Nov 18	Minor flash floods
1986 Feb 15	Flash floods
1986 Nov 10-11	Minor flash flooding
1987 Apr 21-22	Minor flash flooding
1987 Apr 26	Flash flooding
1987 May 5-6	10" rain, flash flooding
1988 Jan 28-29	Flash floods
1988 Nov 4-5	Extensive flooding
1988 Dec 5-6	Flash flooding
1989 Feb 10-11	Minor flash flooding
1989 Mar 1-4	Minor flash floods
1990 Jan 14-22	Up to 20" rain, flooding
1991 Jan 27	Flooding
1991 Mar 19-21	Flooding
1993 July 21-23	Flooding, remnants of H Dora
2003 Nov 29 - Dec 8	Up to 22.74" rain
2004 Aug 3-4	Up to 5.05" rain due to remnants of Darby
2006 Feb 19 - April 2	Up to 41.93" rain
2006 Oct 31- Nov 2	Up to 14.06" rain





Date	Details
2007 Dec 4-11	High winds (70-80 mph gusts) and rains, Widespread flooding across portions of central and upcountry Maui
<b>West Maui - Honokōwai and Lahaina are frequently flooded. Since 1879, 19 damaging floods occurred in the Lahaina area.</b>	
1916 Jan 26	Lahaina and Olowalu flooded
1950 Nov 30	Flash flooding at Lahaina
1960 May 13	Kahoma Stream
1961 Oct 31-Nov 3	West Maui, Kahoma Stream
1967 Mar 17-18	7" in 5.5 hours at West Maui
1971 Jan	Lahaina, Kaua'ula Stream (Hale, Cannery, Kelawe Camp)
1972 Feb 24	5-8" in 5 hours at West Maui, Lahaina
1974 Nov 21	Kā'anapali, Honokōwai
1987 May 5-6	Flash flooding at Lahaina
1988 Dec 5-6	Over 10" of rain
1997 Jan 19-20	Flooding Lahaina
<b>Southwest Maui - Frequent flooding of Kulanihakoī, Waipuilani, Keokia, and Waiakoa streams</b>	
1916 Jan 26	Kīhei
1930 Jan 29	Flash flooding at Kulat, Kīhei
1951 Feb 22	Kīhei
1955 Dec 21	Kīhei
1967 Mar 24	6" in 6 hours at Kīhei
1968 Jan 28	Kīhei
1971 Jan 27-28	6 ft. at Kīhei
1988 Dec 5-6	Over 10" rain at Kīhei
<b>South Slope Haleakalā - Historical flooding of streams between Kīpahulu and Nu'u</b>	
1968 Apr 15-16	
1986 Nov 10-11	
<b>Windward Haleakalā - Makawao, Kaupakulua, Wailua and Hāna frequently flooded by sheetflows</b>	
1965 Apr 25-28	Flash flood at Hāna
1968 Apr 15-16	East Maui esp. Honomaele Stream
1981 Oct. 27-28	Road to Hāna
1982 Mar 30-31	Road to Hāna
1982 July 21-22	Flash flooding
1982 Aug 1	Flash flooding esp. Kā'anapali
1984 May 23	Minor flash flooding, road to Hāna
1987 Feb 15	8-10" at Hāna area
1987 May 5-6	10"
1988 Mar 24	Road to Hāna
1991 Mar 19-21	Road to Hāna
1992 Nov 26-27	Severe flooding
1993 Oct 23	Flash flood, mudslide
1994 Apr 12-13	Flash flood, mudslide
<b>North Central Maui - Wailuku and Ūao Stream are frequently flooded. Kahului frequently inundated by sheetflow.</b>	
1900 Nov 14	Kahului
1903 Feb 13	Flash flood at Wailuku
1916 Jan 14	17000 cfs at Ūao Valley





Date	Details
1920 Dec 24	Storm, flooding at Wailuku
1930 Nov 18	ʻĪao Stream
1948 Jan ?	ʻĪao Stream
1950 Nov 30	Flash flooding at ʻĪao Valley, Wailuku
1950 Dec 3	7550 cfs, 5" rain in 2 hours at ʻĪao Stream
1961 Nov 2	5700 cfs at ʻĪao Stream
1965 Feb 4	Sheetflow
1971 Jan 27-28	5820 cfs at ʻĪao Stream, 2 ft. at Paia
1972 Feb 8	3.5" in 1 hr at Wailuku
1978 Nov 12	Flash flooding at ʻĪao Valley, Kahului
1982 Mar 30-31	ʻĪao Valley
1987 Mar 5-6	Over 10" rain, flash flooding at Wailuku, Kahului
1989 Feb 3-5	Flash flooding near Haʻikū
1994 Apr 12-13	Flash flood, mudslide
2007 Dec 4-11	Flash flooding in the Waiohuli area of Maui sweeping a house from its foundation.
<b>Northwest Maui</b>	
1961 Nov 2	Flash flooding at NW Maui, Nāpili, Honolua
1964 Dec 19	NW Maui
1967 Mar 17	Nāpili Bay
1967 Mar 24	Nāpili Bay, heavy rains
1968 Mar 13-16	24" in 48 hours at Nāpili Beach, Honolua, Paʻākea

## E.6.4 COUNTY OF HAWAIʻI

The latest severe flooding occurred in November 2000.

The enormous north swells of February 1993 and January 1998 brought 20-30 foot waves to the north facing shores. Overwash of the Hilo breakwater and flooding of the coastal roads near Hilo, caused damage in November 1996 and January 1998. The summer south swell generally ranges 4-6 feet. Significant south swells also occur, such as in July 1986 and June 1995, producing 8-12 foot surf along southern shores. Aliʻi Drive in Kailua town, for example, is located particularly close to the ocean in many places and suffers periodic overwash.

Homes were flooded, roads closed, and emergency shelters filled as families flocked to find help during the floods that affected the Big Island from October 28-November 3, 2000. According to the National Weather Service, 26.22 inches fell at Hilo airport in 24-hours on November 1, 2000. The previous record was 22.3 inches on February 19-20, 1979. Damage in Hawaiʻi County was estimated to be \$20 million. Civil Defense Deputy Bruce Butts said 77 businesses and as many as 300 homes were damaged. At Pahala in the Kaʻū District, two bridges on the Hawaiʻi Belt Road were severely damaged. On November 3, Governor Cayetano declared the islands of Hawaiʻi and Maui a disaster area, which authorizes use of major disaster fund, relocation and rehabilitation, housing relief, commercial and personal loan program, and relief to farmers.

On November 9, President Clinton declared Hawaiʻi County a federal disaster area, which authorized federal assistance. More than 1,131 Hawaiʻi Island flood victims registered for assistance through FEMA's toll-free tele-







registration number since November 30, 2000. The US Small Business Administration (SBA) approved \$2,210,000.00 in low interest disaster loans. For more information on Federal disaster recovery on Hawai‘i Island, see the County of Hawai‘i Hazard Mitigation Plan.

During August 2-4, 2004 as the remnant swirl of Darby moved closer to the unstable region, thunderstorms began to develop. The first round of thunderstorms occurred just north and east of the Big Island on August 2. That night, additional showers and thunderstorms formed across parts of the Big Island, particularly the normally dry Kona side. Rainfall amounts of 2 to 5 inches over a few hours were reported, and this led to flooding and closures of several roads. Two subsequent High Winds and Flooding Rains weather events occurred on December 4-11, 2007 and December 10-14, 2008. While the December 2011 event caused widespread flooding, the December 2008 rainfall on the island brought much needed drought relief.

*Table E-7. County of Hawai‘i Stream Flooding from Atlas of Natural Hazards in the Hawaiian Coastal Zone (Updated)*

Date	Details
<b>Hawai‘i - Island wide stream flooding because of heavy rains</b>	
1959 Aug 4-7	H Dot
1979 Feb 19-20	Flooding
1979 Dec 14-18	Flooding
1980 Mar 6-25	Episodes of flooding
1981 Oct 27-28	Flash flooding
1982 July 21-22	TD Daniel, flash flooding
1984 Dec 24-25	Kona storm, flooding
1986 Apr 8	Flooding
1986 Nov 10-11	Flooding
1987 July 21-23	Flooding
1987 Dec 11-19	Flooding
1988 Mar 14-18	Flooding
1988 Aug 4-8	H, flooding
1989 Feb 3-5	Flooding
1989 Mar 1-4	Flooding
1989 July 18-20	TS Dalilia, flooding
1990 Jan 14-22	Flooding
1992 Sep 14	TS Orlene, flooding
1992 Nov 29	Widespread flooding
1993 July 21-22	TS Dora, flooding
2003 Aug 31 - Sep 1	6 to 10" rain due to Jimena
2003 Nov 29 - Dec 8	Up to 11.01" rain
2004 Aug 3-4	Up to 5.56" rain due to remnants of Darby
2006 Feb 19 - Apr 2	Up to 54.72" rain
2006 Oct 31- Nov 2	Up to 3.38" rain
2007 Dec 4-11	High winds (70-80 mph gusts) and rains, Widespread flooding across the county
<b>Kohala</b>	
1918 Apr 9-10	Flash flooding
1936 Jan 17	Flash flooding at N. Hi





Date	Details
1966 Nov 20	Flash flooding at S. Kohala
1967 Jan 11	Flooding
1982 Aug 9-10	Flash flooding
1983 Dec 24-26	Flooding
1986 Feb 16	Localized flooding
1986 Apr 8	Flooding at Waimea, Kohala
1989 Feb 3-5	Flash flooding at Pāhala
1989 Apr 28-29	Flash flooding at Waimea
1991 Aug 5-7	Flash flooding
1996 Sep 8-9	Flash flood S. Kohala and Waikalua
1997 Jan 5	Widespread floods Waikalua Village
<b>Kailua-Kona</b>	
1918 Apr 9-10	Flash flood at Kona sugar mill
1922 Oct 22	Flash floods at South Kona
1930 Jan 25	Holualua reservoir burst, flash floods
1961 Oct 30	Flash floods at South Kona
1963 Apr 29	Flash floods at Kainaliu
1965 Sep 25	Capt. Cook, Kainaliu
1966 Oct 3-5	Flash floods at Capt. Cook & Holualua
1967 Oct 12	Overland flow at Ho'okena
1967 Oct 24	N. Kona
1968 July 17	Local flash flooding at Kealakekua
1968 Oct 3	Flash floods at N. Kona
1974 Oct 15	Flooding Kaloloa to Hōnaunau, 4.5" in 7 hrs.
1976 Apr 26	Flash flooding Hōnaunau
1982 Mar 17	Minor flooding at Kona
1985 Sep 29	Flash flooding Capt. Cook to Kealakekua
1985 Nov 19	
1986 Feb 16	Localized flooding at N. Kona
1989 Feb 3-5	Flash flooding at S. Kona
1992 Sep 17	Heavy thunderstorms, minor flooding
1996 June 22	2.1" in 1 hr., widespread flooding
1997 Jan 5	Widespread floods, Captain Cook to Kona
<b>South Point</b>	
1967 Nov 26-27	Severe flooding at Naalehu
1979 Feb 19-20	Nā'ālehu & Pāhala, 22.3" in 24 hrs.
<b>Ka'ū</b>	
1917 Mar 19	Flash flood
1945 Apr 8	Flash flood
1962 Mar 13-15	Overland flow at Pāhala
1980 Mar 18	Flooding
1982 July 16-17	TS Emilia
1982 Aug 1	TS Gilma
1985 Nov 19	Minor flash flooding in Ka'ū district
1986 Nov 8	Flash floods, 10" rain





Date	Details
1989 July 18-20	TS Dalilia flooding
1990 Jan 14-22	Flooding, over 20" rain
1990 Sep 14-28	Flooding
1990 Nov 18-20	Flooding, 30" rain
2007 Dec 4-11	Ten and twelve inches at the Kapāpala Ranch and Hawai'i Volcanoes National Park Headquarters gauges. Up to two feet of water covered portions of Highway 11 in the Ka'u district
<b>Hilo/Puna</b>	
1928 Oct 1	Flash flood of Wailuku R.
1966 July 25	Sheet flow
1967 Aug 2-11	Flash flood, 12" rain
1971 Apr 23	Flash floods, 9.66" in 24 hrs.
1979 Feb 19-20	Flooding at Hilo, Kea'au, Pāhoa, Kurtistown
1980 Mar 18	Flooding
1980 Sep 20-22	Flooding
1982 Mar 30-31	Flooding, 10" rain
1982 July 16-17	TS Emilia, flash flooding
1982 July 23	Flash flooding, 29" rain in July
1982 Aug 1	TD Gilma, flash flooding
1984 Nov 3-4	Flooding, 4-6" rain
1985 Sep 25	Flash floods
1986 Apr 3	Flash floods
1986 Sep 26	Flash flooding, 6-10" rain
1986 Nov 8	Flash flooding, 10" rain
1987 Oct 1	Flooding, 10-15" rain
1988 Aug 4-8	H Fabio, flooding in Hilo and Kurtistown
1990 Nov 18-20	Flooding, 30" rain
1991 Aug 3-4	Flash flood, 11" at airport
1992 Sep 14	TS Orlene, widespread flood
1993 Oct 3	5-7" rain Puna and Hilo
1994 Apr 11-12	Floods, landslides
2000 Nov 1-2	Flooding, landslides, 25" in 24 hrs.
<b>Hāmākua Coast</b>	
1890 Dec 9	Flash floods at Hāmākua, Honoka'a
1902 Mar 6	Flash floods at Hāmākua
1965 Aug 4-5	Sheet flows
1982 July 16-17	Flash flooding at Hāmākua
1982 Aug 1	TD Gilma, flash flooding
1982 Aug 9-10	TS John, flash flooding at Honoka'a
1983 Oct 26	Hāmākua Coast
1984 Feb 8	Flooding
1985 Mar 11	Flash flooding
1986 Mar 16	Flash flooding
1986 Apr 3	Flash flooding
1986 Apr 8	Flooding
1986 Sep 26	Flash floods, 6-10" rain





Date	Details
1987 May 5-6	Extensive flash flooding, over 10" rain
1987 Oct 1	Flooding, 10-15" rain
1987 Nov 21	Flash flooding
1988 Mar 14-18	Flooding, 5-10" rain
1989 Apr 28-29	Flooding at Honoka'a
1989 Aug 20-21	Minor flash floods
1990 Dec 18-20	Flooding
1991 Aug 5-7	Flooding
1994 Apr 11-12	Floods, landslides
<b>Waipi'o Valley</b>	
1902 Mar 6	Flash flooding
1972 Aug 18- Sep 3	Flash flooding
1978 Dec 6	Flooding
1979 Dec 14-18	Severe flooding
1989 Apr 4-9	Flooding
1991 Aug 5-7	Flooding

## E.6.5 CHRONIC COASTAL FLOODING

Chronic coastal flooding is defined as the combined effects of annual high wave flooding, passive flooding, and coastal erosion that are being exacerbated by sea level rise.

The 2018 HMP discussed specific coastal erosion and high wave flooding events that occurred in the State of Hawai'i through 2017. Table E-8 includes details regarding major chronic coastal flooding that occurred in the state between 2012 and 2017. Major events include those that resulted in losses or fatalities, as reported by NOAA NCEI, events that resulted in the activation of the state and/or county emergency operations center (EOC), and/or events that led to a FEMA disaster declaration.

With flood documentation for the State of Hawai'i being extensive, not all sources have been identified or researched. Additionally, loss and impact information for many events could vary depending on the source. Therefore, Table E-8 may not include all events that have occurred in the state and the accuracy of monetary figures discussed is based only on the available information identified during research for the 2018 HMP Update.

*Table E-8. Chronic Coastal Flooding Events in Hawai'i, 2012 to 2017*

Date(s) of Event	Event Type	Counties Affected	Description
2012 Jan 03	High Surf	Honolulu	The County and City of Honolulu partially activated their EOC and opened shelters due to high surf.
2012 Nov 4-7	High Surf	Kaua'i, Maui, Hawai'i, and Honolulu	A combination of swells generated surf of 15 to 25 feet along the north-facing shores of the Islands of Ni'ihau, Kaua'i, O'ahu, Moloka'i, Maui, and Hawai'i; 8 to 14 feet along the west-facing shores of the Islands of Ni'ihau, Kaua'i, and Moloka'i; and 6 to 10 feet along the east-facing shores of the Islands of O'ahu and Hawai'i. Lifeguards rescued several individuals who were overwhelmed by the dangerous surf.
2012 Dec 24-26	High Surf	Kaua'i, Maui, Hawai'i, and Honolulu	A swell from a powerful low, far northwest of the islands generated surf of 15 to 25 feet along the north- and west-facing shores of the Islands of Ni'ihau, Kaua'i, and Moloka'i; and the north-facing shores of the Islands of O'ahu and Maui; and





Date(s) of Event	Event Type	Counties Affected	Description
			10 to 15 feet along the west-facing shores of the Island of O’ahu and north-facing shores of the Island of Hawai’i. At least three people required assistance by paramedics after getting caught in the surf. Lifeguards performed numerous rescues and provided warnings to beach goers to stay away from the water.
2013 Jan 17-22	High Surf	Kaua’i, Maui, Hawai’i, and Honolulu	A swell from a powerful low, far northwest of the islands generated surf of 15 to 30 feet along the north- and west-facing shores of the Islands of Ni’ihau and Kaua’i, and the north-facing shores of the Islands of O’ahu, Moloka’i, and Maui; 10 to 20 feet along the west-facing shores of the Islands of O’ahu, Moloka’i, and Maui; 10 to 15 feet along the west-facing shores of the Island of Hawai’i; and 8 to 12 feet along the west-facing shores of the Islands of Lāna’i and Kaho’olawe. On the Island of Kaua’i, there were two fatalities associated with this high surf event. Two men were swept away by the large waves on the north shore of the Island of Kaua’i on January 18. On the Island of O’ahu alone, lifeguards reported more than 2,000 safety actions as a result of this high surf event. Many beaches were closed for a time because of the rough conditions, and several roadways near the shoreline on the individual isles became covered with debris from waves breaking beyond the beach areas.
2013 Apr 4-6	High Surf	Kaua’i, Maui, Hawai’i, and Honolulu	A swell from a powerful low, far northwest of the islands produced surf of 15 to 25 feet along the north- and west-facing shores of the Islands of Ni’ihau and Kaua’i, and the north-facing shores of the Islands of O’ahu, Moloka’i, and Maui; and 10 to 20 feet along the west-facing shores of the Islands of O’ahu, Moloka’i and Maui, and the north-facing shores of the Island of Hawai’i. Lifeguards issued more than 1,000 warnings during the episode, and conducted several rescues of individuals overwhelmed by the pounding surf.
2013 May 16-22	High Surf	Kaua’i, Maui and Hawai’i	A series of swells from the southern hemisphere generated surf of 6 to 10 feet along the south shores of all islands. Lifeguards were busy throughout the high surf episode. They provided many rescues, and warnings to inexperienced swimmers and surfers. On the Island of Maui, with the high surf, three sailing vessels broke free from their moorings and washed aground near Mala Wharf in Lahaina.
2013 June 4-6	High Surf	Kaua’i, Maui, Hawai’i, and Honolulu	A long period swell from the southern hemisphere generated surf of 6 to 12 feet along the south-facing shores of all the main Hawaiian Islands. In a few instances, water from the high surf flowed over adjacent roads and deposited sand and other debris. Lifeguards rescued more than 100 surfers and swimmers and issued hundreds of warnings. One surfer died from injuries suffered at Ala Moana Bowls on the Island of O’ahu on June 6. Another surfer sustained serious injuries while surfing at Sandy Beach.
2013 Oct 20-21	High Surf	Kaua’i, Honolulu, and Maui	A swell from a strong low, far northwest of the islands generated surf of 15 to 20 feet along the north- and west-facing shores of the Islands of Ni’ihau and Kaua’i; and 10 to 15 feet along the north-facing shores of the Islands of O’ahu, Moloka’i, and Maui. On October 21, three individuals were injured when they were swept away on a wave from the Shark’s Cove reef area on the Island of O’ahu’s north shore. Ocean safety officials performed rescues, assists and preventative actions.
2013 Oct 28-29	High Surf	Kaua’i, Honolulu, and Maui	A swell from a strong low generated surf of 15 to 20 feet along the north- and west-facing shores of the Islands of Ni’ihau and Kaua’i; and 10 to 15 feet along the north-facing shores of the Islands of O’ahu, Moloka’i, and Maui. Ocean safety officials were busy with rescues, assists and preventative actions.





Date(s) of Event	Event Type	Counties Affected	Description
2013 Nov 13-15	High Surf	Hawai'i, Kaua'i, and Honolulu	A swell from a powerful low north of the islands, in combination with a strong high far to the northwest, generated surf of 20 to 30 feet along the north-facing shores, and 10 to 20 feet along the east-facing shores of the Islands of Ni'ihau, Kaua'i, O'ahu, Moloka'i, Maui, and Hawai'i. On November 13, a surfer was lost in the churning waters on the north shore of the Island of O'ahu at Chun's Reef. On the Island of Maui, the parking and pavilion areas of Baldwin Park in Pā'ia were closed due to flooding from high surf wash up. Bayfront Highway on the Island of Hawai'i was closed due to the high surf.
2013 Dec 19-22	High Surf	Kaua'i, Honolulu, Maui, and Hawai'i	A swell from powerful low, far northwest of the islands produced surf of 20 to 30 feet along the north- and west-facing shores of the Islands of Ni'ihau and Kaua'i, and the north-facing shores of the Islands of O'ahu, Moloka'i, and Maui; 15 to 25 feet along the west-facing shores of the Island of Hawai'i; and 10 to 15 feet along the west-facing shores of the Islands of O'ahu, Moloka'i, Lāna'i, and Kaho'olawe. Lifeguards issued over 4,800 warnings and rescued or assisted more than 50 people on the Island of O'ahu. Two people were injured by the high surf. Additionally, on the Island of Hawai'i, two boating facilities were damaged by high waves.
2014 Oct 9-11	High Surf	Kaua'i, Honolulu and Maui	A swell from a strong low, far northwest of the islands generated surf of 10 to 20 feet along the north- and west-facing shores of the Islands of Ni'ihau and Kaua'i; the north-facing shores of the Islands of O'ahu, Moloka'i, and Maui; and 8 to 14 feet along the west-facing shores of the Islands of O'ahu and Moloka'i. One person was injured when they were caught in the shore-break at Waimea Bay on the Island of O'ahu's North Shore. Ocean safety personnel performed 1,120 preventative actions, just on North Shore beaches alone.
2015 July 25-28	High Surf	Honolulu	A swell from the southern hemisphere generated surf of 8 to 15 feet along the south-facing shores of all the islands. This was unusually high surf that led to lifeguards performing 3,000 preventative actions and 39 rescues on south and west shores of just the Island of O'ahu alone. There were two deaths associated with this event.
2015 Oct 27-31	High Surf	Maui, Honolulu, and Hawai'i	A swell from a powerful low far northwest of the State of Hawai'i generated surf of 15 to 25 feet along the north-facing shores of all the islands except Lāna'i; 10 to 20 feet along the west-facing shores of the Islands of Ni'ihau, Kaua'i, O'ahu, Moloka'i, and Maui; and 8 to 12 feet along the west-facing shores of the Island of Hawai'i. A large wave near Ka'ena Point on the Island of O'ahu swept three men into the water on October 27. One man died and the other two were injured. On the Island of Kaua'i on the same day, a 33-foot sailing vessel ran aground in the high surf after its motor failed. The vessel beached on the west side of Hanalei Bay at Waipā. The boat's owner injured himself trying to leave the boat.
2015 Dec 5-7	High Surf	Kaua'i, Honolulu, and Maui	A swell from a powerful low, far northwest of the islands generated surf of 20 to 35 feet along the north-facing, and 10 to 20 feet along the west-facing, shores of the Islands of Ni'ihau, Kaua'i, O'ahu, and Moloka'i. Surf reached 20 to 35 feet along the north-facing shores of the Island of Maui as well. Lifeguards and other ocean safety officials provided assistance to surfers and other beachgoers in the rough conditions. One surfer nearly drowned at the Banzai Pipeline on the Island of O'ahu's North Shore due to dangerous surf.





Date(s) of Event	Event Type	Counties Affected	Description
2016 Feb 21-29	High Surf and Coastal Erosion	Kaua'i, Honolulu, Maui, and Hawai'i	Large swells from the northwest generated surf of 20 to 40 feet, with sets as high as 55 feet, on the north- and west-facing shores of the Islands of Ni'ihau and Kaua'i, and the north-facing shores of the Islands of O'ahu, Moloka'i, and Maui; and 15 to 25 feet, with sets as high as 35 feet, on the west-facing shores of the Islands of O'ahu and Moloka'i, and the north-facing shores of the Island of Hawai'i; and 8 to 12 feet along the west-facing shores of the Islands of Maui and Hawai'i. The large surf also caused beach erosion and damaged roadways, inundated parking areas of coastal recreation areas, and closed beaches. One person was swept out to sea as a large wave broke where the person was taking pictures on the Island of Kaua'i.
2017 Jan 28-31	High Surf	Kaua'i, Maui and Honolulu	Swells from powerful lows far northwest of the islands produced surf of 15 to 30 feet along the north- and west-facing shores of the Islands of Ni'ihau and Kaua'i, and the north-facing shores of the Islands of O'ahu, Moloka'i, and Maui; and 10 to 20 feet along the west-facing shores of the Islands of O'ahu and Moloka'i. A young woman drowned in the high surf on the Island of Kaua'i on January 30.
2017 May 5-26	King Tide / High Surf	Kaua'i, Maui, Hawai'i, and Honolulu	The State of Hawai'i EOC was partially activated due to King Tides and high surf.

### E.6.6 EVENT-BASED FLOOD

Event-based floods are the result of storms that cause temporary inundation of land from excessive rainfall or wave action. Flooding also occurs as a result of other event-types such as storm events which are discussed in other sections of the risk assessment. For the purposes of the 2018 HMP Update, event-based flood includes both coastal and inland flooding as depicted on Flood Insurance Rate Maps (FIRMs).

The 2018 HMP discussed specific flooding events that occurred in the State of Hawai'i through 2017. Table E-9 includes details of major flooding events that occurred in the state between 2012 and 2017, with the addition of the April 2018 flood event. These events do not include tropical storms or hurricanes that may also cause flooding. Major events include those that resulted in losses or fatalities, as reported by the National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI), events that resulted in the activation of the state and/or county emergency operations center (EOC), and/or events that led to a FEMA disaster declaration.

*Table E-9. Event-Based Flood Events in the State of Hawai'i, 2012 to April 2018*

Date(s) of Event	Event Type and Federal Disaster Declaration (if applicable)	Counties Affected	Description
2012 Jan 17	Heavy Rain and Flash Flooding	Kaua'i and Hawai'i	Heavy showers fell over the Counties of Hawai'i and Kaua'i. The rain was intense enough in the County of Kaua'i to cause flash flooding. In Princeville (Kaua'i), the Kūhiō Highway was closed at the Hanalei Bridge due to flooding in the area of the Hanalei River. In Kapa'a, there were road closures due to flooding of Keālia Stream. A flash flood warning was issued for the County of Kaua'i, which led to the activation of County's EOC.





Date(s) of Event	Event Type and Federal Disaster Declaration (if applicable)	Counties Affected	Description
2012 Feb 26	Flash Flood Warning	Kaua'i and Honolulu	Surface and upper troughs generated heavy rain across the City and County of Honolulu, as well as the County of Kaua'i, with flash flooding occurring over northern parts of Kaua'i. In the County of Kaua'i, Kūhiō Highway was closed at the Hanalei Bridge due to flooding. In Kōloa, Weliweli Road, Hapa Road and Ala Kinoki were closed due to flooding. A flash flood warning was issued for the County of Kaua'i which led the partial activation of the County's EOC.
2012 Mar 3-11	Severe Weather, Flooding and Tornado (FEMA-DR-4062)	Kaua'i, Honolulu, and Maui	On March 3 and 4, an upper trough in the vicinity of the Hawaiian Islands brought heavy rain and flash flooding to the County of Kaua'i and the City and County of Honolulu. Numerous roads and bridges were closed throughout the impacted counties due to flooding. The City and County of Honolulu EOC was activated. This event resulted in a FEMA declaration for the counties of Kaua'i and Maui. A total of \$3.6 million in public assistance was approved for the impacted counties.
2012 Dec 19	Heavy Rain and Flash Flooding	Hawai'i	Heavy showers fell over the windward side of the County of Hawai'i near Pāpa'aloa. A motorist tried to cross the swollen Pāhale Stream but was swept away by the current; the motorist died.
2013 Jan 26-27	Severe Weather and Flooding	Kaua'i, Honolulu, and Maui	A winter storm triggered heavy rain and flash flooding over the Hawaiian Islands from the County of Kaua'i and the City and County of Honolulu, to the County of Maui. Roadway and property flooding was reported in the impacted counties. The EOCs for these the counties of Kaua'i, Honolulu, and Maui were activated as a result of this event.
2013 Feb 21	Severe Weather and Flooding	Kaua'i, Honolulu, Maui, and Hawai'i	Heavy rain brought flash flooding, mainly to the County of Maui. In the County of Kaua'i, approximately 50 hikers were stranded on the Nā Pali Coast on Kaua'i. One hiker died when swept away into the swollen Hanakāpi'ai Stream. Numerous roads were closed due to flooding throughout the area. The County of Kaua'i activated its EOC. In the County of Honolulu, heavy rain was observed. In the County of Maui, flash flooding was reported which resulted in road closures. In the County of Hawai'i, heavy rain was observed.
2013 Apr 4	Severe Weather and Flooding	Kaua'i, Honolulu	The County of Kaua'i and the City and County of Honolulu EOCs were activated.
2013 May 4-5	Flood	Hawai'i	Heavy rain produced small stream and drainage ditch flooding, and ponding on roadways near Hawi, Waikoloa Village, Māhukona, and Kawahae in the County of Hawai'i. The County of Hawai'i EOC was activated as a result of this event.
2013 May 18	Flood	Hawai'i	Heavy rain fell over the County of Hawai'i. The precipitation led to small stream and drainage ditch flooding and ponding on roadways. Heavy rain led to the activation of the County of Hawai'i EOC.
2013 May 28-29	Flood	Kaua'i, Honolulu, Maui, and Hawai'i	A surface trough and upper low brought heavy rain to the State of Hawai'i. The showers caused ponding on roadways and small stream and drainage ditch flooding. On May 28, in the City and County of Honolulu, the rainfall was intense enough to overflow the banks of the Kalihi Stream due to clogged culverts. Four people were caught in the swollen stream but were able to make it to safety. The City and County of Honolulu EOC was activated as a result of this event.







Date(s) of Event	Event Type and Federal Disaster Declaration (if applicable)	Counties Affected	Description
2013 Sept 30-Oct 1	Severe Weather and Flooding	Kaua'i	An upper low just north of the State of Hawai'i induced heavy rain and thunderstorms over the County of Kaua'i. The rain caused ponding on roadways and small stream and drainage ditch flooding. The County of Kaua'i EOC was activated as a result of this event.
2013 Oct 11	Severe Weather and Flooding	Kaua'i, Honolulu, and Maui	Heavy rain fell over the Counties of Kaua'i, Maui and the City and County of Honolulu. The City and County of Honolulu EOC was activated as a result of this event.
2013 Oct 14	Severe Weather and Flooding	Kaua'i, Honolulu, Maui, and Hawai'i	An upper low moving over the State of Hawai'i produced heavy showers and thunderstorms, and the occasional funnel cloud and waterspout. There was small hail reported in central O'ahu. The rainfall led to small stream and drainage ditch flooding, minor debris flows, and ponding on roadways. The City and County of Honolulu EOC was activated as a result of this event.
2013 Oct 27	Severe Weather and Flooding	Hawai'i and Maui	An upper trough produced heavy rain and thunderstorms over much of the State of Hawai'i. The rain caused ponding on roadways, small stream and drainage ditch flooding, and minor debris flows. The County of Maui EOC was activated as a result of this event.
2013 Nov 9-10	Severe Weather and Flooding	Kaua'i, Honolulu, and Maui	An upper level low, north of the Hawaiian Islands, combined with a surface trough and shear line produced heavy rain and flash flooding over parts of the State of Hawai'i. In the County of Kaua'i, heavy rain caused the Hanalei River to overflow its banks along Kūhiō Highway. Homes flooded and roadways were inundated with water as a result of the heavy rains. The County of Kaua'i activated its EOC as a result of this event.
2013 Dec 1	Severe Weather and Flooding	Kaua'i	An advancing cold front and upper trough brought heavy rain, thunderstorms, and flash flooding to portions of the County of Kaua'i, the Island of Moloka'i (located in the County of Maui), and the City and County of Honolulu. Multiple roadways were closed due to flooding. The County of Kaua'i activated its EOC as a result of this event.
2013 Dec 30	Severe Weather and Flooding	Hawai'i	Heavy rain and thunderstorms impacted a large portion of the County of Hawai'i. There were reports of flash flooding, hail and microbursts. Roads were closed throughout the county due to flooding. Several roadways washed out. The County of Hawai'i activated its EOC as a result of this event.
2014 Jan 11-12	Severe Weather and Flooding	Honolulu, Maui, and Hawai'i	Heavy downpours and isolated thunderstorms impacted parts of the State of Hawai'i (counties of Honolulu, Maui, and Hawai'i). Ponding on roadways, and small stream and drainage ditch flooding occurred in several areas. The County of Maui EOC activated.
2014 Feb 16	Severe Weather and Flooding	Kaua'i	A surface low and upper trough west of the Hawaiian Islands caused instability over the western parts of the State of Hawai'i. Heavy rain and flash flooding occurred over the County of Kaua'i. Roadways were closed due to flooding. The County of Kaua'i activated its EOC as a result of this event.
2014 May 24-26	Heavy Rain and Flash Flooding	Kaua'i and Honolulu	The combination of abundant low-level moisture and an upper trough northwest of the State of Hawai'i generated heavy showers and isolated thunderstorms across the County of Kaua'i and the City and County of Honolulu. The heavy rain caused ponding on roadways, and small stream and drainage ditch flooding. The City and County of Honolulu EOC was activated as a result of this event.





Date(s) of Event	Event Type and Federal Disaster Declaration (if applicable)	Counties Affected	Description
2014 July 19-20	Severe Weather and Flooding(remnants of Tropical Storm Wali)	Honolulu and Maui	An upper trough near the Hawaiian Islands acted on remnant moisture from former Tropical Storm Wali to generate heavy showers and thunderstorms. The rain was intense enough to produce flash flooding in windward parts of the Island O'ahu and in windward West Maui. Strong winds accompanied the precipitation, and blew down trees and damaged homes. Also, a man, snorkeling with a group, died when he succumbed to high waves that battered the area off the County of Maui on July 20. Flooding inundated roads in the impacted areas. The City and County of Honolulu activated its EOC as a result of this event.
2015 July 22	Heavy Rain and Flash Flooding	Kaua'i	Heavy showers and isolated thunderstorms impacted the western portion of the state. The heavy rain led to flash flooding in the County of Kaua'i near Hanalei as the Hanalei River overflowed its banks and inundated Kūhiō Highway near Hanalei Bridge. The County of Kaua'i EOC was activated as a result of this event.
2015 Aug 17	Flooding	Honolulu, Maui, and Hawai'i	Heavy showers and isolated thunderstorms developed over parts of the State of Hawai'i, causing small stream and drainage ditch flooding, ponding on roadways, and flash flooding. In the County of Hawai'i, 14 hikers were rescued by the fire department after the trail they were on was blocked by high water after flash flooding. Many roads were closed throughout the County of Hawai'i as a result of flooding. In the City and County of Honolulu, officials reported between 8 and 12 inches of water on the Kamehameha Highway near Waikane Valley Road in windward O'ahu. In the County of Maui, water over the road forced the closure of Pi'ilani Highway at Mile Marker 29 in the Nu'u area. As a result of this event, the County of Maui and County of Hawai'i EOCs were activated.
2015 Aug 25	Flash Flood and Severe Weather	Kaua'i and Maui	Heavy rain, thunderstorms and flash flooding impacts parts of the State. In the County of Maui, lower Honoapi'ilani Highway was flooded by excessive rainfall near Kahana and Honokōwai. The County of Kaua'i EOC was partially activated as a result of this event.
2015 Sept 3	Flash Flood and Severe Weather	Honolulu	With a moist air mass over the islands, warm ocean temperatures, and low-level instability; heavy showers and thunderstorms brought flooding to parts of the State of Hawai'i (City and County of Honolulu). In the City and County of Honolulu, one foot of water flooded Liliha Street, Dillingham Boulevard, and North King Street in Honolulu. More flash flooding was reported at the intersection of Dillingham Boulevard and Alakawa Street. Liliha Street was closed in both directions from North King Street to Vineyard Boulevard because of excessive ponding on the roadway. In the Iwilei section of Honolulu, Dole Cannery and surrounding offices had to be evacuated due to flooding on the first floor, including rooms with electrical equipment. The City and County of Honolulu EOCs were activated as a result of this event.





Date(s) of Event	Event Type and Federal Disaster Declaration (if applicable)	Counties Affected	Description
2015 Sept 11	Flash Flood and Severe Weather(remnants of Hurricane Jimena)	Honolulu	Another round of heavy rain and flooding developed over parts of the State of Hawai'i (City and County of Honolulu) as the remnants of former Hurricane Jimena passed north of the islands. Warm ocean temperatures and the added instability from the tropical disturbance helped generate deep convection over the area. In the City and County of Honolulu, Waikane Bridge along Kamehameha Highway was closed due to flooding from Waikane Stream in windward O'ahu. The City and County of Honolulu activated its EOC as a result of this event.
2015 Sept 14	Heavy Rain and Flash Flooding	Hawai'i	High running water at Wailuku River's Boiling Pots in the County of Hawai'i resulted in one drowning fatality after the swimmer was pulled downstream.
2015 Nov 20	Flash Flooding	Honolulu	An area of deep tropical moisture moving from the southeast brought heavy showers to most of the Hawaiian Islands, with a majority of impacts in the City and County of Honolulu. The rainfall was intense enough to cause flash flooding over a portion of windward O'ahu. Most of the showers, however, produced mainly small stream and drainage ditch flooding, and ponding on roadways. The City and County of Honolulu EOC was activated as a result of this event.
2016 May 26	Flash Flooding and Landslide	Kaua'i and Honolulu	Heavy rain fell in the County of Kaua'i and the City and County of Honolulu. The City and County of Honolulu EOC was activated as a result of this event.
2016 Sept 11-14	Severe Storms, Flooding, Landslides and Mudslides (FEMA-DR-4282)	Maui and Hawai'i	As a weak tropical disturbance with abundant low-level moisture moved through the Hawaiian Islands, an upper low moved in from the northwest. This combination generated heavy showers and thunderstorms, which then resulted in flash flooding over the County of Maui. In the County of Hawai'i, flash flooding was reported closing roadways in the Mountain View area of the county. Other parts of the state received heavy rainfall as well. Overall damages were estimated at \$15 million.
2016 Dec 3	Heavy Rain and Flash Flooding	Statewide	An upper low and a separate upper trough produced heavy rain and showers, isolated thunderstorms, and flash flooding over much of the state. The system also produced snow in the upper elevations of the County of Hawai'i. A woman was swept away and killed during flash flooding on the County of Kaua'i during a kayak and hiking tour near the Wailua River.
2017 Jan 21	Heavy Rain and Flash Flooding	Hawai'i	Strong wind and heavy rains impacted the County of Hawai'i, downing trees and power lines, causing power outages, and bringing flash flooding. A woman attempted to cross fast-moving water in Ahumoa but was swept away and died.
2017 Feb 28-Mar 1	Heavy Rain and Flash Flooding	Kaua'i, Honolulu, and Maui	Heavy showers and thunderstorms impacted parts of the State of Hawai'i, mainly the Counties of Kaua'i and Maui, and the City and County of Honolulu. Some of the rainfall led to flash flooding. In the City and County of Honolulu, an elementary school and church were damaged. Police closed Kamehameha Highway in the area because of deep water on the roadway. Waimea Valley Park and a home were also damaged due to flooding. The Counties of Maui and Kaua'i, and the City and County of Honolulu EOCs were partially activated as a result of this event.





Date(s) of Event	Event Type and Federal Disaster Declaration (if applicable)	Counties Affected	Description
2017 Mar 7	Heavy Rain and Flooding	Maui	An upper trough near the Hawaiian Islands induced heavy downpours and thunderstorms over the County of Maui, particularly the leeward Haleakalā area. Intense rainfall inundated Kūlanihākoʻi Gulch, which then led to South Kihei Road being flooded. Seven individuals trapped by the deluge had to be rescued by fire crews. The flood waters damaged several vehicles and condominiums. The storm system also produced heavy rain and thunderstorms over the County of Hawaiʻi and the City and County of Honolulu. In the County of Maui, several roads were closed due to flash flooding and individuals were evacuated from their homes. The County of Maui EOC was activated as a result of this event.
2017 Aug 21	Flash Flood	Kauaʻi and Maui	An upper trough brought heavy showers and thunderstorms over the Counties of Kauaʻi and Hawaiʻi. Most of the rain caused ponding on roadways and small stream and drainage ditch flooding. In the County of Kauaʻi, the rain caused flash flooding. The Kūhiō Highway in Hanalei (Kauaʻi) became impassable, and county officials were forced to close the Hanalei Bridge. The County of Kauaʻi and the County of Maui activated their EOCs as a result of this event.
2017 Oct 23-24	Severe Weather and Flooding	Maui and Hawaiʻi	Periods of strong winds, heavy rain, thunderstorms, and flash flooding impacted the counties of Maui and Hawaiʻi. Lightning strikes led to power outages, and gusty winds downed trees and power lines. In the County of Maui, the strong winds led to island-wide power outages after lightning hit the electrical system. The storm downed trees and power lines in multiple areas; and flash flooding occurred as well. The County of Maui EOC was partially activated. In the County of Hawaiʻi, the storms brought strong winds, lightning strikes, and heavy rain. The County of Hawaiʻi EOC was fully activated.
2017 Oct 31-Nov 1	Severe Weather and Flooding	Kauaʻi	Flooding conditions in the County of Kauaʻi resulted in several road closures, including Kūhiō Highway in the vicinity of the Hanalei Bridge. County officials were warning motorists of ponding, low visibility, and other hazardous driving conditions. The County of Kauaʻi EOC was partially activated as a result of this event.
2017 Nov 11-12	Severe Weather and Flooding	Honolulu	Rainfall totals ranged from 3.74 inches to 4.37 inches. Multiple car accidents were reported due to water on the roadways. Water rescues were performed near the intersection of Waialae Avenue and Koali Road, where two people were in need of assistance amid rain-swollen stream conditions. The City and County of Honolulu EOC was partially activated.
2017 Dec 20	Flash Flood	Honolulu and Maui	Heavy rain, flash flooding, and isolated thunderstorms impacted the counties of Honolulu and Maui. In the City and County of Honolulu, the intersection at Puʻunēnē and Wakea Avenues near Christ the King Church were closed in all directions due to flooding. In the County of Maui, on Kahekili Highway in the area of Mile Marker 7, the road was impassable due to flooding.
2017 Dec 26	Flash Flood	Honolulu	An area of showers formed over the County of Honolulu, becoming intense and isolated thunderstorms developed. The storm led to flash flooding conditions in the county; however, no significant injuries were reported. Water was flowing into stores at Market City between Kapiolani Boulevard and Kapahulu Avenue.





Date(s) of Event	Event Type and Federal Disaster Declaration (if applicable)	Counties Affected	Description
2018 April	Heavy Rains, Flooding, and Mud and Rock Slides	Kaua'i and Honolulu	Heavy rains and flooding caused damages and losses to areas in the City and County of Honolulu and the County of Kaua'i. According to NOAA, a rain gauge on Kauai's North Shore recorded 49.69 inches of rain in 24 hours. In the County of Kaua'i, heavy rain caused extensive damage to the slopes adjacent to Kūhiō Highway and impacted the communities of Wainiha and Hā'ena. Multiple landslides led to the closure of the road. Numerous road closures reported in the impacted areas. Many homes were damaged or destroyed. American Red Cross conducted damage assessments and distributed clean up kits to residents in Aina Haina, Niu Valley, Kuli'ou'ou, Waimānalo, and Kailua. In the County of Kaua'i, the American Red Cross opened five shelters. Ten residents from Wainiha were airlifted to be taken to a shelter. Between April 13 and 19, the American Red Cross provided shelter to 110 individuals on the County of Kaua'i. Governor Ige declared the District of Hanalei in the County of Kaua'i a disaster area. This declaration provided relief for damage caused by the event. Details regarding monetized impacts are not available at the time of this 2018 HMP Update.

## E.7 Hazardous Materials

The following presents hazardous materials events that occurred in the State of Hawai'i between 2012 and 2017, as presented in the 2013 and 2018 HMPs. The information is reproduced as documented in the 2013 and 2018 plans.

### E.7.1 FIXED-SITE HAZARDOUS MATERIALS

The release of hazardous materials has occurred frequently throughout the state. Releases are reported to the Hawai'i DOH HEER Office. Table E-10 shows the number of releases reported to the HEER Office in 2012 through 2017. In the five-year period between 2012 and 2017, there have been 2,065 instances of fixed-site hazardous material releases, equating to over one incident per day across the state over a five-year period.

*Table E-10. Hazardous Materials Releases Reported to the HEER Office by County, 2012 to 2017*

Year	County of Kaua'i	City and County of Honolulu	County of Maui	County of Hawai'i	Total
2012	8	291	45	34	378
2013	10	301	56	29	396
2014	14	275	45	45	379
2015	3	158	18	18	341
2016	9	205	63	33	310
2017	16	214	57	35	261
<b>Total</b>	<b>60</b>	<b>1,444</b>	<b>284</b>	<b>194</b>	<b>2,065</b>





## E.7.2 IN-TRANSIT HAZARDOUS MATERIALS

The Pipeline and Hazardous Materials Safety Administration (PHMSA) tracks in-transit hazardous material releases through its nationwide database. Regulations in 49 CFR 171.15 and 171.16 govern situations where hazardous materials are released and the resulting required notifications and reporting. Unless they are properly reported, it is difficult to identify and track past hazardous materials releases that occur in-transit. Between 2012 and 2017, there were 14 highway incidents and three pipeline incidents reported, according to PHMSA's database (PHMSA 2017a).

*Table E-11. In-Transit Hazardous Material Incidents from 2012 to 2017*

Date of Incident	Event Type	Counties Affected	Impacts
2012 June 25	Vehicular Incident (highway)	Hawai'i	4,000 gallons of jet fuel released; \$209,254 in damages
2013 Jan 10	Excavation Damage (pipeline)	Honolulu	20 gallons of naphtha released; \$52,040 in damages
2013 Oct 23	Excavation Damage (pipeline)	Honolulu	\$172,747 in damages
2013 Nov 15	Vehicular Incident (highway)	Hawai'i	1,900 gallons of fuel released; \$60,776 in damages
2013 Dec 16	Burst Gasoline Line	Hawai'i	Burst gasoline line in downtown Hilo led to the partial activation of the Hawai'i County Emergency Operations Center.
2015 Feb 16	Corrosion (pipeline)	Honolulu	1,300 barrels of refined petroleum product spilled; \$2,816,000 in damages
2015 June 15	Excavation Damage (pipeline)	Honolulu	1 injury; \$613,900 in damages
2017 Sept 2	Vehicular Incident (highway)	Honolulu	1 fatality and 1 injury; \$66,700 in damages; 1,500 gallons of liquefied petroleum gas released

## E.8 Health Risks

The following presents health risk events that occurred in the State of Hawai'i between 1840s and 2017, as presented in the 2013 and 2018 HMPs. The information is reproduced as documented in the 2013 2018 plans.

The Hawai'i State Department of Health Disease Outbreak Control Division (DOCD) maintains case records on a wide variety of health risks. In 2015, state data shows 7,477 cases of influenza, representing the highest number of cases of any health agent tracked by the DOCD. The state also saw 215 cases of dengue fever in 2015, and 54 in 2016 (238 of these cases were in the outbreak on Hawai'i County). Table E-12 shows significant health events that have occurred in the state between 2012 and 2017.

Table E-13 shows the number of reported cases of notifiable diseases (diseases for which statistics are provided to the CDC to monitor national public health) in Hawai'i. For the 2018 HMP Update, this includes dengue fever, chikungunya, leptospirosis, Zika, mumps, and influenza.





**Table E-12. Health Risk Events in the State of Hawai‘i, 2012 to 2017**

Date(s) of Event	Event Type	Counties Affected	Description
2015 Sept 11 – 2016 Mar 17	Dengue Fever Outbreak	Hawai‘i	264 confirmed cases of dengue fever. 238 were residents, and 26 were visitors.
2017	Mumps Infection	Honolulu, Hawai‘i, Kaua‘i, Maui	There were 760 confirmed cases of mumps in 2017. 602 were in Honolulu County, 106 were in Hawai‘i County, 49 were in Kaua‘i County, and 3 were in Maui County.

**Table E-13. Reported Cases of Notifiable Diseases in the State of Hawai‘i**

Disease	2012	2013	2014	2015	2016	2017
Dengue Fever	7	10	14	209	54	15
Chikungunya	Not reported	Not reported	22	6	4	1
Zika	Not reported	Not reported	Not reported	6	22	9
Leptospirosis	11	17	24	22	34	26
Mumps	1	0	1	4	10	760
Influenza (lab-confirmed)	2,811	5,086	5,382	7,477	5,129	9,053

### E.8.1 DENGUE FEVER

The first large-scale dengue fever epidemic in the State of Hawai‘i occurred in the late 1840s. A second outbreak occurred at the turn of the century, with an estimated 30,000 cases. Epidemic dengue occurred again on the island of O‘ahu between 1943 and 1944, when 1,498 infections were reported, mostly in urban areas of the city of Honolulu. *Aedes albopictus* had been introduced into the Hawaiian Islands at the beginning of the century, and by 1940 it was the dominant day-biting *Stegomyia* mosquito species in the islands.

An outbreak that occurred in 2001 and 2002 involved a statewide effort to provide information and testing to the public. Response to the outbreak in 2001-2002 required coordination among the county government, the State Department of Health, State Civil Defense, and the Centers for Disease Control. Excerpts of an article covering the event, prepared by the State of Hawai‘i Department of Health and the Centers for Disease Control follow

In September 2001, the State of Hawai‘i Department of Health was notified of an unusual febrile illness in a resident with no travel history; and shortly thereafter dengue fever was confirmed. During the investigation, 1,644 persons with locally acquired dengue-like illness were evaluated, 122 (7%) laboratory-positive dengue infections were identified; and dengue virus serotype 1 was isolated from 15 patients. No cases of dengue hemorrhagic fever or shock syndrome were reported. In 3 instances autochthonous infections were linked to a person who reported dengue-like illness after travel to French Polynesia. Phylogenetic analyses showed the Hawaiian isolates were closely associated with contemporaneous isolates from Tahiti in French Polynesia.





## E.8.2 PANDEMIC FLU

While there has been some human-to-human spread of H5N1 (Avian flu), it has been limited and un-sustained. For example, in 2004 in Thailand, probable human-to-human spread in a family resulting from prolonged and very close contact between an ill child and her mother was reported. Most recently, in June 2006, the World Health Organization (WHO) reported evidence of human-to-human spread of the virus in Indonesia. In this situation, eight people in one family were infected. The first family member to be infected is thought to have become ill through contact with infected poultry. This person then infected six family members. One of those six people (a child) then infected another family member (his father). No further spread outside of the exposed family was documented or suspected.

During the period from 2007 to 2010, there were incidents of swine flu (H1N1) outbreaks in the State of Hawai'i. Of particular concern is the 2009 the outbreak of H1N1 Pandemic that resulted in several deaths from the flu. Similar to other outbreaks, the virus spread with international travelers. This is particularly concerning for the state since it is among the most remote places on the planet, and it will be difficult to sustain livelihoods should the state lose connection with the United States mainland or international travel.

## E.9 High Wind Storms (now called Windstorm in the 2023 HMP Update)

The following presents high wind storm events that occurred in the State of Hawai'i between 1871 and 2017, as presented in the 2013 and 2018 HMPs. The information is reproduced as documented in the 2013 and 2018 plans.

During the 1993–1994 and 1994–1995 winter seasons, for example, strong and gusty trade winds of 40 to 50 mph lasted several days and inflicted damage to roof tops, tree limbs, and telephone equipment. In February 2013, gusty trade winds over 50 mph lasted for two days, causing numerous power outages due to damaged electrical transmission and distribution networks.

By far the most notable documented Kona wind event to affect the island of Hawai'i (County of Hawai'i) was that of January 1980, which caused damages of \$42 million. (Disaster Declaration DR-613-HI) The loss on the island of Hawai'i was \$11.7 million. Agriculture – macadamia, coffee, foliage and flower farms – had major losses. The island of Maui (County of Maui) was also declared a disaster area during this storm. The January 1980 severe Kona storm caused closure of all airports with sustained winds of 40-50 mph gusting over 100 mph in certain regions due to topographical features.

In December 26, 2008, the entire electrical grid on the island of O'ahu was blacked out for around 12 hours due to a Kona storm. The blackout was triggered by lightning strikes on or near the Hawaiian Electric 138 kV transmission system, which short circuited the system and tripped protective relay switches shutting down the entire grid.

Table E-14 provides a comprehensive list of recorded high wind events for over a century. Further information on historic occurrences of strong winds from All Storms Until 2017; trade winds, Kona storms and tropical cyclones, are provided on Figure E-5 through Figure E-9.







*Table E-14. High Wind Events*

Date	Description	Island
1871 Aug 9	Strong winds	O'ahu
1896 Dec 7	Strong winds	Maui
1906 Jan 21	High winds	Maui
1906 Mar 6-7	High winds	O'ahu
1914 Jan 12-13	High NE winds	O'ahu
1915 Dec 26	High winds	O'ahu
1916 Jan 10	High winds	O'ahu
1916 Jan 14	High winds	Maui
1918 Dec 3-4	High winds	O'ahu
1926 June 8	Possible Tornado	O'ahu
1948 Jan 17	High winds	Maui
1948 Jan 23-26	High winds	Maui
1949 Jan 15-17	High winds	O'ahu
1954 Nov 27-28	High winds	O'ahu
1955 Dec 21	High winds	Maui
1959 Jan 17-18	Storm	O'ahu, Maui
1961 Oct 24	Strong winds	O'ahu
1963 Jan 15-17	Strong winds, gusts of up to 70 mph	O'ahu, Maui
1963 Jan 30-31	Strong winds, gusts of up to 84 mph	O'ahu, Maui
1963 Feb 28	Tornado	O'ahu
1963 Mar 31	Strong winds	O'ahu
1963 Mar 30-31	High winds	O'ahu
1964 Dec 19-23	Strong winds	Maui
1965 Nov 10-15	High winds	O'ahu
1966 Dec 18	Whirlwind	O'ahu
1967 Feb 16-17	Gusty winds	O'ahu
1967 Nov 2-11	High trade winds	O'ahu, Maui, Kaua'i
1967 Dec 9	High winds	Maui
1967 Dec 12	Strong winds, winter storm	O'ahu, Maui
Jan 16-17	Winter storm, wind gusts > 50 mph	O'ahu
1968 Feb 15-18	SW winds, gusts to 62 mph	O'ahu
1968 Apr 9-10	30-50 mph winds	O'ahu
1968 Nov 28	Strong winds up to 69 mph	O'ahu, Kaua'i
1968 Dec 5-6	Storm	Maui
1969 Jan 30	Strong winds	O'ahu
1969 Feb 20-21	Strong winds	O'ahu, Maui
1970 Jan 13-15	High winds, 96 mph, gusts to 117 mph	O'ahu
1970 Dec 25-29	Winter storm, 50-60 mph	O'ahu, Maui
1971 Jan 5	Strong winds	O'ahu, Maui, Kaua'i
1971 Jan 21	Tornado at Whitmore Village	O'ahu
1972 Feb 4	Gusts to 69 mph	O'ahu
1973 Aug 15	Dust devil	O'ahu
1975 Nov 23-27	Storm	Maui
1976 Feb 5-7	Strong winds	O'ahu, Maui





Date	Description	Island
1976 Nov 6-7	Strong winds	O'ahu
1978 Oct 22	70 mph winds	O'ahu
1979 Jan 11-19	High winds in excess of 50 mph	Maui
1980 Jan 8-10	Storm	O'ahu, Maui, Kaua'i
1981 Feb 11	Strong winds	O'ahu
1982 Feb 11	Winter storm, strong winds	O'ahu, Kaua'i
1982 Feb 13	Tornado	O'ahu
1982 Dec 18-19	Gusty trade winds up to 60 mph	O'ahu, Maui, Kaua'i
1982 Dec 23-24	High winds	O'ahu
1983 Sept 23	Tornado at Pearl City	O'ahu
1983 Sept 29	High winds	O'ahu
1983 Dec 24-25	Winter storm, gusts > 50 mph	O'ahu, Maui, Kaua'i
1984 Mar 1-3	Gusts 30-40 mph	O'ahu, Kaua'i
1984 Dec 24-25	Kona Storm	O'ahu, Maui, Kaua'i
1985 Jan 29-30	High winds, Nānākuli & Wai'anae	O'ahu
1985 Mar 1-11	Gale force trade winds	O'ahu, Maui
1985 Nov 30	Strong northerly winds	O'ahu
1986 Apr 8	Strong winds at Nānākuli	O'ahu
1986 May 13	Small tornado at Waipahu	O'ahu
1986 Mar 28	Tornado at Barbers Point	O'ahu
1986 Dec 5	Gusts up to 50 mph	O'ahu, Kaua'i
1987 Jan 19	High winds, 35 mph	O'ahu
1988 Nov 4-5	Storm with gusts of 40-50 mph.	O'ahu, Maui
1988 Dec 5-6	S winds of up to 50 mph	O'ahu, Maui
1988 Dec 17-18	Gusty winds	Maui
1988 Dec 30-31	40-50 mph winds	O'ahu, Maui
1989 Mar 1-4	Storm, strong winds	O'ahu, Maui
1989 Dec 9-11	Gusty winds	O'ahu, Maui, Kaua'i
1990 Feb 6-9	Gusts to 60 mph	O'ahu
1991 Jan 27	Strong winds	Maui
1993 Mar 9	Frontal system, strong winds, minor damage	O'ahu Maui
1993 Dec 4-6	Strong trade winds, 60-80 mph	O'ahu, Maui, Kaua'i
1994 Mar 12-16	Strong gusty trade winds, 40-50 mph	O'ahu
1995 Apr 14-19	Strong trade winds, 40-50 mph	O'ahu
1996 Dec 7-8	N winds, gusts to 60 mph	O'ahu
1996 Dec 23-25	Southwest winds of 40 mph	Maui
1996 Dec 26-31	S and SW winds, gusts to 75 mph	O'ahu, Kaua'i
1997 Jan 2-3	S winds, gusts to 60 mph	O'ahu, Kaua'i
1997 Jan 27-29	SW winds, 60 mph	O'ahu, Maui, Kaua'i
1997 Feb 25-27	High winds downed several trees and utility poles and blew off part of a roof from a house in the 'Īao Valley on the island of Maui.	Maui
1998 Jan 5-8	Westerly winds of 40 to 60 mph near the summit of Haleakalā on the island of Maui.	Maui
1998 Jan 29	West to northwest winds of 50 to 60 mph near the summit of Haleakalā on the island of Maui.	Maui





Date	Description	Island
1998 Apr 3-4	West to northwest winds of 40 to 60 mph near the summit of Haleakalā on the island of Maui.	Maui
1998 Apr 9-11	NE winds up to 55 mph, power outages	O'ahu, Maui
1998 Apr 13	West to northwest winds of 40 to 60 mph near the summit of Haleakalā on the island of Maui.	Maui
1998 Nov 30	West to northwest winds of 50 to 60 mph near the summit of Haleakalā on the island of Maui.	Maui
1999 Jan 15	A spotter from upcountry Maui reported strong winds which knocked down power lines. Average sustained winds from 8 a.m. to 6 p.m. at Haleakalā were 40 mph, while a peak wind of 74 mph was recorded at 1:00 p.m.	Maui
1999 Feb 3-4	High winds toppled eucalyptus trees near Seabury Hall and along Kaupakalua Road. A large tree near Seabury Hall broke two power poles, leaving 125 customers in the Olinda area along Pi'iholo Road without electrical service. Another falling eucalyptus tree was blamed for snapping conductor wires along Kaupakalua Road that affected about 50 homes in that area and Kokomo. At 8:00pm at Haleakalā, the peak gust was 68 mph and the highest sustained wind speed was 48 mph.	Maui
1999 Mar 20-21	Wind gusts up to 55 mph, fallen trees, power outages, minor roof damage	O'ahu, Maui
1999 May 5	Dust devil in Kunia	O'ahu
1999 July 26-27	Winds up to 50 mph, fallen trees, power outages, dust storms; winds with gusts over 70 mph in the Mā'alaea on the island of Maui.	O'ahu, Maui
1999 Aug 31	Winds with gusts between 35 and 55 mph in the central valley of the island of Maui.	Maui
1999 Nov 28-29	Strong winds 30-45 mph	O'ahu, Maui
2000 Mar 22-23	Winds of 30 to 35 mph with gusts up to 45 mph along the southern coastal section of the saddle area on the island of Maui, from Mā'alaea to Kihei.	Maui
2000 Apr 1-5	Trade winds of 20 to 35 mph across all islands. Gusts of up to 60 mph reported on the island of Maui. Winds partially blew off a roof at Lahaina Elementary School and overturned a delivery van along Honoapi'ilani Highway (State Highway 30) near Olowalu on the island of Maui. Also on the island of Maui, blowing dust caused the closure of Kihei Road near the Maui Zoo.	Maui
2000 Nov 17	Winds of 30 to 40 mph with gusts as high as 50 mph in the saddle, downslope sections, and in the Mā'alaea Bay area of the west side of the island of Maui.	Maui
2001 Jan 14	Northeast winds of 35 to 40 mph with gusts up to 55 mph	All Islands
2001 Feb 14-16	NE winds 35 to 40 mph, gusts to 55 mph, localized power outages	O'ahu
2001 Feb 26	Waterspout ashore at Ehukai beach	O'ahu
2001 Apr 12	30 mph east to northeast winds with gusts up to 43 mph in locales in the central valley and western parts of the island of Maui. Some power outages were attributed to the high winds.	Maui
2001 Aug 31	Sustained winds 25 to 35 mph, gusts to 51 mph	All Islands
2001 Nov 26-27	SW winds 40-45 mph, gusts to 50 mph, fallen trees, localized roof damage, power outages	O'ahu
2001 Dec 2-3	NE to E winds 30 to 40 mph, gusts to 50 mph., fallen trees, power outages, localized roof damage	All Islands
2001 Dec 11-14	NE to E winds 30 to 40 mph, gusts to 55 mph., fallen trees, power outages	All Islands
2002 Jan 17-20	E to E/NE winds 30 to 40 mph, gusts to 50 mph	All Islands
2002 Jan 29-20	E to E/NE winds 30 to 40 mph, gusts to 45 mph	All Islands





Date	Description	Island
2002 Feb 26-27	East to east/northeast winds of 30 to 40 mph with gusts of up to 44 mph on the islands of Maui and Lānaʻi	Maui, Lanai
2002 Mar 17-18	N to NE winds 30 to 40 mph, gusts to 50 mph	Oʻahu, Maui
2002 Apr 1	West to Southwest winds estimated at 50 to 60 mph with gusts up to 65 mph near the summit of Haleakalā on the island of Maui.	Maui
2003 Jan 4-5	SW to W winds, fallen trees, power outages, localized roof damage	Oʻahu, Maui
2003 Jan 14-16	SW to W winds, gusts to 50 mph, fallen trees, power outages; southwest to west winds gusted to 70 mph on the high elevations of the island of Maui.	Oʻahu
2003 Jan 14	Southwest to west winds gusted to 70 mph on the high elevations of the island of Maui.	Maui
2003 June 3	F0 tornado	Oʻahu
2003 Nov 19	NE winds 30 to 40 mph, gusts to 65 mph, fallen trees, power outages, localized roof damage	Oʻahu
2003 Dec 21	North to northeast winds of 35 to 45 mph with gusts of up to 50 mph swept across Haleakalā summit, island of Maui.	Maui
2003 Dec 29	Southwest winds of 40 to 60 mph with one gust over 90 mph at and near Haleakalā summit, island of Maui.	Maui
2004 Jan 12	Southwest to west winds with gusts up to 70 mph affected areas at and near Haleakalā summit, island of Maui.	Maui
2004 Jan 14	High winds, fallen trees, power outages, considerable roof damage, school closures	Oʻahu Maui
2004 Jan 22-23	Thunderstorm, gusts to 60 mph	Oʻahu
2004 Jan 25	Funnel cloud, F0 tornado	Oʻahu
2004 Feb 7	F0 tornado	Oʻahu
2004 Feb 27-28	S thunderstorm winds, gusting to 58 mph, fallen trees, power outages, localized roof damage	Oʻahu, Maui
2004 Mar 11	Strong winds with gusts over 63 mph at Haleakalā summit, island of Maui.	Maui
2004 Nov 14-16	Winds gusting to 46 mph, power outages	Oʻahu
2004 Dec 2	Winds with gusts up to 70 mph at Haleakalā summit, island of Maui.	Maui
2004 Dec 6	East to Southeast winds gusted to 60 mph at Haleakalā summit, island of Maui.	Maui
2005 Jan 8-10	Gusty thunderstorms, fallen trees and fences, power outages	Oʻahu, Maui, Kauaʻi
2005 Feb 11-12	20-25 mph, 50 mph gusts, fallen trees, power outages	Oʻahu
2005 Mar 14-15	Gusty winds, fallen trees, power outages, property damage	Oʻahu, Maui
2005 Dec 4	F0 tornado, minor damage to one house	Oʻahu
2005 Dec 18	Gusty winds, power outages, localized roof damage, 1 fatality	Oʻahu, Maui
2007 Feb 2	High winds, gusts to 70 mph.	Oʻahu
2007 Feb 18	Trade Winds with gusts up to 57 mph at Haleakalā summit, island of Maui	Maui
2007 Dec 4	High winds, gusts to 55 mph; high winds with gusts of up to 82 mph	Oʻahu, Maui, Molokai
2008 Dec 13	Gusty thunderstorms, fallen trees, damages to roadways, homes and other structures, and agriculture; schools closure	Oʻahu, Maui, Kauaʻi
2013 Feb 17-18	Trade winds with gusts up to over 50 mph causes damage to electrical transmission tower, distribution networks, and utility poles.	Oʻahu
2012 Feb 7	A cold front moving through Hawaiʻi brought strong winds and heavy rain. The winds downed power lines and trees. In Waikīkī, a tree branch snapped, injuring three people at the International Market Place.	Honolulu





Date	Description	Island
2012 Mar 9	Significant weather impacted Hawai'i, bringing thunderstorms, flash flooding, record-setting hail, and a tornado. There were no reports of fatalities or serious injuries. In Maui County, strong winds destroyed a portion of the roof of the Hana Hotel, causing \$25,000 in damages. Maui County had approximately \$3.2 million in infrastructure damage from this event. Kaua'i County had approximately \$2 million in infrastructure damage.	Kaua'i and Maui
2015 Feb 13	Gusty winds moved through Hawai'i, downing power lines, utility poles, and trees. The winds damaged roofs and forced roadway closures due to debris. There was one injury reported on O'ahu (Honolulu County). A firefighter was injured when attempting to secure roof materials in Kāne'ohe in windward O'ahu.	Honolulu
2016 Feb 16	Strong winds led to power outages, downed trees, and damage to roofs in parts of O'ahu (Honolulu County), including Mānoa, Aina Haina, Kalihi, and Nu'uauu. One injury was reported on O'ahu when a tree fell on a home and pinned a man to his bed.	Honolulu
2016 Mar 8	Gusty north to northeast winds moved over O'ahu (Honolulu County) and around the state. Power outages, downed trees and power lines were common across the state. On O'ahu, a downed power line led to road closures. There was one reported injury from of this event. A person was injured at the Koko Head Shooting Complex when the winds blew the roof off the structure and flipped it over.	Honolulu
2017 Jan 21-22	The Maui and Hawai'i County EOCs were partially activated because of this event.	Maui and Hawai'i
2017 Feb 11	A front moving through the state produced heavy rain and thunderstorms, flash flooding, and gusty winds. This event led to downed power lines and trees, and ponding on roadways. On the south shore of O'ahu, a tent collapsed at the community college due to the strong winds. Three individuals were injured.	Honolulu
2017 Oct 13-14	Strong winds, heavy rain, thunderstorms, and flash flooding impacted parts of Hawai'i. Lightning strikes led to power outages, and gusty winds knocked down trees and power lines. One injury was reported on O'ahu (Honolulu County) when a tree fell onto a bus stop structure where a woman was standing. In Maui County, wind speeds reached 59 mph.	Honolulu and Maui





Figure E-5. Historic Occurrences of Strong Winds from All Storms Until 1997, Island of Kaua‘i

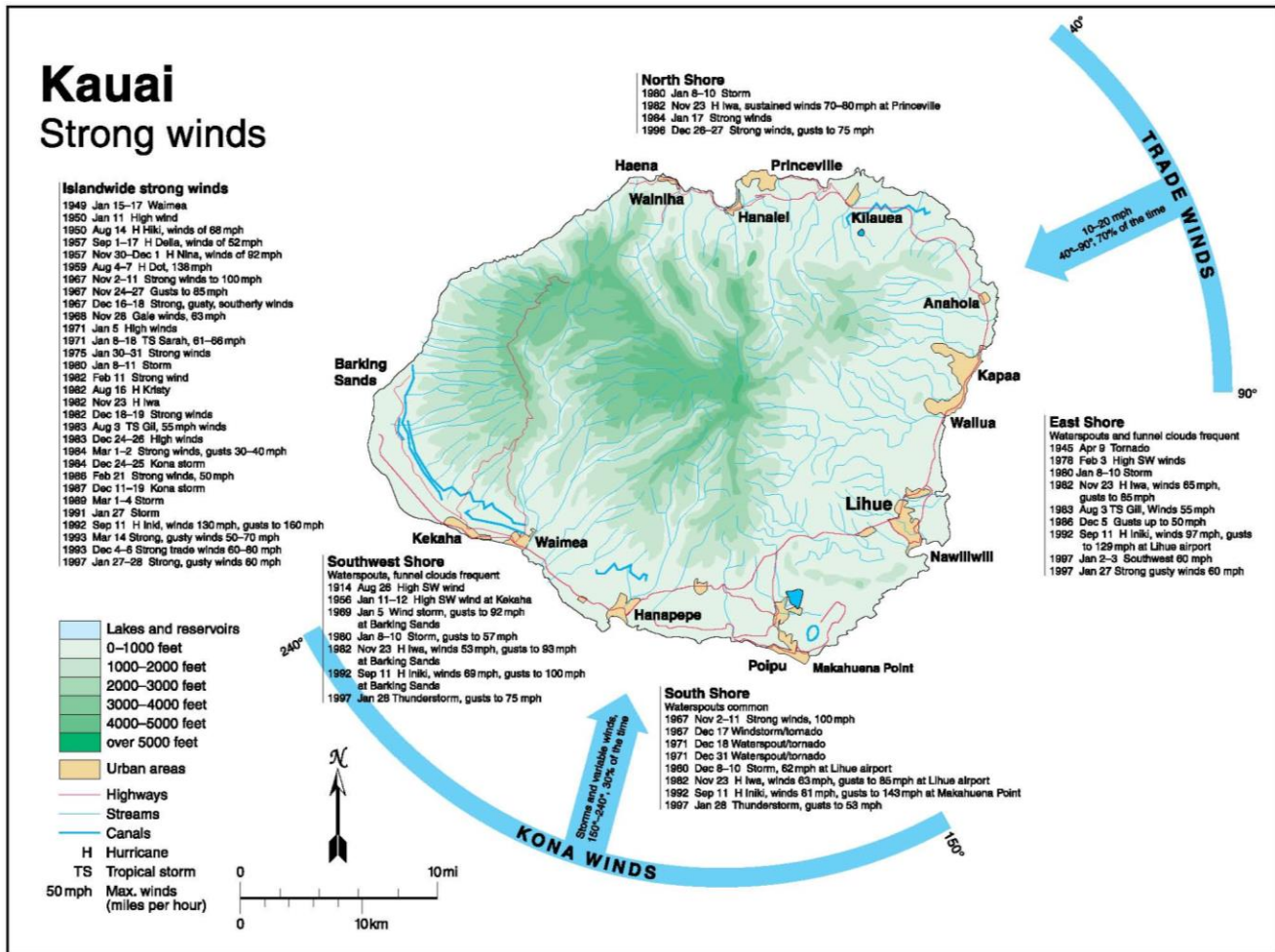




Figure E-6. Historic Occurrences of Strong Winds from All Storms Until 1997, Island of O'ahu

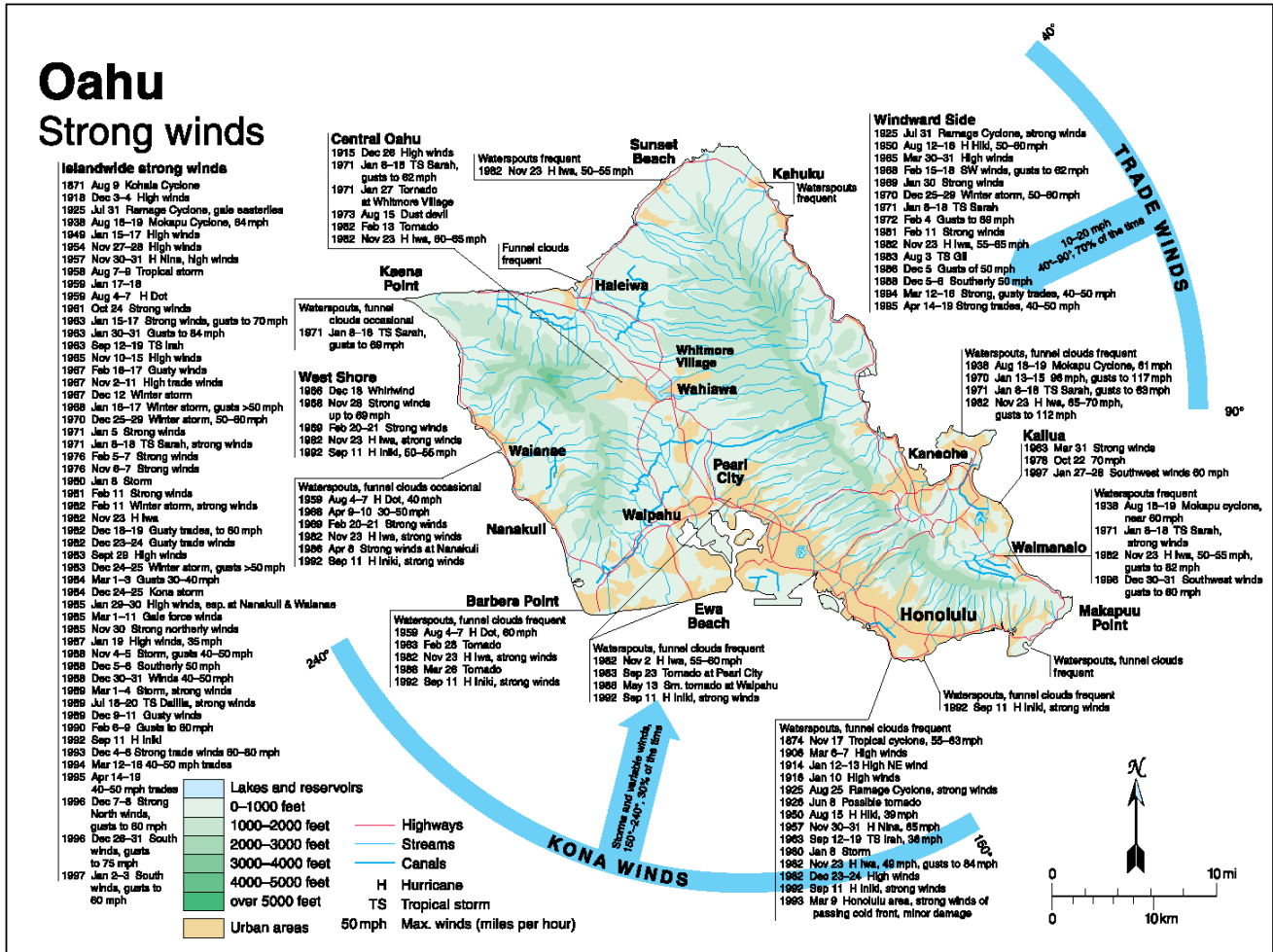




Figure E-7. Historic Occurrences of Strong Winds from All Storms Until 1997, Maui

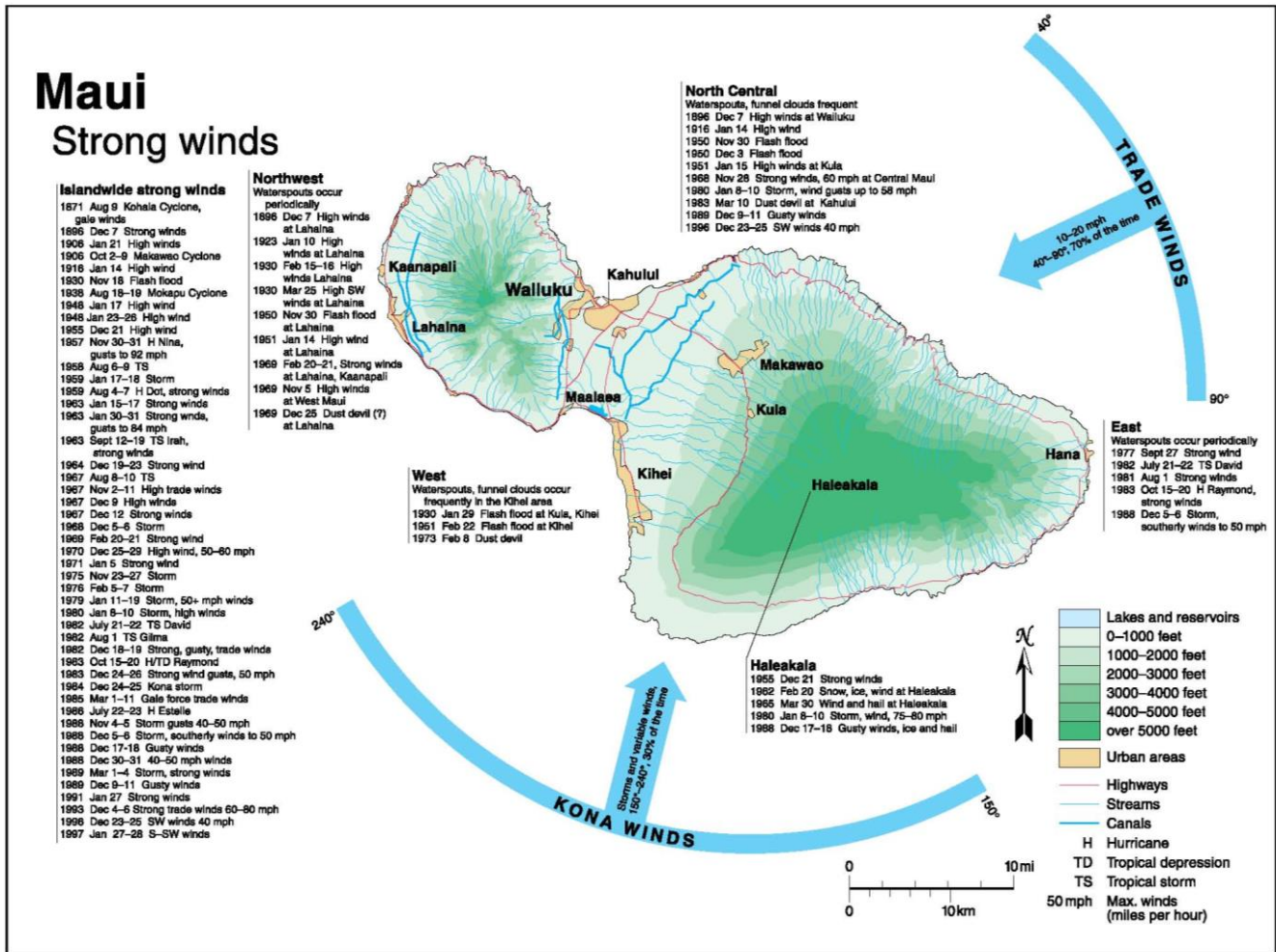






Figure E-8. Historic Occurrences of Strong Winds from All Storms Until 1997, Islands of Moloka'i and Lāna'i

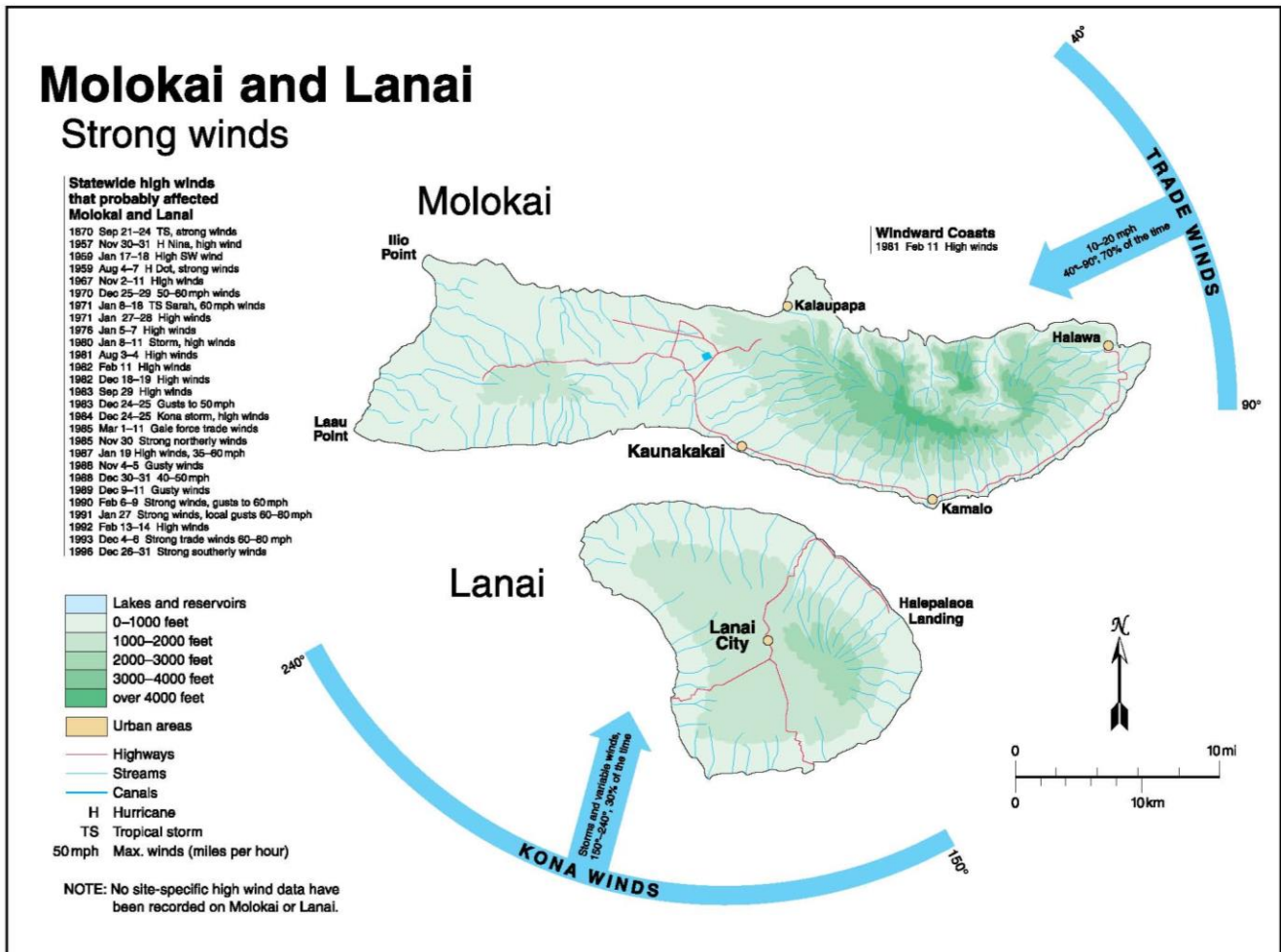
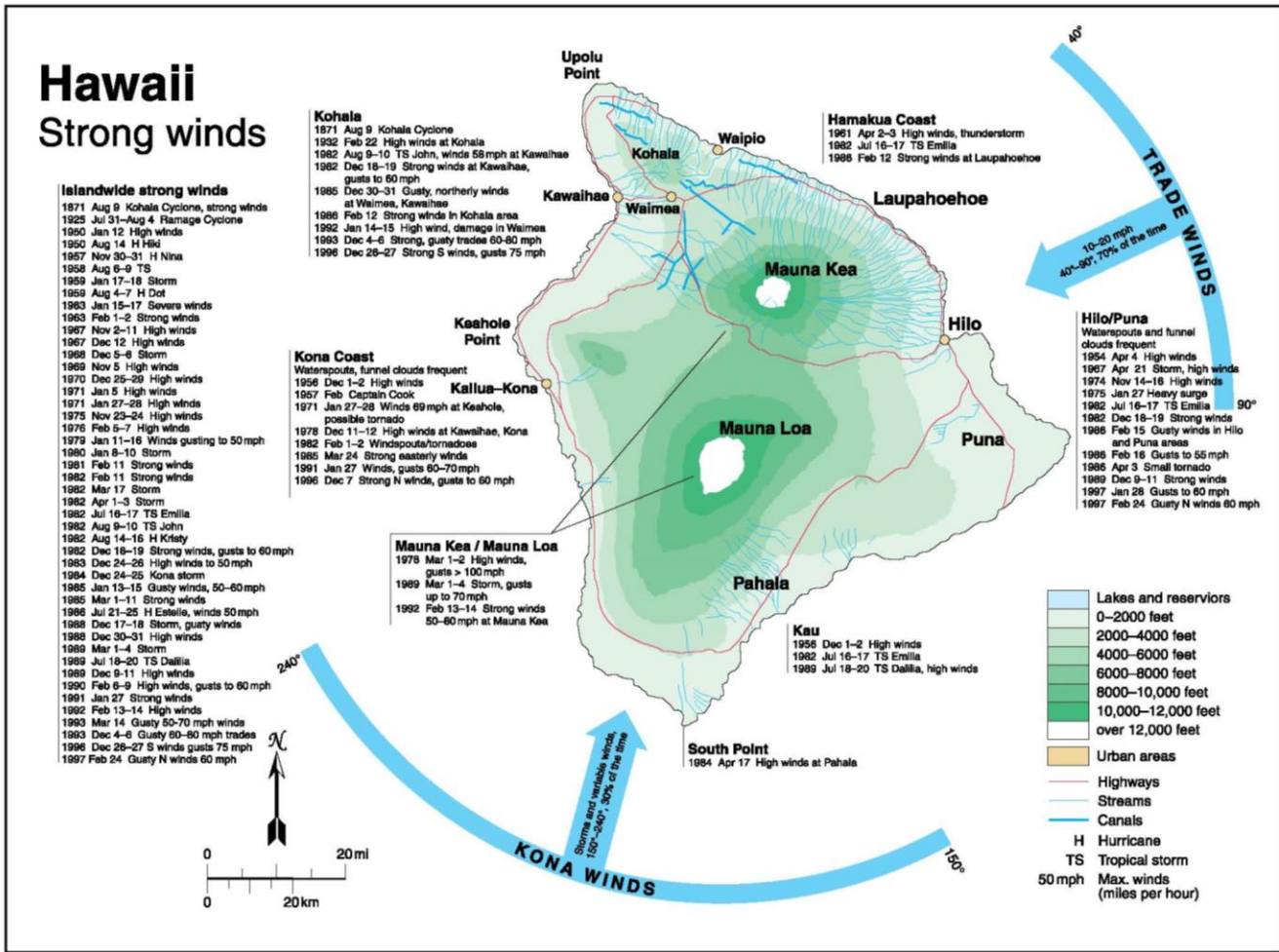




Figure E-9. Historic Occurrences of Strong Winds from All Storms Until 1997, Island of Hawai'i



## E.10 Hurricane

The following presents hurricane events that occurred in the State of Hawai'i between 1871 and 2017, as presented in the 2013 and 2018 HMPs. The information is reproduced as documented in the 2013 and 2018 plans.

On the island of Kaua'i, numerous high wind events have affected the entire island, and many were associated with passing storms. Hurricanes Dot (1959), 'Iwa (1982), and Iniki (1992) were exceptionally damaging. Hurricane Dot packed sustained winds of 75 mph with gusts of 165 mph as it passed directly over the island of Kaua'i. Winds and flooding led to \$5.5-6 million (at the time) in agricultural losses and hundreds of houses and trees were damaged.

Hurricanes 'Iwa and Iniki both produced high waves ranging 20-30 feet and winds over 125 mph. Although Hurricane 'Iwa passed to the northwest of the island of Kaua'i, the high surf it produced, combined with a 5-6 foot storm surge, flooded 600 feet inland in areas between Kekaha and Po'ipu and caused \$312 million in damage. Ironically, despite the massive flooding and wind damage to the Po'ipu area, redevelopment following 'Iwa





occurred in precisely the same location, only to be devastated 10 years later by Hurricane Iniki. Today, these same areas are once again densely developed.

On September 11, 1992, Hurricane Iniki, the strongest and most destructive hurricane to hit the Hawaiian Islands, made landfall just west of Port Allen on the island of Kaua‘i’s south shore. Iniki's winds were sustained at 130 mph and gusts topped 160 mph. Winds and waves destroyed 1,421 houses and caused minor to heavy damage to some 13,000 houses. Although Hurricanes ‘Iwa and Iniki did not strike the island of O‘ahu directly, communities on O‘ahu’s Wai‘anae Coast and Wahiawā-Mililani suffered severe damage.

Of course not all of the storms make landfall in Hawai‘i and actual hurricane strikes in Hawai‘i are relatively rare in modern record. Those hurricanes that head north to the east of the Islands cross colder water and tend to dissipate before reaching the Islands. Tropical Storm Felicia (2009) is a recent example of this degradation of intensity over cooler waters. More commonly, near misses that generate large swell and moderately high winds causing varying degrees of damage are the hallmark of hurricanes passing close to the islands.

Table E-15, Table E-16, and Table E-17 provide a summary of significant Hawaiian hurricanes over the last century along with the estimated damage from each hurricane

**Table E-15. Significant Hawaiian Hurricanes of the 20th Century**

Name	Date	Damage (1990 Dollars)	Deaths
Mokapu Cyclone	1938 Aug 19	Unknown	Unknown
Hiki	1950 Aug 15	Unknown	Unknown
Nina	1957 Dec 2	\$900,000	4
Dot	1959 Aug 6	\$28,000,000	0
‘Iwa	1982 Nov 23	\$394,000,000	1
Iniki	1992 Sept 11	\$2,800,000,000	4

**Table E-16. Historical Tropical Cyclones Affecting the Hawaiian Islands**

Date	Tropical Cyclone
1871 Aug 9	Kohala Cyclone, gale winds
1925 July 31	Ramage Cyclone
1938 Aug 18-19	Mokapu Cyclone
1948 Jan 23-26	High winds
1950 Aug 15	Hurricane Hika
1957 Nov 30-31	Hurricane Nina, gusts to 92 mph.
1958 Aug 6-9	Tropical Storm
1959 Aug 4-7	Hurricane Dot, strong winds
1963 Sept 12-19	Tropical Storm Irah, strong winds
1967 Aug 8-10	Tropical Storm
1971 Jan 8-18	Tropical Storm Sarah
1982 July 21-22	Tropical Storm Daniel
1982 Aug 1	Tropical Storm Gilma
1982 Nov 23	Hurricane ‘Iwa
983 Oct 15-20	Hurricane/Tropical Depression Raymond
1986 July 22-23	Hurricane Estelle, rain and high surf





Date	Tropical Cyclone
1989 July 18-20	Tropical Storm Dalilia
1992 Sept 11	Hurricane Iniki, heavy rain, high winds, and high surf
1993 July 16	Hurricane Fernanda, rain and high surf
1994 July 14	Tropical Storm Daniel, moderate surf
1994 July 24	Tropical Storm Fabio, heavy rainfall
1999 Aug 15	Hurricane Dora, mild rain
2003 Sept 1	Hurricane/Tropical Storm Jimena, 4 to 8-foot swell
2004 Aug 3	Hurricane Darby, heavy rain and 4 to 8-foot swell
2005 Sept 22	Hurricane/Tropical Storm Jova, 8 to 12-foot swell
2005 Sept 30	Hurricane/Tropical Storm Kenneth, 8 to 10-foot swell
2007 Aug 13	Hurricane Flossie, rain
2009 Aug 10	Hurricane/Tropical Storm Felicia, rain

**Table E-17. Tropical Storm and Hurricane Events in the State of Hawai'i, 2012–2017**

Date(s) of Event	Event Type	Counties Affected	Description
July 26 to 30, 2013	Tropical Storm Flossie	Maui and Hawai'i	Tropical Storm Flossie affected the state, bringing high surf, thunderstorms, heavy rain, flash flooding and strong winds. Strong winds downed trees and power lines across the state, closing roads and leading to power outages. Widespread power outages were reported on the Islands of Hawai'i, Maui and Moloka'i. There were several injuries reported due to lightning strikes. The state EOC was activated during this event. Total cost of damages was not readily available for this event.
August 4 to 21, 2014	Tropical Storm Iselle (FEMA-DR-4194)	City and County of Honolulu, Maui, and Hawai'i	<p>Tropical Storm Iselle brought heavy rain, strong winds, downed trees and wires, and widespread power outages. Overflowing streams flooded roadways in throughout the State of Hawai'i. There were over 200 reports of damage to homes and businesses and over 100 reports of infrastructure issues (downed utility poles and power lines; damaged roadways). Agriculture was heavily impacted by the storm with approximately 50% of the state's papaya crop destroyed (an estimated \$55 million loss). The storm also caused damage to other crops; including flowers, macadamia nuts, and coffee. Estimated total losses ranged from \$148 million to \$325 million.</p> <p>On September 5, 2014, Governor Neil Abercrombie requested a major disaster declaration due to Tropical Storm Iselle during the period of August 7 to 9, 2014. The Governor requested a declaration for public assistance for three counties and hazard mitigation statewide. On September 12, 2014, President Obama declared that a major disaster existed in the State of Hawai'i. The declaration made public assistance available to state and eligible local governments and certain private non-profit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the Tropical Storm Iselle in the City and County of Honolulu, County of Maui, and County of Hawai'i. Total public assistance was estimated at over \$8 million, with over \$4.9 million obligated.</p>
October 13 to 19, 2014	Hurricane Ana	Kaua'i and Hawai'i	Hurricane Ana brought heavy rain to the Counties of Kaua'i and Hawai'i. The system also generated isolated thunderstorms that moved westward. The swell from the hurricane produced high surf that ranged from 8 to 15 feet along the south shores of the islands. Roads were closed throughout the impacted areas due to flash flooding. The state EOC was fully activated as a result of this event. Overall, there were no reports of significant property damage or injuries associated with Hurricane Ana.





Date(s) of Event	Event Type	Counties Affected	Description
July 31 to August 5, 2015	Tropical Storm Guillermo	Kaua'i, Maui, and Hawai'i	A swell from Tropical Storm Guillermo produced surf of 10 to 20 feet along the east-facing shores of the Islands of Kaua'i, O'ahu, Moloka'i, Maui, and Hawai'i. The high surf forced county officials to close beaches in the Counties of Maui and Hawai'i. The high water also brought debris onto coastal roads near inundated areas. There were no reports of significant property damage or injuries associated with Tropical Storm Guillermo. County EOCs were partially activated as a result of this event.
August 20 to 24, 2015	Hurricane Kilo	Honolulu, Maui, and Hawai'i	On August 20, 2015, from west to east, Hurricane Kilo was located 1,200 miles west-southwest of the City and County of Honolulu. It passed over the southern end of the state, bringing heavy rain, thunderstorms, and flash flooding to the area. Many roads were closed throughout the impacted counties due to flash flooding. Several schools were closed for several days due to flooded roadways and power outages. On O'ahu (City and County of Honolulu), sewers overflowed and water was coming through manholes. Thousands of gallons of water escaped from the sewer system. All county EOCs were monitoring the situation. There were direct impacts to Johnston Island and portions of the Northwestern Hawaiian Islands.
August 26 to September 4, 2015	Hurricane Ignacio	Kaua'i, City and County of Honolulu, Maui, and Hawai'i	On August 30, 2015, from west to east, Hurricane Ignacio was located 515 miles east-southeast of Hilo (County of Hawai'i). A swell from the storm generated surf of 10 to 20 feet along the east-facing shores, and 6 to 8 feet along the south-facing shores of all the islands except Lāna'i. The unusually high surf on eastern shorelines led to the occasional deposited sand and other debris on roadways along the coastlines. There were no reports of serious property damage; however, there was one injury reported on O'ahu (City and County of Honolulu). All EOCs were monitoring the event. There were direct impacts to Johnston Island and portions of the Northwestern Hawaiian Islands.
September 2 to 9, 2015	Hurricane Jimena	Kaua'i, City and County of Honolulu, Maui, and Hawai'i	On August 30, 2015, from west to east, Hurricane Jimena was located 1,815 miles east-southeast of Hilo. Remnants of Hurricane Jimena moved north of the state. It brought heavy rain and flooding over parts of the state. Roads were closed due to flooding of local streams and creeks. All EOCs were monitoring this event. There were direct impacts to Johnston Island and portions of the Northwestern Hawaiian Islands.
September 22, 2015	Tropical Storm Niala	Kaua'i, City and County of Honolulu, Maui, and Hawai'i	All state and county EOCs were monitoring the event.
October 2 to 5, 2015	Tropical Storm Oho	Kaua'i, City and County of Honolulu, Maui, and Hawai'i	All state and county EOCs were monitoring the event.
October 20 to 23, 2015	Hurricane Olaf	Kaua'i, City and County of Honolulu, Maui, and Hawai'i	A swell from Hurricane Olaf produced surf of 10 to 20 feet along the east-facing shores of the Island of Hawai'i, 8 to 12 feet along the east-facing shores of the Island of Maui, and 6 to 9 feet along the south-facing shores of all the major islands of the state of Hawai'i. Several roadways were inundated by several inches of water. There were no significant injuries or property damage reported. All EOCs were monitoring the event.

Sources: NOAA-NCEI 2018; FEMA 2018; State of Hawai'i 2018; NOAA 2015

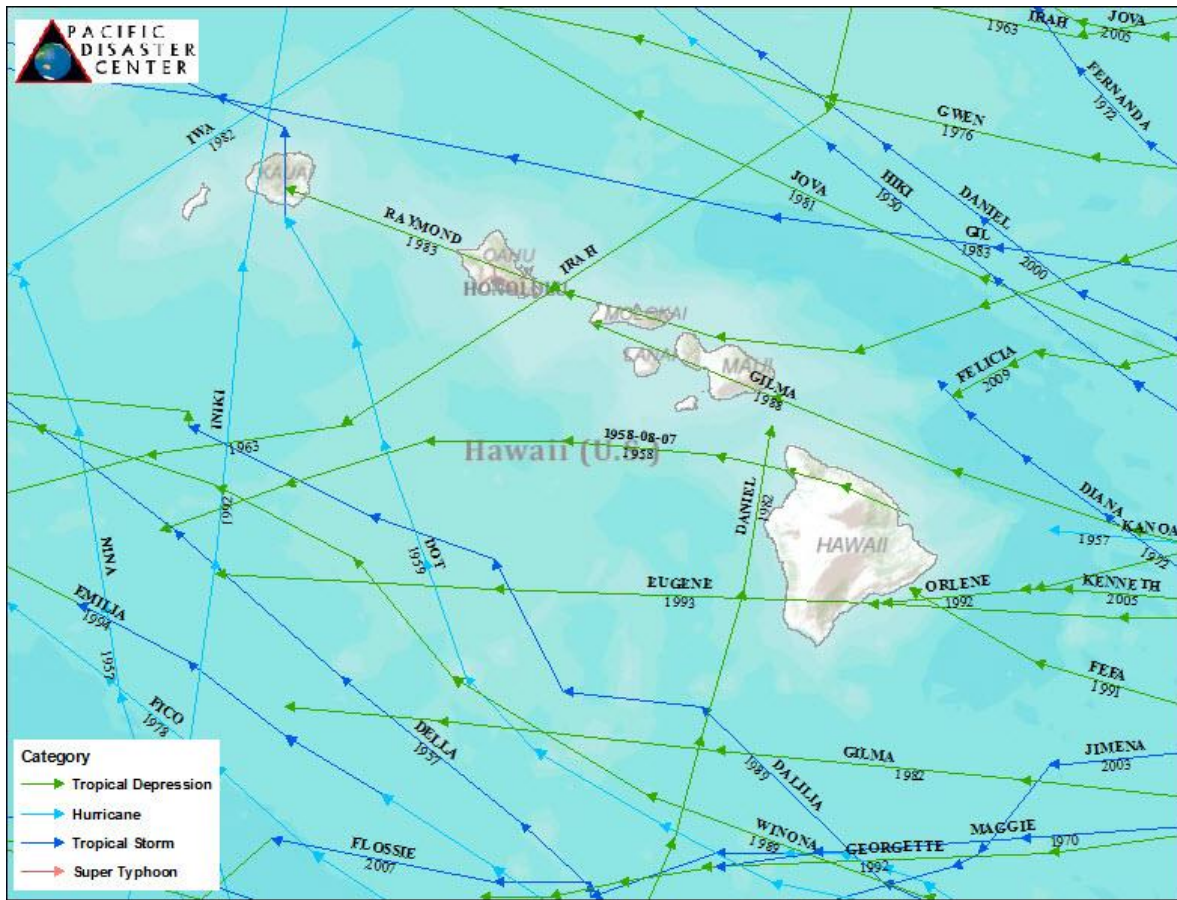
Note: Hurricane documentation for the State of Hawai'i is extensive and not all sources have been identified or researched. Additionally, loss and impact information for many events could vary depending on the source. Therefore, Table 4.10-3 may not include all events that have occurred in the state and the accuracy of monetary figures discussed is based only on the available information identified during research for this 2018 HMP Update.

- DR Major Disaster Declaration (FEMA)
- EOC Emergency Operations Center
- FEMA Federal Emergency Management Agency
- NCEI National Centers for Environmental Information
- NOAA National Oceanic and Atmospheric Administration



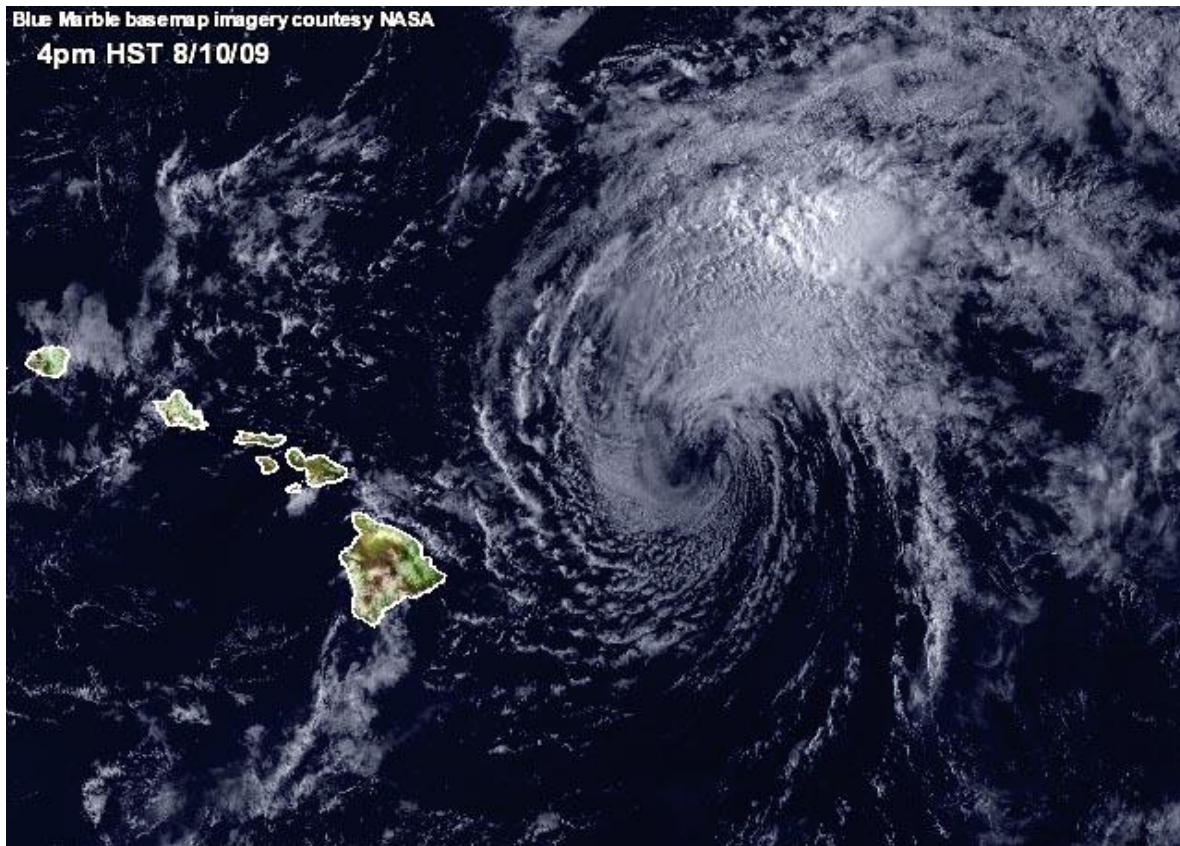


Figure E-10. Historical Storm Tracks in the Vicinity of Hawai'i





*Figure E-11. Tropical Storm Felicia Approaching Hawai'i on August 10, 2009*



## E.11 Landslide and Rockfall

The following presents landslide and rockfall events that occurred in the State of Hawai'i between 1871 and 2017, as presented in the 2013 and 2018 HMPs. The information is reproduced as documented in the 2013 and 2018 plans.

Many sources from FEMA, USGS, and DLNR provided information regarding previous occurrences and losses associated with landslide and rockfall events throughout the State of Hawai'i. The 2018 HMP discussed specific landslide and rockfall events that occurred in the state between January 1, 2012 and December 31, 2017. However, due to the heavy rains, flooding, and mud/rockslides that caused damages and losses to areas in the City and County of Honolulu and the County of Kaua'i during the time of the 2018 HMP Update, the April 2018 event was included. Table E-18 lists major landslide and rockfall events that occurred in the state between 2012 and 2017, with the addition of the April 2018 event





**Table E-18. Landslide Events in the State of Hawai‘i, 2012–April 2018**

Date(s) of Event	Event Type and Federal Disaster Declaration (if applicable)	Counties Affected	Description
2012 Mar 3-11	Severe Storms, Flooding, and Landslides (FEMA-DR-4062)	Kaua‘i, Honolulu, and Maui	On March 3 and 4, an upper trough in the vicinity of the Hawaiian Islands brought heavy rain, landslides, and flash flooding to the County of Kaua‘i and the City and County of Honolulu. Numerous roads and bridges were closed throughout the impacted counties due to flooding. The City and County of Honolulu EOC was activated. This event resulted in a FEMA declaration for the counties of Kaua‘i and Maui. A total of \$3.6 million in public assistance was approved for the impacted counties.
2012 Apr 4	Rockfall	Honolulu	Boulders fell from loose soil and damaged homes and roadways along Kula Kōlea Place in Kāhili Valley. Three homes were damaged, two severely. There were no injuries, but nine homes were evacuated. Several other boulders on the hillside needed to be stabilized or removed to prevent further damage, at a cost of \$150,000.
2016 May 16	Flash Flood, Landslide	Honolulu	Rocks fell on a portion of the Pali Highway. The Honolulu Emergency Operations Center was activated.
2016 Sept 11-14	Severe Storms, Flooding, Landslides, and Mudslides (FEMA-DR-4282)	Maui and Hawai‘i	<p>As a weak tropical disturbance with abundant low-level moisture moved through the Hawaiian Islands, an upper low moved in from the northwest. This combination generated heavy showers and thunderstorms, which then resulted in landslides, mudslides, and flash flooding over the County of Maui. In the County of Hawai‘i, flash flooding was reported closing roadways in the Mountain View area of the county. Other parts of the state received heavy rainfall as well. Overall damages were estimated at \$15 million and created approximately 9,000 truckloads of debris.</p> <p>On September 27, 2016, Governor Ige requested a major disaster declaration due to this event. On October 6, 2016, President Obama declared that a major disaster existed in the State of Hawai‘i. The County of Maui was included in the declaration. Public assistance for the event reached over \$7.4 million.</p>







Date(s) of Event	Event Type and Federal Disaster Declaration (if applicable)	Counties Affected	Description
2018 Apr	Heavy Rains, Flooding, and Mud & Rock Slides (FEMA-DR-4365)	Honolulu and Kaua'i	<p>Heavy rains and flooding caused damages and losses to areas in Honolulu and Kaua'i. According to NOAA, a rain gauge on Kauai's North Shore recorded 49.69 inches of rain in 24 hours. In Kaua'i County, heavy rain caused extensive damage to the slopes adjacent to Kūhiō Highway and impacted the communities of Wainiha and Haena. Multiple landslides led to the closure of the road. Numerous road closures reported in the impacted areas. Many homes were damaged or destroyed. American Red Cross conducted damage assessments and distributed clean up kits to residents in Aina Haina, Niu Valley, Kuliouou, Waimanalo, and Kailua. In Kaua'i County, the American Red Cross opened five shelters. Ten residents from Wainiha were airlifted to be taken to a shelter. Between April 13<sup>th</sup> and 19<sup>th</sup>, the Red Cross provided shelter to 110 individuals on Kaua'i.</p> <p>Governor Ige declared the District of Hanalei in Kaua'i County a disaster area. This declaration provided relief for damage caused by the event. Details regarding monetized impacts are not available at the time of this plan update</p>

**E.11.1 COUNTY OF KAUA'I**

Soil avalanches or landslides taking place on the western side or even northern side of the island of Kaua'i. Soil avalanches may leave bright scars on the hillside for months. A good example is a slide that occurred in Olokele Canyon in October 1981. The slide face was about 300 meters wide and about 800 meters high (about a thousand feet wide by 2,400 feet high) – a slide of tremendous proportions. This particular slide was caused by a combination of high rainfall and underground water seepage. Features and processes like this are responsible for much of the valley development, cliff faces, and other geologic features in the Hawaiian archipelago.

**E.11.2 CITY AND COUNTY OF HONOLULU**

The hazards of debris flows in the Honolulu District were exhibited during the New Year's Eve storm of 1987-1988. Most of the damage occurred in the eastern part of the Honolulu District. Debris flows directly impacted several homes in Kuli'ou'ou and Haha'ione valleys. Debris from a number of landslides clogged a drainage structure, and caused severe flooding in Haha'ione Valley. The storm also triggered a large landslide high in the Kūpaua valley that sent tons of mud, rock, and other debris downstream into lower Niu Valley, obstructing drainage channels and flooding a number of homes and a shopping center. Fortunately, no lives were lost, and the damage to private property was light, in view of the severity of the storm and the hundreds of debris flows it produced. Total damage from the storm nevertheless, sufficient to warrant a federal disaster declaration.

- May 9, 1999 - a landslide killed seven hikers and injured many more at Sacred Falls State Park, near Hau'ula on the north shore of the island. One of the injured hikers later died of injuries received in the landslide. The governor of Hawai'i at the time, Ben Cayetano, closed the park due to concern about continuing landslide hazard near the falls.





- March 2000 - notable rockfalls include a Waimea Bay rockslide which hit two cars and resulted in total closure of highway 83 affecting 6,000 vehicles a day for more than two weeks. Emergency design and construction of a realigned roadway cost \$10 million.
- August 9, 2002 – Dara Rei Onishi, 26 was killed when a 5-ton boulder hit her family’s Nu’uanu home as she slept. This was the worst of two incidents on Henry Street.
- October 15, 2002 - rockslide at Makapu’u Point closed a lane of highway 72, affecting 10,200 vehicles a day for several months.
- November 28, 2002 - on Thanksgiving Day, a rockslide brought down two boulders from a hillside above the Lalea condominium in Hawai’i Kai that slammed into parked cars, prompting the evacuation of 26 families for 11 months.
- February 14, 2003 - a 4-by-3-foot boulder rumbled down a hillside in Wai’alae Nui and came to rest 20 feet from a house.
- May 11, 2004 – Thi Vo Hamakado of Henry Street was saved when she jumped out of the path of a 1-1/2-ton boulder that barreled out of the tree line behind her Nu’uanu Valley home.
- April 17, 2006 – The state shut down Kamehameha Highway near Waimea Bay after a slide of rocks and debris, chain-link fencing and netting the state installed after the 2000 slide was in place, but the new slide occurred at an unprotected area.
- August 24, 2007 – A U.S. Army Corps of Engineers project removed five large boulders perched above homes on Ala Mahina Street in Moanalua Valley, at a cost of \$309,000.
- November 4, 2007 – A fall rainstorm led to two separate incidents of 4-foot boulders striking homes, one in Pālolo Valley and one in Hao Street in upper ‘Āina Haina.
- January 7, 2009 – A rock 28 inches across slammed into the back of a Kahawalu Drive home in Nu’uanu.
- January 22, 2010 – Two large boulders rumbled down a hillside in Kalihi Valley and crashed through a chain-link fence above an apartment complex, hit a wall and came to rest on a patio. Nine families were temporarily displaced.
- April 11, 2012 – Five boulders fell from a steep hillside and caused substantial damage of two homes on Kula Kolea Place, Kalihi Valley. The state appropriated funds to remove remaining boulders from private property above the homes.

Debris flows triggered by the New Year’s Eve storm were not a unique occurrence in the history of Honolulu. The most recent disaster involving debris flow on the island of O’ahu occurred in 2006 when a sustained period of heavy rain from February through April caused a number of instances of flooding and mudslides on O’ahu and Kaua’i. On O’ahu this included debris flow and mudslides onto Highway 61 (Kailua road) causing closures of the road. In another incident, a mudslide buried cars and other property on Maunaloa road in Makiki. There were further reports of mudslides on Pu’uhonua Street and flooding in Mānoa. Kahala Mall was also flooded causing closure of many of the stores and theaters for up to 9 months.





### E.11.3 COUNTY OF MAUI

#### ISLAND OF MAUI

On September 14, 2004, a female ranger at Haleakalā National Park was fatally injured while trying to clear a rockslide on Pi'ilani Highway (State Highway 31) near Kīpahulu. The ranger was on duty when she was hit by a falling rock from the nearby hillside while removing rocks on the narrow road.

On the first week of December of 2007, a strong Kona storm hit the Island of Maui causing runoff induced debris flows across several roads and highways. In the Kīhei area, runoff from gathering from the slopes of Haleakalā volcano pushed boulders and debris onto Pi'ilani Highway (State Highway 31) forcing temporary closure of the road. Similarly, the storm's runoff carried debris across portions of Honoapi'ilani Highway (State Highway 30) near Nāpili in East Maui. The storm also generated debris flows in the Kula region of upcountry Maui. For instance, mud, rocks, and loosen vegetation were carried across Lower Kula Road. More noteworthy is the case of a debris flow across Polipoli Road also in the Kula region. In this case, debris including remains of a private residence, forced the closure of the road for several days until county crews removed all the leftovers from the debris flow.

On March 21, 2009, a mudslide on northeast Maui forced the closure of the Hāna Highway (State Highway 360). The incident occurred at 9:30 a.m. near mile-post 21, approximately two miles on the Ke'anae side of Pua'a Ka'a State Wayside Park. State and county public works crew cleared the mud and debris using heavy equipment. The highway reopened five hours after the mudslide. The County said the area had not been identified as a potential slide-problem area, but that wet weather in the few weeks before the incident may have saturated the soil resulting in the slide.

On April 23, 2009, another landslide occurred at the same location of the Hāna Highway following an episode of intense rainfall. The landslide occurred at 10:00 p.m. and forced the closure of the highway in both directions between mile-post 19 near the Wailua lookout and mile-post 21. The cleanup work on both lanes had to be postponed until the morning of the 24th due to unsafe conditions resulting from nighttime wet weather. After the partial removal of rocks and debris on the morning of the 24th, the highway reopened intermittently for a few days until cleanup work was completed.

Also on April 23, 2009, a rockfall occurred on Kahekili Highway (State Highway 340) at around 5:00 p.m. The rockfall resulted in large boulders blocking the highway near Waihale Gulch resulting in the closure of the road near mile-post 15. Debris removal began the morning of the 24th and extended well into the afternoon.

#### ISLANDS OF MOLOKA'I AND LĀNA'I

In 1871, the Lāna'i Earthquake had a magnitude of 7 or greater. Massive rockfalls and cliff collapse occurred on Lāna'i as a result of the event. Houses and churches were flattened on the island of Maui and Moloka'i and land slippage was reported in Waianae and Lahaina. The 1938 Maui Earthquake was assigned a magnitude of 6.7-6.9 with an epicenter located only 6 miles north of the island of Maui. Landslides forced the closure of the road to Hāna, and long sections of the highway collapsed into the sea.





On November 5, 2007, heavy rains resulted in rockfalls and debris flows along different portions of Kamehameha V Highway (State Highway 450) on the east side of the island of Moloka'i. In the case of the island of Lāna'i, there are no available records of any historic landslides, debris flows, or rockfalls.

#### E.11.4 COUNTY OF HAWAII

The largest Hawaiian earthquake in recorded history occurred in 1868 beneath the Ka'ū district on the southeast flank of Mauna Loa. The earthquake caused a mudflow that killed 31 people. The second most destructive earthquake in Hawai'i occurred on Kīlauea's south flank in Kalapana, November 29, 1975. The earthquake caused 11 feet of the Kalapana coast to subside, triggering a tsunami. Damage can be reduced by land-use zoning that restricts building on or near steep slopes that can fail during an earthquake and in areas underlain by materials that are likely to amplify the ground motion of a strong earthquake.

## E.12 Terrorism

Specific events involving terrorism were not discussed in the 2013 and 2018 SHMPs.

## E.13 Tsunami

The following presents tsunami events that occurred in the State of Hawai'i between 1812 and 2017, as presented in the 2013 and 2018 HMPs. The information is reproduced as documented in the 2013 and 2018 plans.

The recorded history of tsunamis in Hawai'i encompasses several phases according to the availability of recorded data. During the 19th century, numerous tsunamis were reported in newspapers, weeklies, and books written by residents at the time. The cause of tsunamis was not generally known, nor was the origin in terms of whether the tsunami was the result of a seismic event in a distant source such as the Aleutian Islands of Alaska or a local submarine landslide in the Hawaiian Islands. Toward the end of the 19th century, seismological stations became available to record and locate earthquakes. Through the instruments in these stations, it became easier to associate distant earthquakes with tsunamis in Hawai'i. The establishment of the Hawai'i Volcano Observatory in 1912 brought the expertise needed to accurately determine the origin and causes of local earthquakes and tsunamis in the islands. After the 1946 tsunami, the Tsunami Warning System was established and a group of experts was constituted to track and document origin, wave heights, and other data pertinent to tsunamis.

Up to May of 2013, twenty-eight tsunamis with run-up heights greater than 3.3 feet (1 meter) have made landfall in the Hawaiian Islands during recorded history and 4 have had significant damaging effects. In fact, tsunamis in the Hawaiian Archipelago have cumulatively killed the largest number of people of all natural hazards affecting the islands. Tsunamis reaching the Hawaiian Islands have exhibited tremendous variability in terms of their run-up heights, inundation distances, and the damage they have inflicted. Table E-19 and Table E-20 list tsunamis affecting the state of Hawai'i with run-up heights greater than 3.3 feet (1 meter). To complement the aforementioned table, Table E-21 lists tsunami destruction in the state of Hawai'i.





**Table E-19. Tsunamis Affecting Hawai'i, 1812–2012**

TSUNAMIS AFFECTING HAWAII, 1812-2002 (> 1 M RUNUP)											
Yr	Mo	Day	Ms	MM	Runup (m)	Runup (ft)	Runup Station Location	Source	Notes (H=Hawai'i, M=Maui, Mo=Molokai, O=O'ahu, K=Kauai'i)		
1812	12/21/1812	12	21		3	10	Ho'okena, Hawai'i	S. California?	1 (H)		
1819	4/12/1819	4	12		2	7	W. Hawai'i, Hawai'i	North Coast Chile	1 (H)		
1837	11/7/1837	11	7		6	20	Hilo, Hawai'i	South Coast Chile	3 (H,M,O)		
1841	5/17/1841	5	17		4.6	15	Hilo, Hawai'i	Kamchatka	3 (H,M,O)		
1860	12/1/1860	12	1		3.6	12	Maliko, Maui	N. Pacific?	2 (M)		
1868	8/13/1868	8	13		4.5	15	Hilo, Hawai'i	North Chile	6 (H,M,O,K)		
1868	10/2/1868	10	2		6.1	20	Kahaualea, Hawai'i	S. Pacific?	1 (H)		
1869	7/24/1869	7	24		8.2	27	Puna Coast, Hawai'i	S. Pacific?	2 (H,M)		
1871	2/20/1871	2	20	7				Off Lanai?			
1872	8/23/1872	8	23		1.3	4	Hilo, Hawai'i	Aleutians	1 (H)		
1877	5/10/1877	5	10		4.8	16	Wai'akea, Hawai'i	N. Chile	8 (H,M,O)		
1896	6/15/1896	6	15		5.5	18	Keauhou Landing, Hawai'i	Japan	15 (H,M,K)		
1868	4/2/1868	4	2	7.9	XI	13.7	Keauhou Landing	Ka'u	many observations		
1908	9/21/1908	9	21	6.8	VI	1.2	4	Hilo, Hawai'i	Mauna Loa NE Rift	1 (H)	
1919	10/2/1919	10	2	6.1		4.3	14	Ho'opuloa, Hawai'i	South Kona (landslide possibly)	3 (H), Hoopuloa submarine landslide	
1926	3/20/1926	3	20		1.5			Off Wailupe, Oahu			
1951	8/21/1951	8	21	6.9	VIII	1.2	4	Ho'okena, Hawai'i	South Kona		
1952	3/17/1952	3	17	4.5	V	3	10	Kalapana, Hawai'i	Kilauea South Flank	1 (H)	
1975	11/29/1975	11	29	7.2	VIII	14.3	47	Keauhou Landing, Hawai'i	Kilauea South Flank	many observations (H), 2 deaths/19 injured, <b>\$4.1 million</b> ; 32 campers at foot of Pu'u Kapukapu - rocks fell pushing them to beach where waves started 1) 1.5 m wave, 2) 7.9 m (26-ft) wave carried campers into crevice/ditch saving them from being carried to sea; subsidence 3-3.5 m (11.5ft)Halape	
1901	8/9/1901	8	9	7.8		1.2	4	Ho'opuloa, Kailua-Kona, Hawai'i	Vanuatu		
1906	1/31/1906	1	31	8.1		1.8	6	Hilo, Hawai'i	Ecuador		
1906	8/17/1906	8	17	8		3.6	12	Ma'alea, Maui	Chile		
1918	9/7/1918	9	7	8		1.5	5	Hilo, Hawai'i	Kurils		
1922	11/11/1922	11	11	8.1		2.1	7	Hilo, Hawai'i	Chile		
1923	2/3/1923	2	3	8.1		6.1	20	Hilo, Hawai'i	Kamchatka		
1933	3/2/1933	3	2	8.3		3.3	11	Ka'alualu, Hawai'i	Japan		
1946	4/1/1946	4	1	7.1		16.4	54	Waikolu Valley, Moloka'i	Aleutians	159 deaths, <b>\$26 million</b> , in Hilo (3800 km), 8-m waves, every house facing bay washed across st/smashed	
1952	11/4/1952	11	4	8.2		9.1	30	Ka'ena Point, Oahu	Kamchatka	<b>\$0.8-1.0 million</b>	
1957	3/9/1957	3	9	8.1		16.1	53	Kauai, Kauai	Aleutians	<b>\$5 million</b> , arr Laie, Oahu (3600 km away) 12ft wave	
1960	5/22/1960	5	22	8.5		10.7	35	Hilo, Hawai'i	Chile	61 deaths, <b>\$26.5 million</b>	
1964	3/28/1964	3	28	8.4		4.9	16	Waimea Bay, O'ahu	Alaska		
1965	2/4/1965	2	4	8.2		1.1	4	North Kauai, Kauai	Aleutians	2 observations on Kauai	
EQ - NO TSUNAMI											
1983	11/16/1983	11	16	6.6				Kao'iki	Ext damage SE Hawai'i, <b>&gt;\$6 million</b>		
1989	6/25/1989	6	25	6.1				Kalapana	SE Hawai'i, <b>Almost \$1 million</b>		
2011	3/11/2011	3	11	9.0				Honshu, Japan			
					covert m-ft	3.286713					

**Table E-20. Tsunami Events in Hawai'i, 2012–2017**

Date(s) of Event	Event Type	Counties Affected	Description
2012 Oct 28	Tsunami Runup	Honolulu, Maui, Kaua'i, and Hawai'i	<p>The source of the tsunami was in British Columbia, Canada. The maximum runup of this tsunami near the source was 13 meters. The Pacific Tsunami Warning Center issued a tsunami warning for Hawai'i. There were no reports of damage; however, one person died in a car crash on O'ahu's north shore during the evacuation. From photographs, runup was inferred to have been about one meter at Honouliwai, Moloka'i and at Kapalua, Maui. Runup was measured in all counties:</p> <ul style="list-style-type: none"> <li>• Waianea (Honolulu) had a maximum water height of 0.41 meters (tide-gauge measurement)</li> <li>• Barbers Point (Honolulu) had a maximum water height of 0.09 meters (tide-gauge measurement)</li> <li>• Lahaina (Maui) had a maximum water height of 0.28 meters (tide-gauge measurement)</li> <li>• Kahului (Maui) had a maximum water height of 0.79 meters (tide-gauge measurement)</li> <li>• Hanalei (Kaua'i) had a maximum water height of 0.19 meters (tide-gauge measurement)</li> </ul>





Date(s) of Event	Event Type	Counties Affected	Description
			<ul style="list-style-type: none"> <li>Nāwiliwili (Kaua’i) had a maximum water height of 0.03 meters (tide-gauge measurement)</li> <li>Hale’iwa (Honolulu) had a maximum water height of 0.43 meters (tide-gauge measurement)</li> <li>Mokuolo’e-Coconut Island (Honolulu) had a maximum water height of 0.09 meters (tide-gauge measurement)</li> <li>Makapu’u Point (Honolulu) had a maximum water height of 0.27 meters and 0.41 meters (tide-gauge measurement)</li> <li>Honolulu (Honolulu) had a maximum water height of 0.2 meters (tide-gauge measurement)</li> <li>Kaumalapau (Maui) had a maximum water height of 0.18 meters (tide-gauge measurement)</li> <li>Kawaihae (Hawai’i) had a maximum water height of 0.56 meters (tide-gauge measurement)</li> <li>Honokōhau (Hawai’i) had a maximum water height of 0.09 meters (tide-gauge measurement)</li> <li>Honu’apo (Hawai’i) had a maximum water height of 0.04 meters (tide-gauge measurement)</li> <li>Kapoho (Hawai’i) had a maximum water height of 0.19 meters (tide-gauge measurement)</li> <li>Hilo (Hawai’i) had a maximum water height of 0.29 meters (tide-gauge measurement)</li> </ul>
2012 Nov 7	Tsunami Runup	Maui and Hawai’i	<p>The source of the tsunami was in Guatemala. The maximum near-source runup of this tsunami was 0.35 meters. Runup was measured in the Counties of Maui and Hawai’i:</p> <ul style="list-style-type: none"> <li>Kahului (Maui) had a maximum water height of 0.07 meters (tide-gauge measurement)</li> <li>Hilo (Hawai’i) had a maximum water height of 0.06 meters (tide-gauge measurement)</li> </ul>
2013 Feb 6	Tsunami Runup	Honolulu, Maui, Kaua’i and Hawai’i	<p>The source of the tsunami was in the Santa Cruz Islands, where runup reached 11 meters and there were numerous deaths. The tsunami was measured in all counties:</p> <ul style="list-style-type: none"> <li>Waianea (Honolulu) had a maximum water height of 0.06 meters (tide-gauge measurement)</li> <li>Barbers Point (Honolulu) had a maximum water height of 0.05 meters (tide-gauge measurement)</li> <li>Lahaina (Maui) had a maximum water height of 0.12 meters (tide-gauge measurement)</li> <li>Nāwiliwili (Kaua’i) had a maximum water height of 0.01 meters (tide-gauge measurement)</li> <li>Hale’iwa (Honolulu) had a maximum water height of 0.19 meters (tide-gauge measurement)</li> <li>Makapu’u Point (Honolulu) had a maximum water height of 0.08 meters (tide-gauge measurement)</li> <li>Honolulu (Honolulu) had a maximum water height of 0.06 meters (tide-gauge measurement)</li> <li>Kaumalapau (Maui) had a maximum water height of 0.03 meters (tide-gauge measurement)</li> </ul>





Date(s) of Event	Event Type	Counties Affected	Description
			<ul style="list-style-type: none"> <li>• Kahului (Maui) had a maximum water height of 0.12 meters (tide-gauge measurement)</li> <li>• Kawaihae (Hawai'i) had a maximum water height of 0.09 meters (tide-gauge measurement)</li> <li>• Honokōhau (Hawai'i) had a maximum water height of 0.07 meters (tide-gauge measurement)</li> </ul>
2014 Apr 1	Tsunami Runup	Honolulu, Kaua'i, Hawai'i	<p>The source of the tsunami was in Northern Chile, where runup reached 4.4 meters. Runup was measured in the Counties of Honolulu, Kaua'i, and Hawai'i:</p> <ul style="list-style-type: none"> <li>• Waianea (Honolulu) had a maximum water height of 0.09 meters (tide-gauge measurement)</li> <li>• Barbers Point (Honolulu) had a maximum water height of 0.08 meters (tide-gauge measurement)</li> <li>• Nāwiliwili (Kaua'i) had a maximum water height of 0.04 meters (tide-gauge measurement)</li> <li>• Hale'iwa (Honolulu) had a maximum water height of 0.15 meters (tide-gauge measurement)</li> <li>• Makapu'u Point (Honolulu) had a maximum water height of 0.08 meters (tide-gauge measurement)</li> <li>• Waimānalo (Honolulu) had a maximum water height of 0.11 meters (tide-gauge measurement)</li> <li>• Honolulu (Honolulu) had a maximum water height of 0.06 meters (tide-gauge measurement)</li> <li>• Kaumalapau (Maui) had a maximum water height of 0.02 meters (tide-gauge measurement)</li> <li>• Kahului (Maui) had a maximum water height of 0.53 meters (tide-gauge measurement)</li> <li>• Kawaihae (Hawai'i) had a maximum water height of 0.22 meters (tide-gauge measurement)</li> <li>• Honokōhau (Hawai'i) had a maximum water height of 0.09 meters (tide-gauge measurement)</li> <li>• Honu'apo (Hawai'i) had a maximum water height of 0.04 meters (tide-gauge measurement)</li> <li>• Kapoho (Hawai'i) had a maximum water height of 0.12 meters (tide-gauge measurement)</li> <li>• Hilo (Hawai'i) had a maximum water height of 0.57 meters (tide-gauge measurement)</li> </ul>
2014 June 23	Tsunami Runup	Kaua'i, Honolulu, and Maui	<p>The source of the tsunami was in the Aleutian Islands in Alaska. The maximum measured runup in the Aleutians (though some distance from the source) was 0.17 meters. Runup was measured in the Counties of Kaua'i, Honolulu, and Maui:</p> <ul style="list-style-type: none"> <li>• Hanalei (Kaua'i) had a maximum water height of 0.05 meters (tide-gauge measurement)</li> <li>• Hale'iwa (Honolulu) had a maximum water height of 0.04 meters (tide-gauge measurement)</li> <li>• Makapu'u Point (Honolulu) had a maximum water height of 0.03 meters (tide-gauge measurement)</li> <li>• Kahului (Maui) had a maximum water height of 0.1 meters (tide-gauge measurement)</li> </ul>





Date(s) of Event	Event Type	Counties Affected	Description
2015 Sept 16	Tsunami Runup	Honolulu, Kaua'i, Hawai'i, and Maui	<p>The source of the tsunami was in Central Chile, where runup reached 13.6 meters. A tsunami watch was issued for the state of Hawai'i but was cancelled before the tsunami arrived. The tsunami was measured in all counties:</p> <ul style="list-style-type: none"> <li>• Waianea (Honolulu) had a maximum water height of 0.23 meters (tide-gauge measurement)</li> <li>• Barbers Point (Honolulu) had a maximum water height of 0.1 meters (tide-gauge measurement)</li> <li>• Nāwiliwili (Kaua'i) had a maximum water height of 0.14 meters (tide-gauge measurement)</li> <li>• Hanalei (Kaua'i) had a maximum water height of 0.03 meters (tide-gauge measurement)</li> <li>• Waimānalo (Hawai'i) had a maximum water height of 0.21 meters (tide-gauge measurement)</li> <li>• Mokuolo'e-Coconut Island (Honolulu) had a maximum water height of 0.04 meters (tide-gauge measurement)</li> <li>• Makapu'u Point (Honolulu) had a maximum water height of 0.01 meters (tide-gauge measurement)</li> <li>• Waimānalo (Honolulu) had a maximum water height of 0.21 meters (tide-gauge measurement)</li> <li>• Honolulu (Honolulu) had a maximum water height of 0.11 meters (tide-gauge measurement)</li> <li>• Kalaupapa (Maui) had a maximum water height of 0.08 meters (tide-gauge measurement)</li> <li>• Kahului (Maui) had a maximum water height of 0.65 meters (tide-gauge measurement)</li> <li>• Kawaihae (Hawai'i) had a maximum water height of 0.27 meters (tide-gauge measurement)</li> <li>• Hilo (Hawai'i) had a maximum water height of 0.91 meters (tide-gauge measurement)</li> </ul>
2016 Nov 21	Tsunami Runup	Hawai'i	<p>The source of the tsunami was in Japan off the east coast of Honshu Island. The maximum water height from this tsunami is unknown. A runup from this event was observed at the Midway Islands in Hawai'i, with a maximum water height of 0.09 meters (tide-gauge measurement).</p>
2017 Sept 8	Tsunami Runup	Honolulu, Maui, and Hawai'i	<p>The source of the tsunami was in Mexico, where runup reached 2.7 meters. The tsunami was measured in the Counties of Honolulu, Maui, and Hawai'i:</p> <ul style="list-style-type: none"> <li>• Mokuolo'e-Coconut Island(Honolulu) had a maximum water height of 0.03 meters (tide-gauge measurement)</li> <li>• Kahului (Maui) had a maximum water height of 0.18 meters (tide-gauge measurement)</li> <li>• Kawaihae (Hawai'i) had a maximum water height of an unknown height (tide-gauge measurement)</li> <li>• Hilo (Hawai'i) had a maximum water height of 0.17 meters (tide-gauge measurement)</li> </ul>







**Table E-21. Tsunami Destruction in Hawai'i**

DATE	SOURCE	DEATHS*	WHERE	Run-up**	REMARKS
1837	Earthquake in Chile	16	Hawaiian islands	6 m / 19.6 ft	14 deaths on the Big Island and 2 on Maui.
1868	Earthquake off the Big Island	47	Big Island	13.7 m / 45 ft	The earthquake also caused a landslide in Pahala that killed 37 bringing total deaths to 79.
1877	Earthquake in Chile	5	Hilo	4.8 m / 16 ft	Also 17 injured in Hilo.
1923	Kamchatka earthquake	1	Hilo	6.1 m / 20 ft	Others may have been killed (up to 12 others) and extensive damage occurred in Hilo and Kahului.
1933	Earthquake in Japan	1,600	Japan	3.3 m / 10.8 ft	No deaths in Hawaii but 17 feet waves were reported at Napoopoo.
1946	Earthquake in Aleutian islands	159	Mostly in Hilo (96) but also Kauai (15), Maui (14), & Oahu (9)	16.4 m / 53.8 ft	The largest natural disaster recorded to have occurred in Hawaii.
1952	Kamchatka earthquake	0	Hawaiian islands	9.1 m / 29.9 ft	Damage occurred on Kauai, Maui, Oahu, and in Hilo.
1957	Earthquake in the Aleutian islands	0	Hawaiian islands	16.12 m / 52.8 ft	Caused extensive damage on Kauai.
1960	Earthquake in Chile	61	Hawaiian islands	10.7 m / 35.1 ft	Over 1,000 people died in Chile, Japan, The Philippines, and Hawaii.
1964	Earthquake in Alaska	0	Hawaiian islands	4.9 m / 16.1 ft	106 people died in Alaska and 16 died on the North American coast. Damage occurred in Hilo and Kahului.
1975	Earthquake off the Big Island	2	Halape	14.3 m / 47 ft	19 others were injured.

\* For more details see Doak C. Cox, "Tsunami Casualties and Mortality in Hawaii", University of Hawaii, Environmental Center, June 1987.

\*\*Maximum run-up is the greatest height the tsunami was found to reach above the normal shore. The measurements listed are for the highest run-up recorded anywhere in Hawaii for that event (listed in meters and feet).

The tsunamis of 1868 and 1975 were locally generated by earthquakes beneath the southern coast of the island of Hawai'i. The waves produced by the 1868 tsunami destroyed several coastal villages in the Ka'u and Puna districts of the Island of Hawai'i (most of which were never rebuilt). The 1975 tsunami claimed two lives and caused widespread damage along the Kalapana coast on the East side of the island of Hawai'i.

The most devastating tsunamis to hit the state of Hawai'i in the last century occurred in 1946 and 1960. The tsunami of 1946 originated in the Aleutian Islands, and struck the Hawaiian Islands without warning. Over 170 people were killed in the Island of Hawai'i, mainly at Laupāhoehoe and Hilo where the wave heights averaged 30 feet. The maximum wave height reported on the island of Hawai'i was 55 feet at Pololū Valley on the northern tip of the island.

The May 1960 tsunami (generated by the magnitude 9.5 Great Valdivia Earthquake in Chile) was one of the most destructive to hit the Hawaiian Islands. In the town of Kahului in the island of Maui, damage estimate was about \$763,000 in the low coastal areas of the town. The waves washed inland for a distance of about 3,000 feet to ground elevations of about 6 feet. The Kahului Shopping Center and immediate vicinity received most of the





damage. This tsunami also had significant effect on the town of Hilo, on the east shore of the Island of Hawai'i. Although the arrival time of this tsunami was correctly predicted, many people failed to heed the warnings and evacuations mandated by the authorities were insufficient. As a result, 61 lives were lost as waves up to 35 feet high crashed through homes in Hilo. Whole city blocks were swept clean of all buildings, and 580 acres were flooded. \$23 Million in damages were reported in Hilo.

A much less destructive tsunami hit the island of Maui in March 1964 (generated by the magnitude 9.2 Great Alaskan Earthquake) with a recorded maximum run-up at Kahului of 12 feet and doing estimated \$53,000 (1964 dollars) damage.

In 2010, a tsunami generated by a magnitude 8.8 earthquake offshore of the Region of Maule in Chile, arrived to the Hawaiian Islands approximately at noon on February 27. Although very similar in nature to the May 22 tsunami generated by the Valdivia Earthquake also in Chile, the 2010 tsunami did not cause any damage to property, injury, or loss of life because its run-ups were much lower than those of the 1960 tsunami. The tsunami generally generated run-ups between 3 and 4 feet across all shores of all Hawaiian Islands with the higher run-ups occurring on the south and east facing shores.

Although not destructive, the latest tsunami to hit the Hawaiian Islands occurred in 2011. This tsunami was generated by a magnitude 9.0 earthquake off the coast of Tōhoku, Japan. Likewise, the 2010 tsunami created by the Chile earthquake, this tsunami did not cause any damage to property, injury, or loss of life in any of the Hawaiian Islands.

## E.14 Volcanic Hazards

The following presents volcanic hazard events that occurred in the state of Hawai'i between 1790 and 2018, as presented in the 2013 and 2018 SHMPs. The information is reproduced as documented in the 2018 plan.

The recorded history of volcanic activity in Hawai'i begins with the arrival of the Christian missionaries in the early 1800's and those that are known from oral traditions of the Hawaiians. Additional information on prehistoric eruptions is based on geologic mapping and dating of old lava flows.

For the 2018 HMP Update, volcanic events were summarized between January 1, 2012, and December 31, 2017. Major events include those that resulted in losses or fatalities, events that resulted in the activation of the state and/or county emergency operations center (EOC), and/or events that led to a FEMA disaster declaration. It should be noted that it is recognized that the Kīlauea Volcano entered a new and very damaging phase of its long-running eruption at the end of April of 2018 and this activity continues as this plan is updated. Data regarding those impacts are in the development stage.





**Table E-22. Volcanic Hazard Events in Hawai'i, 2012–2017**

Date(s) of Event	Event Type	Counties Affected	Description
2014 Sept 4 – 2015 June 27	Pu'u 'Ō'ō Volcanic Eruption and Lava Flow	Hawai'i	Lava erupted from the northeast flank of Kīlauea's Pu'u 'Ō'ō cone. Hawai'i Electric Light Company staff worked to insulate utility poles from encroaching lava flows. Staff were deployed to monitor the lava flow. Crews worked to build new roads around Pahoa in case the lava cut off access to Highway 130. One residence was destroyed, and a solid waste transfer station was temporarily out of commission.
2017 June 8	South Flank Kīlauea Volcanic Eruption and Earthquake	Hawai'i	A 5.3 magnitude earthquake occurred on the south flank of Kīlauea, due to southward spreading of the volcano. The earthquake was reported felt by about 800 people within an hour. The County of Hawai'i EOC was fully activated.
2018 May – June *	Kīlauea Volcanic Eruption and Earthquakes (DR-4366)	Hawai'i	<ul style="list-style-type: none"> <li>▪ On May 1, the USGS HVO issued a report that a migration of seismicity and deformation downrift (east) of Pu'u 'Ō'ō indicated that a large area along the East Rift Zone was potentially at risk of new outbreak, possibly in the Lower Puna area.</li> <li>▪ On May 11, FEMA issued a major disaster declaration for the State of Hawai'i due to the eruption of Kīlauea. The County of Hawai'i was included in this declaration.</li> <li>▪ On May 16, heavy de-gassing was occurring at each vent within the Leilani Estates neighborhood and the lower East Rift. The Hawai'i Fire Department reported air quality condition RED (immediate danger to health) in areas around Lanipuna Gardens and surrounding farm lots on Pohoiki Road.</li> <li>▪ On May 17, HVO indicated an explosive eruption at Kīlauea summit occurred at 4:17am. By the afternoon, HVO reported a new fissure 21 down rift of Makamae Street in Leilani Estates neighborhood. Several fissures reactivated, and flows have been generated. The HVO reported lava was Pāhoehoe. Residents were issued masks for ash protection and shelters were open for residents. Eruptions continued to occur, and fissures reactivated. Lava destroyed homes, led to road closures, caused brush fires, and residents were evacuated.</li> <li>▪ On May 20, white plumes of acid and extremely fine shards of glass billowed over the Island of Hawai'i as molten rock from Kīlauea poured into the ocean. The rate of sulfur dioxide gas shooting from the ground fissures tripled, leading County of Hawai'i to repeat warnings about air quality. At the volcano's summit, two explosive eruptions unleashed clouds of ash. Winds carried much of it toward the southwest. Since May 3, Kīlauea burned some 40 structures, including two dozen homes, since it began erupting in the Leilani Estates neighborhood. About 2,000 people were evacuated from their homes, including 300 who were staying in shelters.</li> <li>▪ May 31, 2018, Mandatory Evacuation Order in Effect for Leilani Estates</li> <li>▪ Hawaiian Volcano Observatory reports that vigorous lava eruptions continue from the lower east rift zone fissure system in the area of Leilani Estates and Lanipuna Gardens.</li> </ul>





### E.14.1 MAUNA LOA, ISLAND OF HAWAI'I

Mauna Loa has had 33 historically recorded eruptions, most of which have occurred at the summit. Approximately 25% of the eruptions have started on the east-northeast rift zone and another 25% began in the southwest rift zone. During the period from 1832 to 1950, Mauna Loa averaged one eruption every 3.6 years. Since 1950, eruption activity on Mauna Loa has slowed considerably. The two eruptions since 1950 include a 1-day summit eruption in 1975 and a 3-week eruption on the northeast rift zone which advanced to within 4 miles of Hilo.

Six eruptions from Mauna Loa have reached the ocean since 1859. The 1859 eruption on the northwest flank of Mauna Loa lasted approximately 300 days and reached the ocean north of Kīholo Bay in the North Kona district. Between 1868 and 1950, 5 lava flows have reached the ocean from eruptions on the southwest rift zone of Mauna Loa. These flows traveled quickly with 4 out of the 5 reaching the ocean in 3 to 48 hours. These flows entered the ocean in the South Kona and Ka'u districts. The eruption of 1950 destroyed the Ho'okena-Mauka village in South Kona with the swiftly flowing lava traveling 14 miles in only 3 hours. Although the lava flow also crossed the area's only highway in two places, the residents escaped unharmed.

### E.14.2 KĪLAUEA, ISLAND OF HAWAI'I

Kīlauea was almost continuously erupting at its summit caldera from the beginning of historic records up until 1924. Since 1955, most of the activity has occurred along the east rift zone. In January 1960, the volcano erupted; destroying villages of Koa'e and Kapoho (see Figure E-12). The latest eruption of the east rift zone began in 1983 and is still ongoing as of the date of this report. The southwest rift zone has been less active with only 5 eruptions in the past 200 years; the latest was in 1974.

The recorded eruption history of Kīlauea (see Table E-23) demonstrates the degree of variability in eruption type, duration, and other aspects of volcanoes. Although voluminous records covering various facets of volcano activity obviously exist, it is important to note that they do not necessarily inform our mitigation strategies, as most directly impacted areas are uninhabited federal lands under the jurisdiction of the National Park Service. In turn, the brunt of the mitigation focus is on indirect impacts that have implications for population settlements.





Figure E-12. Photograph of the Kīlauea eruption taken 10:00 am January 14, 1960



Table E-23. Summary of Historical Eruptions at Kīlauea from 1790–2017

Year	Start (mo-day)	Duration (days)	Eruptive Subdivision	Area Covered (km <sup>2</sup> )	Volume (km <sup>3</sup> )
1983	3-Jan	>6,200 (s)(v)	ER (u)	102	1.9
1982	25-Sep	<1	C	0.8	0.003
1982	30-Apr	<1	C	0.3	0.0005
1979	16-Nov	1	ER	0.3	0.00058
1977	13-Sep	18	ER	7.8	0.0329
1975	Nov-29 (bb)	<1	C	0.3	0.00022
1974	31-Dec	<1	SWR	7.5	0.0143 (w)
1974	19-Sep	<1	C	1	0.0102 (aa)
1974	19-July	3	C, ER	3.1	0.0066
1973	10-Nov	30	ER (z)	1	0.0027
1973	5-May	<1	ER (x)	0.3	0.0012 (y)
1972	3-Feb	900 (s)	ER (t)	46	0.162
1971	24-Sep	5	C, SWR	3.9	0.0077 (w)
1971	14-Aug	<1	C	3.1	0.0091
1969	24-May	874 (s)	ER (t)	50	0.185
1969	22-Feb	6	ER (r)	6	0.0161
1968	7-Oct	15	ER (q)	2.1	0.0066
1968	22-Aug	5	ER (o)	0.1	0.00013 (p)
1967	5-Nov	251	H	0.7	0.0803
1965	24-Dec	<1	ER (n)	0.6	0.00085
1965	5-Mar	10	ER (m)	7.8	0.0168
1963	5-Oct	1	ER (l)	3.4	0.0066
1963	21-Aug	2	ER (k)	0.2	0.0008





Year	Start (mo-day)	Duration (days)	Eruptive Subdivision	Area Covered (km <sup>2</sup> )	Volume (km <sup>3</sup> )
1962	7-Dec	2	ER (j)	0.1	0.00031
1961	22-Sep	3	ER (i)	0.8	0.0022
1961	10-July	7	H	1	0.0126
1961	3-Mar	2	H	0.3	0.00026
1961	24-Feb	1	H	0.1	0.000022 (h)
1960	13-Jan	36	ER	10.7	0.1132
1959	14-Nov	36	KI	0.6	0.0372
1955	28-Feb	88	ER	15.9	0.0876
1954	31-May	3	H, C	1.1	0.0062
1952	27-June	136	H	0.6	0.0467
1934	6-Sep	33	H	0.4	0.0069
1931	23-Dec	14	H	0.3	0.007
1930	19-Nov	19	H	0.2	0.0062
1929	25-July	4	H	0.2	0.0026
1929	20-Feb	2	H	0.2	0.0014
1927	7-July	13	H	0.1	0.0023 (g)
1924	19-July	11	H	0.1	0.000234
1924 (g)	10-May	17	C	No lava	No lava
1923	25-Aug	1	ER	0.5	0.000073
1922	28-May	2	MC, NC	0.1	NA
1921	18-Mar	7	C	2	0.0064
1919	21-Dec	221	SWR	13	0.0453
1919	7-Feb	294 (f)	C	4.2	0.0252 ?
1918	23-Feb	14	C	0.1	0.000183
1894	7-July	4 ?	C	NA	NA
1894	21-Mar	6+	C	NA	NA
1885	Mar	80	C	NA	NA
1884	Jan-22 (e)	1	ER	0.1	NA
1877	21-May	-	K	0.1	NA
1877	4-May	1	CW	NA	NA
1868	2-Apr	Short	SWR	0.1	0.000183
1868	2-Apr	Short	KI	0.2	NA
1840	30-May	26	ER	17.2 (d)	0.205
1832	14-Jan	Short	east rim of C	NA	NA
1823	Feb-July	Short	SWR	10.0 (d)	0.0110 (d)
<b>Nearly continuous lava-lake activity on the caldera floor characterized the period from before 1823 until 1924. (a)</b>					
1790 (c)	Nov	-	C	No lava flow	No lava flow
1790 ?	-	-	ER	7.9	0.0275
1750 ?	-	-	ER	4.1	0.0142

- C = summit caldera
- CW = caldera wall
- SWR = southwest rift zone
- ER = east rift zone
- ER = east rift zone
- H = Halema`uma`u
- K = Keanakako`i

Written records begin in July-August 1823, when the first European visited the summit of Kīlauea. Thereafter until 1924, lava-lake eruptive activity was almost continuous in the caldera. Before the mid-1800s, however, records of the many overflows from the lava lake are sparse. The table lists the periods of major overflows only.





## E.15 Wildfire

The following presents wildfire events that occurred in the State of Hawai‘i between 1953 and 2017, as presented in the 2013 and 2018 HMPs. The information is reproduced as documented in the 2013 and 2018 plans.

Due to the fact that the bulk of analysis for this plan relies on the history of past wildfires and spatial extent, clear patterns emerged particularly in the County of Hawai‘i with approximately 48 fires burning a total of 90,159.19 acres from which to draw the following inferences.

Twenty-nine out of the 48 total fires were on the western end of the island, in the proximity of the Waikoloa Village “Community at Risk.” Vulnerability of “Communities at Risk” locations in this analysis is primarily a function of proximity to historical wildfire incidents.

When combining the past burn areas layer and the rainfall tercile layer, it is apparent that “low rainfall” zones increase the odds of wildfire occurrence. A total of 40 of the 48 fires in the County of Hawai‘i from 1953 to 2001 occurred in “low rainfall” zones. Table E-24 illustrates the range of potential wildfire triggers, as well as substantiates the general assertion that human negligence is the main trigger.

**Table E-24. Wildland Fire Incidence, Causes, and Extent of Damage in the State of Hawai‘i from 2003–2016**

Year	Lightning		Campfire		Smoking		Debris burning		Arson		Equipment		Children		Miscellaneous	
	#	Acres	#	Acres	#	Acres	#	Acres	#	Acres	#	Acres	#	Acres	#	Acres
2003	0	0.0	5	12.2	5	2.4	9	372.5	15	2.6	8	302.5	1	0.1	64.0	15,893.1
2004	2	2.0	7	8.4	5	70.4	4	12.7	16	48.6	9	16.5	1	0.1	39.0	1,910.6
2005	3	4.1	8	801.7	0	0.0	5	1.6	12	218.2	6	135.9	0	0.0	75.0	25,331.1
2006	7	3,596.3	4	783.1	0	0.0	12	37.9	27	3,104.3	15	679.9	0	0.0	140.0	6,383.3
2007	1	0.1	5	40.1	1	2,291.0	11	53.9	21	6,728.5	9	255.6	0	0.0	99.0	20,222.3
2008	0	0.0	1	5.0	0	0.0	1	50.0	2	50.0	3	1,500.0	0	0.0	1.0	2,236.0
2009	0	0.0	2	23.0	0	0.0	0	0.0	0	0.0	3	199.0	0	0.0	2.0	7,852.0
2010	1	900.0	2	2.0	0	0.0	0	0.0	2	1,487.0	0	0.0	0	0.0	5.0	7,140.0
2011	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	1,153.0	0	0.0	2.0	1,566.0
2012	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	11.0	13,065.0
2013	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2.0	700.0
2014	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2.0	554.0
2015	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	9.0	5,691.0
2016	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	13.0	25,514.0
<b>Total</b>	<b>13</b>	<b>3,602.5</b>	<b>32</b>	<b>1,673.5</b>	<b>11</b>	<b>2,363.8</b>	<b>42</b>	<b>528.6</b>	<b>93</b>	<b>10,152.2</b>	<b>54</b>	<b>4,242.4</b>	<b>2</b>	<b>0.2</b>	<b>464.0</b>	<b>115,858.4</b>

### E.15.1 COUNTY OF KAUA‘I

The County of Kaua‘i has had the smallest wildfire incidence despite intermittent drought conditions. Although Kaua‘i is known for its relatively wet weather most of the “high rainfall” locations are situated high in the central mountains on conservation land. Much of the “medium rainfall” zones are likewise located in the central area of the island, in remote mountainous areas. As such, a greater portion of the island falls within the “low rainfall” category. The wildfires that have been mapped have actually occurred in conservation or agriculture land, with the distances to “community at risk” ranging from 1.3 miles away to distances of 16.2 miles away. Hence, from





this analysis, wildland fires may not appear to be much of a problem on Kauaʻi, but as stated previously, wildland fire vulnerability is not predictive of wildfire occurrence.

## E.15.2 CITY AND COUNTY OF HONOLULU

The City and County of Honolulu, from 1998 to 2002, according to the map data had 9 fires, 5 of which were located in the Waipiʻo “Community at Risk”. Four of the fires occurred in 2002 alone, and were fires that were between communities, hence endangering more than one community. The City and County of Honolulu, has the largest number of “Communities at Risk,” primarily due to the fact that 72 percent of the state’s population lives in the City and County of Honolulu, and there is a larger mix of urban/rural land to open land, with approximately 35 percent urban/rural, as compared to Maui County (5%), Kauaʻi County (5%), and Hawaiʻi County (2%). This can be interpreted as a density factor or a built-up area to open land ratio, which can be very dangerous during a wildland fire. Most of the wildland fires in the City and County of Honolulu have taken place on the central to western end of the island, either in “low rainfall” locations or between zones of low to medium rainfall within agriculture lands. Some areas, like the Waipiʻo location mentioned previously, abut communities along major road corridors. Unlike other counties, there was a higher incidence of what appeared to be “natural” wildfires, such as Waiʻanae Valley and Kaʻena Point.

## E.15.3 COUNTY OF MAUI

### ISLAND OF MAUI

In the island of Maui, wildfires in the last ten years have been consistent with the concept of “communities at risk” developed during the preparation NFP. As will be discussed in this section, most of the fires in the last decade have occurred near or within populated centers.

On September 16, 2003, a controlled burn by the Hawaiian Commercial & Sugar Company got out of hand near the locality of Waikapū on the central valley of the island of Maui when the wind carried some of the flames into nearby mountainous terrain. The fire ended up blackening about 1000 acres of parched grassland, to as high as 2000 feet in elevation in the West Maui Mountains. The blaze forced the evacuation of the Sandalwood and Grand Waikapū golf courses for a few hours during the afternoon of the 16th and all day on the 17th. State and federal firefighters, with the help of four water-carrying helicopters (including a large Chinook from the Hawaiʻi Army National Guard on the island of Oʻahu), battled the fire over several days. No serious injuries or property damage were reported during this uncontrolled sugar can burn.

The first large fires of the last ten years occurred in 2005. This year was a particularly active year for wildfires in the Island of Maui. The first fire, which occurred in early July, burned 120 acres in the Launiupoko area causing the closure of Honoapiʻilani Highway (State Highway 30) for three and a half hours. Another July brush fire, this time on the 12th, scorched 200 acres between Māʻalaea and McGregor Point halted traffic for several hours along Honoapiʻilani Highway (State Highway 30). Smoke from the fire caused much of the problem. Four separate fires along the route merged into one large blaze that took fire fighters many hours to contain and control. County officials believed that the initial fires were intentionally set. There were no reports of serious property damage or injuries.







Also on July 12 of 2005, a wildfire upslope from Lahainaluna High School in leeward West Maui was of unknown origin and burned over two and a half days. The fire scorched 120 acres of brush and grass land, but for a time threatened native plants and bird habitats. However, no serious injuries or property damage were reported after the blaze was extinguished.

Just a few weeks later, on July 37 of 2005, a grass and brush fire with a suspicious origin scorched 80 acres near Lahaina in leeward West Maui. The blaze came within 50 yards of homes in the Wahikuli residential area, above Kahoma Street on the slopes of the West Maui Mountains. However, no serious injuries or property damage were reported.

The last two fires of 2005 happened simultaneously in the Lahaina area during the month of October. The blazes, which are suspected to have been arson incidents, burned near Lahainaluna High school. One of the two October 2005 fires charred 200 acres of former sugar cane land.

On September 1, 2006, a large wildfire in the Mā'ālaea area charred approximately 2,000 acres of land. The fire threatened residences and businesses in the town of Mā'ālaea. This Mā'ālaea blaze also posed a significant risk to the Kaheawa Wind Power farm perched in the slopes of the West Maui Mountains above Mā'ālaea. A fire Management Assistance Grant (FMAG) was approved by the Federal Emergency Management Agency (FEMA) to assist the County of Maui and the State of Hawai'i in suppressing this fire.

During 2007, a myriad of wildfires affected the island of Maui. On January 27, 2007, the Upper Waiohuli Wildfire burned approximately 2,300 acres of forested public lands within the Lula Forest Reserve on the western slopes of the Haleakalā volcano on the island's east side. The wildfire, which burned for approximately two weeks, is believed to have been started by a discarded cigarette, most likely from a hiker. According to a report by the State of Hawai'i Department of Land and Natural Resources (DLNR) Division of Forestry and Wildlife, in terms of size and intensity, the Upper Waiohuli Wildfire was one of the most devastating to have occurred for many decades in the Hawaiian Islands. Per the same document, approximately 500 acres within the burn unit were subject to relatively lighter fire intensities, and the forest areas therein are anticipated to recover. On the other hand, approximately 1,800 acres within the burn unit were severely burned with little remaining live vegetation.

A couple of weeks after the Upper Waiohuli Wildfire, a wildfire struck the Kaua'ula Valley in the Lahaina area on February 19, 2007. The conflagration, which started above the Puamana subdivision, burned more than 1,000 acres of former sugar cane fields. According to the Honolulu Star Bulletin, the Kaua'ula Valley Wildfire also entered the fringe of the Panaewa section of the West Maui Natural Area Reserve system. This reserve area is home to endangered species of plants.

On June 27, 2007, two brushfires on the island's west side forced evacuations in the Lahaina and Olowalu areas. The smaller Lahaina brushfire came within 20 feet of homes at the Wahikulu subdivision forcing evacuations of some homes. The much larger Olowalu fire burned approximately 2,600 acres and destroyed one residence. The fire, which started on the mountain side of Honoapi'ilani Highway (State Highway 30), spread across the road to the ocean side of the highway severely disrupting traffic along a two-mile portion of this main arterial road.

Just a few days after the late June 2007 high winds flared up another wildfire in the Lahaina area. The fire, which started on July 3, consumed approximately 180 acres and prompted the evacuation of at least 150 people from a





homeless shelter and rental project in the town of Lahaina. The fire also threatened the Lahaina Aquatic Center. The fire is believed to have been sparked by fireworks.

Lastly, in 2009, several brushfires affected the Mā'alaea area. On June 21st, a brush fire that started near Mā'alaea Harbor forced the closing of Honoapi'ilani Highway (State Highway 30) from the town of Mā'alaea to the Ukumehame gulch area. The brush fire charred approximately 80 acres, damaged one residence, and fully destroyed another residence. Similarly, on November 2<sup>nd</sup> another blaze resulted in the closure of Honoapi'ilani Highway.

## ISLAND OF MOLOKA'I

Of the islands that conform the County of Maui, the island of Moloka'i seems to be the most susceptible to wildfire. There were nine years on record where 1,000 plus acres were burned. The top years for fires in the island of Moloka'i have been 1981, 1988, 1991, 1998, 2007 and 2009. On July 6, 2005, a fire about 2.5 miles south of Ho'olehua Airport burned 200 acres of brush. The cause of the fire was unknown. There were no reports of serious injuries or property damage.

In 2007, the Kalua Koi wildfire charred 3,000 acres of bush on the far west end of Moloka'i. The blaze was first reported on June 7 near mile marker 11 along Maunaloa Highway (State Highway 460). The Kalua Koi wildfire spread quickly on the ocean side of the highway and reached well past Kalua Koi road. Luckily, the blaze did not pose a threat to any residences.

More recently, during the last days of August and first days of September of 2009, a wildfire consumed approximately 7,800 acres near the town of Kaunakakai on central Moloka'i. The Kaunakakai fire was first reported on August 29th and burned for 7 days until it was fully contained on September 5th by the combined effort of more than 30 firefighters from the Division of Forestry and Wildlife Management (DOFAW) and the Maui Fire Department (MFD). The fire forced the evacuation of residents from Kalamaula Mauka and threatened 400 primary structures and 80 communication structures.

## ISLAND OF LĀNA'I

Of The island of Lāna'i has been the safest island in terms of wildfires with only a few consequential fires in the past two decades. In January 1995, one fire burned 1,204 acres and in December 1999, a fire in the Kaluanui Flats area, approximately 2 miles southeast of Lāna'i City, burned over 2,000 acres. On November 18, 2008, the Pālāwai Basin wildfire consumed approximately 1,000 acres south of Lāna'i City. According to County of Maui officials, the Pālāwai Basing conflagration forced the evacuation of 600 visitors and residents from Mānele Bay Hotel and nearby residences.

## COUNTY OF HAWAI'I

A fire in July 2007 burned 25 acres adjacent to the entrance road into Puakō. On October 28, 2007, nine fires were set in the Puakō/Kawaihae/Waikoloa area. The community was evacuated as the largest of these fires, more than 1,000 acres, approached within a ¼ -mile of Puakō Beach Drive. Only a fortuitous shift in wind prevented a huge loss of property (estimated value more than \$500 million). Those people who refused to evacuate were also at risk.





South Kona was recently reminded that upland wildfire is a significant threat. It took weeks for firefighters to extinguish the 1800-acre wildfire which began at Kealakekua Ranch on December 27, 2009. Grasses ignited by lightning were fueled by mature ‘ohi’a and koa trees, hard woods which can burn for weeks. These long burning fuels and rhizomous grasses that can smolder and carry fire underground made the fire extremely challenging to put out. The rugged terrain at the 4,400-foot elevation where the fire broke out, along with lack of access to water, abundant fuel sources, dry conditions, and warm weather causing smoldering to reignite all combined to create difficult and hazardous conditions for the dozens of firefighters who worked 24-hour shifts to battle the blaze and protect the community. Smoke from the fire, trapped by Kona’s temperature inversion layer, created health hazards for fire fighters and the entire South Kona community.

In July 2013, a brush fire in the Kailua-Kona area forced the evacuation of a condominium multifamily building. The fire, which occurred on Hulikoa drive, scorched about 100-acres of land.

**E.15.4 SUMMARY FOR ALL COUNTIES**

Table E-25 summarizes all wildfire events statewide and the spatial relationship between wildfire events and relevant CDPs. To complement Table E-25, summary reports that analyze annual wildfires for the years 2004 through 2008 are included in Table E-26 through Table E-35. The information provided on this last table is available and regularly updated on the State of Hawai‘i Department of Land and Natural Resources Division of Forestry and Wildlife (DOFAW) Fire Management Program website.

Table E-36 and Table E-37 detail the number of fires and acres burned by County for the period between 2003 and 2012. Although there are annual dry seasons, the wildfires are more frequent during severe drought. Lastly, Table E-38 summarizes fire occurrences across the State of Hawai‘i that were declared to Federal Emergency Management Agency for Fire Management Assistance from 2007 through 2017. A summary of each fire is also provided subsequently to the table.

*Table E-25. Historic Wildfire Events by County and Impacted CDPs*

County	Year	No.	Total Acreage	Closest CDP	Distance	CDP Pop (Year 2000)
Hawai‘i	1953	1	3,681.34	Waimea	10.4 Miles	7,208
Hawai‘i	1969	1	2,616.55	Waikoloa Village	3.02 Miles	4,806
Hawai‘i	1972	1	8.966	Waimea	5.76 Miles	7,208
Hawai‘i	1973	8	7,223.44	Waikoloa Village	4.46 Miles	4,806
Hawai‘i	1975	2	342.209	Waimea	11.19 Miles	7,208
Hawai‘i	1976	2	5.047	Honalo	12.82 Miles	1,987
Hawai‘i	1977	2	1,065.11	Waimea	11.05 Miles	7,208
Hawai‘i	1978	1	35.42	Waikoloa Village	11.67 Miles	4,806
Hawai‘i	1983	1	5.82	Waikoloa Village	5.10 Miles	4,806
Hawai‘i	1985	1	24,270.08	Waikoloa Village	3.28 Miles	4,806
Hawai‘i	1987	3	11,701.20	Waikoloa Village	0 Miles	4,806
Hawai‘i	1988	1	575.452	Kalaoa	6.15 Miles	6,794
Hawai‘i	1989	1	3,318.15	Puakō	2.14 Miles	429





County	Year	No.	Total Acreage	Closest CDP	Distance	CDP Pop (Year 2000)
Hawai'i	1991	2	215.831	Kalaoa	6.28 Miles	6,794
Hawai'i	1993	4	1,451.91	Waikoloa Village	6.14 Miles	4,806
Hawai'i	1994	2	714.632	Honalo	12.42 Miles	1,987
Hawai'i	1995	3	1,408.47	Kailua-Kona	2.88 Miles	9,870
Hawai'i	1996	1	72.988	Waikoloa Village	6.23 Miles	4,806
Hawai'i	1998	5	12,666.38	Waikoloa Village	0.84 Miles	4,806
Hawai'i	1999	4	18,709.09	Waikoloa Village	0.38 Miles	4,806
Hawai'i	2001	2	71.106	Kailua-Kona	14.22 Miles	9,870
Hawai'i	1980	4	4,829.06	Kualapu'u	0 Miles	1,936
Maui	1984	5	2,003.21	Kihei	0.85 Miles	16,749
Maui	1985	1	0.269	Wailea-Mākena	4.11 Miles	5,761
Maui	1987	4	970.061	Kaunakakai	2.33 Miles	2,726
Maui	1988	2	83.581	Waikapu	0.48 Miles	1,115
Maui	1989	2	31.264	Waikapu	0.39 Miles	1,115
Maui	1990	4	207.659	Lāna'i City	1.34 Miles	3,164
Maui	1991	6	8,320.79	Waikapu	2.55 Miles	1,115
Maui	1992	3	315.761	Kaunakakai	1.45 Miles	2,726
Maui	1993	3	217.51	Kaunakakai	2.00 Miles	2,726
Maui	1995	1	48.217	Waikapu	1.87 Miles	1,115
Maui	1998	5	12,145.19	Kaunakakai	0 Miles	2,726
Maui	2001	1	547.524	Lahaina	2.27 Miles	9,118
Maui	2002	1	296.384	Lahaina	3.45 Miles	9,118
Kaua'i	1998	1	1.328	Waimea	5.00 Miles	1,787
Kaua'i	1999	2	16.167	Waimea	6.85 Miles	1,787
Kaua'i	2000	2	12.001	Hanalei	10.44 Miles	478
Honolulu	1998	4	864.808	Mokulē'ia	1.08 Miles	1,839
Honolulu	2000	1	272.969	Waipi'o	0 Miles	11,672
Honolulu	2002	4	2,765.25	Pearl City, Waipi'o	0 Miles	30,976/11,672

*Table E-26. Annual Wildfire Summary Report, 2008—Total Fires, by Cause*

Cause	No.	Acres
Lightning	0	0
Campfire	1	5
Smoking	0	0
Debris burning	1	50
Arson	2	50
Equipment	3	1,500
Railroads	0	0
Children	0	0
Miscellaneous	1	2,236
<b>TOTAL:</b>	<b>8</b>	<b>3,841</b>





**Table E-27. Annual Wildfire Summary Report, 2008— Total Fires, by Site Class**

Size Class	No.	Acres
Class A - 0.25 acres or less	0	0
Class B - 0.26 to 9 acres	1	9
Class C - 10 to 99 acres	3	325
Class D - 100 to 299 acres	2	525
Class E - 300 to 999 acres	0	0
Class F - 1000 to 4999 acres	2	2,982
Class G - 5000 acres or more:	0	0
<b>TOTAL:</b>	<b>8</b>	<b>3,841</b>

**Table E-28. Annual Wildfire Summary Report, 2009— Total Fires, by Cause**

Cause	No.	Acres
Lightning	0	0
Campfire	2	23
Smoking	0	0
Debris burning	0	0
Arson	0	0
Equipment	3	199
Railroads	0	0
Children	0	0
Miscellaneous	2	7,852
<b>TOTAL:</b>	<b>7</b>	<b>8,074</b>

**Table E-29. Annual Wildfire Summary Report, 2009— Total Fires, by Site Class**

Size Class	No.	Acres
Class A - 0.25 acres or less	1	1
Class B - 0.26 to 9 acres	2	18
Class C - 10 to 99 acres	2	143
Class D - 100 to 299 acres	1	110
Class E - 300 to 999 acres	0	0
Class F - 1000 to 4999 acres	0	0
Class G - 5000 acres or more	1	7,802
<b>TOTAL:</b>	<b>7</b>	<b>8,074</b>

**Table E-30. Annual Wildfire Summary Report, 2010— Total Fires, by Cause**

Cause	No.	Acres
Lightning	1	900
Campfire	2	2
Smoking	0	0
Debris burning	0	0
Arson	2	1,487
Equipment	0	0
Railroads	0	0





Cause	No.	Acres
Children	0	0
Miscellaneous	5	7,140
<b>TOTAL:</b>	<b>10</b>	<b>9,529</b>

*Table E-31. Annual Wildfire Summary Report, 2010— Total Fires, by Site Class*

Size Class	No.	Acres
Class A - 0.25 acres or less	1	1
Class B - 0.26 to 9 acres	2	28
Class C - 10 to 99 acres	2	175
Class D - 100 to 299 acres	1	100
Class E - 300 to 999 acres	3	3,025
Class F - 1000 to 4999 acres	0	0
Class G - 5000 acres or more	1	6,200
<b>TOTAL:</b>	<b>10</b>	<b>9,529</b>

*Table E-32. Annual Wildfire Summary Report, 2011— Total Fires, by Cause*

Cause	No.	Acres
Lightning	0	0
Campfire	0	0
Smoking	0	0
Debris burning	0	0
Arson	0	0
Equipment	1	1,153
Railroads	0	0
Children	0	0
Miscellaneous	2	413
<b>TOTAL:</b>	<b>3</b>	<b>1,566</b>

*Table E-33. Annual Wildfire Summary Report, 2011— Total Fires, by Site Class*

Size Class	No.	Acres
Class A - 0.25 acres or less	0	0
Class B - 0.26 to 9 acres	0	0
Class C - 10 to 99 acres	1	75
Class D - 100 to 299 acres	0	0
Class E - 300 to 999 acres	1	338
Class F - 1000 to 4999 acres	1	1,153
Class G - 5000 acres or more	0	0
<b>TOTAL:</b>	<b>3</b>	<b>1,566</b>





**Table E-34. Annual Wildfire Summary Report, 2012— Total Fires, by Cause**

Cause	No.	Acres
Lightning	0	0
Campfire	0	0
Smoking	0	0
Debris burning	0	0
Arson	0	0
Equipment	0	0
Railroads	0	0
Children	0	0
Miscellaneous	17	5,837
<b>TOTAL:</b>	<b>17</b>	<b>5,837</b>

**Table E-35. Annual Wildfire Summary Report, 2012— Total Fires, by Site Class**

Size Class	No.	Acres
Class A - 0.25 acres or less	0	0
Class B - 0.26 to 9 acres	6	13
Class C - 10 to 99 acres	5	122
Class D - 100 to 299 acres	1	220
Class E - 300 to 999 acres	2	1,152
Class F - 1000 to 4999 acres	3	4,330
Class G - 5000 acres or more	0	0
<b>TOTAL:</b>	<b>17</b>	<b>5,837</b>

**Table E-36. Number of Wildfires by County from 2003 to 2012**

Year	Number of Fires				
	Kaua'i	Honolulu	Maui	Hawai'i	Total
2003	6	11	1	2	21
2004	3	2	1	1	7
2005	4	0	0	1	5
2006	1	4	1	5	11
2007	2	3	10	10	25
2008	2	1	3	2	8
2009	1	4	2	0	7
2010	1	2	3	4	10
2011	0	0	1	2	3
2012	3	7	2	5	17





*Table E-37. Acres Burned by County from 2003 to 2012*

Year	Acres Burned				
	Kaua'i	Honolulu	Maui	Hawai'i	Total
2003	9	1,809	60	2,1242	4,002
2004	6	1,790	60	30	1,886
2005	40	0	0	1	41
2006	135	3,270	110	16,000	19,515
2007	292	1,076	16,177	5,980	23,525
2008	55	5	396	3,385	3,841
2009	23	249	7,802	0	8,074
2010	1	506	6,925	2,097	9,529
2011	0	0	75	1,491	1,566
2012	3,002	1,770	30	1,035	5,837

*Table E-38. Federal Emergency Management Agency, Declared Fires from 2007 to 2013*

Fire	Acreage	Nearest Town	Distance to Population	Population	Cost	Cause
OLAWALU FEMA-2701 6/27– 7/4/07	1938	Olawalu, Launiopoko	0.1 mile	Lahaina 9118	\$359,081, (2 homes destroyed)	Human, accidental
WAIALUA FEMA-2720 8/12 – 8/21/07	8000	Waialua, Haleiwa, North Shore	0.1 mile	Waialua 3761 Mokulē'ia 1839 Hale'iwa 2225	\$642,229	Human, intentional
KOHALA MTN. FEMA- 2722 8/16 – 8/22/07	200+	Waimea, Kamuela View Estates	3 miles Waimea ¼ mi. – one house	WaikoloaVlg. 4806	\$111,504	Unknown
PUAKŌ FEMA-2740 10/28 – 11/7/07	1005	Puakō, Spenser Park, Mauna Kea Beach	¼ mile	Puakō 429	\$320,321	Unknown
KAUNAKAKAI FEMA-2834 8/29 – 9/7/09	10,000	Kaunakakai, Kualapu'u	0.1 mile	Kaunakakai 2726	\$880,944 (estimate)	Unknown
MĀ'ALAEA FEMA-2844 6/7/10 - 6/13/10	6200	Mā'alaea, Harbor area	0.5 mile	Mā'alaea 454	No estimates available yet.	Unknown

**Olowalu fire (06/27/2007 through 07/04/2007):** The Olowalu fire in Olowalu, Maui started on July 27, 2007, was a particularly destructive fire, ultimately destroying two homes and sending over 330 persons to shelters. The fire was thought to be started accidentally by a backhoe digging behind the Olowalu General Store, hitting something, possibly just a rock, and throwing a spark. One of the homes destroyed was close behind the Store, and the other was just east of the Launiupoko subdivision of Olowalu village. Of those entering the shelters, at Maui High School, over 320 were tourists who had missed flights or had checked out of their hotels. Ten were local residents. Three people were sent to Maui Memorial Hospital Emergency Room and released. Strong winds up to 52 mph hindered







firefighters initially and caused the fire to grow and expand its territory. The combination of the high wind and dry grass in the area caused the fire to spread rapidly and race upwards towards the mountain.

**Waialua Fire (08/12/2007 through 08/21/2007):** The fire consumed about 8000 acres of brush land and farm land along the North shore of Hawai'i, threatening the town of Waialua and the area between the mountains and the ocean. In addition, Dillingham airfield, several camps are in the area and were threatened by the fire. There were also concerns that the Mt. Ka'ala Observatory could be affected. The fire started before noon on the 12th and several homes were quickly evacuated. The mountains above the farms were particularly difficult to work within as access to burning areas was often difficult. The fire was burning uphill in areas of dry brush. The Otake Camp housing area and the Pamoho agricultural area were affected, as well as the local high school and elementary school, 100 homes and about 15 businesses in the Waialua area. As the fire grew, shelters were opened at the Waialua District Park and Lili'okalani Protestant Church. Ultimately approximately 8000 acres were burned.

**Kohala Mountain Road Fire (08/16/ 2007 through 08/22/ 2007):** The fire was along Highway 250, or the Kohala Mountain Road near the 4-mile marker, on the ocean side of the highway, in the South Kohala district of Hawai'i County. Residents along Mahua Street of Kamuela View Estates were evacuated, with approximately 50 homes being involved, as the fire reached within a quarter-mile of the homes. On the 16th windblown debris caused a short circuit in a 34,000-volt transmission line. There was speculation that the sparking caused by this actually started the fire. This fire also occurred during a period when Hurricane Flossie threatened the Big Island by passing within 100 miles. An earthquake of 5.4 also rattled the island Monday night the 20th, but it resulted in no injuries or major damage.

**Puakō fire (10/ 28/2007 through 11/ 7/ 2007):** The Puakō fire on the Leeward coast of Big Island occurred when nine runaway fires of varying sizes were burning at the same time, straining county and state resources to their maximum abilities. Puakō along Puakō Beach Drive and Spencer Beach Park in Kawaihae were evacuated and evacuation centers set up at Waiakoloa Elementary School in Waikoloa and the Waimea Community Center. A mandatory evacuation of Puakō was announced on the October 28th. Three hundred homes were directly threatened by the fire, a factor which contributed in the quick declaration by FEMA. By the end of the fire, about 1000 acres were consumed.

**Kaunakakai Fire (08/29/2009 through 09/07/2009):** The Kaunakakai fire destroyed approximately 10,000 acres of land North of Kaunakakai Town, Island of Moloka'i, Maui and extended west to the boundaries of the airport. The amount of resources expended for this single fire makes it the largest fire in the state within the last several years. The fire began on the 29th of August and was not declared controlled until September 7.

**Kealakekua Ranch on December 27, 2009:** Grasses ignited by lightning were fueled by mature 'ohi'a and koa trees, hard woods which can burn for weeks. These long burning fuels and rhizomous grasses that can smolder and carry fire underground made the fire extremely challenging to put out. The rugged terrain at the 4,400-foot elevation where the fire broke out, along with lack of access to water, abundant fuel sources, dry conditions, and warm weather causing smoldering to reignite all combined to create difficult and hazardous conditions for the dozens of firefighters who worked 24-hour shifts to battle the blaze and protect the community. Smoke from the fire, trapped by Kona's temperature inversion layer, created health hazards for fire fighters and the entire South Kona community.





**Mā‘alaea Fire (06/07/2010 through 06/14/2010):** The fire encompassed an area of approximately 6200 acres in Wailuku, Maui, becoming the first declared fire of the 2010 year. The area affected was around the town of Mā‘alaea up into surrounding hillsides, similar to the Mā‘alaea Fire of 2006. It threatened homes in the direction of Wailuku, near the local King Kamehameha Golf Club. The fire also burned up into the hills toward the Wind electric generating ‘farm’ at the top of the first range of hills, actually causing reported burn damage to at least two of the ‘windmills’.

*Table E-39. Wildfire Events in the State of Hawai‘i – 2012 to 2017*

Date(s) of Event	Event Type	Counties Affected	Description
2012 Feb 18	Wildfire	Hawai‘i	Approximately 80 acres burned near the Waikoloa Elementary School. No structures were threatened, and no roads were closed. A nearby car show was evacuated as a precaution. Waikoloa Emergency Operations Center (EOC) was activated.
2012 May 28-June 5	Wildfire (Miloli‘i Hikimoe Fire)	Kaua‘i	Approximately 220 acres burned
2012 June 4-11	Wildfire (Kukahi Fire)	Honolulu	Fire burned approximately 1,200 acres, starting in the Lualualei Naval Magazine and burning through the Lualualei Valley into the Wai‘anae Kai Valley Forest Reserve. By June 5, nearly half of the Honolulu Fire Department’s assets were dedicated to battling the fire. Many farms were evacuated, and roads were closed.
2012 June 6-7	Wildfire	Honolulu	Approximately 1,000 acres burned in the Wai‘anae Valley, unrelated to the fire burning from June 4 to 11, 2012. Sixty firefighters responded and prevented the fire from threatening structures. The County of O‘ahu EOC was partially activated.
2012 June 18	Brush Fires	Hawai‘i	The Hawai‘i EOC was partially activated in response to two wildfires burning in the Pāhala area. One wildfire burned approximately 5,200 acres, the other burned 400 acres.
2012 June 25-July 4	Wildfire (Hikimoe Ridge)	Kaua‘i	The Hikimoe Ridge Fire burned 765 acres of a eucalyptus tree plantation. A voluntary evacuation order was put in place as a precaution. The fire cost the state \$375,000, mostly for the cost of hiring fire suppression helicopters.
2012 July 4	Wildfire	Honolulu	A fire flared along the north side of the Kaloko New Industrial Area road. Smoke was visible in Kailua Village.
2012 July 14-15	Wildfire (Yokahama Cecily fire)	Honolulu	Approximately 500 acres burned
2012 Aug 17-22	Wildfire (Pōki‘i Ridge Fire)	Kaua‘i	Approximately 3,000 acres above Kekaha burned. It started on the Pōki‘i Ridge and spread to the Paua and Waiaka Ridges. The fire approached a high voltage power line, which was shut down. The fire damaged power, radio, and fiber optic lines. Residents and businesses in Kekaha and Waimea were asked to limit water consumption to essential uses only. The fire chief issued a voluntary evacuation order of Kōke‘e. The County of Kaua‘i EOC was activated.
2012 Nov 10	Wildfire (Iroquois Point Fire)	Honolulu	‘Ewa Beach experienced its largest wildfire between 2001 and 2012 on November 10, 2012. The fire started near the intersection of Ho‘omaka Street and Iroquois Road in an area of dry grass and brush. One hundred





Date(s) of Event	Event Type	Counties Affected	Description
			acres of brush and grasses burned along Iroquois Point Road in western O’ahu.
2012 Nov 15	Wildfire (PTA Training Area 22 Fire)	Hawai’i	Approximately 1,000 acres burned
2013 Aug 18	Wildfire (Makua Kea’au Keolu Fire)	Honolulu	Approximately 100 acres burned
2013 Nov 25-26	Wildfire (Pu’u Anahulu Fire Complex)	Hawai’i	Nearly 600 acres on the Island of Hawai’i burned. Three fires made up this incident. No structures were damaged. The Hawai’i County EOC was activated.
2014 Apr 24	Wildfire	Hawai’i	Four acres burned near Mile Marker 29 of Highway 190 in Kona. Traffic was limited to one lane on the highway. No injuries or structure damage were reported. The County of Hawai’i EOC was partially activated.
2014 Aug 22	Wildfire (Makakilo First Goal Fire)	Honolulu	Approximately 550 acres burned.
2015 Jan 20 – Feb 17	Wildfire (Lau Strike Kipapa Fire)	Honolulu	Approximately 460 acres burned.
2015 Mar 23	Wildfire (Waimea Canyon Drive Fire)	Kaua’i	Approximately 130 acres burned.
2015 May 4	Brush Fire	Hawai’i	Over 20 acres within the Ninole Loop on the southeast side of Highway 11 burned. Highway 11 was closed for several hours due to low visibility. The fire burned through vacant pasture land. The County of Hawai’i EOC was partially activated.
2015 May 11	Brush Fire	Hawai’i	A runaway brush fire consumed 20 acres and one home in the Green Sands and Mark Twain Estates subdivision in Ka’u. No injuries were reported. The County of Hawai’i EOC was partially activated.
2015 July 5-9	Wildfire (Pōki’i Ridge 2015 Fire)	Kaua’i	Approximately 365 acres burned.
2015 Aug 1-11	Wildfire (Malevolence Poamoho Fire)	Honolulu	Approximately 500 acres burned.
2015 Aug 8	Wildfire (Kawaihae Fire)	Hawai’i	Approximately 3,300 acres burned.
2015 Aug 14	Wildfire (Pu’ukoli’i Fire 2015)	Maui	Approximately 356 acres burned.
2015 Aug 22	Wildfire	Honolulu	The Makakilo Fire was human-caused and one of the largest wildfires in Makakilo’s history. The fire burned 1,000 acres near homes along ‘Umena Street and up toward Honouliuli Forest Reserve. Dozens of homes and cabins were evacuated, including Camp Timberline visitors and occupants. Red Cross established an emergency shelter at Makakilo Community Park, where they hosted approximately residents.





Date(s) of Event	Event Type	Counties Affected	Description
2016 Jan 16	Wildfire	Hawai'i	Palamanui Campus fire burned 200 acres near Queen Ka'ahumanu Highway.
2016 Feb 10-11	Wildfire	Hawai'i	A string of Pu'u Anahulu fires burned 1,150 acres in total in North Kona. These included a fire mauka of intersection of Daniel K. Inouye Hwy (Mile Marker 50) and Highway 190; a fire at Highway 190 at Mile Marker 16; and a fire at Highway 190 near Mile Marker 17 on the mauka side of the highway.
2016 Feb 15-24	Brush Fire	Maui	Approximately 5,300 acres of the southern slopes of Haleakalā burned between February 15 and 24, 2016. The Kahikinui Homesteads area was evacuated. Shelters for displaced residents were opened at Kēōkea Park in Kula. The County of Maui EOC was activated.
2016 Mar 5	Wildfire	Maui	The Kahikinui Fire, caused by arson, burned 5,800 acres and threatened 15 residences and 3 other structures. No structures were destroyed.
2016 Mar 17	Wildfire	Honolulu	The Nānākuli Valley Fire was one of the largest wildfires in Western O'ahu's history, burning 2,500 acres. The wildfire began atop a steep cliff on the southeastern edge of the valley and moved downslope toward homes along Pikaiolela Street, Waiea Place, and Huikala Place. The fire burned right to the edge of homes, prompting voluntary evacuations. Westbound lanes of Farrington Highway at Ko 'Olina were shut down by police.
2016 Mar 23-24	Wildfire	Hawai'i	A wildfire burned 2,500 acres of brush and grass mixture along Highway 190 between Mākālei and Daniel K. Inouye Highway.
2016 Mar 28	Brush Fire	Hawai'i	A runaway brush fire that started in a residential area burned 125 acres on the mauka side of Waimea. The fire destroyed a ranch shed, but no homes or businesses. The County of Hawai'i EOC was activated.
2016 Mar 29	Brush Fire	Honolulu	Due to drought conditions, the slopes of Diamond Head on O'ahu were impacted by a brush fire. The fire was moving quickly upslope and spreading due to strong winds. Roads were closed and 12 fire companies responded. The brush fire burned approximately two acres.
2016 July 2	Wildfire (Mā'alaea Nui Fire)	Maui	Approximately 4,700 acres burned after equipment caused the Mā'alaea Nui wildfire.
2016 July 8-10	Wildfire (Ukumehame Fire)	Maui	Approximately 1,242 acres burned
2016 Nov 18-22	Wildfire	Honolulu	Approximately 1,235 acres burned
2017 Mar 22-23	Bush Fire	Hawai'i	Approximately 10 acres of brush makai of the Queen Ka'ahumanu Highway shut down southbound lanes of the highway and other roads. The County of Hawai'i EOC was partially activated.
2017 May 4-18	Wildfire	Kaua'i	The Kapalawai Wildfire resulted in the County of Kaua'i EOC being partially activated. Approximately 750 acres burned. Total costs in equipment and personnel to suppress the fire reached over \$80,000.
2017 July 7	Brush Fire	Hawai'i	Approximately 2,176 acres burned near the Puukapu Farm Lots and Parker ranch area over two days. No injuries were reported. The County of Hawai'i EOC was partially activated.





# **Appendix F. State Profile and Risk Assessment Supplement**



# CONTENTS

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<sup>1</sup> Section Cover Photo: Aerial view of Moloka'i and the town of Kaunakakai. Photo by Megan Brotherton





# APPENDIX F. STATE PROFILE AND RISK ASSESSMENT SUPPLEMENT

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The 2023 State Hazard Mitigation Plan (SHMP) Update was organized into a practical and readable document for the public and an implementable document for the State to support future risk reduction. This appendix contains supporting information for the State Profile (Section 3) and Risk Assessment (Section 4) sections, as available.

## F.1 State Profile

The list of facilities deemed critical by HI-EMA contained spatial coordinates for the majority of the facilities. For the facilities that did not have spatial coordinates or the original coordinates were invalid, other location attributes were used to geocode the facilities. Not all facilities had sufficient location attributes for geocoding. Of the total 1,542 facilities, 1,475 had sufficient data to be geocoded and are included in the spatial analyses reported in Sections 4.2 through 4.16.

An estimated 400 community lifelines and critical facilities are State buildings that appear in both inventories used for the risk assessment. The duplication of these assets is acknowledged, and the datasets are reported separately.

The original facility list only contained two attributes: facility name and facility type. Therefore, assumptions were made to populate the required fields needed to estimate potential losses using Hazus. The average values already populated in Hazus for each facility type (known as default values) for square footage were utilized; however, it is recognized that the actual square footage could differ significantly. The replacement cost, or amount it will cost to replace the structure at the time of the loss, was calculated using the default square footage values and 2022 RS Means costs per square foot for each facility. RS Means is the industry-standard cost-estimate model for replacement cost. Therefore, replacement costs could vary significantly from actual values; however, this is a suitable methodology for planning purposes. The Hazus default attribute data for community lifelines was used to replace the default attribute values where the facilities could not be matched to the community lifeline or critical facility using the facility name.

Table F-1 summarizes the facility types included in each community lifeline and critical facility category used in the risk assessment.





**Table F-1. Facility Type Included in Each Community Lifeline and Critical Facility Category**

Facility Lifeline Category	Facility Type	
<b>Communications</b>	<ul style="list-style-type: none"> <li>• 911 Call Center</li> <li>• Banking and Credit</li> <li>• Communications Distribution Hub</li> <li>• Communications Site</li> <li>• Emergency Services Communication Facility (Dispatch Center)</li> </ul>	<ul style="list-style-type: none"> <li>• Information Technology Center</li> <li>• Office</li> <li>• Other Communication Facility</li> <li>• Radio/TV</li> </ul>
<b>Energy</b>	<ul style="list-style-type: none"> <li>• Line Booster</li> <li>• Liquefied Natural Gas (LNG) Satellite Storage</li> <li>• Liquid Petroleum Gas (LPG)</li> <li>• Motor Vehicle Fueling Station</li> <li>• Natural Gas</li> <li>• Operations Yard</li> <li>• Petroleum Product Bulk Plant</li> </ul>	<ul style="list-style-type: none"> <li>• Petroleum Product Land-based Bulk</li> <li>• Terminal Petroleum Product pipeline</li> <li>• Power Plant</li> <li>• Propane Air Injection/Regulator Station</li> <li>• Propane Plant</li> <li>• Resource Recovery Facility</li> </ul>
<b>Food, Water, Shelter</b>	<ul style="list-style-type: none"> <li>• Agriculture and Food Product Storage and Distribution Warehouse</li> <li>• Animal Shelter</li> <li>• Food and Beverage Store</li> <li>• Food Bank</li> <li>• Food Processing Facility</li> <li>• Grocery Store/Supermarket</li> <li>• Hotel/Motel</li> <li>• Ice Distributor</li> </ul>	<ul style="list-style-type: none"> <li>• Lift/Pump Station</li> <li>• Pump Station - Potable</li> <li>• Religious Facility (Shelter)</li> <li>• Wastewater Collection System</li> <li>• Wastewater Pump Station</li> <li>• Wastewater Treatment Facility</li> <li>• Wastewater Treatment Plant</li> <li>• Water Treatment Facility</li> <li>• Water Well</li> </ul>
<b>Hazardous Material</b>	<ul style="list-style-type: none"> <li>• Landfill/Solid Waste</li> </ul>	<ul style="list-style-type: none"> <li>• Solid Waste Transfer Station</li> </ul>
<b>Health &amp; Medical</b>	<ul style="list-style-type: none"> <li>• Ambulatory Healthcare Facility</li> <li>• Community Healthcare Center</li> <li>• Extended Care Facility</li> <li>• Facility/Mortuary Facility</li> <li>• Hospice</li> <li>• Hospital/Medical Facility</li> <li>• Kidney Dialysis Center</li> </ul>	<ul style="list-style-type: none"> <li>• Mental Health Treatment Facility</li> <li>• Nursing Care Facility</li> <li>• Public Health Agency</li> <li>• Public Health Laboratory</li> <li>• Residential Care Facility</li> <li>• Urgent Care Center</li> </ul>
<b>Safety &amp; Security</b>	<ul style="list-style-type: none"> <li>• Armory</li> <li>• Baseyard</li> <li>• Collee</li> <li>• Correctional Facility/Jail/Prison</li> <li>• Department Operations Center (DOC)</li> <li>• Emergency Operations Center (EOC)</li> <li>• Fire &amp; Emergency Services Administrative Office/Headquarters</li> <li>• Fire &amp; Emergency Services Operational Facility</li> </ul>	<ul style="list-style-type: none"> <li>• Government Building (designated as essential)</li> <li>• Law Enforcement Administrative Office/Headquarters</li> <li>• Law Enforcement Operational Facility</li> <li>• Maintenance/Repair Facility</li> <li>• Museum</li> <li>• Office</li> <li>• Other Emergency Services Facility</li> <li>• School</li> </ul>
<b>Transportation</b>	<ul style="list-style-type: none"> <li>• Air Traffic Control or Navigation Facility</li> <li>• Airport</li> <li>• Airport Terminal</li> <li>• Cargo Terminal</li> <li>• Maritime Supporting Facility</li> </ul>	<ul style="list-style-type: none"> <li>• Operations Support Facility</li> <li>• Pier</li> <li>• Transit Bus Garage</li> <li>• Transit Bus Terminal</li> <li>• Transit Operations</li> </ul>





Facility Lifeline Category	Facility Type	
<b>Other Critical Facilities</b>	<ul style="list-style-type: none"> <li>• Civic Center</li> <li>• Community Center</li> <li>• Gym</li> <li>• Home Improvement Store</li> </ul>	<ul style="list-style-type: none"> <li>• Office</li> <li>• Park</li> <li>• Warehouse</li> </ul>

Source: HI-EMA 2022

## F.2 Risk Assessment Methodology

### F.2.1 HAZUS

In 1997, FEMA developed the standardized Hazards U.S. (Hazus) model to estimate losses caused by earthquakes and identify areas that face the highest risk and potential for loss. Hazus was later expanded into a multi-hazard methodology with new models for estimating potential losses from hurricanes, floods, and tsunamis.

Hazus is a GIS-based software program used to support risk assessments, mitigation planning, and emergency planning and response. It provides a wide range of inventory data, such as demographics, building stock, community lifeline, critical facility, transportation and utility lifeline, and multiple models to estimate potential losses from natural disasters. The program maps and displays hazard data and the results of damage and economic loss estimates for buildings and infrastructure. Its advantages include the following:

- Provides a consistent methodology for assessing risk across geographic and political entities.
- Provides a way to save data so that they can readily be updated as population, inventory, and other factors change and as mitigation planning efforts evolve.
- Facilitates review of mitigation plans because it helps to ensure that FEMA methodologies are incorporated.
- Supports grant applications by calculating benefits using FEMA definitions and terminology.
- Produces hazard data and loss estimates that can be used in communication with local stakeholders.
- Administered by the local government and can be used to manage and update a hazard mitigation plan throughout its implementation.

### LEVELS OF DETAIL FOR EVALUATION

Hazus provides default data for inventory, vulnerability, and hazards; these default data can be supplemented with local data to provide a more refined analysis. The model can carry out three levels of analysis, depending on the format and level of detail of information about the planning area:

- **Level 1**—All of the information needed to produce an estimate of losses is included in the software's default data. These data are derived from national databases and describe in general terms the characteristic parameters of the planning area.
- **Level 2**—More accurate estimates of losses require more detailed information about the planning area. To produce Level 2 estimates of losses, detailed information is required about local geology, hydrology,





hydraulics, and building inventory, as well as data about community lifelines. This information is needed in a GIS format.

- **Level 3**—This level of analysis generates the most accurate estimate of losses. It requires detailed engineering and geotechnical information to customize it for the planning area.

For the 2023 SHMP Update, a user-defined analysis was conducted. The State buildings, community lifelines, and critical facilities were added to Hazus in the user-defined inventory to estimate potential losses for each individual structure. All community lifelines and critical facilities were updated using RS Means 2022 data.

The dasymetric building data provided in Hazus v5.1 was used to evaluate the event-based flood hazard. Development of the dasymetric dataset involved removing homogeneous undeveloped areas (such as areas covered by bodies of water, parks, or forests) from the Census blocks. Cumulative building exposure is distributed only in developed sub-Census Block areas. As a result, more accurate flood loss determinations are produced using this dataset.

The State building dataset included various structural attributes used for the analyses, including replacement cost, agency that owns or leases the building, use description, year built, number of stories, and square footage. For State buildings, community lifelines, and critical facilities that have missing values for these attributes and for additional attributes required for the FEMA Hazus analyses, default values were used. The following table summarizes the default data used if the information was missing from the dataset provided. Note that all analyses in the SHMP for the County of Maui include the County of Kalawao.

**Table F-2. Default Building Values in Hazus v5.1**

Attribute	Default Value
<b>Year Built</b>	2020 Census median year built at the tract or state level
<b>Number of Stories</b>	1 story
<b>Square Footage</b>	Typical size for the occupancy class as shown in the Table 14.1 of the Hazus-MH Flood Model Technical Manual.
<b>Building Replacement Cost</b>	Per square foot cost for the occupancy class from RS Means multiplied by the square footage.
<b>Content Replacement Cost</b>	Building replacement cost multiplied by the default Hazus contents value percent of structure value for the occupancy class as shown in Table 14.6 of the Hazus-MH Flood Model Technical Manual.
<b>Earthquake Building Type</b>	Most common building type for the occupancy class based on year built and number of stories as shown in Tables 3A.2 through 3A.10 of the Hazus-MH Flood Model Technical Manual.
<b>Earthquake Design Code</b>	Design code based on year built and UBC seismic zone (zone 1 for Kaua’i and City and County of Honolulu, zone 2B for Maui, zone 4 for County of Hawai’i) as shown in Table 5.20 of the Hazus Earthquake Technical Manual.
<b>Flood Building Type</b>	Based on the earthquake building type.
<b>Flood Foundation Type</b>	Most common foundation type for the occupancy class as shown in the Flood Specific Occupancy Mapping tables viewable through the inventory menu in Hazus.
<b>First Floor Elevation</b>	1 foot for slab on grade foundations and 2 feet for crawl space foundations.

When analyzing hazard areas, the total area was calculated from the State of Hawai’i State Land Use District GIS layer. Hazard areas downloaded from the State of Hawai’i GIS Program Geospatial Data Portal were clipped to the





coastline. Total area may differ slightly between this and other calculations due to slight differences in the shoreline geography.

## SOCIALLY VULNERABLE POPULATION

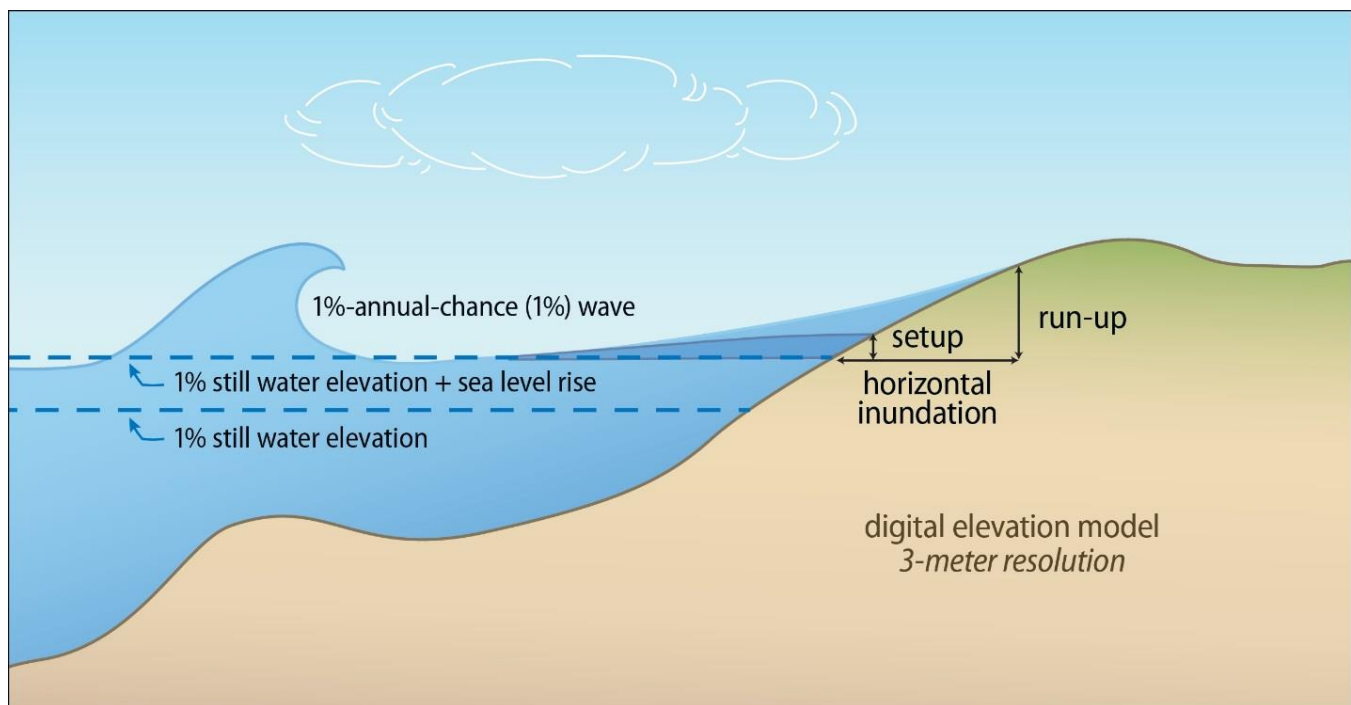
The vulnerability of the Census tracts in the Social Vulnerability Index data was based on the Centers for Disease Control and Prevention (CDC) Social Vulnerability Index (SVI) and was categorized as “high” if the overall tract summary ranking aligned with the current FEMA BRIC evaluation score greater than 0.80 (80%).

## F.3 Climate Change and Sea Level Rise

### F.3.1 1%CFZ-3.2 DATA GENERATION METHODOLOGY

Under the DLNR Contract 64064, a coastal flood zone was modeled that includes flood extents and wave heights for wave-generating events with sea level rise by Tetra Tech Inc. and Sobis Inc. This area is referred to as the 1%-annual-chance coastal flood zone or 1%CFZ. Key inputs and outputs of modeling the 1%CFZ are shown in Figure F-1.

**Figure F-1. Schematic diagram Showing Key Inputs and Outputs of Modeling the 1%-Annual-Chance Coastal Flood Zone (1%CFZ)**



## DATA INPUTS

Hazard modeling for the 1%CFZ used the 3-meter DEM, which captured the same horizontal extent of passive flooding but with lower resolution of the land closest to the shoreline. The current 1%-annual-chance stillwater elevation was generated based on the most current flood insurance studies (FIS) for each island conducted by





FEMA. The FIS calculates the 1%-annual-chance stillwater elevation, wave setup, and wave run-up (called maximum wave crest) at regularly spaced transects around the islands based on historical data. In some parts of the islands, large gaps exist between transects. In order to address these gaps in the data coverage, Hazus was run at 0.5-foot stillwater level intervals, and the results were compared to the existing floodplain (FIRM). The interval of 0.5 feet was chosen as a small enough step to result in a near approximation of the FIRM while not being too impractically narrow to require the testing of dozens of input elevations. The elevation which matched up best was used as the current base flood elevation.

## MODELING APPROACH

Key steps in modeling the projected 1%CFZ with sea level rise include: (1) generating a contiguous (no gaps along the shoreline) and present-day 1%-annual-chance stillwater elevation based on the most recent FIS, (2) elevating the present-day 1%-annual-chance stillwater elevation by adding projected sea level rise heights, and (3) modeling the projected 1%-annual-chance coastal flood with sea level rise in Hazus using the 1%-annual-chance wave setup and run-up from the FIS. The 1%CFZ extent and depth was generated using the Hazus v5.1 coastal flood model, 3-meter DEM, the FIS for each island, and the Intergovernmental Panel on Climate Change Fifth Assessment Report upper sea level projection for Representative Concentration Pathway (RCP) 8.5 scenario for 0.6 feet, 1.0 feet, 2.0 feet, and 3.2 feet of sea level rise above Mean Higher High Water. The Hazus output includes the estimated spatial extent of coastal flooding as well as an estimated flood depth map grid for the sea level rise projections.

Using the current floodplain generated with Hazus, the projected 1%-annual-chance stillwater elevation was generated using the sea level rise projections. This stillwater elevation with sea level rise was used as a basis for modeling. The projected 1%-annual coastal flood with sea level rise was modeled in Hazus using the current 1%-annual-chance wave setup and run-up from the FIS and the projected 1%-annual-chance stillwater elevation with sea level rise.

### *Assumptions and Limitations*

Historical records of severe wave events used to model the 1%CFZ do not consider potential changes in tropical cyclone activity related to climate change. Historical data used to model the 1%CFZ were based on the current FIS for each island conducted by the NFIP. The FIS use historic severe wave events from hurricanes, tsunamis, and other significant events to develop the FIRMs.

The 1%CFZ is modeled as a static rise of the base flood elevation using a fixed shoreline. As such, it does not consider changes in the location of the shoreline resulting from coastal erosion. While the current FIS for each island was used for modeling; these studies are based on historical records of hurricanes, tsunamis, and other coastal wave events and do not include projected changes in waves due to changes in storm frequency or intensity as a result of climate change. Also, riverine flooding is not included in the modeling.





## ADDITIONAL RESULTS

Table F-3 summarizes the number of miles of State roads located in the SLR-XA-3.2 and 1%CFZ-3.2, organized by county.

*Table F-3. State Road Exposure to Sea-Level Rise Hazard Areas by County*

State Route	Length (in miles)				
	Total Length (miles)	Miles of State Road in the SLR-XA-3.2	Percent (%) of Total Length	Miles of State Road in the 1%CFZ-3.2	Percent (%) of Total Length
<b>County of Kaua'i</b>					
State Route 50	32.89242	3.193582	9.71%	11.88131	36.12%
State Route 51	3.457222	0.029893	0.86%	0.531002	15.36%
State Route 56	28.316299	1.448715	5.12%	6.505937	22.98%
State Route 58	2.052085	0	0.00%	0.161423	7.87%
State Route 540	3.884869	0	0.00%	0	0.00%
State Route 541	0.37465	0	0.00%	0.064994	17.35%
State Route 550	14.03193	0	0.00%	0.125556	0.89%
State Route 560	9.98938	2.643944	26.47%	6.792348	68.00%
State Route 570	1.125605	0	0.00%	0	0.00%
State Route 580	6.668581	0.040679	0.61%	0.878158	13.17%
State Route 583	0.921237	0	0.00%	0	0.00%
<b>Total</b>	<b>103.714278</b>	<b>7.356813</b>	<b>7.09%</b>	<b>26.940728</b>	<b>25.98%</b>
<b>City and County of Honolulu</b>					
State Route 61	21.173569	0.021857	0.10%	0.028452	0.13%
State Route 63	16.618809	0	0.00%	0	0.00%
State Route 64	2.624714	0.124464	4.74%	2.138496	81.48%
State Route 65	6.584201	0	0.00%	0.251109	3.81%
State Route 72	22.766927	1.479001	6.50%	8.252005	36.25%
State Route 76	11.059837	1.01059	9.14%	1.339601	12.11%
State Route 78	1.346173	0.014683	1.09%	0.097597	7.25%
State Route 80	1.893686	0	0.00%	0	0.00%
State Route 83	47.821595	8.352385	17.47%	17.854149	37.33%
State Route 92	18.685552	1.987624	10.64%	10.79711	57.78%
State Route 93	19.522013	4.703742	24.09%	2.855635	14.63%
State Route 98	3.470599	0.031178	0.90%	0.032308	0.93%
State Route 99	41.120805	0.108576	0.26%	0.353361	0.86%
State Route 750	8.056213	0	0.00%	0	0.00%
State Route 901	1.403364	0	0.00%	0	0.00%
State Route 930	10.054945	0.554215	5.51%	3.065938	30.49%
State Route 7012	1.862959	0	0.00%	0	0.00%
State Route 7101	5.865258	0.035746	0.61%	0.422072	7.20%
State Route 7110	0.609843	0	0.00%	0	0.00%
State Route 7141	1.50208	0	0.00%	0	0.00%
State Route 7210	0.115075	0	0.00%	0	0.00%
State Route 7239	0.338737	0	0.00%	0	0.00%







State Route	Length (in miles)				
	Total Length (miles)	Miles of State Road in the SLR-XA-3.2	Percent (%) of Total Length	Miles of State Road in the 1%CFZ-3.2	Percent (%) of Total Length
State Route 7241	2.331816	0.008449	0.36%	0.010742	0.46%
State Route 7310	1.041137	0	0.00%	0.2275	21.85%
State Route 7345	0.554715	0	0.00%	0	0.00%
State Route 7350	0.597196	0	0.00%	0	0.00%
State Route 7351	0.243914	0	0.00%	0	0.00%
State Route 7401	0.214056	0.044232	20.66%	0.214056	100.00%
State Route 7413	0.352495	0	0.00%	0	0.00%
State Route 7415	0.536255	0	0.00%	0.16786	31.30%
State Route 7526	0.397834	0	0.00%	0	0.00%
State Route 7601	0.432591	0	0.00%	0	0.00%
State Route 7801	1.151651	0	0.00%	0	0.00%
State Route 8300	0.501274	0.020791	4.15%	0.098285	19.61%
State Route 8918	0.13352	0	0.00%	0	0.00%
State Route 8930	4.941677	0	0.00%	0	0.00%
State Route 8940	3.321223	0	0.00%	0	0.00%
State Route 8945	0.984948	0	0.00%	0	0.00%
State Route 8955	2.697864	0.260486	9.66%	0.85498	31.69%
State Route H-1	54.2852	0.61322	1.13%	1.43314	2.64%
State Route H-2	16.631646	0	0.00%	0	0.00%
State Route H-201	8.479473	0.024632	0.29%	0.031691	0.37%
State Route H-3	30.593733	0.01579	0.05%	0.372911	1.22%
<b>Total</b>	<b>374.921172</b>	<b>19.411661</b>	<b>5.18%</b>	<b>50.898998</b>	<b>13.58%</b>
<b>County of Maui</b>					
State Route 30	41.599628	6.819562	16.39%	0.921403	2.21%
State Route 31	7.147053	0	0.00%	0	0.00%
State Route 32	2.855291	0	0.00%	0.927283	32.48%
State Route 36	16.225414	0.282187	1.74%	0.971622	5.99%
State Route 37	21.33757	0	0.00%	0	0.00%
State Route 310	3.609294	1.646439	45.62%	2.395813	66.38%
State Route 311	6.415815	0	0.00%	0	0.00%
State Route 340	4.265623	0	0.00%	0	0.00%
State Route 360	34.838612	0	0.00%	0.059796	0.17%
State Route 377	9.136002	0	0.00%	0	0.00%
State Route 378	10.082808	0	0.00%	0	0.00%
State Route 380	6.197863	0	0.00%	0.323681	5.22%
State Route 440	13.153636	0	0.00%	0	0.00%
State Route 441	0.476716	0	0.00%	0	0.00%
State Route 442	0.022862	0	0.00%	0	0.00%
State Route 450	27.477007	2.248936	8.18%	11.150368	40.58%
State Route 460	16.534641	0.030871	0.19%	1.66084	10.04%
State Route 470	10.74695	0	0.00%	0	0.00%
State Route 480	5.898639	0	0.00%	0	0.00%





State Route	Length (in miles)				
	Total Length (miles)	Miles of State Road in the SLR-XA-3.2	Percent (%) of Total Length	Miles of State Road in the 1%CFZ-3.2	Percent (%) of Total Length
State Route 3000	2.346263	0	0.00%	0	0.00%
State Route 3400	2.635502	0.737817	28.00%	0.304754	11.56%
State Route 3500	1.125483	0	0.00%	0.562062	49.94%
State Route 3800	0.625243	0	0.00%	0	0.00%
State Route 32A	0.400435	0.035054	8.75%	0.400435	100.00%
State Route 32B	0.172196	0	0.00%	0.172196	100.00%
State Route 36A	0.526104	0	0.00%	0.43995	83.62%
<b>Total</b>	<b>245.85265</b>	<b>11.800866</b>	<b>4.80%</b>	<b>20.290203</b>	<b>8.25%</b>
<b>County of Hawai'i</b>					
State Route 11	117.608086	0	0.00%	0.100353	0.09%
State Route 19	93.300605	0.204494	0.22%	1.957262	2.10%
State Route 130	21.68728	0	0.00%	0	0.00%
State Route 139	1.197816	0	0.00%	0	0.00%
State Route 160	3.821277	0	0.00%	0	0.00%
State Route 163	0.133863	0	0.00%	0	0.00%
State Route 190	34.085758	0	0.00%	0	0.00%
State Route 197	1.17843	0	0.00%	0	0.00%
State Route 200	43.219679	0	0.00%	0	0.00%
State Route 220	3.754068	0	0.00%	0	0.00%
State Route 240	9.601941	0	0.00%	0	0.00%
State Route 250	19.266672	0	0.00%	0	0.00%
State Route 270	27.020618	0	0.00%	0.422338	1.56%
State Route 1370	0.191175	0	0.00%	0.191175	100.00%
State Route 1970	0.923307	0	0.00%	0.080659	8.74%
State Route 2000	2.184464	0	0.00%	0	0.00%
<b>Total</b>	<b>379.175039</b>	<b>0.204494</b>	<b>0.05%</b>	<b>2.751787</b>	<b>0.73%</b>

Source: State of Hawaii Department of Transportation 2022; Hawai'i Climate Change Mitigation and Adaptation Commission 2017; Tetra Tech Inc. and Sobis Inc. 2017

Table F-4 shows the square miles of SLR-XA-3.2 and 1%CFZ-3.2 for each State Land Use District in each county.

**Table F-4. State Land Use Districts in the Sea Level Rise Hazard Areas**

Land Use District	Area (in Square Miles)						
	Total Square Miles	Square Miles in SLR-XA-3.2	SLR-XA-3.2 as Percent (%) of Total Area	SLR-XA-3.2 as Percent (%) of Total Hazard Exposure	Square Miles in 1%CFZ-3.2	1%CFZ-3.2 as Percent (%) of Total Area	1%CFZ-3.2 as Percent (%) of Total Hazard Exposure
<b>County of Kaua'i</b>							
Agricultural	297.078539	4.847083	1.63%	54.30%	19.072984	6.42%	59.01%
Conservation	304.260357	2.552858	0.84%	28.60%	7.411515	2.44%	22.93%
Rural	2.146976	0.03049	1.42%	0.34%	0.368211	17.15%	1.14%
Urban	23.643203	1.496503	6.33%	16.76%	5.46669	23.12%	16.91%
<b>Total</b>	<b>627.129075</b>	<b>8.926934</b>	<b>1.42%</b>	<b>100.00%</b>	<b>32.3194</b>	<b>5.15%</b>	<b>100.00%</b>





Land Use District	Area (in Square Miles)						
	Total Square Miles	Square Miles in SLR-XA-3.2	SLR-XA-3.2 as Percent (%) of Total Area	SLR-XA-3.2 as Percent (%) of Total Hazard Exposure	Square Miles in 1%CFZ-3.2	1%CFZ-3.2 as Percent (%) of Total Area	1%CFZ-3.2 as Percent (%) of Total Hazard Exposure
<b>City and County of Honolulu</b>							
Agricultural	188.479146	1.902749	1.01%	15.63%	8.440963	4.48%	20.84%
Conservation	247.601978	3.150159	1.27%	25.88%	4.684754	1.89%	11.57%
Rural	-	-	-	-	-	-	-
Urban	162.455059	7.117581	4.38%	58.48%	27.371817	16.85%	67.59%
<b>Total</b>	<b>598.536183</b>	<b>12.170489</b>	<b>2.03%</b>	<b>100.00%</b>	<b>40.497534</b>	<b>6.77%</b>	<b>100.00%</b>
<b>County of Maui</b>							
Agricultural	637.731138	2.040536	0.32%	21.58%	4.580218	0.72%	25.55%
Conservation	552.35574	4.621992	0.84%	48.87%	7.264157	1.32%	40.52%
Rural	12.824585	0.564782	4.40%	5.97%	1.791795	13.97%	10.00%
Urban	45.187433	2.229674	4.93%	23.58%	4.289195	9.49%	23.93%
<b>Total</b>	<b>1,248</b>	<b>9.456984</b>	<b>0.76%</b>	<b>100.00%</b>	<b>17.925365</b>	<b>1.44%</b>	<b>100.00%</b>
<b>County of Hawai'i</b>							
Agricultural	1,850.31	0.146216	0.01%	3.29%	3.660674	0.20%	19.49%
Conservation	2,098.66	3.42501	0.16%	77.09%	10.731767	0.51%	57.13%
Rural	1.36344	0.004256	0.31%	0.10%	0.005582	0.41%	0.03%
Urban	87.847736	0.867486	0.99%	19.52%	4.385858	4.99%	23.35%
<b>Total</b>	<b>4,038</b>	<b>4.442968</b>	<b>0.11%</b>	<b>100.00%</b>	<b>18.783881</b>	<b>0.47%</b>	<b>100.00%</b>

Source: State Land Use Commission, Hawaii Statewide GIS Program 2021; Honolulu County GIS 2022; Hawai'i Climate Change Mitigation and Adaptation Commission 2017; Tetra Tech Inc. and Sobis Inc. 2017

Notes: (-) Denotes no rural district in the City and County of Honolulu

## F.4 Cyber Threat

There are no additional tables to support Section 4.3 (Cyber Threat).

## F.5 Drought

There are no additional tables to support Section 4.4 (Drought).

## F.6 Earthquake

Table F-5 summarizes the estimated potential damages to State buildings by agency as a result of the 100-year probabilistic earthquake event in Hazus v5.1.

**Table F-5. Estimated Potential Loss to State Buildings by Agency (100-year Probabilistic Earthquake Event)**

Agency	Total Number of State Buildings	Total Replacement Cost Value	Total Number of State Buildings in Hazard Area	Estimated Potential Loss	Percent (%) of Total Value
Dept. of Accounting & General Services	66	\$953,963,738	66	\$3,191,403	0.33%





Agency	Total Number of State Buildings	Total Replacement Cost Value	Total Number of State Buildings in Hazard Area	Estimated Potential Loss	Percent (%) of Total Value
Dept. of Agriculture	70	\$147,607,399	70	\$1,728,845	1.17%
Dept. of Attorney General	15	\$108,425,480	15	\$301,576	0.28%
Dept. of Budget & Finance	16	\$28,968,679	16	\$137,221	0.47%
Dept. of Business, Economic Development and Tourism	25	\$645,480,379	25	\$1,452,562	0.23%
Dept. of Commerce & Consumer Affairs	2	\$40,197,360	2	\$61,939	0.15%
Dept. of Defense	69	\$267,352,836	69	\$2,158,817	0.81%
Dept. of Education	4,090	\$10,598,205,739	4003	\$268,584,100	2.53%
Dept. of Hawaiian Home Lands	12	\$110,427,352	12	\$431,959	0.39%
Dept. of Health	44	\$387,068,440	43	\$1,025,948	0.27%
Dept. of Human Resources Development	1	\$5,973,872	1	\$8,018	0.13%
Dept. of Human Services	130	\$480,212,294	130	\$2,235,397	0.47%
Dept. of Labor and Industrial Relations	22	\$90,076,209	22	\$1,114,879	1.24%
Dept. of Land and Natural Resources	90	\$101,441,821	89	\$268,403	0.26%
Dept. of Public Safety	154	\$440,774,415	154	\$8,803,098	2.00%
Dept. of Taxation	1	\$7,174,162	1	\$11,809	0.16%
Dept. of Transportation	68	\$2,935,208,214	68	\$5,949,192	0.20%
Hawai'i State Ethics Commission	1	\$984,533	1	\$1,422	0.14%
Hawai'i Health Systems Corporation	106	\$1,230,852,871	97	\$27,166,906	2.21%
Hawai'i Housing Finance & Development Corporation	86	\$360,851,671	86	\$3,206,470	0.89%
Hawai'i Public Housing Authority	273	\$982,981,701	209	\$6,052,550	0.62%
Hawai'i State Legislature	2	\$48,555,381	2	\$75,061	0.15%
Hawai'i State Public Library System	53	\$525,584,082	51	\$3,292,268	0.63%
Judiciary	41	\$534,877,354	41	\$3,267,028	0.61%
Legislative Reference Bureau	1	\$2,996,162	1	4082.9213	0.14%
Office of Hawaiian Affairs	11	\$54,125,645	11	\$87,800	0.16%
Office of the Auditor	2	\$1,921,180	2	\$2,569	0.13%
Office of the Governor	1	\$2,996,162	1	\$4,083	0.14%
Office of the Lieutenant Governor	2	\$4,588,849	2	\$9,945	0.22%
Office of the Ombudsman	1	\$1,818,060	1	\$2,484	0.14%
Research Corporation of the University of Hawai'i	3	\$4,189,026	3	\$6,583	0.16%
University of Hawai'i	637	\$5,014,974,503	637	\$18,138,256	0.36%
<b>Total</b>	<b>6,095</b>	<b>\$26,120,855,568</b>	<b>5,931</b>	<b>\$358,782,672</b>	<b>1.37%</b>

Source: State of Hawai'i Risk Management Office 2017; FEMA Hazus v5.1

Table F-6 summarizes the estimated potential damages to State buildings by county as a result of the Kalapana earthquake event in Hazus v5.1.

**Table F-6. Estimated Potential Loss to State Buildings by County (Kalapana 1975 M7.7 Scenario)**

County	Total Replacement Cost Value	Estimated Potential Loss	
		Value	Percent (%) of Total
County of Kaua'i	\$990,850,824	\$0	0.00%
City and County of Honolulu	\$17,393,945,915	\$2,607,370	0.01%





County	Total Replacement Cost Value	Estimated Potential Loss	
		Value	Percent (%) of Total
County of Maui	\$3,097,491,689	\$361,115	0.01%
County of Hawai'i	\$4,638,567,141	\$112,266,079	2.42%
<b>Total</b>	<b>\$26,120,855,568</b>	<b>\$115,234,564</b>	<b>0.44%</b>

Source: State of Hawaii Risk Management Office 2017; United States Geological Survey 2013; FEMA Hazus v5.1

Table F-7 summarizes the estimated potential damages to State buildings by agency as a result of the Kalapana earthquake event in Hazus v5.1.

**Table F-7. Estimated Potential Loss to State Buildings by Agency (Kalapana 1975 M7.7 Scenario)**

Agency	Total Replacement Cost Value	Estimated Potential Loss	
		Value	Percent (%) of Total
Dept. of Accounting & General Services	\$953,963,738	\$810,273	0.08%
Dept. of Agriculture	\$147,607,399	\$694,619	0.47%
Dept. of Attorney General	\$108,425,480	\$44,044	0.04%
Dept. of Budget & Finance	\$28,968,679	\$77,881	0.27%
Dept. of Business, Economic Development & Tourism	\$645,480,379	\$122,544	0.02%
Dept. of Commerce & Consumer Affairs	\$40,197,360	\$5,179	0.01%
Dept. of Defense	\$267,352,836	\$1,531,755	0.57%
Dept. of Education	\$10,598,205,739	\$80,394,007	0.76%
Dept. of Hawaiian Home Lands	\$110,427,352	\$40,340	0.04%
Dept. of Health	\$387,068,440	\$235,300	0.06%
Dept. of Human Resources Development	\$5,973,872	\$1,468	0.02%
Dept. of Human Services	\$480,212,294	\$526,885	0.11%
Dept. of Labor & Industrial Relations	\$90,076,209	\$726,303	0.81%
Dept. of Land & Natural Resources	\$101,441,821	\$24,805	0.02%
Dept. of Public Safety	\$440,774,415	\$5,126,088	1.16%
Dept. of Taxation	\$7,174,162	\$1,271	0.02%
Dept. of Transportation	\$2,935,208,214	\$1,222,041	0.04%
Hawai'i State Ethics Commission	\$984,533	\$100	0.01%
Hawai'i Health Systems Corporation	\$1,230,852,871	\$13,674,956	1.11%
Hawai'i Housing Finance & Development Corporation	\$360,851,671	\$134,509	0.04%
Hawai'i Public Housing Authority	\$982,981,701	\$669,034	0.07%
Hawai'i State Legislature	\$48,555,381	\$11,758	0.02%
Hawai'i State Public Library System	\$525,584,082	\$1,778,824	0.34%
Judiciary	\$534,877,354	\$1,185,061	0.22%
Legislative Reference Bureau	\$2,996,162	\$742	0.02%
Office of Hawaiian Affairs	\$54,125,645	\$8,860	0.02%
Office of the Auditor	\$1,921,180	\$261	0.01%
Office of the Governor	\$2,996,162	\$742	0.02%





Agency	Total Replacement Cost Value	Estimated Potential Loss	
		Value	Percent (%) of Total
Office of the Lieutenant Governor	\$4,588,849	\$870	0.02%
Office of the Ombudsman	\$1,818,060	\$248	0.01%
Research Corporation of the University of Hawai'i	\$4,189,026	\$783	0.02%
University of Hawai'i	\$5,014,974,503	\$6,183,013	0.12%
<b>Total</b>	<b>\$26,120,855,568</b>	<b>\$115,234,564</b>	<b>0.44%</b>

Source: Source: State of Hawaii Risk Management Office 2017; United States Geological Survey 2013; FEMA Hazus v5.1

Table F-8 summarizes the estimated potential damages to community lifelines and critical facilities by category as a result of the Kalapana earthquake event in Hazus v5.1.

**Table F-8. Estimated Potential Loss to Community Lifelines and Critical Facilities by Category (Kalapana 1975 M7.7 Scenario)**

Category	Total Replacement Cost Value	Estimated Potential Loss	
		Value	Percent (%) of Total
Communications	\$776,797,683	\$2,958,202	0.38%
Energy	\$3,093,949,530	\$1,948,153	0.06%
Food, Water, Shelter	\$11,847,189,588	\$40,547,006	0.34%
Hazardous Material	\$436,474,800	\$7,962,395	1.82%
Health and Medical	\$4,606,713,364	\$23,308,914	0.51%
Safety and Security	\$38,164,188,232	\$54,391,923	0.14%
Transportation Services	\$2,039,091,600	\$2,661,950	0.13%
Additional Critical Facilities	\$447,698,794	\$3,357,342	0.75%
<b>Total</b>	<b>\$61,412,103,591</b>	<b>\$137,135,884</b>	<b>0.22%</b>

Source: Hawai'i Emergency Management Agency 2017; Federal Emergency Management Agency Lifeline Data 2020; United States Geological Survey 2013, Hazus v5.1

Table F-9 summarizes the estimated potential damages to State buildings by county as a result of the Ka'ū earthquake event in Hazus v5.1.

**Table F-9. Estimated Potential Loss to State Buildings by County (Ka'ū M8.0 Scenario)**

County	Total Replacement Cost Value	Estimated Potential Loss	
		Value	Percent (%) of Total
County of Kaua'i	\$990,850,824	\$0	0.00%
City and County of Honolulu	\$17,393,945,915	\$3,892,689	0.02%
County of Maui	\$3,097,491,689	\$772,179	0.02%
County of Hawai'i	\$4,638,567,141	\$143,537,454	3.09%
<b>Total</b>	<b>\$26,120,855,568</b>	<b>\$148,202,322</b>	<b>0.57%</b>

Source: State of Hawaii Risk Management Office 2017; United States Geological Survey 2013; FEMA Hazus v5.1





Table F-10 summarizes the estimated potential damages to State buildings by agency as a result of the Ka’ū earthquake event in Hazus v5.1.

**Table F-10. Estimated Potential Loss to State Buildings by Agency (Ka’ū M8.0 Scenario)**

Agency	Total Replacement Cost Value	Estimated Potential Loss	
		Value	Percent (%) of Total
Dept. of Accounting & General Services	\$953,963,738	\$1,106,170	0.12%
Dept. of Agriculture	\$147,607,399	\$911,336	0.62%
Dept. of Attorney General	\$108,425,480	\$58,606	0.05%
Dept. of Budget & Finance	\$28,968,679	\$82,770	0.29%
Dept. of Business, Economic Development & Tourism	\$645,480,379	\$178,734	0.03%
Dept. of Commerce & Consumer Affairs	\$40,197,360	\$9,762	0.02%
Dept. of Defense	\$267,352,836	\$1,579,360	0.59%
Dept. of Education	\$10,598,205,739	\$100,407,448	0.95%
Dept. of Hawaiian Home Lands	\$110,427,352	\$243,190	0.22%
Dept. of Health	\$387,068,440	\$326,827	0.08%
Dept. of Human Resources Development	\$5,973,872	\$1,468	0.02%
Dept. of Human Services	\$480,212,294	\$720,727	0.15%
Dept. of Labor & Industrial Relations	\$90,076,209	\$764,268	0.85%
Dept. of Land & Natural Resources	\$101,441,821	\$36,741	0.04%
Dept. of Public Safety	\$440,774,415	\$7,351,391	1.67%
Dept. of Taxation	\$7,174,162	\$2,379	0.03%
Dept. of Transportation	\$2,935,208,214	\$1,698,065	0.06%
Hawai’i State Ethics Commission	\$984,533	\$224	0.02%
Hawai’i Health Systems Corporation	\$1,230,852,871	\$18,865,437	1.53%
Hawai’i Housing Finance & Development Corporation	\$360,851,671	\$214,980	0.06%
Hawai’i Public Housing Authority	\$982,981,701	\$1,264,044	0.13%
Hawai’i State Legislature	\$48,555,381	\$11,758	0.02%
Hawai’i State Public Library System	\$525,584,082	\$1,902,838	0.36%
Judiciary	\$534,877,354	\$1,474,413	0.28%
Legislative Reference Bureau	\$2,996,162	\$742	0.02%
Office of Hawaiian Affairs	\$54,125,645	\$15,806	0.03%
Office of the Auditor	\$1,921,180	\$471	0.02%
Office of the Governor	\$2,996,162	\$742	0.02%
Office of the Lieutenant Governor	\$4,588,849	\$1,403	0.03%
Office of the Ombudsman	\$1,818,060	\$451	0.02%
Research Corporation of the University of Hawai’i	\$4,189,026	\$1,234	0.03%
University of Hawai’i	\$5,014,974,503	\$8,968,535	0.18%
<b>Total</b>	<b>\$24,780,556,017</b>	<b>\$148,202,322</b>	<b>0.60%</b>

Source: State of Hawaii Risk Management Office 2017; United States Geological Survey 2013; FEMA Hazus v5.1





Table F-11 summarizes the estimated potential damages to community lifelines and critical facilities by category as a result of the Ka'ū earthquake event in Hazus v5.1.

**Table F-11. Estimated Potential Loss to Community Lifelines and Critical Facilities by Category (Ka'ū M8.0 Scenario)**

Category	Total Replacement Cost Value	Estimated Potential Loss	
		Value	Percent (%) of Total
Communications	\$776,797,683	\$3,906,389	0.50%
Energy	\$3,093,949,530	\$1,614,276	0.05%
Food, Water, Shelter	\$11,847,189,588	\$54,302,551	0.46%
Hazardous Material	\$436,474,800	\$8,124,554	1.86%
Health and Medical	\$4,606,713,364	\$46,855,655	1.02%
Safety and Security	\$38,164,188,232	\$102,405,944	0.27%
Transportation Services	\$2,039,091,600	\$3,095,431	0.15%
Additional Critical Facilities	\$447,698,794	\$4,581,006	1.02%
<b>Total</b>	<b>\$61,412,103,591</b>	<b>\$224,885,808</b>	<b>0.37%</b>

Source: Hawaii's Emergency Management Agency 2017; Federal Emergency Management Agency Lifeline Data 2020; United States Geological Survey 2013, Hazus v5.1

Table F-12 summarizes the estimated potential damages to State buildings by county as a result of the Lāna'i earthquake event in Hazus v5.1.

**Table F-12. Estimated Potential Loss to State Buildings by County (Lāna'i M7.0 Scenario)**

County	Total Replacement Cost Value	Estimated Potential Loss	
		Value	Percent (%) of Total
County of Kaua'i	\$990,850,824	\$0	0.00%
City and County of Honolulu	\$17,393,945,915	\$2,067,123	0.01%
County of Maui	\$3,097,491,689	\$37,395,087	1.21%
County of Hawai'i	\$4,638,567,141	\$23,550	0.00%
<b>Total</b>	<b>\$26,120,855,568</b>	<b>\$39,485,760</b>	<b>0.15%</b>

Source: State of Hawaii Risk Management Office 2017; United States Geological Survey 2013; FEMA Hazus v5.1

Table F-13 summarizes the estimated potential damages to State buildings by agency as a result of the Lāna'i earthquake event in Hazus v5.1.

**Table F-13. Estimated Potential Loss to State Buildings by Agency (Lāna'i M7.0 Scenario)**

Agency	Total Replacement Cost Value	Estimated Potential Loss	
		Value	Percent (%) of Total
Dept. of Accounting & General Services	\$953,963,738	\$295,115	0.03%
Dept. of Agriculture	\$147,607,399	\$30,168	0.02%







Agency	Total Replacement Cost	Estimated Potential Loss	
	Value	Value	Percent (%) of Total
Dept. of Attorney General	\$108,425,480	\$15,792	0.01%
Dept. of Budget & Finance	\$28,968,679	\$4,378	0.02%
Dept. of Business, Economic Development & Tourism	\$645,480,379	\$72,572	0.01%
Dept. of Commerce & Consumer Affairs	\$40,197,360	\$5,716	0.01%
Dept. of Defense	\$267,352,836	\$51,913	0.02%
Dept. of Education	\$10,598,205,739	\$31,769,046	0.30%
Dept. of Hawaiian Home Lands	\$110,427,352	\$13,763	0.01%
Dept. of Health	\$387,068,440	\$53,414	0.01%
Dept. of Human Resources Development	\$5,973,872	\$658	0.01%
Dept. of Human Services	\$480,212,294	\$348,243	0.07%
Dept. of Labor & Industrial Relations	\$90,076,209	\$159,811	0.18%
Dept. of Land & Natural Resources	\$101,441,821	\$28,470	0.03%
Dept. of Public Safety	\$440,774,415	\$105,381	0.02%
Dept. of Taxation	\$7,174,162	\$1,161	0.02%
Dept. of Transportation	\$2,935,208,214	\$2,224,415	0.08%
Hawai'i State Ethics Commission	\$984,533	\$134	0.01%
Hawai'i Health Systems Corporation	\$1,230,852,871	\$2,324,765	0.19%
Hawai'i Housing Finance & Development Corporation	\$360,851,671	\$244,966	0.07%
Hawai'i Public Housing Authority	\$982,981,701	\$98,323	0.01%
Hawai'i State Legislature	\$48,555,381	\$6,908	0.01%
Hawai'i State Public Library System	\$525,584,082	\$346,432	0.07%
Judiciary	\$534,877,354	\$450,962	0.08%
Legislative Reference Bureau	\$2,996,162	\$335	0.01%
Office of Hawaiian Affairs	\$54,125,645	\$12,137	0.02%
Office of the Auditor	\$1,921,180	\$211	0.01%
Office of the Governor	\$2,996,162	\$335	0.01%
Office of the Lieutenant Governor	\$4,588,849	\$2,783	0.06%
Office of the Ombudsman	\$1,818,060	\$204	0.01%
Research Corporation of the University of Hawai'i	\$4,189,026	\$631	0.02%
University of Hawai'i	\$5,014,974,503	\$816,617	0.02%
<b>Total</b>	<b>\$26,120,855,568</b>	<b>\$39,485,760</b>	<b>0.15%</b>

Source: State of Hawaii Risk Management Office 2017; United States Geological Survey 2013; FEMA Hazus v5.1

Table F-14 summarizes the estimated potential damages to community lifelines and critical facilities by category as a result of the Lāna'i earthquake event in Hazus v5.1.





**Table F-14. Estimated Potential Loss to Community Lifelines and Critical Facilities by Category (Lānaʻi M7.0 Scenario)**

Category	Total Replacement Cost Value	Estimated Potential Loss	
		Value	Percent (%) of Total
Communications	\$776,797,683	\$991,928	0.13%
Energy	\$3,093,949,530	\$375,321	0.01%
Food, Water, Shelter	\$11,847,189,588	\$8,312,963	0.07%
Hazardous Material	\$436,474,800	\$17,462	0.00%
Health and Medical	\$4,606,713,364	\$6,936,985	0.15%
Safety and Security	\$38,164,188,232	\$380,048,621	1.00%
Transportation Services	\$2,039,091,600	\$7,302,517	0.36%
Additional Critical Facilities	\$447,698,794	\$833,761	0.19%
<b>Total</b>	<b>\$61,412,103,591</b>	<b>\$404,819,558</b>	<b>0.66%</b>

Source: Hawaii Emergency Management Agency 2017; Federal Emergency Management Agency Lifeline Data 2020; United States Geological Survey 2013, Hazus v5.1

Table F-15 summarizes the estimated potential damages to State buildings by county as a result of the NE Maui earthquake event in Hazus v5.1.

**Table F-15. Estimated Potential Loss to State Buildings by County (NE Maui M7.0 Scenario)**

County	Total Replacement Cost Value	Estimated Potential Loss	
		Value	Percent (%) of Total
County of Kauaʻi	\$990,850,824	\$0	0.00%
City and County of Honolulu	\$17,393,945,915	\$743,785	0.00%
County of Maui	\$3,097,491,689	\$3,897,232	0.13%
County of Hawaiʻi	\$4,638,567,141	\$47,651	0.00%
<b>Total</b>	<b>\$26,120,855,568</b>	<b>\$4,688,669</b>	<b>0.02%</b>

Source: State of Hawaii Risk Management Office 2017; United States Geological Survey 2013; FEMA Hazus v5.1

Table F-16 summarizes the estimated potential damages to State buildings by agency as a result of the NE Maui earthquake event in Hazus v5.1.

**Table F-16. Estimated Potential Loss to State Buildings by Agency (NE Maui M7.0 Scenario)**

Agency	Total Replacement Cost Value	Estimated Potential Loss	
		Value	Percent (%) of Total
Dept. of Accounting & General Services	\$953,963,738	\$62,546	0.01%
Dept. of Agriculture	\$147,607,399	\$60,801	0.04%
Dept. of Attorney General	\$108,425,480	\$12,614	0.01%
Dept. of Budget & Finance	\$28,968,679	\$2,609	0.01%
Dept. of Business, Economic Development & Tourism	\$645,480,379	\$44,114	0.01%





Agency	Total Replacement Cost	Estimated Potential Loss	
	Value	Value	Percent (%) of Total
Dept. of Commerce & Consumer Affairs	\$40,197,360	\$2,027	0.01%
Dept. of Defense	\$267,352,836	\$60,720	0.02%
Dept. of Education	\$10,598,205,739	\$1,479,239	0.01%
Dept. of Hawaiian Home Lands	\$110,427,352	\$6,514	0.01%
Dept. of Health	\$387,068,440	\$31,071	0.01%
Dept. of Human Resources Development	\$5,973,872	\$276	0.00%
Dept. of Human Services	\$480,212,294	\$83,068	0.02%
Dept. of Labor & Industrial Relations	\$90,076,209	\$13,217	0.01%
Dept. of Land & Natural Resources	\$101,441,821	\$23,348	0.02%
Dept. of Public Safety	\$440,774,415	\$102,707	0.02%
Dept. of Taxation	\$7,174,162	\$511	0.01%
Dept. of Transportation	\$2,935,208,214	\$896,094	0.03%
Hawai'i State Ethics Commission	\$984,533	\$46	0.00%
Hawai'i Health Systems Corporation	\$1,230,852,871	\$940,641	0.08%
Hawai'i Housing Finance & Development Corporation	\$360,851,671	\$62,662	0.02%
Hawai'i Public Housing Authority	\$982,981,701	\$53,329	0.01%
Hawai'i State Legislature	\$48,555,381	\$2,440	0.01%
Hawai'i State Public Library System	\$525,584,082	\$72,368	0.01%
Judiciary	\$534,877,354	\$70,278	0.01%
Legislative Reference Bureau	\$2,996,162	\$139	0.00%
Office of Hawaiian Affairs	\$54,125,645	\$3,187	0.01%
Office of the Auditor	\$1,921,180	\$88	0.00%
Office of the Governor	\$2,996,162	\$139	0.00%
Office of the Lieutenant Governor	\$4,588,849	\$4,421	0.10%
Office of the Ombudsman	\$1,818,060	\$85	0.00%
Research Corporation of the University of Hawai'i	\$4,189,026	\$259	0.01%
University of Hawai'i	\$5,014,974,503	\$597,110	0.01%
<b>Total</b>	<b>\$26,120,855,568</b>	<b>\$4,688,669</b>	<b>0.02%</b>

Source: State of Hawaii Risk Management Office 2017; United States Geological Survey 2013; FEMA Hazus v5.1

Table F-17 summarizes the estimated potential damages to community lifelines and critical facilities by category as a result of the NE Maui earthquake event in Hazus v5.1.





**Table F-17. Estimated Potential Loss to Community Lifelines and Critical Facilities by Category (NE Maui M7.0 Scenario)**

Category	Total Replacement Cost Value	Estimated Potential Loss	
		Value	Percent (%) of Total
Communications	\$776,797,683	\$196,892	0.03%
Energy	\$3,093,949,530	\$425,985	0.01%
Food, Water, Shelter	\$11,847,189,588	\$3,313,261	0.03%
Hazardous Material	\$436,474,800	\$4,212	0.00%
Health and Medical	\$4,606,713,364	\$1,334,965	0.03%
Safety and Security	\$38,164,188,232	\$51,399,655	0.13%
Transportation Services	\$2,039,091,600	\$1,483,104	0.07%
Additional Critical Facilities	\$447,698,794	\$323,458	0.07%
<b>Total</b>	<b>\$61,412,103,591</b>	<b>\$58,481,531</b>	<b>0.10%</b>

Source: Hawai'i Emergency Management Agency 2017; Federal Emergency Management Agency Lifeline Data 2020; United States Geological Survey 2013, Hazus v5.1

Table F-18 summarizes the number of miles of State roads located on NEHRP soil types D and E, organized by county.

**Table F-18. State Road Exposure to NEHRP Soil Types D and E by County**

State Route	Length (in miles)						
	Total Length	Length in NEHRP Type D Soil	Exposed Length as % of Total Length	Length in NEHRP Type E Soil	Exposed Length as % of Total Length	NEHRP Type D & E Soil Hazard Area	Exposed Length as % of Total Length
<b>County of Kaua'i</b>							
State Route 50	32.89242	0	0.00%	0.0	0.0%	0	0.00%
State Route 51	3.457222	0	0.00%	0.0	0.0%	0	0.00%
State Route 56	28.316299	0	0.00%	0.0	0.0%	0	0.00%
State Route 58	2.052085	0	0.00%	0.0	0.0%	0	0.00%
State Route 540	3.884869	0	0.00%	0.0	0.0%	0	0.00%
State Route 541	0.37465	0	0.00%	0.0	0.0%	0	0.00%
State Route 550	14.03193	0	0.00%	0.0	0.0%	0	0.00%
State Route 560	9.98938	0	0.00%	0.0	0.0%	0	0.00%
State Route 570	1.125605	0	0.00%	0.0	0.0%	0	0.00%
State Route 580	6.668581	0	0.00%	0.0	0.0%	0	0.00%
State Route 583	0.921237	0	0.00%	0.0	0.0%	0	0.00%
<b>Total</b>	<b>103.714278</b>	<b>0</b>	<b>0.00%</b>	<b>0.0</b>	<b>0.0%</b>	<b>0</b>	<b>0.00%</b>
<b>City and County of Honolulu</b>							
State Route 61	21.173569	0	0.00%	0.0	0.0%	0	0.00%
State Route 63	16.618809	0	0.00%	0.0	0.0%	0	0.00%
State Route 64	2.624714	0	0.00%	0.0	0.0%	0	0.00%
State Route 65	6.584201	0	0.00%	0.0	0.0%	0	0.00%





State Route	Length (in miles)						
	Total Length	Length in NEHRP Type D Soil	Exposed Length as % of Total Length	Length in NEHRP Type E Soil	Exposed Length as % of Total Length	NEHRP Type D & E Soil Hazard Area	Exposed Length as % of Total Length
State Route 72	22.766927	0	0.00%	0.0	0.0%	0	0.00%
State Route 76	11.059837	0	0.00%	0.0	0.0%	0	0.00%
State Route 78	1.346173	0	0.00%	0.0	0.0%	0	0.00%
State Route 80	1.893686	0	0.00%	0.0	0.0%	0	0.00%
State Route 83	47.821595	0	0.00%	0.0	0.0%	0	0.00%
State Route 92	18.685552	0	0.00%	0.0	0.0%	0	0.00%
State Route 93	19.522013	0	0.00%	0.0	0.0%	0	0.00%
State Route 98	3.470599	0	0.00%	0.0	0.0%	0	0.00%
State Route 99	41.120805	0	0.00%	0.0	0.0%	0	0.00%
State Route 750	8.056213	0	0.00%	0.0	0.0%	0	0.00%
State Route 901	1.403364	0	0.00%	0.0	0.0%	0	0.00%
State Route 930	10.054945	0	0.00%	0.0	0.0%	0	0.00%
State Route 7012	1.862959	0	0.00%	0.0	0.0%	0	0.00%
State Route 7101	5.865258	0	0.00%	0.0	0.0%	0	0.00%
State Route 7110	0.609843	0	0.00%	0.0	0.0%	0	0.00%
State Route 7141	1.50208	0	0.00%	0.0	0.0%	0	0.00%
State Route 7210	0.115075	0	0.00%	0.0	0.0%	0	0.00%
State Route 7239	0.338737	0	0.00%	0.0	0.0%	0	0.00%
State Route 7241	2.331816	0	0.00%	0.0	0.0%	0	0.00%
State Route 7310	1.041137	0	0.00%	0.0	0.0%	0	0.00%
State Route 7345	0.554715	0	0.00%	0.0	0.0%	0	0.00%
State Route 7350	0.597196	0	0.00%	0.0	0.0%	0	0.00%
State Route 7351	0.243914	0	0.00%	0.0	0.0%	0	0.00%
State Route 7401	0.214056	0	0.00%	0.0	0.0%	0	0.00%
State Route 7413	0.352495	0	0.00%	0.0	0.0%	0	0.00%
State Route 7415	0.536255	0	0.00%	0.0	0.0%	0	0.00%
State Route 7526	0.397834	0	0.00%	0.0	0.0%	0	0.00%
State Route 7601	0.432591	0	0.00%	0.0	0.0%	0	0.00%
State Route 7801	1.151651	0	0.00%	0.0	0.0%	0	0.00%
State Route 8300	0.501274	0	0.00%	0.0	0.0%	0	0.00%
State Route 8918	0.13352	0	0.00%	0.0	0.0%	0	0.00%
State Route 8930	4.941677	0	0.00%	0.0	0.0%	0	0.00%
State Route 8940	3.321223	0	0.00%	0.0	0.0%	0	0.00%
State Route 8945	0.984948	0	0.00%	0.0	0.0%	0	0.00%
State Route 8955	2.697864	0	0.00%	0.0	0.0%	0	0.00%
State Route H-1	54.2852	0	0.00%	0.0	0.0%	0	0.00%
State Route H-2	16.631646	0	0.00%	0.0	0.0%	0	0.00%
State Route H-201	8.479473	0	0.00%	0.0	0.0%	0	0.00%





State Route	Length (in miles)						
	Total Length	Length in NEHRP Type D Soil	Exposed Length as % of Total Length	Length in NEHRP Type E Soil	Exposed Length as % of Total Length	NEHRP Type D & E Soil Hazard Area	Exposed Length as % of Total Length
State Route H-3	30.593733	0	0.00%	0.0	0.0%	0	0.00%
<b>Total</b>	<b>374.921172</b>	<b>0</b>	<b>0.00%</b>	<b>0.0</b>	<b>0.0%</b>	<b>0</b>	<b>0.00%</b>
<b>County of Maui</b>							
State Route 30	41.599628	20.88681	50.21%	0.0	0.0%	20.88681	50.21%
State Route 31	7.147053	1.835538	25.68%	0.0	0.0%	1.835538	25.68%
State Route 32	2.855291	2.855291	100.00%	0.0	0.0%	2.855291	100.00%
State Route 36	16.225414	2.32542	14.33%	0.0	0.0%	2.32542	14.33%
State Route 37	21.33757	0.065403	0.31%	0.0	0.0%	0.065403	0.31%
State Route 310	3.609294	3.609294	100.00%	0.0	0.0%	3.609294	100.00%
State Route 311	6.415815	5.203529	81.10%	0.0	0.0%	5.203529	81.10%
State Route 340	4.265623	2.51029	58.85%	0.0	0.0%	2.51029	58.85%
State Route 360	34.838612	1.145617	3.29%	0.0	0.0%	1.145617	3.29%
State Route 377	9.136002	0.06717	0.74%	0.0	0.0%	0.06717	0.74%
State Route 378	10.082808	0.148269	1.47%	0.0	0.0%	0.148269	1.47%
State Route 380	6.197863	6.197863	100.00%	0.0	0.0%	6.197863	100.00%
State Route 440	13.153636	2.966894	22.56%	0.0	0.0%	2.966894	22.56%
State Route 441	0.476716	0	0.00%	0.0	0.0%	0	0.00%
State Route 442	0.022862	0	0.00%	0.0	0.0%	0	0.00%
State Route 450	27.477007	20.375919	74.16%	0.0	0.0%	20.375919	74.16%
State Route 460	16.534641	3.971464	24.02%	0.0	0.0%	3.971464	24.02%
State Route 470	10.74695	0	0.00%	0.0	0.0%	0	0.00%
State Route 480	5.898639	0	0.00%	0.0	0.0%	0	0.00%
State Route 3000	2.346263	0.846656	36.09%	0.0	0.0%	0.846656	36.09%
State Route 3400	2.635502	2.635502	100.00%	0.0	0.0%	2.635502	100.00%
State Route 3500	1.125483	1.125483	100.00%	0.0	0.0%	1.125483	100.00%
State Route 3800	0.625243	0.554144	88.63%	0.0	0.0%	0.554144	88.63%
State Route 32A	0.400435	0.400435	100.00%	0.0	0.0%	0.400435	100.00%
State Route 32B	0.172196	0.172186	99.99%	0.0	0.0%	0.172186	99.99%
State Route 36A	0.526104	0.526104	100.00%	0.0	0.0%	0.526104	100.00%
<b>Total</b>	<b>245.85265</b>	<b>80.425281</b>	<b>32.71%</b>	<b>0.0</b>	<b>0.0%</b>	<b>80.425281</b>	<b>32.71%</b>
<b>County of Hawai'i</b>							
State Route 11	117.608086	1.909226	1.62%	0.0	0.0%	1.909226	1.62%
State Route 19	93.300605	1.879939	2.01%	0.0	0.0%	1.879939	2.01%
State Route 130	21.68728	0	0.00%	0.0	0.0%	0	0.00%
State Route 139	1.197816	0	0.00%	0.0	0.0%	0	0.00%
State Route 160	3.821277	0	0.00%	0.0	0.0%	0	0.00%
State Route 163	0.133863	0	0.00%	0.0	0.0%	0	0.00%
State Route 190	34.085758	0	0.00%	0.0	0.0%	0	0.00%





State Route	Length (in miles)						
	Total Length	Length in NEHRP Type D Soil	Exposed Length as % of Total Length	Length in NEHRP Type E Soil	Exposed Length as % of Total Length	NEHRP Type D & E Soil Hazard Area	Exposed Length as % of Total Length
State Route 197	1.17843	0	0.00%	0.0	0.0%	0	0.00%
State Route 200	43.219679	8.119068	18.79%	0.0	0.0%	8.119068	18.79%
State Route 220	3.754068	0	0.00%	0.0	0.0%	0	0.00%
State Route 240	9.601941	0	0.00%	0.0	0.0%	0	0.00%
State Route 250	19.266672	0	0.00%	0.174809	0.91%	0.174809	0.91%
State Route 270	27.020618	0.650338	2.41%	0.0	0.0%	0.650338	2.41%
State Route 1370	0.191175	0	0.00%	0.0	0.0%	0	0.00%
State Route 1970	0.923307	0	0.00%	0.0	0.0%	0	0.00%
State Route 2000	2.184464	0	0.00%	0.0	0.0%	0	0.00%
<b>Total</b>	<b>379.175039</b>	<b>12.558571</b>	<b>3.31%</b>	<b>0.2</b>	<b>0.0%</b>	<b>12.73338</b>	<b>3.36%</b>

Source: State of Hawaii Department of Transportation 2022; AECOM 2008; United States Geological Survey

Notes: The County of Kaua'i and the City and County of Honolulu do not have spatially delineated NEHRP soils available for this analysis.

Table F-19 shows the square miles of NEHRP Soil Types D and E in each State Land Use District in each county.

**Table F-19. Area of State Land Use Districts on NEHRP Class D and E Soils**

Land Use District	Area (in square miles)			
	Total Square Miles	Square Miles on NEHRP Type D & E Soils	Square Miles on NEHRP Type D & E Soils as Percent (%) of Total Area	Square Miles on NEHRP Type D & E Soils as Percent (%) of Total Hazard Exposure
<b>City and County of Honolulu</b>				
Agricultural	637.731138	64.679352	10.14%	56.68%
Conservation	552.35574	26.32655	4.77%	23.07%
Rural	12.824585	3.342811	26.07%	2.93%
Urban	45.187433	19.756157	43.72%	17.31%
<b>Total</b>	<b>1,248</b>	<b>114.10487</b>	<b>9.14%</b>	<b>100.00%</b>
<b>County of Hawai'i</b>				
Agricultural	1,850.31	53.777899	2.91%	41.33%
Conservation	2,098.66	74.143346	3.53%	56.99%
Rural	1.36344	0.00594	0.44%	0.00%
Urban	87.847736	2.180574	2.48%	1.68%
<b>Total</b>	<b>4,038</b>	<b>130.107759</b>	<b>3.22%</b>	<b>100.00%</b>

Source: State Land Use Commission, Hawaii Statewide GIS Program 2021; Honolulu County GIS 2022; AECOM 2008; United States Geological Survey





## F.7 Flood

### F.7.1 CHRONIC COASTAL FLOOD

Table F-20 summarizes the number of miles of State roads located in the SFHA, organized by county.

*Table F-20. State Road Exposure to the Chronic Coastal Flood Hazard Area by County*

State Route	Length (in miles)		
	Total Length	Chronic Coastal Flooding Hazard Area Length	Exposed Length as % of Total Length
<b>County of Kaua'i</b>			
State Route 50	32.89242	1.991849	6.06%
State Route 51	3.457222	0.019938	0.58%
State Route 56	28.316299	0.289864	1.02%
State Route 58	2.052085	0	0.00%
State Route 540	3.884869	0	0.00%
State Route 541	0.37465	0	0.00%
State Route 550	14.03193	0	0.00%
State Route 560	9.98938	1.431079	14.33%
State Route 570	1.125605	0	0.00%
State Route 580	6.668581	0.008347	0.13%
State Route 583	0.921237	0	0.00%
<b>Total</b>	<b>103.714278</b>	<b>3.741077</b>	<b>3.61%</b>
<b>City and County of Honolulu</b>			
State Route 61	21.173569	0.019234	0.09%
State Route 63	16.618809	0	0.00%
State Route 64	2.624714	0.116064	4.42%
State Route 65	6.584201	0	0.00%
State Route 72	22.766927	0.552122	2.43%
State Route 76	11.059837	0.003199	0.03%
State Route 78	1.346173	0	0.00%
State Route 80	1.893686	0	0.00%
State Route 83	47.821595	3.72413	7.79%
State Route 92	18.685552	0.374774	2.01%
State Route 93	19.522013	0.988107	5.06%
State Route 98	3.470599	0.031178	0.90%
State Route 99	41.120805	0.09529	0.23%
State Route 750	8.056213	0	0.00%
State Route 901	1.403364	0	0.00%
State Route 930	10.054945	0.12444	1.24%
State Route 7012	1.862959	0	0.00%
State Route 7101	5.865258	0.029919	0.51%







State Route	Length (in miles)		
	Total Length	Chronic Coastal Flooding Hazard Area Length	Exposed Length as % of Total Length
State Route 7110	0.609843	0	0.00%
State Route 7141	1.50208	0	0.00%
State Route 7210	0.115075	0	0.00%
State Route 7239	0.338737	0	0.00%
State Route 7241	2.331816	0.007428	0.32%
State Route 7310	1.041137	0	0.00%
State Route 7345	0.554715	0	0.00%
State Route 7350	0.597196	0	0.00%
State Route 7351	0.243914	0	0.00%
State Route 7401	0.214056	0.044232	20.66%
State Route 7413	0.352495	0	0.00%
State Route 7415	0.536255	0	0.00%
State Route 7526	0.397834	0	0.00%
State Route 7601	0.432591	0	0.00%
State Route 7801	1.151651	0	0.00%
State Route 8300	0.501274	0.013861	2.77%
State Route 8918	0.13352	0	0.00%
State Route 8930	4.941677	0	0.00%
State Route 8940	3.321223	0	0.00%
State Route 8945	0.984948	0	0.00%
State Route 8955	2.697864	0	0.00%
State Route H-1	54.2852	0.218541	0.40%
State Route H-2	16.631646	0	0.00%
State Route H-201	8.479473	0.021757	0.26%
State Route H-3	30.593733	0.01579	0.05%
<b>Total</b>	<b>374.921172</b>	<b>6.380066</b>	<b>1.70%</b>
<b>County of Maui</b>			
State Route 30	41.599628	3.468854	8.34%
State Route 31	7.147053	0	0.00%
State Route 32	2.855291	0	0.00%
State Route 36	16.225414	0.026017	0.16%
State Route 37	21.33757	0	0.00%
State Route 310	3.609294	0.801981	22.22%
State Route 311	6.415815	0	0.00%
State Route 340	4.265623	0	0.00%
State Route 360	34.838612	0	0.00%
State Route 377	9.136002	0	0.00%
State Route 378	10.082808	0	0.00%
State Route 380	6.197863	0	0.00%





State Route	Length (in miles)		
	Total Length	Chronic Coastal Flooding Hazard Area Length	Exposed Length as % of Total Length
State Route 440	13.153636	0	0.00%
State Route 441	0.476716	0	0.00%
State Route 442	0.022862	0	0.00%
State Route 450	27.477007	0.006653	0.02%
State Route 460	16.534641	0.008827	0.05%
State Route 470	10.74695	0	0.00%
State Route 480	5.898639	0	0.00%
State Route 3000	2.346263	0	0.00%
State Route 3400	2.635502	0.376556	14.29%
State Route 3500	1.125483	0	0.00%
State Route 3800	0.625243	0	0.00%
State Route 32A	0.400435	0	0.00%
State Route 32B	0.172196	0	0.00%
State Route 36A	0.526104	0	0.00%
<b>Total</b>	<b>245.85265</b>	<b>4.688888</b>	<b>1.91%</b>
<b>County of Hawai'i</b>			
State Route 11	117.608086	0	0.00%
State Route 19	93.300605	0.194483	0.21%
State Route 130	21.68728	0	0.00%
State Route 139	1.197816	0	0.00%
State Route 160	3.821277	0	0.00%
State Route 163	0.133863	0	0.00%
State Route 190	34.085758	0	0.00%
State Route 197	1.17843	0	0.00%
State Route 200	43.219679	0	0.00%
State Route 220	3.754068	0	0.00%
State Route 240	9.601941	0	0.00%
State Route 250	19.266672	0	0.00%
State Route 270	27.020618	0	0.00%
State Route 1370	0.191175	0	0.00%
State Route 1970	0.923307	0	0.00%
State Route 2000	2.184464	0	0.00%
<b>Total</b>	<b>379.175039</b>	<b>0.194483</b>	<b>0.05%</b>

Source: State of Hawaii Department of Transportation 2022; Hawai'i Climate Change Mitigation and Adaptation Commission 2017

Table F-21 shows the square miles of the chronic coastal flood hazard area (SLR-XA-1.1) in each State Land Use District in each county.





**Table F-21. State Land Use Districts in the Chronic Coastal Flood Hazard Area by County**

Land Use District	Area (in square miles)			
	Total Square Miles	Square Miles in Chronic Coastal Flood Hazard Area	Hazard Area as Percent (%) of Total Area	Hazard Area as Percent (%) of Total Hazard Exposure
<b>County of Kaua'i</b>				
Agricultural	297.078539	1.955746	0.66%	43.39%
Conservation	304.260357	1.805303	0.59%	40.05%
Rural	2.146976	0.008052	0.38%	0.18%
Urban	23.643203	0.738555	3.12%	16.38%
<b>Total</b>	<b>627.129075</b>	<b>4.507656</b>	<b>0.72%</b>	<b>100.00%</b>
<b>City and County of Honolulu</b>				
Agricultural	188.479146	0.63963	0.34%	10.67%
Conservation	247.601978	2.551735	1.03%	42.57%
Rural	0	0	0.00%	0
Urban	162.455059	2.802986	1.73%	46.76%
<b>Total</b>	<b>598.536183</b>	<b>5.994351</b>	<b>1.00%</b>	<b>100.00%</b>
<b>County of Maui</b>				
Agricultural	637.731138	0.313962	0.05%	6.40%
Conservation	552.35574	3.116214	0.56%	63.54%
Rural	12.824585	0.22841	1.78%	4.66%
Urban	45.187433	1.245985	2.76%	25.40%
<b>Total</b>	<b>1,248</b>	<b>4.904571</b>	<b>0.39%</b>	<b>100.00%</b>
<b>County of Hawai'i</b>				
Agricultural	1,850.31	0.078357	0.00%	2.32%
Conservation	2,098.66	2.811525	0.13%	83.25%
Rural	1.36344	0.003763	0.28%	0.11%
Urban	87.847736	0.483611	0.55%	14.32%
<b>Total</b>	<b>4,038</b>	<b>3.377256</b>	<b>0.08%</b>	<b>100.00%</b>

Source: State Land Use Commission, Hawaii Statewide GIS Program 2021; Hawai'i Climate Change Mitigation and Adaptation Commission 2017

### F.7.2 EVENT-BASED FLOOD

Table F-22 summarizes the State buildings located in the 1% annual chance flood A-Zone and estimated potential losses by county.

**Table F-22. State Buildings Exposure and Potential Losses to 1% Annual Chance Flood A-Zone Hazard Areas**

County	Number of State Buildings in the A-Zone	Total Value of State Buildings in the A-Zone	Estimated Potential Loss	
			Value	Percent (%) of Total
<b>County of Kaua'i</b>	80	\$126,182,385	\$8,495,647	6.73%
<b>City and County of Honolulu</b>	251	\$602,961,198	\$70,169,830	11.64%
<b>County of Maui</b>	32	\$125,192,806	0	0.00%
<b>County of Hawai'i</b>	29	\$39,912,701	\$998,700	2.50%
<b>Total</b>	<b>392</b>	<b>\$894,249,090</b>	<b>\$79,664,176</b>	<b>8.91%</b>

Source: FEMA Map Service Center 2021; State of Hawaii Risk Management Office 2017; FEMA Hazus v5.1

Table F-23 summarizes the total length of State roads exposure to the A-Zone and V-Zones by county.





**Table F-23. State Road Exposure to the 1% Annual Chance Flood Event by County**

County	Length (in miles)				
	Total Length	A-Zone Flood Hazard Area Length	Hazard Length as % of Total Length	V-Zone Flood Hazard Area Length	Hazard Length as % of Total Length
County of Kaua'i	103.7	11.6779	11.26%	3.86866	3.73%
City and County of Honolulu	374.9	36.669053	9.78%	8.320804	2.22%
County of Maui	245.9	15.841237	6.44%	4.851483	1.97%
County of Hawai'i	379.2	3.315361	0.87%	1.088591	0.29%
<b>Total</b>	<b>1,103.70</b>	<b>67.503551</b>	<b>6.12%</b>	<b>18.129538</b>	<b>1.64%</b>

Source: State of Hawaii Department of Transportation 2022; FEMA Map Service Center 2021

Table F-24 summarizes the number of miles of State roads by state route located in the A-Zones, V-Zones, and SFHA, organized by county.

**Table F-24. State Road Exposure to the 1% Annual Chance Flood Event by State Route**

State Route	Length (in miles)						
	Total Length	Length in the A-Zone	Exposed Length as % of Total Length	Length in the V-Zone	Exposed Length as % of Total Length	Length in the SFHA	Exposed Length as % of Total Length
<b>County of Kaua'i</b>							
State Route 50	32.89242	5.803111	17.64%	0.639131	1.94%	6.442242	19.59%
State Route 51	3.457222	0.252486	7.30%	0	0.00%	0.252486	7.30%
State Route 56	28.316299	2.040602	7.21%	0.066556	0.24%	2.107158	7.44%
State Route 58	2.052085	0	0.00%	0	0.00%	0	0.00%
State Route 540	3.884869	0	0.00%	0	0.00%	0	0.00%
State Route 541	0.37465	0	0.00%	0	0.00%	0	0.00%
State Route 550	14.03193	0	0.00%	0	0.00%	0	0.00%
State Route 560	9.98938	2.938389	29.42%	3.162972	31.66%	6.101361	61.08%
State Route 570	1.125605	0	0.00%	0	0.00%	0	0.00%
State Route 580	6.668581	0.622327	9.33%	0	0.00%	0.622327	9.33%
State Route 583	0.921237	0.020985	2.28%	0	0.00%	0.020985	2.28%
<b>Total</b>	<b>103.714278</b>	<b>11.6779</b>	<b>11.26%</b>	<b>3.868659</b>	<b>3.73%</b>	<b>15.546559</b>	<b>14.99%</b>
<b>City and County of Honolulu</b>							
State Route 61	21.173569	0.046397	0.22%	0	0.00%	0.046397	0.22%
State Route 63	16.618809	0.05199	0.31%	0	0.00%	0.05199	0.31%
State Route 64	2.624714	0.68192	25.98%	0.133898	5.10%	0.815817	31.08%
State Route 65	6.584201	0.028755	0.44%	0	0.00%	0.028755	0.44%
State Route 72	22.766927	5.659284	24.86%	0.078003	0.34%	5.737287	25.20%
State Route 76	11.059837	0.577192	5.22%	0	0.00%	0.577192	5.22%
State Route 78	1.346173	0	0.00%	0	0.00%	0	0.00%
State Route 80	1.893686	0	0.00%	0	0.00%	0	0.00%
State Route 83	47.821595	11.039649	23.09%	6.458983	13.51%	17.498634	36.59%





State Route	Length (in miles)						
	Total Length	Length in the A-Zone	Exposed Length as % of Total Length	Length in the V-Zone	Exposed Length as % of Total Length	Length in the SFHA	Exposed Length as % of Total Length
State Route 92	18.685552	6.154198	32.94%	0	0.00%	6.154198	32.94%
State Route 93	19.522013	3.427372	17.56%	1.64992	8.45%	5.077291	26.01%
State Route 98	3.470599	0	0.00%	0	0.00%	0	0.00%
State Route 99	41.120805	0.528811	1.29%	0	0.00%	0.528811	1.29%
State Route 750	8.056213	0	0.00%	0	0.00%	0	0.00%
State Route 901	1.403364	0	0.00%	0	0.00%	0	0.00%
State Route 930	10.054945	3.475214	34.56%	0	0.00%	3.475214	34.56%
State Route 7012	1.862959	0	0.00%	0	0.00%	0	0.00%
State Route 7101	5.865258	1.418178	24.18%	0	0.00%	1.418178	24.18%
State Route 7110	0.609843	0.017205	2.82%	0	0.00%	0.017205	2.82%
State Route 7141	1.50208	0	0.00%	0	0.00%	0	0.00%
State Route 7210	0.115075	0	0.00%	0	0.00%	0	0.00%
State Route 7239	0.338737	0	0.00%	0	0.00%	0	0.00%
State Route 7241	2.331816	0	0.00%	0	0.00%	0	0.00%
State Route 7310	1.041137	0	0.00%	0	0.00%	0	0.00%
State Route 7345	0.554715	0.131555	23.72%	0	0.00%	0.131555	23.72%
State Route 7350	0.597196	0	0.00%	0	0.00%	0	0.00%
State Route 7351	0.243914	0	0.00%	0	0.00%	0	0.00%
State Route 7401	0.214056	0.214056	100.00%	0	0.00%	0.214056	100.00%
State Route 7413	0.352495	0	0.00%	0	0.00%	0	0.00%
State Route 7415	0.536255	0.147137	27.44%	0	0.00%	0.147137	27.44%
State Route 7526	0.397834	0	0.00%	0	0.00%	0	0.00%
State Route 7601	0.432591	0.112353	25.97%	0	0.00%	0.112353	25.97%
State Route 7801	1.151651	0	0.00%	0	0.00%	0	0.00%
State Route 8300	0.501274	0.137937	27.52%	0	0.00%	0.137937	27.52%
State Route 8918	0.13352	0	0.00%	0	0.00%	0	0.00%
State Route 8930	4.941677	0.057234	1.16%	0	0.00%	0.057234	1.16%
State Route 8940	3.321223	0	0.00%	0	0.00%	0	0.00%
State Route 8945	0.984948	0	0.00%	0	0.00%	0	0.00%
State Route 8955	2.697864	0	0.00%	0	0.00%	0	0.00%
State Route H-1	54.2852	2.290425	4.22%	0	0.00%	2.290425	4.22%
State Route H-2	16.631646	0.083714	0.50%	0	0.00%	0.083714	0.50%
State Route H-201	8.479473	0.248242	2.93%	0	0.00%	0.248242	2.93%
State Route H-3	30.593733	0.140233	0.46%	0	0.00%	0.140233	0.46%
<b>Total</b>	<b>374.921172</b>	<b>36.669051</b>	<b>9.78%</b>	<b>8.320804</b>	<b>2.22%</b>	<b>44.989855</b>	<b>12.00%</b>
<b>County of Maui</b>							
State Route 30	41.599628	1.826108	4.39%	0.750982	1.81%	2.57709	6.19%
State Route 31	7.147053	0.374025	5.23%	0	0.00%	0.374025	5.23%





State Route	Length (in miles)						
	Total Length	Length in the A-Zone	Exposed Length as % of Total Length	Length in the V-Zone	Exposed Length as % of Total Length	Length in the SFHA	Exposed Length as % of Total Length
State Route 32	2.855291	0.198748	6.96%	0.266274	9.33%	0.465023	16.29%
State Route 36	16.225414	0.86868	5.35%	0.007046	0.04%	0.875725	5.40%
State Route 37	21.33757	0	0.00%	0	0.00%	0	0.00%
State Route 310	3.609294	0.506049	14.02%	1.779762	49.31%	2.285811	63.33%
State Route 311	6.415815	0.610825	9.52%	0	0.00%	0.610825	9.52%
State Route 340	4.265623	0.237162	5.56%	0	0.00%	0.237162	5.56%
State Route 360	34.838612	0.389633	1.12%	0.266775	0.77%	0.656409	1.88%
State Route 377	9.136002	0	0.00%	0	0.00%	0	0.00%
State Route 378	10.082808	0	0.00%	0	0.00%	0	0.00%
State Route 380	6.197863	0.008508	0.14%	0	0.00%	0.008508	0.14%
State Route 440	13.153636	0	0.00%	0	0.00%	0	0.00%
State Route 441	0.476716	0	0.00%	0	0.00%	0	0.00%
State Route 442	0.022862	0	0.00%	0	0.00%	0	0.00%
State Route 450	27.477007	9.459703	34.43%	0.472208	1.72%	9.931911	36.15%
State Route 460	16.534641	1.081467	6.54%	0.004833	0.03%	1.0863	6.57%
State Route 470	10.74695	0	0.00%	0	0.00%	0	0.00%
State Route 480	5.898639	0	0.00%	0	0.00%	0	0.00%
State Route 3000	2.346263	0.026487	1.13%	0	0.00%	0.026487	1.13%
State Route 3400	2.635502	0.09653	3.66%	0.98459	37.36%	1.08112	41.02%
State Route 3500	1.125483	0.065402	5.81%	0.029741	2.64%	0.095143	8.45%
State Route 3800	0.625243	0	0.00%	0	0.00%	0	0.00%
State Route 32A	0.400435	0.08587	21.44%	0.123114	30.75%	0.208985	52.19%
State Route 32B	0.172196	0.006039	3.51%	0.166157	96.49%	0.172196	100.00%
State Route 36A	0.526104		0.00%	0	0.00%	0	0.00%
<b>Total</b>	<b>245.85265</b>	<b>15.841236</b>	<b>6.44%</b>	<b>4.851482</b>	<b>30.63%</b>	<b>20.69272</b>	<b>8.42%</b>
<b>County of Hawai'i</b>							
State Route 11	117.608086	1.011829	0.86%	0	0.00%	1.011829	0.86%
State Route 19	93.300605	1.40357	1.50%	1.088591	1.17%	2.49216	2.67%
State Route 130	21.68728	0	0.00%	0	0.00%	0	0.00%
State Route 139	1.197816	0	0.00%	0	0.00%	0	0.00%
State Route 160	3.821277	0.15051	3.94%	0	0.00%	0.15051	3.94%
State Route 163	0.133863	0.000634	0.47%	0	0.00%	0.000634	0.47%
State Route 190	34.085758	0	0.00%	0	0.00%	0	0.00%
State Route 197	1.17843	0	0.00%	0	0.00%	0	0.00%
State Route 200	43.219679	0	0.00%	0	0.00%	0	0.00%
State Route 220	3.754068	0	0.00%	0	0.00%	0	0.00%
State Route 240	9.601941	0.215562	2.24%	0	0.00%	0.215562	2.24%
State Route 250	19.266672	0.254446	1.32%	0	0.00%	0.254446	1.32%





State Route	Length (in miles)						
	Total Length	Length in the A-Zone	Exposed Length as % of Total Length	Length in the V-Zone	Exposed Length as % of Total Length	Length in the SFHA	Exposed Length as % of Total Length
State Route 270	27.020618	0.038042	0.14%	0	0.00%	0.038042	0.14%
State Route 1370	0.191175	0.175693	91.90%	0	0.00%	0.175693	91.90%
State Route 1970	0.923307	0	0.00%	0	0.00%	0	0.00%
State Route 2000	2.184464	0.065077	2.98%	0	0.00%	0.065077	2.98%
<b>Total</b>	<b>379.175039</b>	<b>3.315363</b>	<b>0.87%</b>	<b>1.088591</b>	<b>0.29%</b>	<b>4.403953</b>	<b>1.16%</b>

Source: State of Hawaii Department of Transportation 2022; FEMA Map Service Center 2021

Table F-25 and Table F-26 summarize the population located in the A-Zone and V-Zones by county.

**Table F-25. 2020 U.S. Census Population Located in the A-Zone by County**

County	Population				
	Total Population	Population in the A-Zone	Population Exposed as Percent (%) of Total Population	Socially Vulnerable Population Located in Hazard Area	Population Exposed as Percent (%) of Total Population
County of Kaua'i	71,949	3,163	4.40%	156	0.22%
City and County of Honolulu	979,682	66,793	6.82%	11,029	1.13%
County of Maui	167,093	7,773	4.65%	858	0.51%
County of Hawai'i	201,350	4,308	2.14%	872	0.43%
<b>Total</b>	<b>1,420,074</b>	<b>82,036</b>	<b>5.78%</b>	<b>12,915</b>	<b>0.91%</b>

Source: U.S. Census Bureau 2020; Centers for Disease Control and Prevention 2018; FEMA Map Service Center 2021

**Table F-26. 2020 U.S. Census Population Located in the V-Zone by County**

County	Population				
	Total Population	Population in the V-Zone	Population Exposed as Percent (%) of Total Population	Socially Vulnerable Population Located in Hazard Area	Population Exposed as Percent (%) of Total Population
County of Kaua'i	71,949	363	0.50%	55	0.08%
City and County of Honolulu	979,682	6,918	0.71%	2,197	0.22%
County of Maui	167,093	1,433	0.86%	367	0.22%
County of Hawai'i	201,350	711	0.35%	266	0.13%
<b>Total</b>	<b>1,420,074</b>	<b>9,425</b>	<b>0.66%</b>	<b>2,884</b>	<b>0.20%</b>

Source: U.S. Census Bureau 2020; Centers for Disease Control and Prevention 2018; FEMA Map Service Center 2021

Table F-27 summarizes the general building stock exposure and estimated potential losses in the A-Zone from the 1% annual chance flood event.





**Table F-27. General Building Stock Exposure and Potential Losses to Buildings in the A-Zone from the 1% Annual Chance Flood Event**

County	Total Replacement Cost Value	Replacement Cost Value in the A-Zone	Percent (%) of Total in the A-Zone	Estimated Potential Loss	
				Replacement Cost Value	Percent (%) of Total
County of Kaua'i	\$24,246,497,228	\$2,935,744,738	12.11%	\$467,606,000	1.93%
City and County of Honolulu	\$239,152,051,766	\$23,784,708,757	9.95%	\$1,265,913,000	0.53%
County of Maui	\$50,796,693,140	\$2,978,602,659	5.86%	\$106,484,000	0.21%
County of Hawai'i	\$58,395,349,136	\$1,521,518,044	2.61%	\$48,130,000	0.08%
<b>Total</b>	<b>\$372,590,591,270</b>	<b>\$31,220,574,198</b>	<b>8.38%</b>	<b>\$1,888,133,000</b>	<b>0.51%</b>

Source: NIYAM IT 2022; United States Army Corps of Engineers 2022; FEMA Map Service Center 2021

Table F-28 summarizes the general building stock exposure and estimated potential losses in the V-Zone from the 1% annual chance flood event.

**Table F-28. General Building Stock Exposure and Potential Losses to Buildings in the V-Zone from the 1% Annual Chance Flood Event**

County	Total Replacement Cost Value	Replacement Cost Value in the V-Zone	Percent (%) of Total in the V-Zone	Estimated Potential Loss	
				Replacement Cost Value	Percent (%) of Total
County of Kaua'i	\$24,246,497,228	\$470,963,159	1.94%	\$107,754,000	0.44%
City and County of Honolulu	\$239,152,051,766	\$1,132,348,207	0.47%	\$73,291,000	0.03%
County of Maui	\$50,796,693,140	\$1,328,441,033	2.62%	\$134,247,000	0.26%
County of Hawai'i	\$58,395,349,136	\$799,981,884	1.37%	\$43,949,000	0.08%
<b>Total</b>	<b>\$372,590,591,270</b>	<b>\$3,731,734,282</b>	<b>1.00%</b>	<b>\$359,241,000</b>	<b>0.10%</b>

Source: NIYAM IT 2022; United States Army Corps of Engineers 2022; FEMA Map Service Center 2021

Table F-29 shows the square miles of the SFHA (total SFHA, A-Zones and V-Zones) in each State Land Use District in each county.







Table F-29. State Land Use Districts Located in the SFHA

Land Use District	Area (in square miles)									
	Total Square Miles	Square Miles in A-Zone Hazard Area	Hazard Area as % of Total Area	Hazard Area as % of Total Hazard Exposure	Square Miles in V-Zone Hazard Area	Hazard Area as % of Total Area	Hazard Area as % of Total Hazard Exposure	Square Miles in SFHA Hazard Area	Hazard Area as % of Total Area	Hazard Area as % of Total Hazard Exposure
<b>County of Kaua'i</b>										
Agricultural	297.078539	11.573782	3.90%	68.93%	0.452032	0.15%	11.04%	12.025813	4.05%	57.58%
Conservation	304.260357	2.244024	0.74%	13.37%	2.701255	0.89%	65.97%	4.945279	1.63%	23.68%
Rural	2.146976	0.495891	23.10%	2.95%	0.054126	2.52%	1.32%	0.550017	25.62%	2.63%
Urban	23.643203	2.476401	10.47%	14.75%	0.887384	3.75%	21.67%	3.363785	14.23%	16.11%
Total	627.129075	16.790098	2.68%	100.00%	4.094797	0.65%	100.00%	20.884894	3.33%	100.00%
<b>City and County of Honolulu</b>										
Agricultural	188.479146	7.521811	3.99%	32.37%	0.632025	0.34%	14.59%	8.153837	4.33%	29.58%
Conservation	247.601978	2.501441	1.01%	10.76%	0.790942	0.32%	18.26%	3.292382	1.33%	11.94%
Rural	0	0	0.00%	0.00%	0	0.00%	0.00%	0	0.00%	0.00%
Urban	162.455059	13.213823	8.13%	56.87%	2.90936	1.79%	67.15%	16.123183	9.92%	58.48%
Total	598.536183	23.237075	3.88%	100.00%	4.332327	0.72%	100.00%	27.569402	4.61%	100.00%
<b>County of Maui</b>										
Agricultural	637.731138	8.339142	1.31%	56.68%	0.695727	0.11%	7.38%	9.034869	1.42%	37.43%
Conservation	552.35574	2.697096	0.49%	18.33%	5.769304	1.04%	61.23%	8.466399	1.53%	35.08%
Rural	12.824585	0.863568	6.73%	5.87%	0.69879	5.45%	7.42%	1.562359	12.18%	6.47%
Urban	45.187433	2.813841	6.23%	19.12%	2.258934	5.00%	23.97%	5.072774	11.23%	21.02%
Total	1,248	14.713647	1.18%	100.00%	9.422755	0.75%	100.00%	24.136401	1.93%	100.00%
<b>County of Hawai'i</b>										
Agricultural	1,850.31	6.798008	0.37%	59.13%	0.840465	0.05%	9.12%	7.638472	0.41%	36.87%
Conservation	2,098.66	2.506877	0.12%	21.81%	6.318861	0.30%	68.54%	8.825738	0.42%	42.60%
Rural	1.36344	0.010702	0.78%	0.09%	0	0.00%	0.00%	0.010702	0.78%	0.05%
Urban	87.847736	2.181132	2.48%	18.97%	2.059405	2.34%	22.34%	4.240537	4.83%	20.47%
Total	4,038	11.496719	0.28%	100.00%	9.218731	0.23%	100.00%	20.715449	0.51%	100.00%

Source: FEMA Map Service Center 2021; State Land Use Commission, Hawaii Statewide GIS Program 2021; Honolulu County GIS 2022





## F.8 Hazardous Materials

There are no additional tables to support Section 4.7 (Hazardous Materials).

## F.9 Health Risks

There are no additional tables to support Section 4.8 (Health Risks).

## F.10 Hurricane

### F.10.1 STATE BUILDINGS

Table F-30 through Table F-32 show the Sea, Lake, and Overland Surges from Hurricanes (SLOSH) Model data for each Hurricane Category (Cat) 1 through 3 concerning State buildings exposure by county. Table F-33 through Table F-35 show the Hurricane Cat 1 through 3 storm surge SLOSH Inundation areas results by state agency.

*Table F-30. State Buildings Located in the Category 1 SLOSH Inundation Area by County*

County	Total Number of State Buildings	Total Replacement Cost Value	Number of State Buildings in the Cat 1 SLOSH	Percent (%) of Total Buildings	Total Value of State Buildings in the Cat 1 SLOSH	Percent (%) of Total Value
County of Kaua'i	531	\$990,850,824	10	1.88%	\$24,359,606	2.46%
City and County of Honolulu	3,472	\$17,393,945,915	158	4.55%	\$1,286,465,159	7.40%
County of Maui	831	\$3,097,491,689	5	0.60%	\$13,872,321	0.45%
County of Hawai'i	1,261	\$4,638,567,141	0	0.00%	\$0	0.00%
<b>Total</b>	<b>6,095</b>	<b>\$26,120,855,568</b>	<b>173</b>	<b>2.84%</b>	<b>\$1,324,697,085</b>	<b>5.07%</b>

Source: Federal Emergency Management Agency; National Weather Service; National Oceanic and Atmospheric Administration; State of Hawaii Risk Management Office 2017

*Table F-31. State Buildings Located in the Category 2 SLOSH Inundation Area by County*

County	Total Number of State Buildings	Total Replacement Cost Value	Number of State Buildings in the Cat 2 SLOSH	Percent (%) of Total Buildings	Total Value of State Buildings in the Cat 2 SLOSH	Percent (%) of Total Value
County of Kaua'i	531	\$990,850,824	12	2.26%	\$26,776,217	2.70%
City and County of Honolulu	3,472	\$17,393,945,915	215	6.19%	\$1,574,581,471	9.05%
County of Maui	831	\$3,097,491,689	35	4.21%	\$55,394,451	1.79%
County of Hawai'i	1,261	\$4,638,567,141	6	0.48%	\$3,050,000	0.07%
<b>Total</b>	<b>6,095</b>	<b>\$26,120,855,568</b>	<b>268</b>	<b>4.40%</b>	<b>\$1,659,802,139</b>	<b>6.35%</b>

Source: Federal Emergency Management Agency; National Weather Service; National Oceanic and Atmospheric Administration; State of Hawaii Risk Management Office 2017





**Table F-32. State Buildings Located in the Category 3 SLOSH Inundation Area by County**

County	Total Number of State Buildings	Total Replacement Cost Value	Number of State Buildings in the Cat 3 SLOSH	Percent (%) of Total Buildings	Total Value of State Buildings in the Cat 3 SLOSH	Percent (%) of Total Value
County of Kaua'i	531	\$990,850,824	34	6.40%	\$133,107,021	13.43%
City and County of Honolulu	3,472	\$17,393,945,915	347	9.99%	\$2,485,357,632	14.29%
County of Maui	831	\$3,097,491,689	47	5.66%	\$168,614,605	5.44%
County of Hawai'i	1,261	\$4,638,567,141	14	1.11%	\$81,047,470	1.75%
<b>Total</b>	<b>6,095</b>	<b>\$26,120,855,568</b>	<b>442</b>	<b>7.25%</b>	<b>\$2,868,126,728</b>	<b>10.98%</b>

Source: Federal Emergency Management Agency; National Weather Service; National Oceanic and Atmospheric Administration; State of Hawaii Risk Management Office 2017

**Table F-33. State Buildings Located in the Category 1 SLOSH Inundation Area by Agency**

Agency	Total Number of State Buildings	Total Replacement Cost Value	Number of State Buildings in the Cat 1 SLOSH	Percent (%) of Total Buildings	Total Value of State Buildings in the Cat 1 SLOSH	Percent (%) of Total Value
Dept. of Accounting & General Services	66	\$953,963,738	5	7.58%	\$45,183,897	4.74%
Dept. of Agriculture	70	\$147,607,399	0	0.00%	\$0	0.00%
Dept. of Attorney General	15	\$108,425,480	2	13.33%	\$16,180,875	14.92%
Dept. of Budget & Finance	16	\$28,968,679	1	6.25%	\$4,806,631	16.59%
Dept. of Business, Economic Development and Tourism	25	\$645,480,379	4	16.00%	\$549,663,751	85.16%
Dept. of Commerce & Consumer Affairs	2	\$40,197,360	0	0.00%	\$0	0.00%
Dept. of Defense	69	\$267,352,836	7	10.14%	\$20,849,967	7.80%
Dept. of Education	4,090	\$10,598,205,739	86	2.10%	\$209,317,922	1.98%
Dept. of Hawaiian Home Lands	12	\$110,427,352	1	8.33%	\$5,489,080	4.97%
Dept. of Health	44	\$387,068,440	2	4.55%	\$6,599,918	1.71%
Dept. of Human Resources Development	1	\$5,973,872	0	0.00%	\$0	0.00%
Dept. of Human Services	130	\$480,212,294	20	15.38%	\$163,442,617	34.04%
Dept. of Labor and Industrial Relations	22	\$90,076,209	0	0.00%	\$0	0.00%
Dept. of Land and Natural Resources	90	\$101,441,821	17	18.89%	\$4,244,180	4.18%
Dept. of Public Safety	154	\$440,774,415	4	2.60%	\$29,532,012	6.70%





Agency	Total Number of State Buildings	Total Replacement Cost Value	Number of State Buildings in the Cat 1 SLOSH	Percent (%) of Total Buildings	Total Value of State Buildings in the Cat 1 SLOSH	Percent (%) of Total Value
Dept. of Taxation	1	\$7,174,162	0	0.00%	\$0	0.00%
Dept. of Transportation	68	\$2,935,208,214	5	7.35%	\$22,734,092	0.77%
Hawai'i State Ethics Commission	1	\$984,533	0	0.00%	\$0	0.00%
Hawai'i Health Systems Corporation	106	\$1,230,852,871	0	0.00%	\$0	0.00%
Hawai'i Housing Finance & Development Corporation	86	\$360,851,671	5	5.81%	\$118,247,972	32.77%
Hawai'i Public Housing Authority	273	\$982,981,701	0	0.00%	\$0	0.00%
Hawai'i State Legislature	2	\$48,555,381	0	0.00%	\$0	0.00%
Hawai'i State Public Library System	53	\$525,584,082	5	9.43%	\$10,023,473	1.91%
Judiciary	41	\$534,877,354	4	9.76%	\$71,970,923	13.46%
Legislative Reference Bureau	1	\$2,996,162	0	0.00%	\$0	0.00%
Office of Hawaiian Affairs	11	\$54,125,645	2	18.18%	\$16,400,000	30.30%
Office of the Auditor	2	\$1,921,180	0	0.00%	\$0	0.00%
Office of the Governor	1	\$2,996,162	0	0.00%	\$0	0.00%
Office of the Lieutenant Governor	2	\$4,588,849	0	0.00%	\$0	0.00%
Office of the Ombudsman	1	\$1,818,060	0	0.00%	\$0	0.00%
Research Corporation of the University of Hawai'i	3	\$4,189,026	0	0.00%	\$0	0.00%
University of Hawai'i	637	\$5,014,974,503	3	0.47%	\$30,009,776	0.60%
<b>Total</b>	<b>6,095</b>	<b>\$26,120,855,568</b>	<b>173</b>	<b>2.84%</b>	<b>\$1,279,513,188</b>	<b>4.90%</b>

Source: Federal Emergency Management Agency; National Weather Service; National Oceanic and Atmospheric Administration; State of Hawaii Risk Management Office 2017





**Table F-34. State Buildings Located in the Category 2 SLOSH Inundation Area by Agency**

Agency	Total Number of State Buildings	Total Replacement Cost Value	Number of State Buildings in the Cat 2 SLOSH	Percent (%) of Total Buildings	Total Value of State Buildings in the Cat 2 SLOSH	Percent (%) of Total Value
Dept. of Accounting & General Services	66	\$953,963,738	8	12.12%	\$67,089,197	7.03%
Dept. of Agriculture	70	\$147,607,399	1	1.43%	\$2,350,211	1.59%
Dept. of Attorney General	15	\$108,425,480	2	13.33%	\$16,180,875	14.92%
Dept. of Budget & Finance	16	\$28,968,679	3	18.75%	\$21,515,418	74.27%
Dept. of Business, Economic Development and Tourism	25	\$645,480,379	6	24.00%	\$560,518,082	86.84%
Dept. of Commerce & Consumer Affairs	2	\$40,197,360	0	0.00%	\$0	0.00%
Dept. of Defense	69	\$267,352,836	7	10.14%	\$20,849,967	7.80%
Dept. of Education	4,090	\$10,598,205,739	135	3.30%	\$360,575,144	3.40%
Dept. of Hawaiian Home Lands	12	\$110,427,352	1	8.33%	\$5,489,080	4.97%
Dept. of Health	44	\$387,068,440	3	6.82%	\$7,922,830	2.05%
Dept. of Human Resources Development	1	\$5,973,872	0	0.00%	\$0	0.00%
Dept. of Human Services	130	\$480,212,294	22	16.92%	\$168,627,477	35.12%
Dept. of Labor and Industrial Relations	22	\$90,076,209	2	9.09%	\$2,790,797	3.10%
Dept. of Land and Natural Resources	90	\$101,441,821	19	21.11%	\$4,614,552	4.55%
Dept. of Public Safety	154	\$440,774,415	4	2.60%	\$29,532,012	6.70%
Dept. of Taxation	1	\$7,174,162	0	0.00%	\$0	0.00%
Dept. of Transportation	68	\$2,935,208,214	22	32.35%	\$127,718,617	4.35%
Hawai'i State Ethics Commission	1	\$984,533	0	0.00%	\$0	0.00%
Hawai'i Health Systems Corporation	106	\$1,230,852,871	0	0.00%	\$0	0.00%
Hawai'i Housing Finance & Development Corporation	86	\$360,851,671	5	5.81%	\$118,247,972	32.77%
Hawai'i Public Housing Authority	273	\$982,981,701	0	0.00%	\$0	0.00%
Hawai'i State Legislature	2	\$48,555,381	0	0.00%	\$0	0.00%
Hawai'i State Public Library System	53	\$525,584,082	7	13.21%	\$15,342,397	2.92%
Judiciary	41	\$534,877,354	7	17.07%	\$75,272,153	14.07%
Legislative Reference Bureau	1	\$2,996,162	0	0.00%	\$0	0.00%
Office of Hawaiian Affairs	11	\$54,125,645	3	27.27%	\$16,648,896	30.76%





Agency	Total Number of State Buildings	Total Replacement Cost Value	Number of State Buildings in the Cat 2 SLOSH	Percent (%) of Total Buildings	Total Value of State Buildings in the Cat 2 SLOSH	Percent (%) of Total Value
Office of the Auditor	2	\$1,921,180	0	0.00%	\$0	0.00%
Office of the Governor	1	\$2,996,162	0	0.00%	\$0	0.00%
Office of the Lieutenant Governor	2	\$4,588,849	0	0.00%	\$0	0.00%
Office of the Ombudsman	1	\$1,818,060	0	0.00%	\$0	0.00%
Research Corporation of the University of Hawai'i	3	\$4,189,026	0	0.00%	\$0	0.00%
University of Hawai'i	637	\$5,014,974,503	11	1.73%	\$38,516,463	0.77%
<b>Total</b>	<b>6,095</b>	<b>\$26,120,855,568</b>	<b>268</b>	<b>4.40%</b>	<b>\$1,659,802,139</b>	<b>6.35%</b>

Source: Federal Emergency Management Agency; National Weather Service; National Oceanic and Atmospheric Administration; State of Hawaii Risk Management Office 2017

**Table F-35. State Buildings Located in the Category 3 SLOSH Inundation Area by Agency**

Agency	Total Number of State Buildings	Total Replacement Cost Value	Number of State Buildings in the Cat 3 SLOSH	Percent (%) of Total Buildings	Total Value of State Buildings in the Cat 3 SLOSH	Percent (%) of Total Value
Dept. of Accounting & General Services	66	\$953,963,738	11	16.67%	\$162,105,561	16.99%
Dept. of Agriculture	70	\$147,607,399	12	17.14%	\$23,658,906	16.03%
Dept. of Attorney General	15	\$108,425,480	3	20.00%	\$28,902,617	26.66%
Dept. of Budget & Finance	16	\$28,968,679	3	18.75%	\$21,515,418	74.27%
Dept. of Business, Economic Development and Tourism	25	\$645,480,379	6	24.00%	\$560,518,082	86.84%
Dept. of Commerce & Consumer Affairs	2	\$40,197,360	0	0.00%	\$0	0.00%
Dept. of Defense	69	\$267,352,836	9	13.04%	\$29,801,107	11.15%
Dept. of Education	4,090	\$10,598,205,739	244	5.97%	\$649,741,226	6.13%
Dept. of Hawaiian Home Lands	12	\$110,427,352	1	8.33%	\$5,489,080	4.97%
Dept. of Health	44	\$387,068,440	3	6.82%	\$7,922,830	2.05%
Dept. of Human Resources Development	1	\$5,973,872	0	0.00%	\$0	0.00%
Dept. of Human Services	130	\$480,212,294	24	18.46%	\$169,297,148	35.25%
Dept. of Labor and Industrial Relations	22	\$90,076,209	4	18.18%	\$59,693,544	66.27%





Agency	Total Number of State Buildings	Total Replacement Cost Value	Number of State Buildings in the Cat 3 SLOSH	Percent (%) of Total Buildings	Total Value of State Buildings in the Cat 3 SLOSH	Percent (%) of Total Value
Dept. of Land and Natural Resources	90	\$101,441,821	20	22.22%	\$9,090,122	8.96%
Dept. of Public Safety	154	\$440,774,415	15	9.74%	\$36,397,935	8.26%
Dept. of Taxation	1	\$7,174,162	1	100.00%	\$7,174,162	100.00%
Dept. of Transportation	68	\$2,935,208,214	40	58.82%	\$397,604,634	13.55%
Hawai'i State Ethics Commission	1	\$984,533	0	0.00%	\$0	0.00%
Hawai'i Health Systems Corporation	106	\$1,230,852,871	0	0.00%	\$0	0.00%
Hawai'i Housing Finance & Development Corporation	86	\$360,851,671	5	5.81%	\$118,247,972	32.77%
Hawai'i Public Housing Authority	273	\$982,981,701	3	1.10%	\$13,437,105	1.37%
Hawai'i State Legislature	2	\$48,555,381	0	0.00%	\$0	0.00%
Hawai'i State Public Library System	53	\$525,584,082	9	16.98%	\$20,459,322	3.89%
Judiciary	41	\$534,877,354	7	17.07%	\$75,272,153	14.07%
Legislative Reference Bureau	1	\$2,996,162	0	0.00%	\$0	0.00%
Office of Hawaiian Affairs	11	\$54,125,645	4	36.36%	\$42,448,896	78.43%
Office of the Auditor	2	\$1,921,180	0	0.00%	\$0	0.00%
Office of the Governor	1	\$2,996,162	0	0.00%	\$0	0.00%
Office of the Lieutenant Governor	2	\$4,588,849	0	0.00%	\$0	0.00%
Office of the Ombudsman	1	\$1,818,060	0	0.00%	\$0	0.00%
Research Corporation of the University of Hawai'i	3	\$4,189,026	0	0.00%	\$0	0.00%
University of Hawai'i	637	\$5,014,974,503	18	2.83%	\$429,348,908	8.56%
<b>Total</b>	<b>6,095</b>	<b>\$26,120,855,568</b>	<b>442</b>	<b>7.25%</b>	<b>\$2,868,126,728</b>	<b>10.98%</b>

Source: Federal Emergency Management Agency; National Weather Service; National Oceanic and Atmospheric Administration; State of Hawaii Risk Management Office 2017

Table F-36 summarizes the number of miles of State roads by state route located in category 1 through 4 SLOSH inundation areas, organized by county.





Table F-36. State Road Exposure to SLOSH Inundation Areas by County

State Route	Length (in miles)								
	Total Length	Cat 1 Length	Exposed Length as % of Total Length	Cat 2 Length	Exposed Length as % of Total Length	Cat 3 Length	Exposed Length as % of Total Length	Cat 4 Length	Exposed Length as % of Total Length
<b>County of Kaua'i</b>									
State Route 50	32.89242	0.091329	0.28%	0.138787	0.42%	2.85477	8.68%	5.457716	16.59%
State Route 51	3.457222	0.072958	2.11%	0.106746	3.09%	0.112444	3.25%	0.128318	3.71%
State Route 56	28.316299	1.76363	6.23%	2.437216	8.61%	3.982471	14.06%	4.159598	14.69%
State Route 58	2.052085	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 540	3.884869	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 541	0.37465	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 550	14.03193	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 560	9.98938	0.467044	4.68%	1.121657	11.23%	1.448199	14.50%	2.05043	20.53%
State Route 570	1.125605	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 580	6.668581	0.096774	1.45%	0.439189	6.59%	0.6105	9.15%	0.667866	10.02%
State Route 583	0.921237	0	0.00%	0	0.00%	0	0.00%	0	0.00%
<b>Total</b>	<b>103.714278</b>	<b>2.491735</b>	<b>2.40%</b>	<b>4.243595</b>	<b>4.09%</b>	<b>9.008384</b>	<b>8.69%</b>	<b>12.463928</b>	<b>12.02%</b>
<b>City and County of Honolulu</b>									
State Route 61	21.173569	0.021404	0.10%	0.021404	0.10%	0.029579	0.14%	0.06374	0.30%
State Route 63	16.618809	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 64	2.624714	0.440512	16.78%	1.647923	62.78%	2.100716	80.04%	2.337003	89.04%
State Route 65	6.584201	0	0.00%	0	0.00%	0	0.00%	0.485132	7.37%
State Route 72	22.766927	1.155768	5.08%	3.216673	14.13%	4.921268	21.62%	6.362638	27.95%
State Route 76	11.059837	1.013057	9.16%	1.336795	12.09%	1.482523	13.40%	1.690596	15.29%
State Route 78	1.346173	0.034919	2.59%	0.115605	8.59%	0.122884	9.13%	0.1359	10.10%
State Route 80	1.893686	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 83	47.821595	3.363868	7.03%	6.768887	14.15%	9.23619	19.31%	12.07292	25.25%
State Route 92	18.685552	7.163123	38.34%	9.633242	51.55%	10.581794	56.63%	11.030269	59.03%
State Route 93	19.522013	0.02739	0.14%	0.065228	0.33%	0.629039	3.22%	1.561741	8.00%
State Route 98	3.470599	0	0.00%	0	0.00%	0.002233	0.06%	0.00893	0.26%
State Route 99	41.120805	0.106847	0.26%	0.240252	0.58%	0.567932	1.38%	1.158587	2.82%
State Route 750	8.056213	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 901	1.403364	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 930	10.054945	0	0.00%	0.023516	0.23%	0.056898	0.57%	0.508456	5.06%
State Route 7012	1.862959	0	0.00%	0	0.00%	0	0.00%	0	0.00%







State Route	Length (in miles)								
	Total Length	Cat 1 Length	Exposed Length as % of Total Length	Cat 2 Length	Exposed Length as % of Total Length	Cat 3 Length	Exposed Length as % of Total Length	Cat 4 Length	Exposed Length as % of Total Length
State Route 7101	5.865258	0.202569	3.45%	1.083771	18.48%	1.34381	22.91%	1.471826	25.09%
State Route 7110	0.609843	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 7141	1.50208	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 7210	0.115075	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 7239	0.338737	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 7241	2.331816	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 7310	1.041137	0	0.00%	0.195723	18.80%	0.296653	28.49%	0.410893	39.47%
State Route 7345	0.554715	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 7350	0.597196	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 7351	0.243914	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 7401	0.214056	0.064391	30.08%	0.164826	77.00%	0.164826	77.00%	0.164826	77.00%
State Route 7413	0.352495	0	0.00%	0	0.00%	0	0.00%	0.005246	1.49%
State Route 7415	0.536255	0.012136	2.26%	0.125754	23.45%	0.187681	35.00%	0.196531	36.65%
State Route 7526	0.397834	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 7601	0.432591	0	0.00%	0	0.00%	0	0.00%	0.009456	2.19%
State Route 7801	1.151651	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 8300	0.501274	0.016638	3.32%	0.016638	3.32%	0.016638	3.32%	0.016638	3.32%
State Route 8918	0.13352	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 8930	4.941677	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 8940	3.321223	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 8945	0.984948	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 8955	2.697864	0.191811	7.11%	0.726912	26.94%	0.837515	31.04%	0.865264	32.07%
State Route H-1	54.2852	0.794879	1.46%	1.128766	2.08%	1.379163	2.54%	2.117247	3.90%
State Route H-2	16.631646	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route H-201	8.479473	0	0.00%	0.007515	0.09%	0.009948	0.12%	0.284022	3.35%
State Route H-3	30.593733	0.031551	0.10%	0.141094	0.46%	0.332241	1.09%	0.515264	1.68%
Total	374.921172	14.640863	3.91%	26.660524	7.11%	34.299531	9.15%	43.473125	11.60%
<b>County of Maui</b>									
State Route 30	41.599628	0.059461	0.14%	0.133133	0.32%	1.005057	2.42%	1.779082	4.28%
State Route 31	7.147053	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 32	2.855291	0	0.00%	0.03031	1.06%	0.604591	21.17%	0.870137	30.47%
State Route 36	16.225414	0	0.00%	0.293663	1.81%	0.819678	5.05%	0.955024	5.89%





State Route	Length (in miles)								
	Total Length	Cat 1 Length	Exposed Length as % of Total Length	Cat 2 Length	Exposed Length as % of Total Length	Cat 3 Length	Exposed Length as % of Total Length	Cat 4 Length	Exposed Length as % of Total Length
State Route 37	21.33757	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 310	3.609294	0.462804	12.82%	1.284677	35.59%	1.756266	48.66%	1.988678	55.10%
State Route 311	6.415815	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 340	4.265623	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 360	34.838612	0.01129	0.03%	0.01129	0.03%	0.02958	0.08%	0.02958	0.08%
State Route 377	9.136002	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 378	10.082808	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 380	6.197863	0	0.00%	0	0.00%	0.17101	2.76%	0.22903	3.70%
State Route 440	13.153636	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 441	0.476716	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 442	0.022862	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 450	27.477007	5.559171	20.23%	8.097149	29.47%	9.4879	34.53%	10.263164	37.35%
State Route 460	16.534641	1.188869	7.19%	1.524283	9.22%	1.8038	10.91%	1.853104	11.21%
State Route 470	10.74695	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 480	5.898639	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 3000	2.346263	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 3400	2.635502	0.085782	3.25%	0.13705	5.20%	0.294525	11.18%	0.531229	20.16%
State Route 3500	1.125483	0	0.00%	0.07879	7.00%	0.542926	48.24%	0.636708	56.57%
State Route 3800	0.625243	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 32A	0.400435	0	0.00%	0.132783	33.16%	0.350359	87.49%	0.400435	100.00%
State Route 32B	0.172196	0	0.00%	0	0.00%	0.16977	98.59%	0.172196	100.00%
State Route 36A	0.526104	0	0.00%	0.136501	25.95%	0.205764	39.11%	0.456797	86.83%
Total	245.85265	7.367377	3.00%	11.859629	4.82%	17.241226	7.01%	20.165164	8.20%
<b>County of Hawai'i</b>									
State Route 11	117.608086	0	0.00%	0	0.00%	0	0.00%	0.233368	0.20%
State Route 19	93.300605	0.051088	0.05%	0.074349	0.08%	0.237819	0.25%	1.082416	1.16%
State Route 130	21.68728	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 139	1.197816	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 160	3.821277	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 163	0.133863	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 190	34.085758	0	0.00%	0	0.00%	0	0.00%	0	0.00%
State Route 197	1.17843	0	0.00%	0	0.00%	0	0.00%	0	0.00%





State Route	Length (in miles)								
	Total Length	Cat 1 Length	Exposed Length as % of Total Length	Cat 2 Length	Exposed Length as % of Total Length	Cat 3 Length	Exposed Length as % of Total Length	Cat 4 Length	Exposed Length as % of Total Length
<b>State Route 200</b>	43.219679	0	0.00%	0	0.00%	0	0.00%	0	0.00%
<b>State Route 220</b>	3.754068	0	0.00%	0	0.00%	0	0.00%	0	0.00%
<b>State Route 240</b>	9.601941	0	0.00%	0	0.00%	0	0.00%	0	0.00%
<b>State Route 250</b>	19.266672	0	0.00%	0	0.00%	0	0.00%	0	0.00%
<b>State Route 270</b>	27.020618	0	0.00%	0	0.00%	0.167082	0.62%	0.398966	1.48%
<b>State Route 1370</b>	0.191175	0	0.00%	0	0.00%	0	0.00%	0	0.00%
<b>State Route 1970</b>	0.923307	0	0.00%	0	0.00%	0	0.00%	0	0.00%
<b>State Route 2000</b>	2.184464	0	0.00%	0	0.00%	0	0.00%	0	0.00%
<b>Total</b>	<b>379.175039</b>	<b>0.051088</b>	<b>0.01%</b>	<b>0.074349</b>	<b>0.02%</b>	<b>0.404901</b>	<b>0.11%</b>	<b>1.71475</b>	<b>0.45%</b>

Source: State of Hawai'i Department of Transportation 2022; Federal Emergency Management Agency; National Weather Service; National Oceanic and Atmospheric Administration

### F.10.2 COMMUNITY LIFELINES AND CRITICAL FACILITIES

Table F-37 through Table F-39 shows the community lifelines and critical facilities located in the Hurricane Category (Cat) 1 through 3 Storm Surge SLOSH Inundation areas by county.

**Table F-37. Community Lifelines and Critical Facilities Located in the Category 1 SLOSH Inundation Areas by County**

County	Lifeline Category							Additional Critical Facilities	Total Number of Facilities in the Hazard Area
	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation		
<b>County of Kaua'i</b>	0	0	3	0	0	2	0	0	5
<b>City and County of Honolulu</b>	13	11	14	0	4	12	0	3	57
<b>County of Maui</b>	1	0	3	0	2	3	1	0	10
<b>County of Hawai'i</b>	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>14</b>	<b>11</b>	<b>20</b>	<b>0</b>	<b>6</b>	<b>17</b>	<b>1</b>	<b>3</b>	<b>72</b>

Source: Federal Emergency Management Agency; National Weather Service; National Oceanic and Atmospheric Administration; Hawai'i Emergency Management Agency 2017; Federal Emergency Management Agency Lifeline Data 2020





**Table F-38. Critical Facilities Exposure to Category 2 SLOSH Inundation Areas by County**

County	Lifeline Category							Additional Critical Facilities	Total Number of Facilities in the Hazard Area
	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation		
County of Kaua'i	0	0	3	0	0	4	0	1	8
City and County of Honolulu	16	17	35	0	4	15	1	3	91
County of Maui	1	0	8	0	2	6	2	1	20
County of Hawai'i	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>17</b>	<b>17</b>	<b>46</b>	<b>0</b>	<b>6</b>	<b>25</b>	<b>3</b>	<b>5</b>	<b>119</b>

Source: Federal Emergency Management Agency; National Weather Service; National Oceanic and Atmospheric Administration; Hawai'i Emergency Management Agency 2017; Federal Emergency Management Agency Lifeline Data 2020

**Table F-39. Critical Facilities Exposure to Category 3 SLOSH Inundation Areas by County**

County	Lifeline Category							Additional Critical Facilities	Total Number of Facilities in the Hazard Area
	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation		
County of Kaua'i	1	2	9	0	0	6	2	1	21
City and County of Honolulu	24	18	40	0	4	20	1	3	110
County of Maui	1	0	10	0	3	9	2	1	26
County of Hawai'i	0	0	2	0	0	0	2	0	4
<b>Total</b>	<b>26</b>	<b>20</b>	<b>61</b>	<b>0</b>	<b>7</b>	<b>35</b>	<b>7</b>	<b>5</b>	<b>161</b>

Source: Federal Emergency Management Agency; National Weather Service; National Oceanic and Atmospheric Administration; Hawai'i Emergency Management Agency 2017; Federal Emergency Management Agency Lifeline Data 2020

Table F-40 through Table F-42 shows the community lifelines and critical facilities located in the hurricane category 1 through 3 SLOSH Inundation areas.

**Table F-40. Community Lifelines and Critical Facilities Exposure to Category 1 SLOSH Inundation Areas by Category**

Category	Total Number of Facilities	Total Replacement Cost Value	Number of Facilities in Hazard Area	Percent (%) of Total Facilities	Value in the Hazard Area	Percent (%) of Total Value
Communications	188	\$776,797,683	14	7.45%	\$40,156,935	5.17%
Energy	89	\$3,093,949,530	11	12.36%	\$397,588,020	12.85%
Food, Water, Shelter	345	\$11,847,189,588	20	5.80%	\$671,461,285	5.67%
Hazardous Material	12	\$436,474,800	0	0.00%	\$0	0.00%
Health and Medical	193	\$4,606,713,364	6	3.11%	\$90,902,124	1.97%
Safety and Security	486	\$38,164,188,232	17	3.50%	\$2,329,181,390	6.10%





Category	Total Number of Facilities	Total Replacement Cost Value	Number of Facilities in Hazard Area	Percent (%) of Total Facilities	Value in the Hazard Area	Percent (%) of Total Value
Transportation	56	\$2,039,091,600	1	1.79%	\$36,294,000	1.78%
Additional Facilities	106	\$447,698,794	3	2.83%	\$14,662,680	3.28%
<b>Total</b>	<b>1,475</b>	<b>\$61,412,103,591</b>	<b>72</b>	<b>4.88%</b>	<b>\$3,580,246,434</b>	<b>5.83%</b>

Source: Federal Emergency Management Agency; National Weather Service; National Oceanic and Atmospheric Administration; Hawai'i Emergency Management Agency 2017; Federal Emergency Management Agency Lifeline Data 2020

**Table F-41. Community Lifelines and Critical Facilities Exposure to Category 2 SLOSH Inundation Areas by Category**

Category	Total Number of Facilities	Total Replacement Cost Value	Number of Facilities in Hazard Area	Percent (%) of Total Facilities	Value in the Hazard Area	Percent (%) of Total Value
Communications	188	\$776,797,683	17	9.04%	\$48,787,986	6.28%
Energy	89	\$3,093,949,530	17	19.10%	\$616,750,790	19.93%
Food, Water, Shelter	345	\$11,847,189,588	46	13.33%	\$1,598,913,690	13.50%
Hazardous Material	12	\$436,474,800	0	0.00%	\$0	0.00%
Health and Medical	193	\$4,606,713,364	6	3.11%	\$90,902,124	1.97%
Safety and Security	486	\$38,164,188,232	25	5.14%	\$2,440,253,134	6.39%
Transportation	56	\$2,039,091,600	3	5.36%	\$109,828,800	5.39%
Additional Facilities	106	\$447,698,794	5	4.72%	\$21,967,480	4.91%
<b>Total</b>	<b>1,475</b>	<b>\$61,412,103,591</b>	<b>119</b>	<b>8.07%</b>	<b>\$4,927,404,004</b>	<b>8.02%</b>

Source: Federal Emergency Management Agency; National Weather Service; National Oceanic and Atmospheric Administration; Hawai'i Emergency Management Agency 2017; Federal Emergency Management Agency Lifeline Data 2020

**Table F-42. Community Lifelines and Critical Facilities Exposure to Category 3 SLOSH Inundation Areas by Category**

Category	Total Number of Facilities	Total Replacement Cost Value	Number of Facilities in Hazard Area	Percent (%) of Total Facilities	Value in the Hazard Area	Percent (%) of Total Value
Communications	188	\$776,797,683	26	13.83%	\$74,242,272	9.56%
Energy	89	\$3,093,949,530	20	22.47%	\$702,937,980	22.72%
Food, Water, Shelter	345	\$11,847,189,588	61	17.68%	\$2,081,827,690	17.57%
Hazardous Material	12	\$436,474,800	0	0.00%	\$0	0.00%
Health and Medical	193	\$4,606,713,364	7	3.63%	\$96,271,474	2.09%
Safety and Security	486	\$38,164,188,232	35	7.20%	\$2,686,249,378	7.04%
Transportation	56	\$2,039,091,600	7	12.50%	\$255,004,800	12.51%
Additional Facilities	106	\$447,698,794	5	4.72%	\$21,967,480	4.91%
<b>Total</b>	<b>1,475</b>	<b>\$61,412,103,591</b>	<b>161</b>	<b>10.92%</b>	<b>\$5,918,501,074</b>	<b>9.64%</b>

Source: Federal Emergency Management Agency; National Weather Service; National Oceanic and Atmospheric Administration; Hawai'i Emergency Management Agency 2017; Federal Emergency Management Agency Lifeline Data 2020





### F.10.3 HAZUS SCENARIOS

Wind field import files provided by the Pacific Disaster Center were used for the Hazus analyses. The wind field files were created for the *2015 Hawai'i Catastrophic Hurricane Plan* and include one statewide scenario and four county-specific scenarios as described in Section 4.1. The estimate potential general building stock losses and sheltering needs are presented in the tables below for each scenario; statewide hurricane scenario and each county-specific hurricane scenario.

**Table F-43. Estimated Sheltering Needs from a 500-Year Mean Return Period Statewide Hurricane Scenario in Hazus**

County	Displaced Households	Short-Term Sheltering Needs
County of Kaua'i	2	1
City and County of Honolulu	26,596	16,642
County of Maui	11,679	7,341
County of Hawai'i	16,965	11,452
<b>Total</b>	<b>55,242</b>	<b>35,436</b>

Source: FEMA Hazus v5.1

**Table F-44. Estimated General Building Stock Loss and Sheltering Needs from a Category 4 Hurricane Scenario for County of Kaua'i**

County	Total Replacement Cost Value	Displaced Households		Short-Term Sheltering Needs	
		Estimated Loss	Estimated Loss as % of Total RCV	Estimated Loss	Estimated Loss as % of Total RCV
County of Kaua'i	\$24,246,497,228	\$6,175,235,960	46.50%	1404700.00%	316900.00%
City and County of Honolulu	\$239,152,051,766	\$44,992,388	0.00%	0.00%	0.00%
County of Maui	\$50,796,693,140	\$0	0.00%	0.00%	0.00%
County of Hawai'i	\$58,395,349,136	\$0	0.00%	0.00%	0.00%
<b>Total</b>	<b>\$372,590,591,270</b>	<b>\$6,220,228,348</b>	<b>2.60%</b>	<b>1404700.00%</b>	<b>0.00%</b>

Source: NIYAM IT 2022; United States Army Corps of Engineers 2022; FEMA Hazus v5.1

**Table F-45. Estimated General Building Stock Loss and Sheltering Needs from a Category 4 Hurricane for City and County of Honolulu**

County	Total Replacement Cost Value	Displaced Households		Short-Term Sheltering Needs	
		Estimated Loss	Estimated Loss as % of Total RCV	Estimated Loss	Estimated Loss as % of Total RCV
County of Kaua'i	\$24,246,497,228	\$969,211.00	0.00%	\$0.00	0.00%
City and County of Honolulu	\$239,152,051,766	\$80,890,824,106.00	49.10%	\$217,193.00	4704600.00%
County of Maui	\$50,796,693,140	\$122,955,340.00	0.40%	\$105.00	2400.00%
County of Hawai'i	\$58,395,349,136	\$0.00	0.00%	\$0.00	0.00%
<b>Total</b>	<b>\$372,590,591,270</b>	<b>\$81,014,748,658.00</b>	<b>33.40%</b>	<b>\$217,298.00</b>	<b>0.00%</b>

Source: NIYAM IT 2022; United States Army Corps of Engineers 2022; FEMA Hazus v5.1





**Table F-46. Estimated General Building Stock Loss and Sheltering Needs from a Category 4 Hurricane for County of Maui**

County	Total Replacement Cost Value	Displaced Households		Short-Term Sheltering Needs	
		Estimated Loss	Estimated Loss as % of Total RCV	Estimated Loss	Estimated Loss as % of Total RCV
County of Kaua'i	\$24,246,497,228	\$0.00	0.00%	\$0.00	0.00%
City and County of Honolulu	\$239,152,051,766	\$0.00	0.00%	\$0.00	0.00%
County of Maui	\$50,796,693,140	\$11,869,243,202.00	37.90%	\$27,596.00	593000.00%
County of Hawai'i	\$58,395,349,136	\$207,337,617.00	0.60%	\$136.00	2800.00%
<b>Total</b>	<b>\$372,590,591,270</b>	<b>\$12,076,580,819.00</b>	<b>5.00%</b>	<b>\$27,732.00</b>	<b>0.00%</b>

Source: NIYAM IT 2022; United States Army Corps of Engineers 2022; FEMA Hazus v5.1

**Table F-47. Estimated General Building Stock Loss and Sheltering Needs from a Category 4 Hurricane for County of Hawai'i**

County	Total Replacement Cost Value	Displaced Households		Short-Term Sheltering Needs	
		Estimated Loss	Estimated Loss as % of Total RCV	Estimated Loss	Estimated Loss as % of Total RCV
County of Kaua'i	\$24,246,497,228	\$0	0.00%	0.00%	0.00%
City and County of Honolulu	\$239,152,051,766	\$0	0.00%	0.00%	0.00%
County of Maui	\$50,796,693,140	\$541,178	0.00%	0.00%	0.00%
County of Hawai'i	\$58,395,349,136	\$8,845,149,253	26.50%	1982800.00%	431900.00%
<b>Total</b>	<b>\$372,590,591,270</b>	<b>\$8,845,690,431</b>	<b>3.60%</b>	<b>1982800.00%</b>	<b>0.00%</b>

Source: NIYAM IT 2022; United States Army Corps of Engineers 2022; FEMA Hazus v5.1

Table F-48 shows the total number of square miles environmental resources located in the SLOSH inundation areas (Categories 1 through 4).

**Table F-48. Total Area of Environmental Resources located in the SLOSH Inundation Areas**

County	Area (in square miles)								
	Total Area	Cat 1 Hazard Area	Hazard Area as % of Total Area	Cat 2 Hazard Area	Hazard Area as % of Total Area	Cat 3 Hazard Area	Hazard Area as % of Total Area	Cat 4 Hazard Area	Hazard Area as % of Total Area
County of Kaua'i	919.953924	3.830831	0.42%	4.641689	0.50%	7.413525	0.81%	8.797537	1%
City and County of Honolulu	762.964336	4.055786	0.53%	7.721169	1.01%	10.192861	1.34%	10.863595	1%
County of Maui	2,109.97	6.677426	0.32%	8.326711	0.39%	9.03072	0.43%	9.524094	0%
County of Hawai'i	3,626.96	2.571946	0.07%	2.925765	0.08%	3.368075	0.09%	3.868921	0%
<b>Total</b>	<b>7,419.85</b>	<b>17.135989</b>	<b>0.23%</b>	<b>23.615334</b>	<b>0.32%</b>	<b>30.005181</b>	<b>0.40%</b>	<b>33.054147</b>	<b>0.45%</b>

Source: Federal Emergency Management Agency; National Weather Service; National Oceanic and Atmospheric Administration; U.S. Fish and Wildlife Service, Pacific Islands Office, 2022, U.S. Fish and Wildlife Service 2021; 2017, Hawaii State Department of Land and Natural Resources, Division of Forestry and Wildlife 2022, NOAA raster nautical charts 2020b, State of Hawaii Department of Land and Natural Resources, Division of State Parks 2021





Table F-49 shows the square miles of each environmental resource located in the SLOSH inundation areas (Categories 1 through 4). Table F-50 shows the square miles of the SLOSH inundation areas in each watershed partnership area. Table F-51 shows the square miles of the SLOSH inundation areas in each State Land Use District in each county.







Table F-49. Environmental Assets Located in the SLOSH Hurricane Inundation Areas by County

Environmental Resource	Area (in square miles)								
	Total Area	Category 1 SLOSH	Category 1 as % of Total Area	Category 2 SLOSH	Category 2 as % of Total Area	Category 3 SLOSH	Category 3 as % of Total Area	Category 4 SLOSH	Category 4 as % of Total Area
<b>County of Kaua'i</b>									
Critical Habitat	89.949404	0.071099	0.08%	0.097965	0.11%	0.129874	0.14%	0.174283	0.19%
Wetlands	599.856747	3.039062	0.51%	3.33769	0.56%	5.800842	0.97%	6.833477	1.14%
Parks & Reserves	225.627609	0.565748	0.25%	1.021719	0.45%	1.289758	0.57%	1.592265	0.71%
Reefs	4.520164	0.154922	3.43%	0.184315	4.08%	0.193051	4.27%	0.197512	4.37%
<b>Total</b>	<b>919.953924</b>	<b>3.830831</b>	<b>0.42%</b>	<b>4.641689</b>	<b>0.50%</b>	<b>7.413525</b>	<b>0.81%</b>	<b>8.797537</b>	<b>0.96%</b>
<b>City and County of Honolulu</b>									
Critical Habitat	120.940098	0.028801	0.02%	0.0773	0.06%	0.109615	0.09%	0.143039	0.12%
Wetlands	505.8093	2.954961	0.58%	4.675767	0.92%	5.949417	1.18%	6.289636	1.24%
Parks & Reserves	120.493604	0.807386	0.67%	2.661692	2.21%	3.798662	3.15%	4.078305	3.38%
Reefs	15.721334	0.264638	1.68%	0.30641	1.95%	0.335167	2.13%	0.352615	2.24%
<b>Total</b>	<b>762.964336</b>	<b>4.055786</b>	<b>0.53%</b>	<b>7.721169</b>	<b>1.01%</b>	<b>10.192861</b>	<b>1.34%</b>	<b>10.863595</b>	<b>1.42%</b>
<b>County of Maui</b>									
Critical Habitat	293.089135	0.375184	0.13%	0.485412	0.17%	0.582686	0.20%	0.65702	0.22%
Wetlands	1,382.29	4.824587	0.35%	5.665934	0.41%	6.033595	0.44%	6.279072	0.45%
Parks & Reserves	408.607306	1.044554	0.26%	1.726279	0.42%	1.94967	0.48%	2.106948	0.52%
Reefs	25.988851	0.433101	1.67%	0.449086	1.73%	0.464769	1.79%	0.481054	1.85%
<b>Total</b>	<b>2,109.97</b>	<b>6.677426</b>	<b>0.32%</b>	<b>8.326711</b>	<b>0.39%</b>	<b>9.03072</b>	<b>0.43%</b>	<b>9.524094</b>	<b>0.45%</b>
<b>County of Hawai'i</b>									
Critical Habitat	446.603954	0.018414	0.00%	0.021188	0.00%	0.031773	0.01%	0.049524	0.01%
Wetlands	1,148.77	1.770142	0.15%	1.893513	0.16%	2.003302	0.17%	2.145768	0.19%
Parks & Reserves	2,022.98	0.545323	0.03%	0.751505	0.04%	1.054814	0.05%	1.380874	0.07%
Reefs	8.603698	0.238067	2.77%	0.259559	3.02%	0.278186	3.23%	0.292755	3.40%
<b>Total</b>	<b>3,626.96</b>	<b>2.571946</b>	<b>0.07%</b>	<b>2.925765</b>	<b>0.08%</b>	<b>3.368075</b>	<b>0.09%</b>	<b>3.868921</b>	<b>0.11%</b>

Source: Federal Emergency Management Agency; National Weather Service; National Oceanic and Atmospheric Administration; U.S. Fish and Wildlife Service, Pacific Islands Office, 2022, U.S. Fish and Wildlife Service 2021; 2017, Hawaii State Department of Land and Natural Resources, Division of Forestry and Wildlife 2022, NOAA raster nautical charts 2020b, State of Hawaii Department of Land and Natural Resources, Division of State Parks 2021





**Table F-50. Watershed Partnership Areas Located in the SLOSH Hurricane Areas**

Watershed	Area (in square miles)								
	Total Area (square miles)	Cat 1 Hazard Area	Hazard Area as % of Total Area	Cat 2 Hazard Area	Hazard Area as % of Total Area	Cat 3 Hazard Area	Hazard Area as % of Total Area	Cat 4 Hazard Area	Hazard Area as % of Total Area
<b>County of Kaua'i</b>									
Kaua'i Watershed Alliance	225.61	0.023	0.01%	0.031	0.01%	0.039	0.02%	0.051	0.02%
<b>City and County of Honolulu</b>									
Ko'olau Mountains Watershed Partnership	160.62	0.129	0.08%	0.196	0.12%	0.239	0.15%	0.263	0.16%
Wai'anae Mountains Watershed Partnership	73.59	0.032	0.04%	0.042	0.06%	0.059	0.08%	0.105	0.14%
<b>Total</b>	<b>234.21</b>	<b>0.161</b>	<b>0.12%</b>	<b>0.238</b>	<b>0.18%</b>	<b>0.298</b>	<b>0.23%</b>	<b>0.368</b>	<b>0.30%</b>
<b>County of Maui</b>									
East Maui Watershed Partnership	173.01	0.002	0.00%	0.003	0.00%	0.006	0.00%	0.009	0.00%
East Moloka'i Watershed Partnership	105.27	0.525	0.50%	0.652	0.62%	0.747	0.71%	0.831	0.79%
Leeward Haleakalā Watershed Restoration Partnership	53.56	0.000	0.00%	0.000	0.00%	0.000	0.00%	0.000	0.00%
West Maui Mountains Watershed Partnership	73.94	0.000	0.00%	0.000	0.00%	0.000	0.00%	0.000	0.00%
Lāna'i Forest and Watershed Partnership	14.84	0.000	0.00%	0.000	0.00%	0.000	0.00%	0.000	0.00%
Overlap East Maui Watershed Partnership and Leeward Haleakalā Watershed Restoration Partnership	13.72	0.000	0.00%	0.000	0.00%	0.000	0.00%	0.000	0.00%
<b>Total</b>	<b>434.34</b>	<b>0.527</b>	<b>0.50%</b>	<b>0.655</b>	<b>0.62%</b>	<b>0.753</b>	<b>0.71%</b>	<b>0.84</b>	<b>0.79%</b>
<b>County of Hawai'i</b>									
Kohala Watershed Partnership	115.81	0.015	0.01%	0.019	0.02%	0.028	0.02%	0.095	0.08%
Mauna Kea Watershed Alliance	400.39	0.000	0.00%	0.000	0.00%	0.000	0.00%	0.000	0.00%
Three Mountain Alliance	1767.20	0.224	0.01%	0.292	0.02%	0.364	0.02%	0.498	0.03%
<b>Total</b>	<b>2283.4</b>	<b>0.239</b>	<b>0.02%</b>	<b>0.311</b>	<b>0.04%</b>	<b>0.392</b>	<b>0.04%</b>	<b>0.593</b>	<b>0.11%</b>

Source: Federal Emergency Management Agency; National Weather Service; National Oceanic and Atmospheric Administration; Department of Land & Natural Resources, Division of Forestry and Wildlife 2020





Table F-51. State Land Use Districts Located in SLOSH Inundation Area

Land Use District	Area (in square miles)													
	Total Square Miles	Square Miles in Category 1 Hazard Area	Hazard Area as % of Total Area	Hazard Area as % of Total Hazard Exposure	Square Miles in Category 2 Hazard Area	Hazard Area as % of Total Area	Hazard Area as % of Total Hazard Exposure	Square Miles in Category 3 Hazard Area	Hazard Area as % of Total Area	Hazard Area as % of Total Hazard Exposure	Square Miles in Category 4 Hazard Area	Hazard Area as % of Total Area	Hazard Area as % of Total Hazard Exposure	
<b>County of Kaua'i</b>														
<b>Agricultural</b>	297.078539	2.635421	0.89%	59.72%	3.005075	1.01%	52.55%	6.008907	2.02%	60.40%	7.243863	2.44%	60.13%	
<b>Conservation</b>	304.260357	0.703152	0.23%	15.93%	1.104049	0.36%	19.31%	1.516014	0.50%	15.24%	1.747253	0.57%	14.50%	
<b>Rural</b>	2.146976	0.012794	0.60%	0.29%	0.018812	0.88%	0.33%	0.04089	1.90%	0.41%	0.142287	6.63%	1.18%	
<b>Urban</b>	23.643203	1.061435	4.49%	24.05%	1.590473	6.73%	27.81%	2.383469	10.08%	23.96%	2.914551	12.33%	24.19%	
<b>Total</b>	627.129075	4.412802	0.70%	100.00%	5.718409	0.91%	100.00%	9.94928	1.59%	100.00%	12.047954	1.92%	100.00%	
<b>City and County of Honolulu</b>														
<b>Agricultural</b>	188.479146	1.272761	0.68%	11.71%	3.72498	1.98%	16.65%	5.027304	2.67%	15.79%	6.173966	3.28%	16.14%	
<b>Conservation</b>	247.601978	1.237519	0.50%	11.38%	2.02288	0.82%	9.04%	2.98093	1.20%	9.36%	3.188242	1.29%	8.34%	
<b>Rural</b>	0	0	0.00%	0.00%	0	0.00%	0.00%	0	0.00%	0.00%	0	0.00%	0.00%	
<b>Urban</b>	162.455059	8.361315	5.15%	76.91%	16.620094	10.23%	74.30%	23.830284	14.67%	74.85%	28.88268	17.78%	75.52%	
<b>Total</b>	598.536183	10.871595	1.82%	100.00%	22.367954	3.74%	100.00%	31.838518	5.32%	100.00%	38.244888	6.39%	100.00%	
<b>County of Maui</b>														
<b>Agricultural</b>	637.731138	2.570695	0.40%	39.52%	3.446269	0.54%	39.95%	4.048856	0.63%	37.98%	4.334316	0.68%	35.21%	
<b>Conservation</b>	552.35574	2.485597	0.45%	38.21%	3.126331	0.57%	36.24%	3.587395	0.65%	33.65%	4.00452	0.72%	32.53%	
<b>Rural</b>	12.824585	0.643721	5.02%	9.90%	0.822592	6.41%	9.53%	0.997945	7.78%	9.36%	1.15273	8.99%	9.37%	
<b>Urban</b>	45.187433	0.804994	1.78%	12.37%	1.23226	2.73%	14.28%	2.027142	4.49%	19.01%	2.817119	6.23%	22.89%	
<b>Total</b>	1,248	6.505007	0.52%	100.00%	8.627452	0.69%	100.00%	10.661338	0.85%	100.00%	12.308685	0.99%	100.00%	
<b>County of Hawai'i</b>														
<b>Agricultural</b>	1,850.31	0.024968	0.00%	1.32%	0.048565	0.00%	1.93%	0.070325	0.00%	1.90%	0.191668	0.01%	3.58%	
<b>Conservation</b>	2,098.66	1.283846	0.06%	68.11%	1.628999	0.08%	64.68%	2.151303	0.10%	58.07%	2.775603	0.13%	51.85%	
<b>Rural</b>	1.36344	0.002084	0.15%	0.11%	0.002239	0.16%	0.09%	0.002833	0.21%	0.08%	0.003208	0.24%	0.06%	
<b>Urban</b>	87.847736	0.573989	0.65%	30.45%	0.838803	0.95%	33.30%	1.480486	1.69%	39.96%	2.382947	2.71%	44.51%	
<b>Total</b>	4,038	1.884887	0.05%	100.00%	2.518606	0.06%	100.00%	3.704947	0.09%	100.00%	5.353426	0.13%	100.00%	

Source: State Land Use Commission, Hawaii Statewide GIS Program 2021; Honolulu County GIS 2022; Federal Emergency Management Agency; National Weather Service; National Oceanic and Atmospheric Administration





## F.11 Infrastructure Failure

The State of Hawai‘i has a total 126 State-regulated dams, of which 118 have a classification of “high hazard”. An inventory of dams, by county, is summarized in Table F-52 using the Dam Inventory System from the Department of Land and Natural Resources (DLNR 2023). Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and in low economic and/or environmental losses. Losses are principally limited to the owner’s property. Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure. Dams assigned the high hazard potential are those where failure or misoperation will probably cause loss of human life.

*Table F-52. Dams Located in the State of Hawai‘i, by County, and Hazard Classification*

National ID	State ID	Dam Name	County	Island	Hazard Classification
HI00063	KA-0063	‘A‘ahoaka Reservoir	Kaua‘i	Kaua‘i	High
HI00103	KA-0103	Aepo Reservoir	Kaua‘i	Kaua‘i	High
HI00110	KA-0110	Aepoalua Reservoir	Kaua‘i	Kaua‘i	High
HI00112	KA-0112	Aepoeha Reservoir	Kaua‘i	Kaua‘i	High
HI00111	KA-0111	Aepoekolu Reservoir	Kaua‘i	Kaua‘i	High
HI00011	KA-0011	Aii Reservoir	Kaua‘i	Kaua‘i	High
HI00098	KA-0098	Alexander Reservoir	Kaua‘i	Kaua‘i	High
HI00105	KA-0105	‘Elima Reservoir	Kaua‘i	Kaua‘i	High
HI00117	KA-0117	‘Elua Reservoir	Kaua‘i	Kaua‘i	High
HI00067	KA-0067	Field 1 Keālia Reservoir	Kaua‘i	Kaua‘i	High
HI00146	KA-0146	Hala‘ula Reservoir	Kaua‘i	Kaua‘i	High
HI00121	KA-0121	Halenānahu Reservoir	Kaua‘i	Kaua‘i	High
HI00118	KA-0118	Hanamā‘ulu Reservoir	Kaua‘i	Kaua‘i	High
HI00104	KA-0104	Huinawai Reservoir	Kaua‘i	Kaua‘i	High
HI00101	KA-0101	Hukiwai Reservoir	Kaua‘i	Kaua‘i	High
HI00102	KA-0102	Ioleau Reservoir	Kaua‘i	Kaua‘i	Low
HI00109	KA-0109	Ipuolono Reservoir	Kaua‘i	Kaua‘i	High
HI00009	KA-0009	Ka‘awanui Reservoir	Kaua‘i	Kaua‘i	High
HI00024	KA-0024	Kalihawai Reservoir	Kaua‘i	Kaua‘i	High
HI00030	KA-0030	Kaloko Reservoir	Kaua‘i	Kaua‘i	High
HI00015	KA-0015	Kaneha Reservoir	Kaua‘i	Kaua‘i	High
HI00100	KA-0100	Kapa Reservoir	Kaua‘i	Kaua‘i	High
HI00012	KA-0012	Kapaia Reservoir	Kaua‘i	Kaua‘i	High





National ID	State ID	Dam Name	County	Island	Hazard Classification
HI00145	KA-0145	Kaua'i Lagoons	Kaua'i	Kaua'i	High
HI00108	KA-0108	Kaupale Reservoir	Kaua'i	Kaua'i	High
HI00007	KA-0007	Kepani Reservoir	Kaua'i	Kaua'i	High
HI00106	KA-0106	Kumano Reservoir	Kaua'i	Kaua'i	High
HI00061	KA-0061	Lower Kapahi Reservoir	Kaua'i	Kaua'i	High
HI00005	KA-0005	Mānā Reservoir	Kaua'i	Kaua'i	High
HI00116	KA-0116	Mau Reservoir	Kaua'i	Kaua'i	High
HI00119	KA-0119	Mauka Reservoir	Kaua'i	Kaua'i	High
HI00016	KA-0016	Mimino Reservoir	Kaua'i	Kaua'i	High
HI00014	KA-0014	Okinawa Reservoir	Kaua'i	Kaua'i	High
HI00113	KA-0113	ʻŌmaʻo Reservoir	Kaua'i	Kaua'i	High
HI00120	KA-0120	Papuaa Reservoir	Kaua'i	Kaua'i	High
HI00115	KA-0115	Pia Mill Reservoir	Kaua'i	Kaua'i	High
HI00114	KA-0114	Piwai Reservoir	Kaua'i	Kaua'i	High
HI00155	KA-0155	Pond No. 1 at Kaua'i Ranch	Kaua'i	Kaua'i	High
HI00002	KA-0002	Pu'u Lua Reservoir	Kaua'i	Kaua'i	High
HI00107	KA-0107	Pu'u O Hewa Reservoir	Kaua'i	Kaua'i	High
HI00003	KA-0003	Pu'u Opae Reservoir	Kaua'i	Kaua'i	Low
HI00062	KA-0062	Twin Reservoirs	Kaua'i	Kaua'i	High
HI00065	KA-0065	Upper Anahola Reservoir	Kaua'i	Kaua'i	Low
HI00010	KA-0010	Waiakalua Reservoir	Kaua'i	Kaua'i	High
HI00006	KA-0006	Waikaia Reservoir	Kaua'i	Kaua'i	High
HI00008	KA-0008	Waikoloa Reservoir	Kaua'i	Kaua'i	High
HI00060	KA-0060	Wailua Reservoir	Kaua'i	Kaua'i	High
HI00099	KA-0099	Waitā Reservoir	Kaua'i	Kaua'i	High
HI00023	OA-0023	Helemano 6 Reservoir	Honolulu	O'ahu	High
HI00124	OA-0124	Kāne'ohe Dam	Honolulu	O'ahu	High
HI00021	OA-0021	Kemo'o 5 Reservoir	Honolulu	O'ahu	High
HI00156	OA-0156	Koolau Reservoir	Honolulu	O'ahu	Low
HI00025	OA-0025	Ku Tree Reservoir	Honolulu	O'ahu	High
HI00149	OA-0149	Mauna'olu Reservoir	Honolulu	O'ahu	High
HI00001	OA-0001	Nu'uaniu Dam No. 4	Honolulu	O'ahu	High
HI00154	OA-0154	Nu'uaniu Reservoir No. 1	Honolulu	O'ahu	High
HI00137	OA-0137	O'ahu Reservoir 155	Honolulu	O'ahu	High
HI00018	OA-0018	Ōpaeu'la 01 Reservoir	Honolulu	O'ahu	High
HI00022	OA-0022	Upper Helemano Reservoir	Honolulu	O'ahu	High





National ID	State ID	Dam Name	County	Island	Hazard Classification
HI00017	OA-0017	Wahiawā Dam	Honolulu	O'ahu	High
HI00129	OA-0129	Waimānalo 60 Mg Reservoir	Honolulu	O'ahu	High
HI00095	MA-0095	Ha'ikū Reservoir	Maui	Maui	High
HI00056	MA-0056	Hanaka'ō'ō Reservoir	Maui	Maui	High
HI00130	MA-0130	Honokowai - Structure #8	Maui	Maui	High
HI00058	MA-0058	Honokowai Reservoir	Maui	Maui	High
HI00054	MA-0054	Horner Reservoir	Maui	Maui	High
HI00138	MA-0138	Kahakapao Reservoirs	Maui	Maui	High
HI00126	MA-0126	Kahana Nui Dam	Maui	Maui	High
HI00057	MA-0057	Kahoma Reservoir	Maui	Maui	High
HI00143	MA-0143	Kā'ili 'Ili Reservoir	Maui	Maui	High
HI00134	MA-0134	Ka'ōpala Basin	Maui	Maui	High
HI00094	MA-0094	Kapalaalea Reservoir	Maui	Maui	High
HI00141	MA-0141	Kehalani Offsite Retention Basin	Maui	Maui	High
HI00041	MO-0041	Kualapu'u Reservoir	Maui	Moloka'i	High
HI00144	MA-0144	Māhinahina Reservoir	Maui	Maui	High
HI00139	MA-0139	Maui Field 290 Reservoir	Maui	Maui	High
HI00068	MA-0068	Maui Reservoir 14	Maui	Maui	High
HI00069	MA-0069	Maui Reservoir 15	Maui	Maui	High
HI00070	MA-0070	Maui Reservoir 20	Maui	Maui	High
HI00071	MA-0071	Maui Reservoir 21	Maui	Maui	High
HI00072	MA-0072	Maui Reservoir 22	Maui	Maui	High
HI00073	MA-0073	Maui Reservoir 24	Maui	Maui	High
HI00074	MA-0074	Maui Reservoir 25	Maui	Maui	High
HI00075	MA-0075	Maui Reservoir 30	Maui	Maui	High
HI00076	MA-0076	Maui Reservoir 33	Maui	Maui	High
HI00077	MA-0077	Maui Reservoir 40	Maui	Maui	High
HI00078	MA-0078	Maui Reservoir 42	Maui	Maui	High
HI00079	MA-0079	Maui Reservoir 52	Maui	Maui	High
HI00080	MA-0080	Maui Reservoir 60	Maui	Maui	High
HI00081	MA-0081	Maui Reservoir 61	Maui	Maui	High
HI00082	MA-0082	Maui Reservoir 70	Maui	Maui	High
HI00083	MA-0083	Maui Reservoir 73	Maui	Maui	High
HI00084	MA-0084	Maui Reservoir 74	Maui	Maui	High
HI00085	MA-0085	Maui Reservoir 80	Maui	Maui	High
HI00086	MA-0086	Maui Reservoir 81	Maui	Maui	High





National ID	State ID	Dam Name	County	Island	Hazard Classification
HI00087	MA-0087	Maui Reservoir 82	Maui	Maui	Significant
HI00088	MA-0088	Maui Reservoir 84	Maui	Maui	High
HI00089	MA-0089	Maui Reservoir 90	Maui	Maui	High
HI00090	MA-0090	Maui Reservoir 92	Maui	Maui	High
HI00142	MA-0142	Middle Field 14 Reservoir	Maui	Maui	High
HI00128	MA-0128	Nāpili 2-3 Desilting Basin	Maui	Maui	High
HI00127	MA-0127	Nāpili 4-5 Desilting Basin	Maui	Maui	High
HI00048	MA-0048	Olinda Reservoir	Maui	Maui	High
HI00092	MA-0092	Pāpa‘a‘ea Reservoir	Maui	Maui	High
HI00096	MA-0096	Pa‘uwela Reservoir	Maui	Maui	High
HI00091	MA-0091	Pe‘ahi Reservoir	Maui	Maui	High
HI00047	MA-0047	Pi‘iholo 50 Mg Reservoir	Maui	Maui	High
HI00153	MA-0153	Plantation Reservoir	Maui	Maui	High
HI00133	MA-0133	Pu‘u Koa Reservoir	Maui	Maui	High
HI00059	MA-0059	Reservoir 140	Maui	Maui	High
HI00140	MA-0140	Ukumehame Reservoirs	Maui	Maui	High
HI00132	MA-0132	Upper Field 14 Reservoir	Maui	Maui	High
HI00046	MA-0046	Waikamoi Dam No. 2	Maui	Maui	Low
HI00152	MA-0152	Waikamoi Reservoirs	Maui	Maui	Significant
HI00151	MA-0151	Wailuku Water Reservoir 10	Maui	Maui	High
HI00150	MA-0150	Wailuku Water Reservoir 6	Maui	Maui	High
HI00051	HA-0051	Hāwī No. 5 Reservoir	Hawai‘i	Hawai‘i	High
HI00049	HA-0049	Keaiwa Reservoir	Hawai‘i	Hawai‘i	Low
HI00131	HA-0131	Pa‘auilo Reservoir	Hawai‘i	Hawai‘i	High
HI00147	HA-0147	Pūnāwai Reservoir	Hawai‘i	Hawai‘i	High
HI00123	HA-0123	Pu‘u Pulehu Reservoir	Hawai‘i	Hawai‘i	High
HI00043	HA-0043	Pu‘ukapu Watershed Retarding Dam R-1	Hawai‘i	Hawai‘i	High
HI00040	HA-0040	Waikōloa Reservoir No. 1	Hawai‘i	Hawai‘i	High
HI00122	HA-0122	Waikōloa Reservoir No. 2	Hawai‘i	Hawai‘i	High
HI00136	HA-0136	Waikōloa Reservoir No. 3	Hawai‘i	Hawai‘i	High
HI00042	HA-0042	Waimea 60 Mg Reservoir	Hawai‘i	Hawai‘i	High

Source: DLNR 2023

Table F-53 summarizes State buildings that are exposed to the dam inundation area by agency.





*Table F-53. State Buildings Exposure to Dam Inundation Areas by Agency*

Agency	Total Number of State Buildings	Total Replacement Cost Value	Number of State Buildings in Hazard Area	Percent (%) of Total Buildings	Value in the Hazard Area	Percent (%) of Total Value
Dept. of Accounting & General Services	66	\$953,963,738	2	3.03%	\$12,312,612	1.29%
Dept. of Agriculture	70	\$147,607,399	7	10.00%	\$15,101,709	10.23%
Dept. of Attorney General	15	\$108,425,480	1	6.67%	\$1,288,081	1.19%
Dept. of Budget & Finance	16	\$28,968,679	1	6.25%	\$4,806,631	16.59%
Dept. of Business, Economic Development and Tourism	25	\$645,480,379	0	0.00%	\$0	0.00%
Dept. of Commerce & Consumer Affairs	2	\$40,197,360	0	0.00%	\$0	0.00%
Dept. of Defense	69	\$267,352,836	2	2.90%	\$8,951,140	3.35%
Dept. of Education	4,090	\$10,598,205,739	95	2.32%	\$506,980,435	4.78%
Dept. of Hawaiian Home Lands	12	\$110,427,352	0	0.00%	\$0	0.00%
Dept. of Health	44	\$387,068,440	1	2.27%	\$642,741	0.17%
Dept. of Human Resources Development	1	\$5,973,872	0	0.00%	\$0	0.00%
Dept. of Human Services	130	\$480,212,294	9	6.92%	\$21,728,493	4.52%
Dept. of Labor and Industrial Relations	22	\$90,076,209	0	0.00%	\$0	0.00%
Dept. of Land and Natural Resources	90	\$101,441,821	4	4.44%	\$3,377,505	3.33%
Dept. of Public Safety	154	\$440,774,415	0	0.00%	\$0	0.00%
Dept. of Taxation	1	\$7,174,162	0	0.00%	\$0	0.00%
Dept. of Transportation	68	\$2,935,208,214	9	13.24%	\$44,441,751	1.51%
Hawai'i State Ethics Commission	1	\$984,533	0	0.00%	\$0	0.00%
Hawai'i Health Systems Corporation	106	\$1,230,852,871	2	1.89%	\$3,086,734	0.25%
Hawai'i Housing Finance & Development Corporation	86	\$360,851,671	0	0.00%	\$0	0.00%
Hawai'i Public Housing Authority	273	\$982,981,701	29	10.62%	\$139,214,142	14.16%
Hawai'i State Legislature	2	\$48,555,381	0	0.00%	\$0	0.00%
Hawai'i State Public Library System	53	\$525,584,082	5	9.43%	\$22,596,333	4.30%
Judiciary	41	\$534,877,354	0	0.00%	\$0	0.00%
Legislative Reference Bureau	1	\$2,996,162	0	0.00%	\$0	0.00%
Office of Hawaiian Affairs	11	\$54,125,645	2	18.18%	\$26,025,298	48.08%
Office of the Auditor	2	\$1,921,180	0	0.00%	\$0	0.00%
Office of the Governor	1	\$2,996,162	0	0.00%	\$0	0.00%
Office of the Lieutenant Governor	2	\$4,588,849	0	0.00%	\$0	0.00%







Agency	Total Number of State Buildings	Total Replacement Cost Value	Number of State Buildings in Hazard Area	Percent (%) of Total Buildings	Value in the Hazard Area	Percent (%) of Total Value
Office of the Ombudsman	1	\$1,818,060	0	0.00%	\$0	0.00%
Research Corporation of the University of Hawai'i	3	\$4,189,026	0	0.00%	\$0	0.00%
University of Hawai'i	637	\$5,014,974,503	28	4.40%	\$407,006,130	8.12%
<b>Total</b>	<b>6,095</b>	<b>\$26,120,855,568</b>	<b>197</b>	<b>3.23%</b>	<b>\$1,217,559,734</b>	<b>4.66%</b>

Source: Department of Land and Natural Resources 2022; Pacific Disaster Center 2022; State of Hawaii Risk Management Office 2017  
 Notes: All State Buildings were updated using RS Means 2022 data

Table F-54 summarizes the number of miles of State roads located in the dam inundation areas statewide.

**Table F-54. State Road Exposure to Dam Inundation Areas by County**

State Route	Length (in miles)		
	Total Length	Dam Failure Hazard Area Length	Exposed Length as % of Total Length
<b>County of Kaua'i</b>			
State Route 50	32.89242	1.442388	4.39%
State Route 51	3.457222	0.093479	2.70%
State Route 56	28.316299	0.732696	2.59%
State Route 58	2.052085	0	0.00%
State Route 540	3.884869	0.257356	6.62%
State Route 541	0.37465	0	0.00%
State Route 550	14.03193	0	0.00%
State Route 560	9.98938	0	0.00%
State Route 570	1.125605	0	0.00%
State Route 580	6.668581	0.129142	1.94%
State Route 583	0.921237	0.073831	8.01%
<b>Total</b>	<b>103.714278</b>	<b>2.728892</b>	<b>2.63%</b>
<b>City and County of Honolulu</b>			
State Route 61	21.173569	1.682194	7.94%
State Route 63	16.618809	0	0.00%
State Route 64	2.624714	0	0.00%
State Route 65	6.584201	0	0.00%
State Route 72	22.766927	0.304271	1.34%
State Route 76	11.059837	0	0.00%
State Route 78	1.346173	0	0.00%
State Route 80	1.893686	0.169505	8.95%
State Route 83	47.821595	0.632549	1.32%
State Route 92	18.685552	2.508524	13.42%
State Route 93	19.522013	0.384902	1.97%
State Route 98	3.470599	0.764858	22.04%
State Route 99	41.120805	0.447898	1.09%
State Route 750	8.056213	0	0.00%





State Route	Length (in miles)		
	Total Length	Dam Failure Hazard Area Length	Exposed Length as % of Total Length
State Route 901	1.403364	0	0.00%
State Route 930	10.054945	1.24943	12.43%
State Route 7012	1.862959	0	0.00%
State Route 7101	5.865258	0	0.00%
State Route 7110	0.609843	0	0.00%
State Route 7141	1.50208	0	0.00%
State Route 7210	0.115075	0	0.00%
State Route 7239	0.338737	0	0.00%
State Route 7241	2.331816	0	0.00%
State Route 7310	1.041137	0	0.00%
State Route 7345	0.554715	0	0.00%
State Route 7350	0.597196	0	0.00%
State Route 7351	0.243914	0	0.00%
State Route 7401	0.214056	0	0.00%
State Route 7413	0.352495	0.148353	42.09%
State Route 7415	0.536255	0	0.00%
State Route 7526	0.397834	0	0.00%
State Route 7601	0.432591	0	0.00%
State Route 7801	1.151651	0	0.00%
State Route 8300	0.501274	0.091613	18.28%
State Route 8918	0.13352	0	0.00%
State Route 8930	4.941677	0	0.00%
State Route 8940	3.321223	0	0.00%
State Route 8945	0.984948	0	0.00%
State Route 8955	2.697864	0	0.00%
State Route H-1	54.2852	0.773673	1.43%
State Route H-2	16.631646	0	0.00%
State Route H-201	8.479473	0	0.00%
State Route H-3	30.593733	0	0.00%
<b>Total</b>	<b>374.921172</b>	<b>9.15777</b>	<b>2.44%</b>
<b>County of Maui</b>			
State Route 30	41.599628	1.570027	3.77%
State Route 31	7.147053	0	0.00%
State Route 32	2.855291	0.601657	21.07%
State Route 36	16.225414	4.946908	30.49%
State Route 37	21.33757	0.76343	3.58%
State Route 310	3.609294	0.120682	3.34%
State Route 311	6.415815	1.875338	29.23%
State Route 340	4.265623	0	0.00%
State Route 360	34.838612	0.263662	0.76%
State Route 377	9.136002	0	0.00%
State Route 378	10.082808	0	0.00%
State Route 380	6.197863	0.518661	8.37%





State Route	Length (in miles)		
	Total Length	Dam Failure Hazard Area Length	Exposed Length as % of Total Length
State Route 440	13.153636	0	0.00%
State Route 441	0.476716	0	0.00%
State Route 442	0.022862	0	0.00%
State Route 450	27.477007	0	0.00%
State Route 460	16.534641	0.055914	0.34%
State Route 470	10.74695	0.506733	4.72%
State Route 480	5.898639	0	0.00%
State Route 3000	2.346263	0.01886	0.80%
State Route 3400	2.635502	0.192321	7.30%
State Route 3500	1.125483	0.407566	36.21%
State Route 3800	0.625243	0.58965	94.31%
State Route 32A	0.400435	0.400435	100.00%
State Route 32B	0.172196	0.172196	100.00%
State Route 36A	0.526104	0.318404	60.52%
<b>Total</b>	<b>245.85265</b>	<b>13.322444</b>	<b>5.42%</b>
<b>County of Hawai'i</b>			
State Route 11	117.608086	0	0.00%
State Route 19	93.300605	0.283422	0.30%
State Route 130	21.68728	0	0.00%
State Route 139	1.197816	0	0.00%
State Route 160	3.821277	0	0.00%
State Route 163	0.133863	0	0.00%
State Route 190	34.085758	0	0.00%
State Route 197	1.17843	0	0.00%
State Route 200	43.219679	0	0.00%
State Route 220	3.754068	0	0.00%
State Route 240	9.601941	0.105728	1.10%
State Route 250	19.266672	0.012769	0.07%
State Route 270	27.020618	0	0.00%
State Route 1370	0.191175	0	0.00%
State Route 1970	0.923307	0	0.00%
State Route 2000	2.184464	0	0.00%
<b>Total</b>	<b>379.175039</b>	<b>0.401919</b>	<b>0.11%</b>

Source: State of Hawaii Department of Transportation 2022; Department of Land and Natural Resources 2022; Pacific Disaster Center 2022

## F.12 Landslide and Rockfall

Table F-55 and Table F-56 show the State buildings located in the moderate landslide susceptibility area by county and agency, respectively.





**Table F-55. State Buildings Located in the Moderate Landslide Susceptibility Area by County**

County	Moderate Landslide Susceptibility	
	Number of State Buildings in the Moderate Susceptibility Area	Total Replacement Cost Value of State Buildings in the Moderate Susceptibility Area
County of Kaua'i	0	\$0
City and County of Honolulu	23	\$60,679,449
County of Maui	0	\$0
County of Hawai'i	546	\$1,678,490,843
<b>Total</b>	<b>569</b>	<b>\$1,739,170,292</b>

Source: State of Hawaii Risk Management Office 2017; Pacific Disaster Center 2017; United States Geological Survey 2016

**Table F-56. State Buildings Located in the Moderate Landslide Susceptibility Area by Agency**

Agency	Total Number of State Buildings	Total Replacement Cost Value	Number of State Buildings in Moderate Susceptibility Area	Percent (%) of Total Buildings	Value in the Moderate Susceptibility Area	Percent (%) of Total Value
Dept. of Accounting & General Services	66	\$953,963,737.70	5	7.58%	\$37,925,560	3.98%
Dept. of Agriculture	70	\$147,607,399.20	2	2.86%	\$2,925,786	1.98%
Dept. of Attorney General	15	\$108,425,479.52	4	26.67%	\$5,809,228	5.36%
Dept. of Budget & Finance	16	\$28,968,679.42	2	12.50%	\$190,394	0.66%
Dept. of Business, Economic Development and Tourism	25	\$645,480,378.64	0	0.00%	\$0	0.00%
Dept. of Commerce & Consumer Affairs	2	\$40,197,359.64	0	0.00%	\$0	0.00%
Dept. of Defense	69	\$267,352,836.23	3	4.35%	\$8,436,844	3.16%
Dept. of Education	4090	\$10,598,205,739.17	325	7.95%	\$727,264,187	6.86%
Dept. of Hawaiian Home Lands	12	\$110,427,352.13	2	16.67%	\$2,156,000	1.95%
Dept. of Health	44	\$387,068,440.15	3	6.82%	\$3,403,157	0.88%
Dept. of Human Resources Development	1	\$5,973,872.00	0	0.00%	\$0	0.00%
Dept. of Human Services	130	\$480,212,293.62	3	2.31%	\$2,134,136	0.44%
Dept. of Labor and Industrial Relations	22	\$90,076,208.64	4	18.18%	\$5,930,131	6.58%
Dept. of Land and Natural Resources	90	\$101,441,821.18	0	0.00%	\$0	0.00%
Dept. of Public Safety	154	\$440,774,414.53	42	27.27%	\$33,043,217	7.50%
Dept. of Taxation	1	\$7,174,162.00	0	0.00%	\$0	0.00%
Dept. of Transportation	68	\$2,935,208,213.60	3	4.41%	\$124,757,460	4.25%
Hawai'i State Ethics Commission	1	\$984,532.99	0	0.00%	\$0	0.00%
Hawai'i Health Systems Corporation	106	\$1,230,852,871.26	12	11.32%	\$116,116,674	9.43%





Agency	Total Number of State Buildings	Total Replacement Cost Value	Number of State Buildings in Moderate Susceptibility Area	Percent (%) of Total Buildings	Value in the Moderate Susceptibility Area	Percent (%) of Total Value
Hawai'i Housing Finance & Development Corporation	86	\$360,851,671.33	1	1.16%	\$3,310,800	0.92%
Hawai'i Public Housing Authority	273	\$982,981,701.34	24	8.79%	\$141,317,042	14.38%
Hawai'i State Legislature	2	\$48,555,380.80	0	0.00%	\$0	0.00%
Hawai'i State Public Library System	53	\$525,584,082.00	3	5.66%	\$5,405,343	1.03%
Judiciary	41	\$534,877,354.35	5	12.20%	\$92,484,641	17.29%
Legislative Reference Bureau	1	\$2,996,162.00	0	0.00%	\$0	0.00%
Office of Hawaiian Affairs	11	\$54,125,645.24	1	9.09%	\$339,221	0.63%
Office of the Auditor	2	\$1,921,180.17	0	0.00%	\$0	0.00%
Office of the Governor	1	\$2,996,162.00	0	0.00%	\$0	0.00%
Office of the Lieutenant Governor	2	\$4,588,849.00	0	0.00%	\$0	0.00%
Office of the Ombudsman	1	\$1,818,060.00	0	0.00%	\$0	0.00%
Research Corporation of the University of Hawai'i	3	\$4,189,026.15	0	0.00%	\$0	0.00%
University of Hawai'i	637	\$5,014,974,502.50	125	19.62%	\$426,220,471	8.50%
<b>Total</b>	<b>6,095</b>	<b>\$26,120,855,568.50</b>	<b>569</b>	<b>9.34%</b>	<b>\$1,739,170,292</b>	<b>6.66%</b>

Source: State of Hawai'i Risk Management Office 2017; PDC 2017; USGS 2016

Table F-57 summarizes the number of miles of State roads located in the moderate landslide susceptibility area by county.

**Table F-57. State Roads Located in the Moderate Landslide Susceptibility Areas by County**

County	Length (in miles)		
	Total Length	Moderate Susceptibility Area Length	Length as % of Total Length
County of Kaua'i	103.714278	3.572557	3.44%
City and County of Honolulu	374.921172	11.658545	3.11%
County of Maui	245.85265	11.075659	4.50%
County of Hawai'i	379.175039	79.12231	20.87%
<b>Total</b>	<b>1,103.66</b>	<b>105.429071</b>	<b>9.55%</b>

Source: State of Hawaii Department of Transportation 2022; Pacific Disaster Center 2017; United States Geological Survey 2016

Table F-58 summarizes the number of miles of State roads by state route located in the moderate and high landslide susceptibility areas, organized by county.





**Table F-58. State Road Exposure to Moderate and High Landslide Susceptibility Areas by County**

State Route	Length (in miles)				
	Total Length	Moderate Hazard Area Length	Hazard Length as % of Total Length	High Hazard Area Length	Hazard Length as % of Total Length
<b>County of Kaua'i</b>					
State Route 50	32.89242	0.195156	0.59%	0	0.00%
State Route 51	3.457222	0.01879	0.54%	0	0.00%
State Route 56	28.316299	0.504317	1.78%	0.038454	0.14%
State Route 58	2.052085	0	0.00%	0	0.00%
State Route 540	3.884869	0.02868	0.74%	0.00679	0.17%
State Route 541	0.37465	0	0.00%	0	0.00%
State Route 550	14.03193	0.851831	6.07%	0.008885	0.06%
State Route 560	9.98938	1.287252	12.89%	0.143224	1.43%
State Route 570	1.125605	0	0.00%	0	0.00%
State Route 580	6.668581	0.66073	9.91%	0.0357	0.54%
State Route 583	0.921237	0.025801	2.80%	0	0.00%
<b>Total</b>	<b>103.714278</b>	<b>3.572557</b>	<b>3.44%</b>	<b>0.233053</b>	<b>0.22%</b>
<b>City and County of Honolulu</b>					
State Route 61	21.173569	1.46068	6.90%	0.202416	0.96%
State Route 63	16.618809	1.4983	9.02%	0.272046	1.64%
State Route 64	2.624714	0	0.00%	0	0.00%
State Route 65	6.584201	0.356317	5.41%	0	0.00%
State Route 72	22.766927	0.313863	1.38%	0.119579	0.53%
State Route 76	11.059837	0	0.00%	0	0.00%
State Route 78	1.346173	0	0.00%	0	0.00%
State Route 80	1.893686	0.006471	0.34%	0	0.00%
State Route 83	47.821595	0.333093	0.70%	0.025875	0.05%
State Route 92	18.685552	0	0.00%	0	0.00%
State Route 93	19.522013	0.007545	0.04%	0	0.00%
State Route 98	3.470599	0	0.00%	0	0.00%
State Route 99	41.120805	0.941658	2.29%	0.009963	0.02%
State Route 750	8.056213	0.013218	0.16%	0	0.00%
State Route 901	1.403364	0	0.00%	0	0.00%
State Route 930	10.054945	0.029195	0.29%	0	0.00%
State Route 7012	1.862959	0	0.00%	0	0.00%
State Route 7101	5.865258	0.025513	0.43%	0	0.00%
State Route 7110	0.609843	0.018648	3.06%	0	0.00%
State Route 7141	1.50208	0	0.00%	0	0.00%
State Route 7210	0.115075	0	0.00%	0	0.00%
State Route 7239	0.338737	0	0.00%	0	0.00%
State Route 7241	2.331816	0	0.00%	0	0.00%
State Route 7310	1.041137	0.000082	0.01%	0	0.00%





State Route	Length (in miles)				
	Total Length	Moderate Hazard Area Length	Hazard Length as % of Total Length	High Hazard Area Length	Hazard Length as % of Total Length
State Route 7345	0.554715	0	0.00%	0	0.00%
State Route 7350	0.597196	0	0.00%	0	0.00%
State Route 7351	0.243914	0	0.00%	0	0.00%
State Route 7401	0.214056	0	0.00%	0	0.00%
State Route 7413	0.352495	0	0.00%	0	0.00%
State Route 7415	0.536255	0	0.00%	0	0.00%
State Route 7526	0.397834	0	0.00%	0	0.00%
State Route 7601	0.432591	0	0.00%	0	0.00%
State Route 7801	1.151651	0	0.00%	0	0.00%
State Route 8300	0.501274	0	0.00%	0	0.00%
State Route 8918	0.13352	0	0.00%	0	0.00%
State Route 8930	4.941677	0	0.00%	0	0.00%
State Route 8940	3.321223	0.088322	2.66%	0	0.00%
State Route 8945	0.984948	0	0.00%	0	0.00%
State Route 8955	2.697864	0	0.00%	0	0.00%
State Route H-1	54.2852	0.346488	0.64%	0.018202	0.03%
State Route H-2	16.631646	0.721557	4.34%	0	0.00%
State Route H-201	8.479473	0.132403	1.56%	0.02392	0.28%
State Route H-3	30.593733	5.365192	17.54%	1.083214	3.54%
<b>Total</b>	<b>374.921172</b>	<b>11.658545</b>	<b>3.11%</b>	<b>1.755215</b>	<b>0.47%</b>
<b>County of Maui</b>					
State Route 30	41.599628	2.90368	6.98%	0.094201	0.23%
State Route 31	7.147053	0	0.00%	0	0.00%
State Route 32	2.855291	0	0.00%	0	0.00%
State Route 36	16.225414	0.259227	1.60%	0	0.00%
State Route 37	21.33757	0.135428	0.63%	0	0.00%
State Route 310	3.609294	0	0.00%	0	0.00%
State Route 311	6.415815	0	0.00%	0	0.00%
State Route 340	4.265623	0.376482	8.83%	0.000138	0.00%
State Route 360	34.838612	5.676019	16.29%	1.400432	4.02%
State Route 377	9.136002	0.031067	0.34%	0	0.00%
State Route 378	10.082808	0.115745	1.15%	0	0.00%
State Route 380	6.197863	0	0.00%	0	0.00%
State Route 440	13.153636	0.013673	0.10%	0	0.00%
State Route 441	0.476716	0	0.00%	0	0.00%
State Route 442	0.022862	0	0.00%	0	0.00%
State Route 450	27.477007	1.283396	4.67%	0.037545	0.14%
State Route 460	16.534641	0.076883	0.46%	0	0.00%
State Route 470	10.74695	0.120089	1.12%	0	0.00%





State Route	Length (in miles)				
	Total Length	Moderate Hazard Area Length	Hazard Length as % of Total Length	High Hazard Area Length	Hazard Length as % of Total Length
State Route 480	5.898639	0	0.00%	0	0.00%
State Route 3000	2.346263	0	0.00%	0	0.00%
State Route 3400	2.635502	0.08397	3.19%	0	0.00%
State Route 3500	1.125483	0	0.00%	0	0.00%
State Route 3800	0.625243	0	0.00%	0	0.00%
State Route 32A	0.400435	0	0.00%	0	0.00%
State Route 32B	0.172196	0	0.00%	0	0.00%
State Route 36A	0.526104	0	0.00%	0	0.00%
<b>Total</b>	<b>245.85265</b>	<b>11.075659</b>	<b>4.50%</b>	<b>1.532316</b>	<b>0.62%</b>
<b>County of Hawai'i</b>					
State Route 11	117.608086	27.707302	23.56%	22.38565	19.03%
State Route 19	93.300605	8.314354	8.91%	48.990845	52.51%
State Route 130	21.68728	20.156852	92.94%	1.531079	7.06%
State Route 139	1.197816	1.197816	100.00%	0	0.00%
State Route 160	3.821277	1.911951	50.03%	0.860508	22.52%
State Route 163	0.133863	0.133863	100.00%	0	0.00%
State Route 190	34.085758	0	0.00%	12.030512	35.29%
State Route 197	1.17843	0.013296	1.13%	0	0.00%
State Route 200	43.219679	15.218116	35.21%	12.472882	28.86%
State Route 220	3.754068	0.186518	4.97%	3.56249	94.90%
State Route 240	9.601941	0.331971	3.46%	8.562659	89.18%
State Route 250	19.266672	0	0.00%	19.229681	99.81%
State Route 270	27.020618	1.212455	4.49%	16.864695	62.41%
State Route 1370	0.191175	0.191175	100.00%	0	0.00%
State Route 1970	0.923307	0.923307	100.00%	0	0.00%
State Route 2000	2.184464	1.623334	74.31%	0.560295	25.65%
<b>Total</b>	<b>379.175039</b>	<b>79.12231</b>	<b>20.87%</b>	<b>147.051296</b>	<b>38.78%</b>

Source: State of Hawaii Department of Transportation 2022; Pacific Disaster Center 2017; United States Geological Survey 2016

Table F-59 and Table F-60 summarize the number of community lifelines and critical facilities located in the moderate landslide susceptibility area by county and category, respectively.







**Table F-59. Community Lifelines and Critical Facilities Located in the Moderate Landslide Susceptibility Area by County**

County	Category							
	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Additional Critical Facilities
County of Kaua'i	0	0	0	0	0	0	0	0
City and County of Honolulu	3	0	4	0	1	0	0	0
County of Maui	0	0	1	0	0	0	0	1
County of Hawai'i	10	8	29	1	6	26	12	6
<b>Total</b>	<b>13</b>	<b>8</b>	<b>34</b>	<b>1</b>	<b>7</b>	<b>26</b>	<b>12</b>	<b>7</b>

Source: Pacific Disaster Center 2017; United States Geological Survey 2016; Hawai'i Emergency Management Agency 2017; Federal Emergency Management Agency Lifeline Data 2020

**Table F-60. Community Lifelines and Critical Facilities Located in the Moderate Landslide Susceptibility Area by Category**

Lifeline category	Total Number of Facilities	Total Replacement Cost Value	Number of Facilities in the Moderate Susceptibility Area	Percent (%) of Total Facilities	Value in the Moderate Susceptibility Area	Percent (%) of Total Value
Communications	188	\$776,797,683	13	6.91%	\$36,499,710	4.70%
Energy	89	\$3,093,949,530	8	8.99%	\$188,244,650	6.08%
Food, Water, Shelter	345	\$11,847,189,588	34	9.86%	\$1,117,828,650	9.44%
Hazardous Material	12	\$436,474,800	1	8.33%	\$36,294,000	8.32%
Health and Medical	193	\$4,606,713,364	7	3.63%	\$95,711,194	2.08%
Safety and Security	486	\$38,164,188,232	26	5.35%	\$808,976,729	2.12%
Transportation	56	\$2,039,091,600	12	21.43%	\$435,528,000	21.36%
Additional Critical Facilities	106	\$447,698,794	7	6.60%	\$25,925,600	5.79%
<b>Total</b>	<b>1,475</b>	<b>\$61,412,103,591</b>	<b>108</b>	<b>7.32%</b>	<b>\$2,745,008,532</b>	<b>4.47%</b>

Source: Pacific Disaster Center 2017; United States Geological Survey 2016; Hawai'i Emergency Management Agency 2017; Federal Emergency Management Agency Lifeline Data 2020

Table F-61 summarizes the population located in the moderate landslide susceptibility area by county.





**Table F-61. 2020 U.S. Census Population Located in the Moderate Landslide Susceptibility Area by County**

County	Population				
	Total Population	Population in the Moderate Susceptibility Area	Population Exposed as Percent (%) of Total Population	Socially Vulnerable Population in the Moderate Susceptibility Area	Socially Vulnerable Population Exposed as Percent (%) of Total Population
County of Kaua'i	71,949	7,886	10.96%	1,708	2.37%
City and County of Honolulu	979,682	61,246	6.25%	7,925	0.81%
County of Maui	167,093	8,455	5.06%	1,157	0.69%
County of Hawai'i	201,350	76,906	38.20%	23,924	11.88%
<b>Total</b>	<b>1,420,074</b>	<b>154,493</b>	<b>10.88%</b>	<b>34,714</b>	<b>2.44%</b>

Source: Pacific Disaster Center 2017; United States Geological Survey 2016; U.S. Census Bureau 2020; Centers for Disease Control and Prevention 2018

Table F-62 summarizes the buildings located in the moderate landslide susceptibility area by county.

**Table F-62. General Building Stock Located in the Moderate Landslide Susceptibility Area**

County	Total Replacement Cost Value	Replacement Cost Value in the Moderate Susceptibility Area	% of Total in the Moderate Susceptibility Area
County of Kaua'i	\$24,246,497,228	\$149,845,864	0.62%
City and County of Honolulu	\$239,152,051,766	\$3,707,691,875	1.55%
County of Maui	\$50,796,693,140	\$369,607,819	0.73%
County of Hawai'i	\$58,395,349,136	\$20,474,065,501	35.06%
<b>Total</b>	<b>\$372,590,591,270</b>	<b>\$24,701,211,059</b>	<b>6.63%</b>

Source: Pacific Disaster Center 2017; United States Geological Survey 2016; NIYAM IT 2022; United States Army Corps of Engineers 2022

Table F-63 summarizes the square miles of Hawaiian Home Lands located in the moderate landslide susceptibility area by county.

**Table F-63. Hawaiian Home Lands Located in the Moderate Landslide Susceptibility Area**

County	Area (in square miles)		
	Total Area	Moderate Hazard Area	Hazard Area as % of Total Area
County of Kaua'i	32.087158	8.954376	27.91%
City and County of Honolulu	10.612342	2.217911	20.90%
County of Maui	102.588953	12.140417	11.83%
County of Hawai'i	191.458448	21.261618	11.11%
<b>Total</b>	<b>336.746901</b>	<b>44.574322</b>	<b>13.24%</b>

Source: Pacific Disaster Center 2017; United States Geological Survey 2016; Hawaii State Department of Hawaiian Homelands 2021

Table F-64 summarizes the square miles of environmental resources located in the moderate landslide susceptibility area by county.





**Table F-64. Environmental Resources Located in Moderate Landslide Susceptibility Area**

County	Area (in square miles)		
	Total Area	Moderate Susceptibility Area	Percent (%) of Total Area
County of Kaua'i	919.953924	130.874587	14.23%
City and County of Honolulu	762.964336	121.852822	15.97%
County of Maui	2,109.97	196.687536	9.32%
County of Hawai'i	3,626.96	729.506453	20.11%
<b>Total</b>	<b>7,419.85</b>	<b>1,178.92</b>	<b>15.89%</b>

Source: Pacific Disaster Center 2017; United States Geological Survey 2016; U.S. Fish and Wildlife Service, Pacific Islands Office, 2022, U.S. Fish and Wildlife Service 2021; 2017, Hawaii State Department of Land and Natural Resources, Division of Forestry and Wildlife 2022, NOAA raster nautical charts 2020b, State of Hawaii Department of Land and Natural Resources, Division of State Parks 2021

Table F-65 shows the square miles of the moderate and high landslide susceptibility areas in each State Land Use District in each county.

**Table F-65. State Land Use District Located in the Moderate and High Landslide Susceptibility Areas**

Land Use District	Area (in square miles)						
	Total Square Miles	Square Miles in Moderate Hazard Area	Hazard Area as % of Total Area	Hazard Area as % of Total Hazard Exposure	Square Miles in High Hazard Area	Hazard Area as % of Total Area	Hazard Area as % of Total Hazard Exposure
<b>County of Kaua'i</b>							
Agricultural	297.078539	41.8072	14.07%	24.55%	5.2489	1.77%	7.63%
Conservation	304.260357	127.864956	42.02%	75.10%	63.505168	20.87%	92.34%
Rural	2.146976	0.078825	3.67%	0.05%	0.006235	0.29%	0.01%
Urban	23.643203	0.515212	2.18%	0.30%	0.014828	0.06%	0.02%
<b>Total</b>	<b>627.129075</b>	<b>170.266193</b>	<b>27.15%</b>	<b>100.00%</b>	<b>68.775131</b>	<b>10.97%</b>	<b>100.00%</b>
<b>City and County of Honolulu</b>							
Agricultural	188.479146	30.337508	16.10%	18.91%	3.704832	1.97%	6.77%
Conservation	247.601978	124.42643	50.25%	77.56%	50.788756	20.51%	92.78%
Rural	0	0	0.00%	0.00%	0	0.00%	0.00%
Urban	162.455059	5.662148	3.49%	3.53%	0.249769	0.15%	0.46%
<b>Total</b>	<b>598.536183</b>	<b>160.426086</b>	<b>26.80%</b>	<b>100.00%</b>	<b>54.743357</b>	<b>9.15%</b>	<b>100.00%</b>
<b>County of Maui</b>							
Agricultural	637.731138	61.155451	9.59%	28.95%	10.22242	1.60%	10.03%
Conservation	552.35574	149.096308	26.99%	70.58%	91.674086	16.60%	89.93%
Rural	12.824585	0.437947	3.41%	0.21%	0.019259	0.15%	0.02%
Urban	45.187433	0.548873	1.21%	0.26%	0.028955	0.06%	0.03%
<b>Total</b>	<b>1,248</b>	<b>211.238579</b>	<b>16.92%</b>	<b>100.00%</b>	<b>101.94472</b>	<b>8.17%</b>	<b>100.00%</b>
<b>County of Hawai'i</b>							
Agricultural	1,850.31	415.576337	22.46%	40.26%	626.362822	33.85%	66.11%
Conservation	2,098.66	592.041591	28.21%	57.36%	306.871234	14.62%	32.39%
Rural	1.36344	0.283389	20.78%	0.03%	0.161795	11.87%	0.02%
Urban	87.847736	24.28247	27.64%	2.35%	14.08882	16.04%	1.49%
<b>Total</b>	<b>4,038</b>	<b>1032.183787</b>	<b>25.56%</b>	<b>100.00%</b>	<b>947.484671</b>	<b>23.46%</b>	<b>100.00%</b>

Source: Pacific Disaster Center 2017; United States Geological Survey 2016; State Land Use Commission, Hawaii Statewide GIS Program 2021; Honolulu County GIS 2022





## F.13 Terrorism

There are no additional tables to support Section 4.12 (Terrorism).

## F.14 Tsunami

Table F-66 summarizes the number of miles of State roads by state route located in the Great Aleutian Tsunami (GAT) 1,500-year inundation area, organized by county.

*Table F-66. State Roads Located in the GAT Inundation Areas by County*

State Route	Length (in miles)		
	Total Length	Length in the GAT Inundation Area	Exposed Length as Percent (%) of Total Length
<b>County of Kaua'i</b>			
State Route 50	32.89242	10.028536	30.49%
State Route 51	3.457222	0.542591	15.69%
State Route 56	28.316299	6.630772	23.42%
State Route 58	2.052085	0.190304	9.27%
State Route 540	3.884869	0	0.00%
State Route 541	0.37465	0	0.00%
State Route 550	14.03193	0.07624	0.54%
State Route 560	9.98938	6.952468	69.60%
State Route 570	1.125605	0	0.00%
State Route 580	6.668581	0.793255	11.90%
State Route 583	0.921237	0	0.00%
<b>Total</b>	<b>103.714278</b>	<b>25.214166</b>	<b>24.31%</b>
<b>City and County of Honolulu</b>			
State Route 61	21.173569	0.094669	0.45%
State Route 63	16.618809	0	0.00%
State Route 64	2.624714	1.084624	41.32%
State Route 65	6.584201	2.118	32.17%
State Route 72	22.766927	13.49105	59.26%
State Route 76	11.059837	1.602284	14.49%
State Route 78	1.346173	0.02011	1.49%
State Route 80	1.893686	0	0.00%
State Route 83	47.821595	32.239486	67.42%
State Route 92	18.685552	8.94591	47.88%
State Route 93	19.522013	14.176511	72.62%
State Route 98	3.470599	0.013183	0.38%
State Route 99	41.120805	0.018754	0.05%
State Route 750	8.056213	0	0.00%
State Route 901	1.403364	0	0.00%
State Route 930	10.054945	8.996766	89.48%
State Route 7012	1.862959	0	0.00%
State Route 7101	5.865258	0.005478	0.09%
State Route 7110	0.609843	0	0.00%
State Route 7141	1.50208	0	0.00%
State Route 7210	0.115075	0	0.00%
State Route 7239	0.338737	0	0.00%
State Route 7241	2.331816	0	0.00%





State Route	Length (in miles)		
	Total Length	Length in the GAT Inundation Area	Exposed Length as Percent (%) of Total Length
State Route 7310	1.041137	0	0.00%
State Route 7345	0.554715	0	0.00%
State Route 7350	0.597196	0	0.00%
State Route 7351	0.243914	0	0.00%
State Route 7401	0.214056	0.049583	23.16%
State Route 7413	0.352495	0	0.00%
State Route 7415	0.536255	0.073976	13.79%
State Route 7526	0.397834	0	0.00%
State Route 7601	0.432591	0	0.00%
State Route 7801	1.151651	0	0.00%
State Route 8300	0.501274	0.49791	99.33%
State Route 8918	0.13352	0	0.00%
State Route 8930	4.941677	0	0.00%
State Route 8940	3.321223	0	0.00%
State Route 8945	0.984948	0	0.00%
State Route 8955	2.697864	1.565256	58.02%
State Route H-1	54.2852	0.847504	1.56%
State Route H-2	16.631646	0	0.00%
State Route H-201	8.479473	0.022862	0.27%
State Route H-3	30.593733	0.160586	0.52%
<b>Total</b>	<b>374.921172</b>	<b>86.024502</b>	<b>22.94%</b>
<b>County of Maui</b>			
State Route 30	41.599628	10.640062	25.58%
State Route 31	7.147053	0.141721	1.98%
State Route 32	2.855291	1.340891	46.96%
State Route 36	16.225414	5.776363	35.60%
State Route 37	21.33757	0	0.00%
State Route 310	3.609294	2.7774	76.95%
State Route 311	6.415815	0.817928	12.75%
State Route 340	4.265623	0	0.00%
State Route 360	34.838612	0.551064	1.58%
State Route 377	9.136002	0	0.00%
State Route 378	10.082808	0	0.00%
State Route 380	6.197863	1.237279	19.96%
State Route 440	13.153636	0	0.00%
State Route 441	0.476716	0	0.00%
State Route 442	0.022862	0	0.00%
State Route 450	27.477007	0	0.00%
State Route 460	16.534641	0	0.00%
State Route 470	10.74695	0	0.00%
State Route 480	5.898639	0	0.00%
State Route 3000	2.346263	0	0.00%
State Route 3400	2.635502	2.335371	88.61%
State Route 3500	1.125483	1.125483	100.00%
State Route 3800	0.625243	0.625243	100.00%
State Route 32A	0.400435	0.400435	100.00%
State Route 32B	0.172196	0.172196	100.00%
State Route 36A	0.526104	0.526104	100.00%
<b>Total</b>	<b>245.85265</b>	<b>28.46754</b>	<b>11.58%</b>





State Route	Length (in miles)		
	Total Length	Length in the GAT Inundation Area	Exposed Length as Percent (%) of Total Length
<b>County of Hawai'i</b>			
State Route 11	117.608086	1.697427	1.44%
State Route 19	93.300605	2.394614	2.57%
State Route 130	21.68728	0	0.00%
State Route 139	1.197816	0	0.00%
State Route 160	3.821277	0	0.00%
State Route 163	0.133863	0	0.00%
State Route 190	34.085758	0	0.00%
State Route 197	1.17843	0	0.00%
State Route 200	43.219679	0	0.00%
State Route 220	3.754068	0	0.00%
State Route 240	9.601941	0	0.00%
State Route 250	19.266672	0	0.00%
State Route 270	27.020618	0.791641	2.93%
State Route 1370	0.191175	0.191175	100.00%
State Route 1970	0.923307	0.923307	100.00%
State Route 2000	2.184464	0	0.00%
<b>Total</b>	<b>379.175039</b>	<b>5.998164</b>	<b>1.58%</b>

Source: State of Hawaii Department of Transportation 2022; Tetra Tech Requested Data from Doug Bausch 2022

Table F-67 summarizes the number of miles of State roads by state route located in the School of Ocean & Earth Science & Technology (SOEST) Historic 200-year inundation area, organized by county.

**Table F-67. State Roads Located in the SOEST Inundation Areas by County**

State Route	Length (in miles)		
	Total Length	Length in the SOEST Inundation Area	Exposed Length as Percent (%) of Total Length
<b>County of Kaua'i</b>			
State Route 50	32.89242	7.369799	22.41%
State Route 51	3.457222	0.405717	11.74%
State Route 56	28.316299	3.912052	13.82%
State Route 58	2.052085	0.10293	5.02%
State Route 540	3.884869	0	0.00%
State Route 541	0.37465	0	0.00%
State Route 550	14.03193	0	0.00%
State Route 560	9.98938	6.069609	60.76%
State Route 570	1.125605	0	0.00%
State Route 580	6.668581	0.583143	8.74%
State Route 583	0.921237	0	0.00%
<b>Total</b>	<b>103.714278</b>	<b>18.44325</b>	<b>17.78%</b>
<b>City and County of Honolulu</b>			
State Route 61	21.173569	0	0.00%
State Route 63	16.618809	0	0.00%
State Route 64	2.624714	0.590152	22.48%
State Route 65	6.584201	0	0.00%
State Route 72	22.766927	8.957422	39.34%





State Route	Length (in miles)		
	Total Length	Length in the SOEST Inundation Area	Exposed Length as Percent (%) of Total Length
State Route 76	11.059837	0.736724	6.66%
State Route 78	1.346173	0	0.00%
State Route 80	1.893686	0	0.00%
State Route 83	47.821595	19.955558	41.73%
State Route 92	18.685552	7.308601	39.11%
State Route 93	19.522013	4.400002	22.54%
State Route 98	3.470599	0.001802	0.05%
State Route 99	41.120805	0	0.00%
State Route 750	8.056213	0	0.00%
State Route 901	1.403364	0	0.00%
State Route 930	10.054945	3.275856	32.58%
State Route 7012	1.862959	0	0.00%
State Route 7101	5.865258	0	0.00%
State Route 7110	0.609843	0	0.00%
State Route 7141	1.50208	0	0.00%
State Route 7210	0.115075	0	0.00%
State Route 7239	0.338737	0	0.00%
State Route 7241	2.331816	0	0.00%
State Route 7310	1.041137	0	0.00%
State Route 7345	0.554715	0	0.00%
State Route 7350	0.597196	0	0.00%
State Route 7351	0.243914	0	0.00%
State Route 7401	0.214056	0.00398	1.86%
State Route 7413	0.352495	0	0.00%
State Route 7415	0.536255	0	0.00%
State Route 7526	0.397834	0	0.00%
State Route 7601	0.432591	0	0.00%
State Route 7801	1.151651	0	0.00%
State Route 8300	0.501274	0.019025	3.80%
State Route 8918	0.13352	0	0.00%
State Route 8930	4.941677	0	0.00%
State Route 8940	3.321223	0	0.00%
State Route 8945	0.984948	0	0.00%
State Route 8955	2.697864	0.909003	33.69%
State Route H-1	54.2852	0.054125	0.10%
State Route H-2	16.631646	0	0.00%
State Route H-201	8.479473	0	0.00%
State Route H-3	30.593733	0	0.00%
<b>Total</b>	<b>374.921172</b>	<b>46.21225</b>	<b>12.33%</b>
<b>County of Maui</b>			
State Route 30	41.599628	8.889797	21.37%
State Route 31	7.147053	0.019082	0.27%
State Route 32	2.855291	1.161511	40.68%
State Route 36	16.225414	3.21006	19.78%
State Route 37	21.33757	0	0.00%
State Route 310	3.609294	2.599272	72.02%
State Route 311	6.415815	0.013102	0.20%
State Route 340	4.265623	0	0.00%





State Route	Length (in miles)		
	Total Length	Length in the SOEST Inundation Area	Exposed Length as Percent (%) of Total Length
State Route 360	34.838612	0.304864	0.88%
State Route 377	9.136002	0	0.00%
State Route 378	10.082808	0	0.00%
State Route 380	6.197863	0.633966	10.23%
State Route 440	13.153636	0	0.00%
State Route 441	0.476716	0	0.00%
State Route 442	0.022862	0	0.00%
State Route 450	27.477007	0	0.00%
State Route 460	16.534641	0	0.00%
State Route 470	10.74695	0	0.00%
State Route 480	5.898639	0	0.00%
State Route 3000	2.346263	0	0.00%
State Route 3400	2.635502	1.664009	63.14%
State Route 3500	1.125483	0.678861	60.32%
State Route 3800	0.625243	0.573952	91.80%
State Route 32A	0.400435	0.400435	100.00%
State Route 32B	0.172196	0.172196	100.00%
State Route 36A	0.526104	0.526104	100.00%
<b>Total</b>	<b>245.85265</b>	<b>20.847211</b>	<b>8.48%</b>
<b>County of Hawai'i</b>			
State Route 11	117.608086	0.275093	0.23%
State Route 19	93.300605	2.1069	2.26%
State Route 130	21.68728	0	0.00%
State Route 139	1.197816	0	0.00%
State Route 160	3.821277	0	0.00%
State Route 163	0.133863	0	0.00%
State Route 190	34.085758	0	0.00%
State Route 197	1.17843	0	0.00%
State Route 200	43.219679	0	0.00%
State Route 220	3.754068	0	0.00%
State Route 240	9.601941	0	0.00%
State Route 250	19.266672	0	0.00%
State Route 270	27.020618	0.574472	2.13%
State Route 1370	0.191175	0.191175	100.00%
State Route 1970	0.923307	0.17173	18.60%
State Route 2000	2.184464	0	0.00%
<b>Total</b>	<b>379.175039</b>	<b>3.31937</b>	<b>0.88%</b>

Source: State of Hawaii Department of Transportation 2022; Tetra Tech Requested Data from Doug Bausch 2022

Table F-68 summarizes the number of miles of State roads by state route located in the American Society of Civil Engineers (ASCE) Design Inundation Mapping 3,500-year inundation area, organized by county.







Table F-68. State Roads Located in the ASCE Inundation Areas by County

State Route	Length (in miles)		
	Total Length	Length in the ASCE Inundation Area	Exposed Length as Percent (%) of Total Length
<b>County of Kaua'i</b>			
State Route 50	32.89242	10.970833	33.35%
State Route 51	3.457222	0.491771	14.22%
State Route 56	28.316299	6.920334	24.44%
State Route 58	2.052085	0.221808	10.81%
State Route 540	3.884869	0	0.00%
State Route 541	0.37465	0.05865	15.65%
State Route 550	14.03193	0.059935	0.43%
State Route 560	9.98938	7.742265	77.50%
State Route 570	1.125605	0	0.00%
State Route 580	6.668581	0.783235	11.75%
State Route 583	0.921237	0	0.00%
<b>Total</b>	<b>103.714278</b>	<b>27.248831</b>	<b>26.27%</b>
<b>City and County of Honolulu</b>			
State Route 61	21.173569	0.307678	1.45%
State Route 63	16.618809	0.108273	0.65%
State Route 64	2.624714	2.49981	95.24%
State Route 65	6.584201	2.581254	39.20%
State Route 72	22.766927	15.580219	68.43%
State Route 76	11.059837	2.436119	22.03%
State Route 78	1.346173	0.11694	8.69%
State Route 80	1.893686	0	0.00%
State Route 83	47.821595	34.125508	71.36%
State Route 92	18.685552	12.415322	66.44%
State Route 93	19.522013	15.550088	79.65%
State Route 98	3.470599	0.487493	14.05%
State Route 99	41.120805	0.453849	1.10%
State Route 750	8.056213	0	0.00%
State Route 901	1.403364	0	0.00%
State Route 930	10.054945	9.748388	96.95%
State Route 7012	1.862959	0	0.00%
State Route 7101	5.865258	0.145763	2.49%
State Route 7110	0.609843	0	0.00%
State Route 7141	1.50208	0	0.00%
State Route 7210	0.115075	0	0.00%
State Route 7239	0.338737	0	0.00%
State Route 7241	2.331816	0	0.00%
State Route 7310	1.041137	0.393042	37.75%
State Route 7345	0.554715	0	0.00%
State Route 7350	0.597196	0	0.00%
State Route 7351	0.243914	0	0.00%
State Route 7401	0.214056	0.13517	63.15%
State Route 7413	0.352495	0.167325	47.47%
State Route 7415	0.536255	0.215236	40.14%
State Route 7526	0.397834	0	0.00%
State Route 7601	0.432591	0	0.00%
State Route 7801	1.151651	0	0.00%





State Route	Length (in miles)		
	Total Length	Length in the ASCE Inundation Area	Exposed Length as Percent (%) of Total Length
State Route 8300	0.501274	0.501274	100.00%
State Route 8918	0.13352	0	0.00%
State Route 8930	4.941677	0	0.00%
State Route 8940	3.321223	0	0.00%
State Route 8945	0.984948	0	0.00%
State Route 8955	2.697864	1.623758	60.19%
State Route H-1	54.2852	2.707129	4.99%
State Route H-2	16.631646	0	0.00%
State Route H-201	8.479473	0.057569	0.68%
State Route H-3	30.593733	0.886405	2.90%
<b>Total</b>	<b>374.921172</b>	<b>103.243612</b>	<b>27.54%</b>
<b>County of Maui</b>			
State Route 30	41.599628	14.828809	35.65%
State Route 31	7.147053	1.309341	18.32%
State Route 32	2.855291	1.486423	52.06%
State Route 36	16.225414	7.546228	46.51%
State Route 37	21.33757	0	0.00%
State Route 310	3.609294	2.839494	78.67%
State Route 311	6.415815	2.688327	41.90%
State Route 340	4.265623	0.752489	17.64%
State Route 360	34.838612	0.793641	2.28%
State Route 377	9.136002	0	0.00%
State Route 378	10.082808	0	0.00%
State Route 380	6.197863	1.424836	22.99%
State Route 440	13.153636	0	0.00%
State Route 441	0.476716	0	0.00%
State Route 442	0.022862	0	0.00%
State Route 450	27.477007	0	0.00%
State Route 460	16.534641	0	0.00%
State Route 470	10.74695	0	0.00%
State Route 480	5.898639	0	0.00%
State Route 3000	2.346263	0	0.00%
State Route 3400	2.635502	2.243248	85.12%
State Route 3500	1.125483	1.125483	100.00%
State Route 3800	0.625243	0.625243	100.00%
State Route 32A	0.400435	0.400435	100.00%
State Route 32B	0.172196	0.172196	100.00%
State Route 36A	0.526104	0.526104	100.00%
<b>Total</b>	<b>245.85265</b>	<b>38.762297</b>	<b>15.77%</b>
<b>County of Hawai'i</b>			
State Route 11	117.608086	1.536022	1.31%
State Route 19	93.300605	4.177425	4.48%
State Route 130	21.68728	0	0.00%
State Route 139	1.197816	0	0.00%
State Route 160	3.821277	0	0.00%
State Route 163	0.133863	0	0.00%
State Route 190	34.085758	0	0.00%
State Route 197	1.17843	0	0.00%
State Route 200	43.219679	0	0.00%





State Route	Length (in miles)		
	Total Length	Length in the ASCE Inundation Area	Exposed Length as Percent (%) of Total Length
State Route 220	3.754068	0	0.00%
State Route 240	9.601941	0	0.00%
State Route 250	19.266672	0	0.00%
State Route 270	27.020618	1.191273	4.41%
State Route 1370	0.191175	0.191175	100.00%
State Route 1970	0.923307	0.923307	100.00%
State Route 2000	2.184464	0	0.00%
<b>Total</b>	<b>379.175039</b>	<b>8.019202</b>	<b>2.11%</b>

Source: State of Hawaii Department of Transportation 2022; Tetra Tech Requested Data from Doug Bausch 2022

Table F-69 shows the square miles of the GAT inundation area in each State Land Use District in each county.

**Table F-69. State Land Use Districts Located in the GAT Hazard Area**

Land Use District	Area (in square miles)			
	Total Square Miles	Square Miles in the GAT Hazard Area	Hazard Area as % of Total Area	Hazard Area as % of Total Hazard Exposure
<b>County of Kaua'i</b>				
Agricultural	297.078539	16.494	5.55%	58.40%
Conservation	304.260357	6.934	2.28%	24.55%
Rural	2.146976	0.274	12.76%	0.97%
Urban	23.643203	4.542	19.21%	16.08%
<b>Total</b>	<b>627.129075</b>	<b>28.244</b>	<b>4.50%</b>	<b>100.00%</b>
<b>City and County of Honolulu</b>				
Agricultural	188.479146	14.926	7.92%	28.81%
Conservation	247.601978	4.547	1.84%	8.78%
Rural	0	0.000	0.00%	0.00%
Urban	162.455059	32.341	19.91%	62.42%
<b>Total</b>	<b>598.536183</b>	<b>51.814</b>	<b>8.66%</b>	<b>100.00%</b>
<b>County of Maui</b>				
Agricultural	637.731138	4.849	0.76%	29.53%
Conservation	552.35574	2.898	0.52%	17.64%
Rural	12.824585	0.297	2.32%	1.81%
Urban	45.187433	8.380	18.54%	51.02%
<b>Total</b>	<b>1,248</b>	<b>16.424</b>	<b>1.32%</b>	<b>100.00%</b>
<b>County of Hawai'i</b>				
Agricultural	1,850.31	5.969	0.32%	32.50%
Conservation	2,098.66	4.000	0.19%	21.78%
Rural	1.36344	0.000	0.00%	0.00%
Urban	87.847736	8.397	9.56%	45.72%
<b>Total</b>	<b>4,038</b>	<b>18.367</b>	<b>0.45%</b>	<b>100.00%</b>

Source: Tetra Tech Requested Data from Doug Bausch 2022; State Land Use Commission, Hawaii Statewide GIS Program 2021; Honolulu County GIS 2022

Table F-70 shows the square miles of the SOEST inundation area in each State Land Use District in each county.





**Table F-70. State Land Use Districts Located in the SOEST Hazard Area**

Land Use District	Area (in square miles)			
	Total Square Miles	Square Miles in the SOEST Hazard Area	Hazard Area as % of Total Area	Hazard Area as % of Total Hazard Exposure
<b>County of Kaua'i</b>				
Agricultural	297.078539	11.918	4.01%	59.32%
Conservation	304.260357	4.658	1.53%	23.18%
Rural	2.146976	0.166	7.73%	0.83%
Urban	23.643203	3.351	14.17%	16.68%
<b>Total</b>	<b>627.129075</b>	<b>20.092</b>	<b>3.20%</b>	<b>100.00%</b>
<b>City and County of Honolulu</b>				
Agricultural	188.479146	5.360	2.84%	30.66%
Conservation	247.601978	1.239	0.50%	7.09%
Rural	0	0.000	0.00%	0.00%
Urban	162.455059	10.880	6.70%	62.25%
<b>Total</b>	<b>598.536183</b>	<b>17.479</b>	<b>2.92%</b>	<b>100.00%</b>
<b>County of Maui</b>				
Agricultural	637.731138	2.137	0.34%	20.26%
Conservation	552.35574	2.578	0.47%	24.45%
Rural	12.824585	0.219	1.71%	2.08%
Urban	45.187433	5.612	12.42%	53.22%
<b>Total</b>	<b>1,248</b>	<b>10.546</b>	<b>0.84%</b>	<b>100.00%</b>
<b>County of Hawai'i</b>				
Agricultural	1,850.31	0.414	0.02%	6.45%
Conservation	2,098.66	2.232	0.11%	34.83%
Rural	1.36344	0.000	0.00%	0.00%
Urban	87.847736	3.762	4.28%	58.71%
<b>Total</b>	<b>4,038</b>	<b>6.408</b>	<b>0.16%</b>	<b>100.00%</b>

Source: Tetra Tech Requested Data from Doug Bausch 2022; State Land Use Commission, Hawaii Statewide GIS Program 2021; Honolulu County GIS 2022

Table F-71 shows the square miles of the ASCE inundation area in each State Land Use District in each county.

**Table F-71. State Land Use Districts Located in the ASCE Hazard Area**

Land Use District	Area (in square miles)			
	Total Square Miles	Square Miles in the ASCE Hazard Area	Hazard Area as % of Total Area	Hazard Area as % of Total Hazard Exposure
<b>County of Kaua'i</b>				
Agricultural	297.078539	18.398	6.19%	59.26%
Conservation	304.260357	7.445	2.45%	23.98%
Rural	2.146976	0.322	15.01%	1.04%
Urban	23.643203	4.879	20.64%	15.72%
<b>Total</b>	<b>627.129075</b>	<b>31.044</b>	<b>4.95%</b>	<b>100.00%</b>





Land Use District	Area (in square miles)			
	Total Square Miles	Square Miles in the ASCE Hazard Area	Hazard Area as % of Total Area	Hazard Area as % of Total Hazard Exposure
<b>City and County of Honolulu</b>				
Agricultural	188.479146	17.959	9.53%	24.37%
Conservation	247.601978	4.922	1.99%	6.68%
Rural	0	0.000	0.00%	0.00%
Urban	162.455059	50.803	31.27%	68.95%
<b>Total</b>	<b>598.536183</b>	<b>73.683</b>	<b>12.31%</b>	<b>100.00%</b>
<b>County of Maui</b>				
Agricultural	637.731138	8.419	1.32%	35.59%
Conservation	552.35574	4.262	0.77%	18.02%
Rural	12.824585	0.384	2.99%	1.62%
Urban	45.187433	10.590	23.44%	44.77%
<b>Total</b>	<b>1,248</b>	<b>23.655</b>	<b>1.90%</b>	<b>100.00%</b>
<b>County of Hawai'i</b>				
Agricultural	1,850.31	14.047	0.76%	38.15%
Conservation	2,098.66	10.678	0.51%	29.00%
Rural	1.36344	0.001	0.10%	0.00%
Urban	87.847736	12.098	13.77%	32.85%
<b>Total</b>	<b>4,038</b>	<b>36.825</b>	<b>0.91%</b>	<b>100.00%</b>

Source: Tetra Tech Requested Data from Doug Bausch 2022; State Land Use Commission, Hawaii Statewide GIS Program 2021; Honolulu County GIS 2022

## F.15 Volcanic Hazards

Table F-72 summarizes the number of miles of State roads by state route located in the lava flow hazard areas, organized by county. There are no lava flow zones available in the County of Kaua'i and City and County of Honolulu; therefore, no results are reported.

*Table F-72. State Roads Located in the Lava Flow Hazard Areas by County*

State Route	Length (in miles)				
	Total Length	Hawai'i Lava Flow Hazard Area Length	Hazard Length as % of Total Length	Maui Lava Flow Hazard Area Length	Hazard Length as % of Total Length
<b>County of Maui</b>					
State Route 30	41.599628	0	0	0	0.00%
State Route 31	7.147053	0	0	4.900278	68.56%
State Route 32	2.855291	0	0	0	0.00%
State Route 36	16.225414	0	0	0	0.00%
State Route 37	21.33757	0	0	5.718588	26.80%
State Route 310	3.609294	0	0	0	0.00%
State Route 311	6.415815	0	0	0	0.00%
State Route 340	4.265623	0	0	0	0.00%
State Route 360	34.838612	0	0	11.492933	32.99%
State Route 377	9.136002	0	0	0	0.00%
State Route 378	10.082808	0	0	0	0.00%





State Route	Length (in miles)				
	Total Length	Hawai'i Lava Flow Hazard Area Length	Hazard Length as % of Total Length	Maui Lava Flow Hazard Area Length	Hazard Length as % of Total Length
State Route 380	6.197863	0	0	0	0.00%
State Route 440	13.153636	0	0	0	0.00%
State Route 441	0.476716	0	0	0	0.00%
State Route 442	0.022862	0	0	0	0.00%
State Route 450	27.477007	0	0	0	0.00%
State Route 460	16.534641	0	0	0	0.00%
State Route 470	10.74695	0	0	0	0.00%
State Route 480	5.898639	0	0	0	0.00%
State Route 3000	2.346263	0	0	0	0.00%
State Route 3400	2.635502	0	0	0	0.00%
State Route 3500	1.125483	0	0	0	0.00%
State Route 3800	0.625243	0	0	0	0.00%
State Route 32A	0.400435	0	0	0	0.00%
State Route 32B	0.172196	0	0	0	0.00%
State Route 36A	0.526104	0	0	0	0.00%
<b>Total</b>	<b>245.85265</b>	<b>0</b>	<b>0</b>	<b>22.111799</b>	<b>8.99%</b>
<b>County of Hawai'i</b>					
State Route 11	117.608086	109.641045	93.23%	0	0.00%
State Route 19	93.300605	30.090763	32.25%	0	0.00%
State Route 130	21.68728	21.68728	100.00%	0	0.00%
State Route 139	1.197816	1.197816	100.00%	0	0.00%
State Route 160	3.821277	3.821277	100.00%	0	0.00%
State Route 163	0.133863	0.133863	100.00%	0	0.00%
State Route 190	34.085758	21.612995	63.41%	0	0.00%
State Route 197	1.17843	1.17843	100.00%	0	0.00%
State Route 200	43.219679	26.017024	60.20%	0	0.00%
State Route 220	3.754068	0	0.00%	0	0.00%
State Route 240	9.601941	0	0.00%	0	0.00%
State Route 250	19.266672	0	0.00%	0	0.00%
State Route 270	27.020618	0	0.00%	0	0.00%
State Route 1370	0.191175	0.191175	100.00%	0	0.00%
State Route 1970	0.923307	0.923307	100.00%	0	0.00%
State Route 2000	2.184464	2.184464	100.00%	0	0.00%
<b>Total</b>	<b>379.175039</b>	<b>218.679439</b>	<b>57.67%</b>	<b>0</b>	<b>0.00%</b>

Source: State of Hawaii Department of Transportation 2022; U.S. Geological Survey, Hawaiian Volcano Observatory 1992; U.S. Geological Survey 2006

Notes: County of Kaua'i and City and County of Honolulu do not have USGS-produced lava flow maps.

Table F-73 shows the square miles of the lava flow hazard areas in each State Land Use District in each county. There are no lava flow zones available in the County of Kaua'i and City and County of Honolulu; therefore, no results are reported.





**Table F-73. State Land Use Districts Located in the Lava Flow Hazard Area by County**

Land Use District	Area (in square miles)			
	Total Square Miles	Square Miles in Volcano Hazard Area	Hazard Area as % of Total Area	Hazard Area as % of Total Hazard Exposure
<b>County of Maui</b>				
Agricultural	637.731138	108.453385	17.01%	50.97%
Conservation	552.35574	95.007087	17.20%	44.65%
Rural	12.824585	1.919147	14.96%	0.90%
Urban	45.187433	7.416911	16.41%	3.49%
<b>Total</b>	<b>1,248</b>	<b>212.79653</b>	<b>17.05%</b>	<b>100.00%</b>
<b>County of Hawai'i</b>				
Agricultural	1,850.31	1014.202448	54.81%	38.24%
Conservation	2,098.66	1,568.82	74.75%	59.15%
Rural	1.36344	1.04	76.64%	0.04%
Urban	87.847736	68.076506	77.49%	2.57%
<b>Total</b>	<b>4,038</b>	<b>2652.145692</b>	<b>65.68%</b>	<b>100.00%</b>

Source: State Land Use Commission, Hawaii Statewide GIS Program 2021; Honolulu County GIS 2022; U.S. Geological Survey, Hawaiian Volcano Observatory 1992; U.S. Geological Survey 2006

## F.16 Wildfire

Table F-74 and Table F-75 summarize the number of State buildings located in the moderate wildfire risk area by county and agency, respectively.

**Table F-74. State Buildings Located in the Moderate Wildfire Risk Hazard Areas by County**

County	Total Number of State Buildings	Total Replacement Cost Value	Moderate Wildfire Risk			
			Number of State Buildings in Moderate Wildfire Risk Hazard Area	Percent (%) of Total	Total Value of State Buildings in Moderate Wildfire Risk Hazard Area	Percent (%) of Total
County of Kaua'i	531	\$990,850,824.17	12	2.26%	\$15,031,325.00	1.52%
City and County of Honolulu	3,472	\$17,393,945,914.79	795	22.90%	\$2,733,290,236.00	15.71%
County of Maui	831	\$3,097,491,688.71	115	13.84%	\$679,605,530.20	21.94%
County of Hawai'i	1,261	\$4,638,567,140.82	69	5.47%	\$164,570,533.70	3.55%
<b>Total</b>	<b>6,095</b>	<b>\$26,120,855,568.50</b>	<b>991</b>	<b>16.26%</b>	<b>\$3,592,497,624.90</b>	<b>13.75%</b>

Source: State of Hawaii Risk Management Office 2017; Hawaii Wildfire Management Organization, Division of Forestry and Wildlife





**Table F-75. State Buildings Located in the Moderate Wildfire Risk Hazard Areas by Agency**

Agency	Total Number of State Buildings	Total Replacement Cost Value	Number of State Buildings in the Moderate Hazard Area	Percent (%) of Total Buildings	Value in the Moderate Hazard Area	Percent (%) of Total Value
Dept. of Accounting & General Services	66	\$953,963,737.70	3	4.55%	\$11,815,083	1.24%
Dept. of Agriculture	70	\$147,607,399.20	4	5.71%	\$1,531,739	1.04%
Dept. of Attorney General	15	\$108,425,479.52	1	6.67%	\$345,153	0.32%
Dept. of Budget & Finance	16	\$28,968,679.42	1	6.25%	\$446,086	1.54%
Dept. of Business, Economic Development and Tourism	25	\$645,480,378.64	13	52.00%	\$14,339,661	2.22%
Dept. of Commerce & Consumer Affairs	2	\$40,197,359.64	0	0.00%	\$0	0.00%
Dept. of Defense	69	\$267,352,836.23	34	49.28%	\$115,691,662	43.27%
Dept. of Education	4090	\$10,598,205,739.17	690	16.87%	\$2,092,045,789	19.74%
Dept. of Hawaiian Home Lands	12	\$110,427,352.13	4	33.33%	\$6,403,080	5.80%
Dept. of Health	44	\$387,068,440.15	20	45.45%	\$199,301,863	51.49%
Dept. of Human Resources Development	1	\$5,973,872.00	0	0.00%	\$0	0.00%
Dept. of Human Services	130	\$480,212,293.62	17	13.08%	\$37,402,374	7.79%
Dept. of Labor and Industrial Relations	22	\$90,076,208.64	2	9.09%	\$3,329,392	3.70%
Dept. of Land and Natural Resources	90	\$101,441,821.18	9	10.00%	\$2,258,695	2.23%
Dept. of Public Safety	154	\$440,774,414.53	12	7.79%	\$48,046,007	10.90%
Dept. of Taxation	1	\$7,174,162.00	0	0.00%	\$0	0.00%
Dept. of Transportation	68	\$2,935,208,213.60	5	7.35%	\$54,169,850	1.85%
Hawai'i State Ethics Commission	1	\$984,532.99	0	0.00%	\$0	0.00%
Hawai'i Health Systems Corporation	106	\$1,230,852,871.26	15	14.15%	\$208,117,978	16.91%
Hawai'i Housing Finance & Development Corporation	86	\$360,851,671.33	0	0.00%	\$0	0.00%
Hawai'i Public Housing Authority	273	\$982,981,701.34	54	19.78%	\$276,533,029	28.13%
Hawai'i State Legislature	2	\$48,555,380.80	0	0.00%	\$0	0.00%
Hawai'i State Public Library System	53	\$525,584,082.00	7	13.21%	\$26,447,878	5.03%







Agency	Total Number of State Buildings	Total Replacement Cost Value	Number of State Buildings in the Moderate Hazard Area	Percent (%) of Total Buildings	Value in the Moderate Hazard Area	Percent (%) of Total Value
Judiciary	41	\$534,877,354.35	5	12.20%	\$15,616,867	2.92%
Legislative Reference Bureau	1	\$2,996,162.00	0	0.00%	\$0	0.00%
Office of Hawaiian Affairs	11	\$54,125,645.24	1	9.09%	\$106,463	0.20%
Office of the Auditor	2	\$1,921,180.17	0	0.00%	\$0	0.00%
Office of the Governor	1	\$2,996,162.00	0	0.00%	\$0	0.00%
Office of the Lieutenant Governor	2	\$4,588,849.00	0	0.00%	\$0	0.00%
Office of the Ombudsman	1	\$1,818,060.00	0	0.00%	\$0	0.00%
Research Corporation of the University of Hawai'i	3	\$4,189,026.15	0	0.00%	\$0	0.00%
University of Hawai'i	637	\$5,014,974,502.50	94	14.76%	\$478,548,977	9.54%
<b>Total</b>	<b>6095</b>	<b>\$26,120,855,568.50</b>	<b>991</b>	<b>16.26%</b>	<b>\$3,592,497,624</b>	<b>13.75%</b>

Source: State of Hawaii Risk Management Office 2017; Hawaii Wildfire Management Organization, Division of Forestry and Wildlife

Table F-76 summarizes the total number of miles of State roads located in the low and moderate wildfire risk areas by county.

**Table F-76 State Roads Located in the Low and Moderate Wildfire Risk Hazard Areas by County**

County	Length (in miles)				
	Total Length	Length in the Low Wildfire Risk Hazard Area	Percent (%) of Total Length	Length in the Moderate Wildfire Risk Hazard Area	Percent (%) of Total Length
County of Kaua'i	103.714278	16.715987	16.12%	6.158878	5.94%
City and County of Honolulu	374.921172	66.66374	17.78%	61.316717	16.35%
County of Maui	245.85265	53.626263	21.81%	22.037993	8.96%
County of Hawai'i	379.175039	91.943879	24.25%	27.621771	7.28%
<b>Total</b>	<b>1,103.66</b>	<b>228.949869</b>	<b>20.74%</b>	<b>117.135359</b>	<b>10.61%</b>

Source: State of Hawaii Department of Transportation 2022; Hawaii Wildfire Management Organization, Division of Forestry and Wildlife

Table F-77 summarizes the number of miles of State roads by state route located in the low, moderate, and high wildfire risk areas, organized by county.





**Table F-77. State Road Exposure to Low, Moderate, and High Wildfire Risk Hazard Areas**

State Route	Length (in miles)						
	Total Length	Low	Exposed Length as % of Total Length	Moderate	Exposed Length as % of Total Length	High	Exposed Length as % of Total Length
<b>County of Kaua'i</b>							
State Route 50	32.89242	1.822218	5.54%	0.959554	2.92%	10.01291	30.44%
State Route 51	3.457222	0	0.00%	0	0.00%	2.23557	64.66%
State Route 56	28.316299	5.944573	20.99%	1.207639	4.26%	12.826033	45.30%
State Route 58	2.052085	0	0.00%	0	0.00%	2.052085	100.00%
State Route 540	3.884869	0	0.00%	0.370198	9.53%	0.430511	11.08%
State Route 541	0.37465	0	0.00%	0	0.00%	0.37465	100.00%
State Route 550	14.03193	0	0.00%	0	0.00%	3.379203	24.08%
State Route 560	9.98938	8.949196	89.59%	0	0.00%	0	0.00%
State Route 570	1.125605	0	0.00%	0	0.00%	1.125605	100.00%
State Route 580	6.668581	0	0.00%	3.621487	54.31%	0.34591	5.19%
State Route 583	0.921237	0	0.00%	0	0.00%	0	0.00%
<b>Total</b>	<b>103.714278</b>	<b>16.715987</b>	<b>16.12%</b>	<b>6.158878</b>	<b>5.94%</b>	<b>32.782477</b>	<b>31.61%</b>
<b>City and County of Honolulu</b>							
State Route 61	21.173569	7.046414	33.28%	4.837746	22.85%	0	0.00%
State Route 63	16.618809	1.739868	10.47%	8.405708	50.58%	0	0.00%
State Route 64	2.624714	1.102798	42.02%	0	0.00%	0	0.00%
State Route 65	6.584201	0	0.00%	0	0.00%	6.584201	100.00%
State Route 72	22.766927	0.337241	1.48%	10.038096	44.09%	9.875287	43.38%
State Route 76	11.059837	0	0.00%	2.151261	19.45%	8.361009	75.60%
State Route 78	1.346173	0	0.00%	0	0.00%	1.346173	100.00%
State Route 80	1.893686	0	0.00%	0	0.00%	1.588637	83.89%
State Route 83	47.821595	21.835854	45.66%	6.704782	14.02%	17.221286	36.01%
State Route 92	18.685552	11.6297	62.24%	5.405417	28.93%	0	0.00%
State Route 93	19.522013	1.694968	8.68%	0	0.00%	13.031994	66.76%
State Route 98	3.470599	3.18727	91.84%	0.287841	8.29%	0	0.00%
State Route 99	41.120805	0	0.00%	4.809275	11.70%	26.831111	65.25%
State Route 750	8.056213	0	0.00%	0.989078	12.28%	1.896944	23.55%
State Route 901	1.403364	0	0.00%	0	0.00%	1.116667	79.57%
State Route 930	10.054945	0	0.00%	0	0.00%	10.054945	100.00%
State Route 7012	1.862959	0	0.00%	0	0.00%	1.862959	100.00%
State Route 7101	5.865258	0	0.00%	0	0.00%	5.865258	100.00%
State Route 7110	0.609843	0	0.00%	0	0.00%	0.203785	33.42%
State Route 7141	1.50208	0	0.00%	0	0.00%	0.585757	39.00%
State Route 7210	0.115075	0	0.00%	0	0.00%	0.115075	100.00%
State Route 7239	0.338737	0	0.00%	0	0.00%	0.338737	100.00%
State Route 7241	2.331816	0	0.00%	0.112325	4.82%	2.222008	95.29%
State Route 7310	1.041137	0	0.00%	1.022983	98.26%	0.018745	1.80%
State Route 7345	0.554715	0	0.00%	0	0.00%	0.554715	100.00%
State Route 7350	0.597196	0	0.00%	0.597196	100.00%	0	0.00%
State Route 7351	0.243914	0	0.00%	0.243914	100.00%	0	0.00%
State Route 7401	0.214056	0.214056	100.00%	0	0.00%	0	0.00%
State Route 7413	0.352495	0.352495	100.00%	0	0.00%	0	0.00%
State Route 7415	0.536255	0.494415	92.20%	0.042564	7.94%	0	0.00%
State Route 7526	0.397834	0.294466	74.02%	0.103368	25.98%	0	0.00%





State Route	Length (in miles)						
	Total Length	Low	Exposed Length as % of Total Length	Moderate	Exposed Length as % of Total Length	High	Exposed Length as % of Total Length
State Route 7601	0.432591	0.184518	42.65%	0	0.00%	0.243295	56.24%
State Route 7801	1.151651	0.742413	64.47%	0	0.00%	0.319869	27.77%
State Route 8300	0.501274	0	0.00%	0	0.00%	0.501274	100.00%
State Route 8918	0.13352	0	0.00%	0	0.00%	0	0.00%
State Route 8930	4.941677	0	0.00%	0	0.00%	0.052996	1.07%
State Route 8940	3.321223	0	0.00%	0	0.00%	2.875141	86.57%
State Route 8945	0.984948	0	0.00%	0	0.00%	0.984948	100.00%
State Route 8955	2.697864	0	0.00%	0	0.00%	2.697864	100.00%
State Route H-1	54.2852	15.340879	28.26%	10.858233	20.00%	18.625217	34.31%
State Route H-2	16.631646	0	0.00%	0.000746	0.00%	16.237483	97.63%
State Route H-201	8.479473	0.466385	5.50%	2.209932	26.06%	5.81185	68.54%
State Route H-3	30.593733	0	0.00%	2.496249	8.16%	6.329894	20.69%
<b>Total</b>	<b>374.921172</b>	<b>66.66374</b>	<b>17.78%</b>	<b>61.316714</b>	<b>16.35%</b>	<b>164.355124</b>	<b>43.84%</b>
<b>County of Maui</b>							
State Route 30	41.599628	0	0.00%	8.518588	20.48%	21.153807	50.85%
State Route 31	7.147053	0	0.00%	0	0.00%	7.097807	99.31%
State Route 32	2.855291	0	0.00%	0	0.00%	2.855291	100.00%
State Route 36	16.225414	8.010984	49.37%	1.557651	9.60%	1.086486	6.70%
State Route 37	21.33757	0	0.00%	2.372363	11.12%	8.551166	40.08%
State Route 310	3.609294	0	0.00%	0	0.00%	0.33541	9.29%
State Route 311	6.415815	0	0.00%	0	0.00%	0.084246	1.31%
State Route 340	4.265623	0	0.00%	0.910252	21.34%	1.632694	38.28%
State Route 360	34.838612	19.387798	55.65%	0	0.00%	0	0.00%
State Route 377	9.136002	0	0.00%	2.791085	30.55%	3.468785	37.97%
State Route 378	10.082808	0	0.00%	2.11774	21.00%	0.004682	0.05%
State Route 380	6.197863	0	0.00%	0	0.00%	2.761649	44.56%
State Route 440	13.153636	0	0.00%	1.902297	14.46%	0	0.00%
State Route 441	0.476716	0	0.00%	0	0.00%	0	0.00%
State Route 442	0.022862	0	0.00%	0.022862	100.00%	0	0.00%
State Route 450	27.477007	15.865763	57.74%	0.894314	3.25%	5.660799	20.60%
State Route 460	16.534641	0	0.00%	0	0.00%	7.341135	44.40%
State Route 470	10.74695	8.527122	79.34%	0	0.00%	0	0.00%
State Route 480	5.898639	1.834596	31.10%	0	0.00%	4.064043	68.90%
State Route 3000	2.346263	0	0.00%	0	0.00%	0.97469	41.54%
State Route 3400	2.635502	0	0.00%	0.950841	36.08%	1.684661	63.92%
State Route 3500	1.125483	0	0.00%	0	0.00%	1.125483	100.00%
State Route 3800	0.625243	0	0.00%	0	0.00%	0.429012	68.62%
State Route 32A	0.400435	0	0.00%	0	0.00%	0.400435	100.00%
State Route 32B	0.172196	0	0.00%	0	0.00%	0.172196	100.00%
State Route 36A	0.526104	0	0.00%	0	0.00%	0.526104	100.00%
<b>Total</b>	<b>245.85265</b>	<b>53.626263</b>	<b>21.81%</b>	<b>22.037993</b>	<b>8.96%</b>	<b>71.410581</b>	<b>29.05%</b>
<b>County of Hawai'i</b>							
State Route 11	117.608086	31.740221	26.99%	5.240364	4.46%	40.135801	34.13%
State Route 19	93.300605	21.804543	23.37%	12.966732	13.90%	16.965794	18.18%
State Route 130	21.68728	12.266005	56.56%	2.447152	11.28%	0	0.00%
State Route 139	1.197816	1.197816	100.00%	0	0.00%	0	0.00%





State Route	Length (in miles)						
	Total Length	Low	Exposed Length as % of Total Length	Moderate	Exposed Length as % of Total Length	High	Exposed Length as % of Total Length
State Route 160	3.821277	0.008749	0.23%	3.812529	99.77%	0	0.00%
State Route 163	0.133863	0	0.00%	0.133863	100.00%	0	0.00%
State Route 190	34.085758	3.363911	9.87%	0	0.00%	2.178989	6.39%
State Route 197	1.17843	0	0.00%	0	0.00%	1.17843	100.00%
State Route 200	43.219679	0.947501	2.19%	0	0.00%	1.077319	2.49%
State Route 220	3.754068	0	0.00%	0.998708	26.60%	00	0.00%
State Route 240	9.601941	2.642506	27.52%	2.022423	21.06%		0.00%
State Route 250	19.266672	3.916922	20.33%	0	0.00%	0.297573	1.54%
State Route 270	27.020618	10.756759	39.81%	0	0.00%	4.862078	17.99%
State Route 1370	0.191175	0.191175	100.00%	0	0.00%	0	0.00%
State Route 1970	0.923307	0.923307	100.00%	0	0.00%	0	0.00%
State Route 2000	2.184464	2.184464	100.00%	0	0.00%	0	0.00%
<b>Total</b>	<b>379.175039</b>	<b>91.943879</b>	<b>24.25%</b>	<b>27.621771</b>	<b>7.28%</b>	<b>66.695984</b>	<b>17.59%</b>

Source: State of Hawaii Department of Transportation 2022; Hawaii Wildfire Management Organization, Division of Forestry and Wildlife

Table F-78 and Table F-79 summarize the number of community lifelines and critical facilities located in the moderate wildfire risk area by county and category, respectively.

**Table F-78. Community Lifelines and Critical Facilities Located in the Moderate Wildfire Risk Hazard Areas by County**

County	Category							
	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health and Medical	Safety and Security	Transportation	Additional Critical Facilities
County of Kaua'i	1	0	2	0	0	1	0	0
City and County of Honolulu	22	11	26	1	17	77	0	11
County of Maui	4	2	15	0	6	11	4	7
County of Hawai'i	1	1	1	0	2	2	0	2
<b>Total</b>	<b>28</b>	<b>14</b>	<b>44</b>	<b>1</b>	<b>25</b>	<b>91</b>	<b>4</b>	<b>20</b>

Source: Hawai'i Emergency Management Agency 2017; Federal Emergency Management Agency Lifeline Data 2020; Hawaii Wildfire Management Organization, Division of Forestry and Wildlife





**Table F-79. Community Lifelines and Critical Facilities Located in the Moderate Wildfire Risk Hazard Areas by Category**

Category	Total Number of Facilities	Total Replacement Cost Value	Number of Facilities in the Moderate Risk Hazard Area	Percent (%) of Total Facilities	Value in the Moderate Risk Hazard Area	Percent (%) of Total Value
Communications	188	\$776,797,683	28	14.89%	\$92,475,536.50	11.90%
Energy	89	\$3,093,949,530	14	15.73%	\$526,787,300.00	17.03%
Food, Water, Shelter	345	\$11,847,189,588	44	12.75%	\$1,490,251,295.00	12.58%
Hazardous Material	12	\$436,474,800	1	8.33%	\$37,240,800.00	8.53%
Health and Medical	193	\$4,606,713,364	25	12.95%	\$658,837,311.20	14.30%
Safety and Security	486	\$38,164,188,232	91	18.72%	\$6,986,691,188.00	18.31%
Transportation	56	\$2,039,091,600	4	7.14%	\$145,176,000.00	7.12%
Additional Critical Facilities	106	\$447,698,794	20	18.87%	\$61,279,440.00	13.69%
<b>Total</b>	<b>1,475</b>	<b>\$61,412,103,591</b>	<b>227</b>	<b>15.39%</b>	<b>\$9,998,738,870.70</b>	<b>16.28%</b>

Source: Hawaii’s Emergency Management Agency 2017; Federal Emergency Management Agency Lifeline Data 2020; Hawaii Wildfire Management Organization, Division of Forestry and Wildlife

Table F-80 summarizes the population located in the moderate wildfire risk area.

**Table F-80. 2020 U.S. Census Population Located in Moderate Wildfire Risk Hazard Areas by County**

County	Population				
	Total Population	Population in Hazard Area	Population Exposed as % of Total Population	Socially Vulnerable Population Located in Hazard Area	Population Exposed as Percent (%) of Total Population
County of Kaua’i	71,949	8,307	11.55%	435	0.60%
City and County of Honolulu	979,682	244,318	24.94%	38,961	3.98%
County of Maui	167,093	19,278	11.54%	25	0.01%
County of Hawai’i	201,350	10,890	5.41%	1,248	0.62%
<b>Total</b>	<b>1,420,074</b>	<b>282,794</b>	<b>19.91%</b>	<b>40,669</b>	<b>2.86%</b>

Source: U.S. Census Bureau 2020; Centers for Disease Control and Prevention 2018; Hawaii’s Wildfire Management Organization, Division of Forestry and Wildlife

Table F-81 summarizes the general building stock located in the moderate wildfire risk area.

**Table F-81. General Building Stock Located in the Moderate Wildfire Risk Hazard Areas by County**

County	Total Value	Replacement Value in Hazard Area	Replacement Value Exposed as % of Total
County of Kaua’i	\$24,246,497,228	\$2,091,037,500	8.62%
City and County of Honolulu	\$239,152,051,766	\$51,624,531,325	21.59%
County of Maui	\$50,796,693,140	\$9,710,233,991	19.12%
County of Hawai’i	\$58,395,349,136	\$5,058,093,772	8.66%
<b>Total</b>	<b>\$372,590,591,270</b>	<b>\$68,483,896,588</b>	<b>18.38%</b>

Source: NIYAM IT 2022; United States Army Corps of Engineers 2022; Hawaii Wildfire Management Organization, Division of Forestry and Wildlife





Table F-82 summarizes the square miles of Hawaiian Home Lands located in the low and moderate wildfire risk areas.

**Table F-82. Hawaiian Home Lands Located in the Low and Moderate Wildfire Risk Hazard Areas by County**

County	Area (in square miles)				
	Total Area	Low Risk Hazard Area	Hazard Area as % of Total Area	Moderate Risk Hazard Area	Hazard Area as % of Total Area
County of Kaua'i	32.087158	0	0.00%	0.120331	0.38%
City and County of Honolulu	10.612342	0.040155	0.38%	1.428661	13.46%
County of Maui	102.588953	5.393994	5.26%	2.492814	2.43%
County of Hawai'i	191.458448	18.920139	9.88%	0	0.00%
<b>Total</b>	<b>336.746901</b>	<b>24.354288</b>	<b>7.23%</b>	<b>4.041806</b>	<b>1.20%</b>

Source: Hawaii Wildfire Management Organization, Division of Forestry and Wildlife; Hawaii State Department of Hawaiian Homelands 2021

Table F-83 and Table F-84 summarize the square miles of environmental resource located in the high wildfire risk hazard area by type, and county respectively.

**Table F-83. Square Miles of Environmental Resources Located in the High Wildfire Risk Hazard Area**

Environmental Resource	County of Kaua'i		City and County of Honolulu		County of Maui		County of Hawai'i	
	Sq. Mi. in High Risk Area	% of Total Asset Area	Sq. Mi. in High Risk Area	% of Total Asset Area	Sq. Mi. in High Risk Area	% of Total Asset Area	Sq. Mi. in High Risk Area	% of Total Asset Area
Critical Habitat	1.053894	1.17%	2.677583	2.21%	24.636064	8.41%	2.735564	0.61%
Wetlands	2.529703	0.42%	4.568932	0.90%	3.8402	0.28%	1.708823	0.15%
Parks and Reserves	5.676893	2.52%	8.194622	6.80%	7.504772	1.84%	17.007563	0.84%
Reefs	0.007175	0.16%	0.22396	1.42%	0.009446	0.04%	0.020168	0.23%
<b>Total<sup>a</sup></b>	<b>9.267665</b>	<b>1.01%</b>	<b>15.665097</b>	<b>2.05%</b>	<b>35.990482</b>	<b>1.71%</b>	<b>21.472118</b>	<b>0.59%</b>

Source: Hawaii Wildfire Management Organization, Division of Forestry and Wildlife; U.S. Fish and Wildlife Service, Pacific Islands Office, 2022a, U.S. Fish and Wildlife Service 2021e, 2017b, Hawaii State Department of Land and Natural Resources, Division of Forestry and Wildlife 2022, NOAA raster nautical charts 2020b, State of Hawaii Department of Land and Natural Resources, Division of State Parks 2021

Notes: a. Total square miles may be over-reported as some environmental resource areas may overlap.





**Table F-84. Square Miles of Total Environmental Resources Located in the High Wildfire Risk Hazard Areas by County**

County	Area (in square miles)		
	Total Area of Environmental Resources	Area of Environmental Resources in the High Wildfire Risk Hazard Area	Percent (%) of Total Area
County of Kaua'i	919.953924	9.267665	1%
City and County of Honolulu	762.964336	15.665097	2%
County of Maui	2,109.97	35.990482	2%
County of Hawai'i	3,626.96	21.472118	1%
<b>Total</b>	<b>7,419.85</b>	<b>82.395362</b>	<b>1%</b>

Source: Hawaii Wildfire Management Organization, Division of Forestry and Wildlife; U.S. Fish and Wildlife Service, Pacific Islands Office, 2022; U.S. Fish and Wildlife Service 2021, 2017; Hawaii State Department of Land and Natural Resources, Division of Forestry and Wildlife 2022, NOAA raster nautical charts 2020; State of Hawaii Department of Land and Natural Resources, Division of State Parks 2021

Table F-85 summarizes the square miles of environmental resources located in the low and moderate wildfire risk areas by county.

**Table F-85. Environmental Resources Located in the Low and Moderate Wildfire Risk Areas**

County	Area (in square miles)				
	Total Area	Low Risk Area	Low Risk as Percent (%) of Total Area	Moderate Risk Area	Moderate Risk as Percent (%) of Total Area
County of Kaua'i	919.953924	2.230916	0.2%	1.552865	0.2%
City and County of Honolulu	762.964336	13.716753	1.8%	5.82849	0.8%
County of Maui	2,109.97	4.162469	0.2%	10.408918	0.5%
County of Hawai'i	3,626.96	53.314766	1.5%	13.431722	0.4%
<b>Total</b>	<b>7,419.85</b>	<b>73.424904</b>	<b>1.0%</b>	<b>31.221995</b>	<b>0.4%</b>

Source: Hawaii Wildfire Management Organization, Division of Forestry and Wildlife; U.S. Fish and Wildlife Service, Pacific Islands Office, 2022; U.S. Fish and Wildlife Service 2021, 2017; Hawaii State Department of Land and Natural Resources, Division of Forestry and Wildlife 2022, NOAA raster nautical charts 2020; State of Hawaii Department of Land and Natural Resources, Division of State Parks 2021

Table F-86 summarizes the square miles of conservation areas located in the low and moderate wildfire risk areas by county.

**Table F-86. Conservation Areas Located in the Low and Moderate Wildfire Risk Areas**

County	Area (in square miles)				
	Total Area	Low Risk Area	Low Risk Area as Percent (%) of Total Area	Moderate Risk Area	Moderate Risk Area as Percent (%) of Total Area
County of Kaua'i	195,692.70	1,275.30	0.65%	483	0.25%
City and County of Honolulu	158,989.00	9,101.20	5.72%	6,281.40	3.95%
County of Maui	325,580.30	3,173.60	0.97%	2,038.20	0.63%
County of Hawai'i	1,339,647.20	32,494.40	2.43%	11,750.20	0.88%
<b>Total</b>	<b>2,019,909</b>	<b>46,044</b>	<b>2.28%</b>	<b>20,553</b>	<b>1.02%</b>

Source: Hawaii Wildfire Management Organization, Division of Forestry and Wildlife





Table F-87 summarizes the square miles of watershed located in the low and moderate wildfire risk areas by county.

**Table F-87. Watershed Partnership Areas Located in Low and Moderate Wildfire Risk Areas**

Watershed Partnership	Area (in square miles)				
	Total Area	Area in the Low Wildfire Risk Area	Percent (%) of Total Area	Area in the Moderate Wildfire Risk Area	Percent (%) of Total Area
<b>County of Kaua'i</b>					
Kaua'i Watershed Alliance	225.61	0.118	0.05%	0.117078	0.05%
<b>Total</b>	<b>225.61</b>	<b>0.118</b>	<b>0.05%</b>	<b>0.117078</b>	<b>0.05%</b>
<b>City and County of Honolulu</b>					
Koolau Mountains Watershed Partnership	160.62	10.486	6.53%	5.43	3.38%
Waianae Mountains Watershed Partnership	73.59	0.000	0.00%	3.78	5.14%
<b>Total</b>	<b>234.21</b>	<b>10.486</b>	<b>4.48%</b>	<b>9.21</b>	<b>3.93%</b>
<b>County of Maui</b>					
East Maui Watershed Partnership	173.01	4.079	2.36%	0.37	0.21%
East Moloka'i Watershed Partnership	105.27	4.299	4.08%	8.875392	8.43%
Leeward Haleakala Watershed Restoration Partnership	53.56	0.000	0.00%	0.000023	0.00%
West Maui Mountains Watershed Partnership	73.94	0.000	0.00%	0.17	0.23%
Lanai Forest and Watershed Partnership	14.84	0.000	0.00%	0.00	0.00%
Overlap East Maui Watershed Partnership and Leeward Haleakala Watershed Restoration Partnership	13.72	0.000	0.00%	0.004334	0.03%
<b>Total</b>	<b>434.34</b>	<b>8.379</b>	<b>1.93%</b>	<b>9.42</b>	<b>2.17%</b>
<b>County of Hawai'i</b>					
Kohala Watershed Partnership	115.81	1.330	1.15%	0	0.00%
Mauna Kea Watershed Alliance	400.39	1.349	0.34%	1.84	0.46%
Three Mountain Alliance	1767.20	47.566	2.69%	16.972761	0.96%
<b>Total</b>	<b>2283.41</b>	<b>50.245</b>	<b>2.20%</b>	<b>18.815187</b>	<b>0.82%</b>

Source: Hawai'i Wildfire Management Organization, Division of Forestry and Wildlife; Department of Land & Natural Resources, Division of Forestry and Wildlife 2020

Table F-88 shows the square miles of the wildfire risk areas in each State Land Use District in each county.







Table F-88. State Land Use Districts Located in Wildfire Risk Areas by County

Land Use District	Area (in square miles)									
	Total Square Miles	Square Miles in Low Risk Area	Hazard Area as % of Total Area	Hazard Area as % of Total Hazard Exposure	Square Miles in Medium Risk Area	Hazard Area as % of Total Area	Hazard Area as % of Total Hazard Exposure	Square Miles in High Risk Area	Hazard Area as % of Total Area	Hazard Area as % of Total Hazard Exposure
<b>County of Kaua'i</b>										
Agricultural	297.078539	9.708012	3.27%	61.10%	4.030501	1.36%	57.93%	17.630686	5.93%	47.14%
Conservation	304.260357	1.981192	0.65%	12.47%	0.751409	0.25%	10.80%	5.320846	1.75%	14.23%
Rural	2.146976	0.301923	14.06%	1.90%	1.011272	47.10%	14.54%	0.764835	35.62%	2.04%
Urban	23.643203	3.896305	16.48%	24.52%	1.163867	4.92%	16.73%	13.685451	57.88%	36.59%
<b>Total</b>	<b>627.129075</b>	<b>15.887432</b>	<b>2.53%</b>	<b>100.00%</b>	<b>6.957049</b>	<b>1.11%</b>	<b>100.00%</b>	<b>37.401818</b>	<b>5.96%</b>	<b>100.00%</b>
<b>City and County of Honolulu</b>										
Agricultural	188.479146	9.410908	4.99%	20.34%	5.905205	3.13%	12.63%	46.900582	24.88%	34.00%
Conservation	247.601978	14.244886	5.75%	30.79%	9.923299	4.01%	21.22%	17.844421	7.21%	12.94%
Rural	0	0	0.00%	0.00%	0	0.00%	0.00%	0	0.00%	0.00%
Urban	162.455059	22.60259	13.91%	48.86%	30.9406	19.05%	66.16%	73.189699	45.05%	53.06%
<b>Total</b>	<b>598.536183</b>	<b>46.258384</b>	<b>7.73%</b>	<b>100.00%</b>	<b>46.769104</b>	<b>7.81%</b>	<b>100.00%</b>	<b>137.934702</b>	<b>23.05%</b>	<b>100.00%</b>
<b>County of Maui</b>										
Agricultural	637.731138	60.366078	9.47%	85.68%	16.893617	2.65%	52.72%	119.697919	18.77%	72.33%
Conservation	552.35574	5.913612	1.07%	8.39%	3.941915	0.71%	12.30%	18.738196	3.39%	11.32%
Rural	12.824585	1.823888	14.22%	2.59%	2.260047	17.62%	7.05%	4.294832	33.49%	2.60%
Urban	45.187433	2.355524	5.21%	3.34%	8.94767	19.80%	27.92%	22.749903	50.35%	13.75%
<b>Total</b>	<b>1,248</b>	<b>70.459102</b>	<b>5.65%</b>	<b>100.00%</b>	<b>32.043249</b>	<b>2.57%</b>	<b>100.00%</b>	<b>165.48085</b>	<b>13.26%</b>	<b>100.00%</b>
<b>County of Hawai'i</b>										
Agricultural	1,850.31	306.953072	16.59%	76.84%	66.580606	3.60%	69.59%	138.096437	7.46%	71.72%
Conservation	2,098.66	50.93668	2.43%	12.75%	18.412073	0.88%	19.24%	24.093931	1.15%	12.51%
Rural	1.36344	0.537676	39.44%	0.13%	0.202151	14.83%	0.21%	0.623133	45.70%	0.32%
Urban	87.847736	41.059991	46.74%	10.28%	10.480244	11.93%	10.95%	29.745058	33.86%	15.45%
<b>Total</b>	<b>4,038</b>	<b>399.487419</b>	<b>9.89%</b>	<b>100.00%</b>	<b>95.675074</b>	<b>2.37%</b>	<b>100.00%</b>	<b>192.558559</b>	<b>4.77%</b>	<b>100.00%</b>

Source: Hawaii Wildfire Management Organization, Division of Forestry and Wildlife; State Land Use Commission, Hawaii Statewide GIS Program 2021; Honolulu County GIS 2022





## F.17 Windstorm

There are no additional tables to support Section 4.16 (Windstorm).

## F.18 Vulnerability Summary

Table F-89 summarizes the hazard ranking statewide and for each individual county based on the 2023 risk assessment results and methodology outlined in Section 4.17 (Vulnerability Summary).

*Table F-89. 2023 State and County Hazard Ranking Summary*

Hazard	Statewide	County of Kaua'i	City and County of Honolulu	County of Maui	County of Hawai'i
Climate Change and Sea Level Rise	High	High	High	High	High
Cyber Threat	Medium	Medium	Medium	Medium	Medium
Drought	Medium	Medium	Medium	Medium	Medium
Earthquake	High	Medium	High	High	High
Flood	Medium	Medium	High	High	Medium
Hazardous Materials	Low	Low	Low	Low	Low
Health Risks	High	High	High	High	High
Hurricane	High	High	High	High	High
Infrastructure Failure	Low	Low	Low	Medium	Low
Landslide and Rockfall	Medium	Medium	Medium	Medium	High
Terrorism	Low	Low	Low	Low	Low
Tsunami	High	High	High	High	High
Volcanic Hazards	Medium	Low	Low	Medium	High
Wildfire	Medium	High	High	High	High
Windstorm	Medium	Medium	Medium	Medium	Medium

*Risk Factor Scores - High: > 4.0; Medium: 3.0 to 4.0; Low < 3.0*





# Appendix G. Mitigation Strategy Supplement



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<sup>1</sup> Section Cover Photo: Double rainbow over the Hawai'i Island jungle. Photo by Megan Brotherton





# APPENDIX G. MITIGATION STRATEGY SUPPLEMENT

This appendix includes detailed information that supports the Mitigation Strategy discussion presented in Section 6 (Mitigation Strategy) of this document.

## G.1 2018 SHMP Goals and Objectives

At the October 2022 Forum meeting, the 2018 SHMP goals were reviewed and discussed to determine if the goals: (1) led to mitigation projects and changes in policy that reduced risk over the performance period of the 2018 SHMP; and (2) continue to articulate the long-term vision for mitigation activities in the State addressing both current and future vulnerabilities. Based on this discussion, modifications were made to the wording of goals to more closely align with the State's updated vision.

The wording of goals 1 and 2 in the 2018 SHMP was enhanced and strengthened. The remaining goals were kept as written. In addition, a new goal (2023 SHMP goal 7) was added to reflect the HI-EMA Mitigation Section's priority to advance mitigation efforts among socially vulnerable populations. Table G-1 summarizes the evaluation of the 2018 SHMP goals and the modifications made, and the updated 2023 SHMP goals. As noted in Section 6 (Mitigation Strategy), 15 new objectives were identified to align with multiple goals; refer to Section 6.2.

*Table G-1. Evaluation of the 2018 SHMP Goals*

2018 SHMP Goal	Evaluation	2023 SHMP Updated Goal
<b>Goal 1</b> —Reduce the long-term vulnerability of Hawaii's people, property, and jurisdictions, including State-owned or operated buildings, infrastructure, and critical facilities, to natural hazards while conserving the State's natural, historical, and cultural assets. This includes high-risk properties such as repetitive loss (RL) and severe repetitive loss (SRL) properties.	Keep goal; update and enhance the wording to include High Hazard Potential Dams	<b>Goal 1</b> —Reduce the long-term vulnerability of Hawaii's people, property and jurisdictions, including State-owned or operated buildings, infrastructure and critical facilities, to natural hazards while conserving the State's natural, historical, and cultural assets. This includes <b>High Hazard Potential Dams</b> and high-risk properties such as repetitive loss (RL) and severe repetitive loss (SRL) properties.
<b>Goal 2</b> —Promote actions designed to ensure long-term resiliency.	Keep goal; update and enhance the wording to include natural hazards and climate change impacts	<b>Goal 2</b> —Promote actions designed to ensure long-term resiliency <b>to natural hazards and climate change impacts.</b>
<b>Goal 3</b> —Strengthen partnerships and leverage existing resources and capabilities to identify, assess, and reduce the impact of natural hazards.	Keep goal	<b>Goal 3</b> —Strengthen partnerships and leverage existing resources and capabilities to identify, assess, and reduce the impact of natural hazards.
<b>Goal 4</b> —Utilize state-of-the-art methods and technology and local knowledge to identify and analyze natural hazards and assess State capabilities to reduce the impact of those hazards.	Keep goal	<b>Goal 4</b> —Utilize state-of-the-art methods and technology and local knowledge to identify and analyze natural hazards and assess State capabilities to reduce the impact of those hazards.





2018 SHMP Goal	Evaluation	2023 SHMP Updated Goal
<b>Goal 5</b> —Promote public awareness of natural hazard risks and public action to reduce the long-term risks	Keep goal	<b>Goal 5</b> —Promote public awareness of natural hazard risks and public action to reduce the long-term risks
<b>Goal 6</b> —Provide a framework for robust local hazard mitigation planning and mitigation strategy implementation in alignment with this plan.	Keep goal	<b>Goal 6</b> —Provide a framework for robust local hazard mitigation planning and mitigation strategy implementation in alignment with this plan.
	New Goal	<b>Goal 7</b> —Build capacity and capabilities to increase disaster resiliency among historically underserved populations, individuals with access and functional needs, and in communities disproportionately impacted by disasters and climate change.

Red text = New or revised goal

## G.2 2018 SHMP Progress Report

A comprehensive review and evaluation of the 2018 SHMP actions is presented in Table G-2. The table includes a narrative listed under ‘Comment’ providing a status of each mitigation action. A brief comment on progress status is listed in column 2. If the action is complete, the funding source is identified.

*Table G-2. Comprehensive Review and Evaluation of 2018 SHMP Mitigation Actions*

Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> State-2018-001 – Conduct non-structural retrofits of schools and hospitals in Hawai’i and County of Maui.</p> <ol style="list-style-type: none"> <li>1. Assess and prioritize schools and hospitals</li> <li>2. Prepare work plans</li> <li>3. Procure funding</li> <li>4. Implement</li> </ol> <p><b>Comment:</b> No measurable progress was made on this action. HI-EMA is potentially prioritizing new school facilities and coordinating with Hawai’i Healthcare Association. HI-EMA intends to add a new mitigation action with wider scope.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>No Progress</b></p> <p><b>2023 Action:</b> 2023-2018-001</p>
<p><b>Action:</b> State-2018-002 - Multi-hazard, Non-Structural Retrofit of Hawai’i and County of Maui Hospitals and Schools</p> <p>Engage FEMA in a Cooperating Technical Partnership (CTP) to acquire technical assistance to assess the Hawai’i &amp; Maui County hospitals and schools for possible seismic, high wind, and flooding non-structural vulnerabilities. The study would prioritize the hospitals and schools, prioritize non-structural actions, develop information for funding applications, and develop documentation for benefit-cost analysis.</p> <p><b>Comment:</b> No measurable progress was made on this action. HI-EMA will consider conducting a feasibility study of structures statewide as a new mitigation action. HI-EMA will review updated data from State Department of Education following 2018 earthquake event.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>No Progress</b></p> <p><b>2023 Action:</b> 2023-2018-002</p>





Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> State-2018-003 - Retrofit of Kalaheo Gym-Emergency Sheltering: Facility is currently being renovated, and the County desires to upgrade the structural integrity of the building, especially the roof. In consultation with HI-EMA, additional funds of \$450,000 from the State will be added to the scope of work to upgrade the gym to a Type A shelter that will be able to withstand Category 2 hurricane winds. This will add 924 shelter spaces to the West side of the island which is faced with a serious deficiency of shelter spaces.</p> <p><b>Comment:</b> Kauai Department of Public Works completed the improvements to the Kalaheo Community Gym, including the strengthening of the roof, allowing use of the gym as a shelter. (Type A, up to Category 2 hurricane winds.). This project was funded through the State Hurricane Program Funding.</p> <p><b>Lead Agency:</b> HI-EMA</p> <p><b>Funding Source:</b> State Hurricane Program Funding</p>	<p><b>Completed</b></p>
<p><b>Action:</b> State-2018-004 - Additional Mitigation Staffing: Document current shortfalls in implementing recent mitigation opportunities and prepare justification for additional positions. Provide technical assistance to up-coming Local Mitigation Plan updates.</p> <p><b>Comment:</b> A new hazard mitigation position was created in 2022: Hazard Mitigation Strategist. This position is currently funded by grant funds and moving to transition to State funds. Public outreach and education scope of the 2018 mitigation action was taken out and will be added as a new mitigation action in 2023 update. Technical assistance for public assistance staff regarding 406 mitigation was taken out and will be added as a new mitigation action in 2023 update.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-004</p>
<p><b>Action:</b> State-2018-005 - Earthquake Mitigation Training: Working with the public and private sectors to determine specific training needs and resources to reduce vulnerability of earthquakes.</p> <p><b>Comment:</b> Ongoing. Redefining and expanding the project to include actionable items such as The Great ShakeOut and structural retrofit.</p> <p><b>Lead Agency:</b> HETAC</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-005</p>
<p><b>Action:</b> State-2018-006 - Implement Actions from Natural Disaster Economic Recovery Strategy.</p> <ol style="list-style-type: none"> <li>1. Coordinate with OPSD to re-engage with the NDERS stakeholders.</li> <li>2. Review and prioritize recommendations with a focus on implementation.</li> <li>3. Identify strategy “champions” and potential funding sources.</li> <li>4. Provide logistical support to champions and support agencies.</li> <li>5. Schedule regular follow-up stakeholder meetings to track progress and identify gaps and solution.</li> </ol> <p><b>Comment:</b> Some progress was made on coordination with OPSD, but due to lack of staffing to support the project, significant progress on the other four items was not made. It is still a priority of the state and will be included in the plan for continued implementation as HI-EMA gains staffing support.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-006</p>
<p><b>Action:</b> State-2018-007 - Enhanced Coordination between HI-EMA and DLNR on Flood Mitigation Projects: HI-EMA will continue to work with DLNR to identify flood vulnerability, identify flood mitigation projects and provide technical assistance to secure grant funding to implement the mitigation projects to reduce flood losses in the State. Mitigation measures may include but are not limited to structural projects, plans, studies, outreach, and training.</p> <p><b>Comment:</b> HI-EMA attended the Q2 2022 Floodplain Manager meeting. Enhanced coordination is still needed between HI-EMA and DLNR. HI-EMA mitigation staff will continue to be invited to quarterly Floodplain Manager Meetings and work to identify flood vulnerability and mitigation projects.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-007</p>





Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> State-2018-008 - Long-Term Plan for GIS Staff, Training, and Technology – Implementation of GIS Assessment:</p> <ol style="list-style-type: none"> <li>1) Hire GIS staff.</li> <li>2) Acquire GIS resources (hardware, software, people, data, and methods) to fit State EOC needs and scale up as situation and County acceptance proceeds.</li> <li>3) Assess GIS system during exercise and adjust as resources and situation dictates.</li> </ol> <p><b>Comment:</b> Discontinued because duplicative to mitigation action State-2018-009. This action is removed from the mitigation strategy.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>Discontinued</b></p>
<p><b>Action:</b> State-2018-009 - Acquire GIS Staff, Training, and Technology</p> <ol style="list-style-type: none"> <li>1) Determine GIS needs and requirements for the Resilience Branch.</li> <li>2) Hire GIS staff for Resilience Branch to conduct project tracking and assist with mitigation planning.</li> <li>3) Acquire GIS licenses and equipment.</li> <li>4) Analyze results and provide recommendations for implementing statewide GIS for EOCs that leverage existing resources, are cost-effective, and are technologically feasible.</li> </ol> <p><b>Comment:</b> Progress has been made on some aspects of this action, while other aspects have not had measurable progress:</p> <ol style="list-style-type: none"> <li>1) HI-EMA knows what the current capabilities are and has determined a need for more staff.</li> <li>2) HI-EMA hired a GIS Specialist in 2020, but the position is open again. HI-EMA is continuing to try to fill the position.</li> <li>3) Measurable progress has not been made on acquiring GIS licenses and equipment.</li> <li>4) HI-EMA cannot dictate what the Counties have or do with their GIS capabilities. This aspect of the action will be removed in the updated action plan.</li> </ol> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-009</p>
<p><b>Action:</b> State-2018-010 - Water Bags for Distribution:</p> <p>HI-EMA will coordinate with the Honolulu Board of Water Supply (BWS) to purchase collapsible, 1-gallon water bags with an imprinted reminder to store 1 gallon of water per person per day for at least 14 days in preparation for an impending event. HI-EMA and BWS will coordinate with various partners to distribute the water bags at various events prior to the next hurricane season.</p> <p><b>Comment:</b> This mitigation action was completed by 2022.</p> <p><b>Lead Agency:</b> HI-EMA</p> <p><b>Funding Source:</b> Grant funded</p>	<p><b>Completed</b></p>
<p><b>Action:</b> State-2018-011 - Housing Vulnerability Assessment:</p> <p>Conduct a housing stock and social vulnerability assessment for seismic, high wind, and flooding vulnerabilities. The study would prioritize the retrofit actions, including incentives for homeowners to strengthen their residences, and to develop guidance for shelter retrofit guidance consistent with FEMA’s grant program guidance.</p> <p><b>Comment:</b> A grant application was submitted in February 2023 and is currently under review. The project will advance if funding is received.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-011</p>







Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> State-2018-012 - Retrofit of the Kaua'i War Memorial Convention Hall (KWMCH)-Emergency Shelter: Structural Analysis to determine suitability of KWMCH to serve as an emergency shelter and to determine scope of work. The retrofit will include hardening of the doors (33) and windows (40) which will serve as a minimum Type B Shelter (Category 1 hurricane). This project will add about 1,668 shelter spaces for the County and the heavily populated area of Lihue. This increases by 44% the amount of residents/visitors seeking shelters during hurricanes in the central portion of the Island.</p> <p><b>Comment:</b> FEMA awarded Phase one of the Kauai War Memorial Convention Hall, Hardening project (HMGP DR-4365-12-12R). The Department of Parks and Recreation has begun the solicitation of a firm to do the structural assessment.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-012</p>
<p><b>Action:</b> State-2018-013 - Retrofit of Moloka'i High School Gym-Emergency Shelter: This facility involves extensive retrofit of the building envelope, doors, windows, and other hardening measures. An initial engineering structural analysis has been completed, and a secondary SAM will be completed to ensure the retrofits are able to meet the EHPA standard.</p> <p><b>Comment:</b> A DR-4510 HMGP Hurricane Wind Envelope Hardening application for Moloka'i High School Gym is in development. This application will leverage the federal match opportunity and will bring the location up to the EHPA construction standard (Category 3 Hurricane Protection).</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-013</p>
<p><b>Action:</b> State-2018-014 - Retrofit of Moloka'i High School Locker Room and Cafeteria-Emergency Shelter: This project will involve the hardening of doors and windows to create Type B shelters which will withstand hurricane-force winds up to Category 1. A total of 600 emergency shelter spaces will be created on an island which has none at this time. An engineering evaluation of the buildings has been accomplished, which certified that the buildings are sound to serve as emergency shelters.</p> <p><b>Comment:</b> This action is not currently a priority item. Additional resources will be provided to meet the emergency sheltering need through the structural hardening of the Moloka'i Gymnasium. The current priority for the use of State hurricane retrofit funds is for the completion of facilities to the EHPA standard of sheltering providing protection for a Category 3 hurricane. This action is discontinued and removed from the mitigation strategy.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>Discontinued</b></p>
<p><b>Action:</b> State-2018-015 - Retrofit of Kapa'a Middle School-Emergency Shelter: An engineering analysis has been conducted to ensure that the school buildings are structural sound to serve as shelters. Four quads (classrooms) will have the doors and windows hardened to become Type B shelters (Category 1 hurricane). This increase emergency shelter spaces by 600 in a County where there is a serious shortfall.</p> <p><b>Comment:</b> The project acceptance date for the Kapa'a Middle School retrofit project was April 19, 2022. Buildings H and I were hardened to meet shelter Type A criteria (i.e., designed to protect against Category 2 hurricanes).</p> <p><b>Lead Agency:</b> HI-EMA</p> <p><b>Funding Source:</b> State Hurricane Shelter Retrofit Program</p>	<p><b>Completed</b></p>





Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> State-2018-016 - Enhance the State Technical Assistance Program to support State agencies and counties:</p> <p>Enhance the HI-EMA’s technical assistance program to support State agencies and counties in all aspects of mitigation. Examples of program expansion and enhancement include working with specific State agencies to support obtaining grant funding, such as DHHL, and submit projects for implementation. In addition, develop a standard operating procedure for providing counties technical assistance in updating their local Hazard Mitigation Plans and implementing hazard mitigation actions to reduce future losses in the State.</p> <p><b>Comment:</b> This is a priority in DR-4639 Mitigation Strategy. HI-EMA is coordinating with FEMA Pacific Area Office on delivering technical assistance trainings in 2022-2023.</p> <p>Technical assistance/training was completed in 2022. BCA, project/application development for BRIC, FMA, and HMGP, training were conducted in November 2022. HI-EMA will continue to enhance technical assistance to support state agencies and counties in the subapplication process for grant funding.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-016</p>
<p><b>Action:</b> State-2018-017 - Monitor water resources and conduct drought forecasts and impact assessments:</p> <ol style="list-style-type: none"> <li>1. Continue to and expand monitoring of hydrologic elements (rainfall, stream flow, reservoir water levels, ground water levels)</li> <li>2. Improve drought forecasting</li> <li>3. Increase drought research</li> <li>4. Collaborate with the National Integrated Drought Information System</li> </ol> <p>See Hawai’i Drought Plan 2017 Update for more details</p> <p><b>Comment:</b> Some actions are ongoing, and some are not started:</p> <ol style="list-style-type: none"> <li>1. CWRM continues to expand hydrologic monitoring as our budget allows. We have installed more stream gauges and monitor wells in 2018.</li> <li>2. No progress on improving drought forecasting.</li> <li>3. We are currently working with the Pacific Drought Knowledge Exchange to improve drought research and user products in Hawai’i.</li> <li>4. We continue to collaborate with NIDIS and the National Drought Mitigation Center on improving drought monitoring and impact assessments in Hawai’i.</li> </ol> <p><b>Lead Agency:</b> DLNR-CWRM</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-017</p>
<p><b>Action:</b> State-2018-018 - Increase water conservation, reuse, and recharge:</p> <ol style="list-style-type: none"> <li>1. Implement the Hawai’i Water Conservation Plan.</li> <li>2. Incentivize and promote reuse (e.g., grants, rebates, policies, etc.).</li> <li>3. Protect and restore watersheds important to water supply (e.g., fencing, invasive species removal, replanting, etc.).</li> </ol> <p>See Hawai’i Drought Plan 2017 Update for more details</p> <p><b>Comment:</b> Some projects in progress, while some are not started.</p> <ol style="list-style-type: none"> <li>1. CWRM is continuing to implement this Plan. We have implemented annual water audits for public water systems across the state.</li> <li>2. No progress on incentivizing and promoting reuse.</li> <li>3. DLNR Division of Forestry and Wildlife continues to protect and restore important watersheds across the state.</li> </ol> <p><b>Lead Agency:</b> DLNR-CWRM</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-018</p>





Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> State-2018-019 - Support the Hawai'i Association of Watershed Partnerships:</p> <ol style="list-style-type: none"> <li>1. Seek dedicated, long-term funding for watershed protection, restoration, and maintenance.</li> <li>2. Support forest stewardship programs.</li> </ol> <p>See Hawai'i Drought Plan 2017 Update for more details</p> <p><b>Comment:</b>  <b>Each aspect of this project is ongoing:</b></p> <ol style="list-style-type: none"> <li>1. Increased fire suppression funds through the State legislature in 2022. Additional funding is needed in future years.</li> <li>2. Supporting forest stewardship programs was done over the past five years and is an ongoing action.</li> </ol> <p><b>Lead Agency:</b> DLNR-DOFAW</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-019</p>
<p><b>Action:</b> State-2018-020 - Develop water sources:</p> <ol style="list-style-type: none"> <li>1. Encourage counties to develop emergency or backup water supplies.</li> <li>2. Encourage County water departments to develop their own drought/water shortage plans.</li> <li>3. Encourage counties to explore the use of alternative sources of water for non-potable uses (e.g., recycled wastewater, storm water).</li> </ol> <p>See Hawai'i Drought Plan 2017 Update for more details</p> <p><b>Comment:</b> This project is no longer under the State's jurisdiction and is not included in the updated action plan. Individual counties will implement the 2017 Hawai'i Drought Plan as applicable for their area.</p> <p><b>Lead Agency:</b> County water departments</p>	<p><b>Discontinued</b></p>
<p><b>Action:</b> State-2018-021 - Provide drought public education awareness and outreach:</p> <ol style="list-style-type: none"> <li>1. Continue to promote drought awareness campaigns and public outreach events (e.g., Wildfire &amp; Drought LOOK OUT!; Halawa Xeriscape Garden Open House and Unthirsty Plant Sale, etc.).</li> <li>2. Seek cooperative outreach &amp; education opportunities with agricultural agencies and organizations to promote drought awareness and conservation actions.</li> <li>3. Encourage water purveyors, businesses, and agricultural producers to develop individual drought plans.</li> </ol> <p>See Hawai'i Drought Plan 2017 Update for more details</p> <p><b>Comment:</b>  <b>Some aspects of this project had progress over the past five years, but others did not show measurable progress:</b></p> <ol style="list-style-type: none"> <li>1. The annual in-person events have been curtailed due to COVID, but they are beginning to come back.</li> <li>2. No measurable progress on seeking cooperative outreach &amp; education opportunities with agricultural agencies and organizations to promote drought awareness and conservation actions.</li> <li>3. Encouraging water purveyors, businesses, and agricultural producers to develop individual drought plans is conducted on an ad hoc basis as we identify opportunities to work with these sectors.</li> </ol> <p><b>Lead Agency:</b> DLNR-CWRM</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-021</p>
<p><b>Action:</b> State-2018-022 - Statewide Public Information Campaign to Increase Citizen Resilience to Flooding:</p> <ol style="list-style-type: none"> <li>1. Work with federal agencies with a role in insurance and State insurance regulator (DCCA) to develop campaign strategy and key messages.</li> <li>2. Develop a public information campaign, including public service announcements, fact sheets, and other forms of communication on the types of insurance and the need to purchase flood insurance.</li> <li>3. Measure Change in the number of active flood insurance policies compared to baseline levels. As of February 2018, there are 60,423 active flood insurance policies statewide.</li> </ol> <p><b>Comment:</b> This is an ongoing effort to provide information and updates on the National Flood Insurance Program (NFIP). Since the last SHMP update in 2018, DLNR-ENG has partnered with FEMA, State Insurance Commissioner, various state and local chapters of national associations representing the lending, insurance, and real estate stakeholders to assist in communicating flood risk and mitigation strategies.</p>	<p><b>Ongoing</b></p> <p><b>2023 Action:</b> 2023-2018-022</p>





Action Item from Previous Plan	Status and/or New Action Number
<p>Although DLNR-ENG has organized and participated in many education and outreach efforts, the list below summarizes the actions that specifically address flood insurance:</p> <p>January 26, 2018: 2018 BIA HOME BUILDING AND REMODELING SHOW: DLNR-ENG participated in this 3-day annual event held at the Neal Blaisdell Exhibition Hall (Oahu). The purpose of participation was to increase awareness on the NFIP and regulatory requirements.</p> <p>March 21, 2018: 2018 KAILUA EMERGENCY PREPAREDNESS FAIR: DLNR-ENG provided Kailua Alert &amp; Prepared president Dana Pagalaboyd with a variety of NFIP outreach material and factsheet on how to use our custom flood hazard map viewer (FHAT) for distribution at the event held at Christ Church Uniting Disciple (Oahu) to increase awareness on the NFIP.</p> <p>May 5, 2018: HONOLULU BOARD OF REALTORS - EAST OAHU REGIONAL GROUP: DLNR-ENG presented at the request of the group during an NFIP update during monthly meeting at Waialae Country Club (Oahu). Approximate number of attendees: 60</p> <p>May 10-17, 2018: NFIP CLAIMS - INFORMATIONAL SESSION: As a result of the April 2018 severe weather that caused significant flooding on Oahu and Kauai, DLNR-ENG requested FEMA's assistance in conducting insurance outreach to property owners since many insured were confused and frustrated with the NFIP claims process. DLNR-ENG planned, advertised, invited and hosted six (6) Flood Insurance Informational Sessions on Oahu and Kauai to provide flood insured home and business owners, as well as renters, and opportunity to attend a presentation given by NFIP General Adjuster, Jonathan Hardy, and NFIP Regional Manager, Adam Lizarraga. Approximate number of attendees for the entire event: 185</p> <p>May 10, 2018: Niu Valley Middle School (Oahu) 4 pm – 8 pm</p> <p>May 12, 2018: Kahala Mall (Oahu) 10 am – 2 pm. For more details, see below.</p> <p>May 14, 2018: Koloa Neighborhood Center (Kauai) 4 pm – 7 pm</p> <p>May 15, 2018: Hanalei Colony Resort (Kauai) 12 pm – 4 pm</p> <p>May 16, 2018: Anahola DHHL Clubhouse (Kauai) 4 pm – 7 pm</p> <p>May 17, 2018: Hale Halawai Ohana O Hanalei (Kauai) 12 pm – 4 pm</p> <p>May 12, 2018: 2018 EASTSIDE DISASTER PREPAREDNESS FAIR: DLNR-ENG personnel participated in this event at Kahala Shopping Mall (Oahu) from 10:00 AM – 2:00 PM. The purpose of participation is to increase awareness of the NFIP. FEMA staff was on-hand and available to answer any questions related to property owner's question on their flood damages from the April 2018 flood event and the claims process. Approximate number of visitors: 80</p> <p>June 2, 2018: 2018 MAUI DISASTER PREPAREDNESS EXPO: DLNR-ENG participated in this event held at Queen Kaahumanu Center (Maui). The purpose of participation is to increase awareness on the NFIP.</p> <p>July 28, 2018: 2018 READY2REACT: DLNR-ENG participated in this event held at Pearlridge Shopping Mall (Oahu). The purpose of participation is to increase awareness on the NFIP. Approximate number of attendees: 100</p> <p>August 13 and 14, 2018: 14th ANNUAL HAWAI'I FPM CONFERENCE: DLNR-ENG hosted this conference at Pomaikai'i Ballrooms at Dole Cannery (Oahu). Approximate number of attendees: 100. 12 CEC credits approved by ASFPM.</p> <p>September 8, 2018: 8th ANNUAL GET READY EWA BEACH PREPAREDNESS FAIR: DLNR-ENG participated in this event at Ewa Mahiko District Park (Oahu). Approximate number of attendees: 100.</p> <p>January 25-27, 2019: 2019 BIA HOME BUILDING AND REMODELING SHOW: DLNR-ENG participated in this 3-day annual event held at the Neal Blaisdell Exhibition Hall (Oahu). The purpose of participation was to increase awareness on the NFIP and regulatory requirements.</p> <p>August 12-13, 2019: 15th ANNUAL HAWAI'I FPM CONFERENCE: DLNR-ENG hosted this conference at the Ala Moana Hotel (Oahu). Approximate number of attendees: 108. 12 CEC credits approved by ASFPM.</p>	





Action Item from Previous Plan	Status and/or New Action Number
<p>August 14, 2019: NFIP FLOOD INSURANCE BRIEFING: DLNR-ENG co-hosted a Flood Insurance Workshop for State Department of Insurance's State Insurance Commissioner and staff. FEMA IX's flood insurance specialist, Ms. Edie Lohmann led the discussion. DLNR-ENG provided a live demo on ursin the FHAT tool.</p> <p>August 15, 2019: FLOOD INSURANCE TRAINING: DLNR-ENG co-hosted Flood Insurance Workshop for Insurance Agents, Realtors, and Lenders with HIIA at Ala Moana Hotel. Approximate number of attendees: 200. This workshop was approved for 3 Property &amp; Casualty credits for licensed insurance agents.</p> <p>September 15, 2019: FLOOD INSURANCE OUTREACH: DLNR-ENG and Hawai'i State DOI collaborated to produce an article to increase awareness on the importance of flood insurance for property owners and renters. DLNR's FHAT was also highlighted in the article as a tool that individuals can use to find out their flood risk. A copy of the article can be found in HONOLULU magazine (<a href="http://www.honolulumagazine.com/5-things-every-local-should-know-about-flood-risk-in-hawaii/">www.honolulumagazine.com/5-things-every-local-should-know-about-flood-risk-in-hawaii/</a>), DOI (<a href="http://cca.hawaii.gov/ins/">cca.hawaii.gov/ins/</a>) and DLNR-ENG's Wai Halana (<a href="http://waihhalana.org">waihhalana.org</a>) websites.</p> <p>January 24-26, 2020: 2020 BIA HOME BUILDING AND REMODELING SHOW: DLNR-ENG participated in this 3-day annual event held at the Neal Blaisdell Exhibition Hall (Oahu). The purpose of participation was to increase awareness on the NFIP and regulatory requirements.</p> <p>July 25-28, 2022: NFIP INSURANCE TRAINING: DLNR-ENG co-hosted Flood Insurance Workshop for Insurance Agents with HIIA in each County. Approximate number of attendees for entire road show: 150. This workshop was approved for 3 Property &amp; Casualty credits for licensed insurance agents.</p> <p><b>Lead Agency:</b> DLNR-ENG</p>	
<p><b>Action:</b> State-2018-023 - Integrated Hazard Mitigation of State Coastal Highways and Beaches from Chronic Coastal Flooding:</p> <ol style="list-style-type: none"> <li>1. Identify coastal highway segments across the state based on vulnerability to coastal hazards exacerbated by sea level rise and geological and physical viability for landward beach migration. (HDOT)</li> <li>2. Select top five State coastal highway segments, in consultation with County and community stakeholders, to develop coastal highway mitigation alternatives and evaluate feasibility of each alternative. (HDOT)</li> <li>3. Develop design specifications and implementation plan for the preferred alternative for each coastal highway segment. (HDOT)</li> <li>4. Implement coastal highway-beach mitigation. (HDOT)</li> <li>5. Conduct hazard mitigation utilizing nature-based approaches along coastal roads that are vulnerable to chronic and storm flooding and erosion, where relocation cannot be implemented in the near-term, to improve public safety and community resilience and protect public trust resources. (CC)</li> <li>6. Update coastal hazards modeling and vulnerability assessment as needed based on new climate science, sea level rise projections, and methods. (CC)</li> </ol> <p><b>Comment:</b> Minimal progress was made on this action due to lack of staffing capacity and funding. It is still a state priority; however, this will be under the lead of HDOT and the Climate Commission in the plan update.</p> <p><b>Lead Agency:</b> HDOT Highway Division, Hawai'i Climate Change Mitigation and Adaptation Commission</p>	<p><b>No Progress</b></p> <p><b>2023 Action:</b> 2023-2018-023</p>
<p><b>Action:</b> State-2018-024 - Reduce and/or convert hazardous fuels on fallow agricultural lands: Implement fuel management through alternative land uses, such as reforestation and active agriculture. Also create and maintain fuel and fire breaks.</p> <p><b>Comment:</b> Routine maintenance as well as reforestation and farming are conducted on an ongoing basis. However, additional land is in need of implementing fuel management.</p> <p><b>Lead Agency:</b> DLNR-DOFAW</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-024</p>





Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> State-2018-025 - Reduce and/or convert hazardous fuels in the Wildland Urban Interface (WUI) to reduce the threat of wildfires to communities and conservation land near them: Implement fuel breaks, including greenbreaks or vegetated fuel breaks; managed grazing; and as necessary, prescribed burns. Increase plant propagation for outplantings in the greenbreaks.</p> <p><b>Comment:</b> Routine maintenance and restoration are performed on an ongoing basis. However, additional land is in need of restoration, which would stop the grass fire cycle by converting invasive dominated grassland to native forest.</p> <p><b>Lead Agency:</b> DLNR-DOFAW</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-025</p>
<p><b>Action:</b> State-2018-026 - Assess, identify, and implement State nursery improvements needed to provide native plants for green breaks: Nursery improvements are needed in order to increase plant propagation for outplantings in the greenbreaks.</p> <p><b>Comment:</b> Some planning and nursery improvements have been implemented, while additional needs exist.</p> <p><b>Lead Agency:</b> DLNR-DOFAW</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-026</p>
<p><b>Action:</b> State-2018-027 - Develop water sources, including installation of water storage structures: Install water storage structures, such as portable catchment tanks, reservoirs, and dip tanks.</p> <p><b>Comment:</b> Water storage structures have been installed, but additional needs exist. DOD REPI notice of funding received for four tanks on Hawai'i Island, but additional funding is needed through the USFS.</p> <p><b>Lead Agency:</b> DLNR-DOFAW</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-027</p>
<p><b>Action:</b> State-2018-028 - Provide wildfire awareness, preparedness, and prevention education involving all sectors: Create a statewide, interagency wildfire prevention plan. Continue all-agency, unified wildfire and drought awareness campaign annually. Hold National Wildfire Community Preparedness Day events in each County annually. Establish Outreach and Education Specialists at each DLNR-DOFAW District Office. Reach a wider audience by participating in interagency wildfire outreach and education efforts at community emergency preparedness fairs.</p> <p><b>Comment:</b> This is an ongoing, programmatic action that has been implemented over the past five years through the annual Wildfire &amp; Drought LOOKOUT! awareness campaign and the National Wildfire Community Preparedness Day on the first Saturday of May each year. The COVID-19 pandemic interrupted some awareness and education events, but they are back on schedule.</p> <p><b>Lead Agency:</b> DLNR-DOFAW</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-028</p>
<p><b>Action:</b> State-2018-029 - Maintain and improve fire and fuel breaks/access roads on State land: Clear, reduce, and convert hazardous fuel in fire and fuel breaks and on both sides of access roads. Monitor vegetative regrowth due to year-round growing season and invasive, fire-prone grasses that grow back quickly. Improve access roads, including paving, repaving, or grading.</p> <p><b>Comment:</b> Routine maintenance is performed on an ongoing basis. The DOD REPI program will fund additional fuel breaks on leeward Hawai'i Island. Additional funding will be applied for from the USFS for fuel breaks on other islands.</p> <p><b>Lead Agency:</b> DLNR-DOFAW</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-029</p>





Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> State-2018-030 - Establish additional Community Wildfire Protection Plans (CWPP): There are 14 CWPPs established throughout Hawaii, which cover over half of the State. Each County has at least one CWPP. Areas not covered by a CWPP will need to be prioritized. Once funding is secured, the entity writing the CWPP will hold community and agency meetings, process data, and write plan.</p> <p><b>Comment:</b> Additional CWPPs are needed to ensure statewide coverage. The Kahikinui was updated in 2021/2022. There are 14 total CWPPs, with one more in development in East Honolulu. Four of the existing plans are scheduled to be revised over the next 2–3 years if funding is received.</p> <p><b>Lead Agency:</b> DLNR-DOFAW</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-030</p>
<p><b>Action:</b> State-2018-031 - Prevent structure ignition from wildfires in the home ignition zone through home hardening: Educate residents and assist them with home hardening through voluntary mitigation programs for existing communities, such as Firewise USA. Increase the number of recognized Firewise USA sites throughout the State as well as establish recognized Firewise USA sites in all counties. Increase the amount of risk reduction investment by each recognized Firewise USA site. Ensure that new development is following the State Fire Code’s Chapter 17 WUI.</p> <p><b>Comment:</b> Some communities are already recognized Firewise USA sites, while others are in the process of gaining recognition. Currently 15 communities are part of the Firewise program, with Mariner's Cove as the most recent addition. HWO program would like to train more assessors from the community and County fire departments so additional assessments can take place.</p> <p><b>Lead Agency:</b> DLNR-DOFAW</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-031</p>
<p><b>Action:</b> State-2018-032 - Install and maintain remote automated weather stations (RAWS): Purchase and install additional RAWS. Maintain RAWS to ensure that all stations within Hawaii’s network are operational.</p> <p><b>Comment:</b> Additional RAWS are needed and current stations are maintained on an ongoing basis. No additional RAWS have been added over the past five years. This action will be included in the plan update to purchase and install additional RAWS and maintain existing RAWS to ensure all stations within the network are operational.</p> <p><b>Lead Agency:</b> DLNR-DOFAW for State-operated RAWS</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-032</p>
<p><b>Action:</b> State-2018-033 - Cesspool Abatement Program: High-Priority Area Cesspool Abatement Program –Implement a public-private cost-share program between the State, Counties, and the private landowners to incentivize upgrades of qualified cesspools to a septic tank or aerobic treatment system, prioritizing identified high-priority areas and cesspools posing the greatest risk to ground water contamination and/or surface water impairment as a result of system overflow during heavy rainfall events.</p> <p><b>Comment:</b> A current program exists in the State under Act 120 in which a taxpayer may apply for a tax credit of up to \$10,000 for cesspools upgraded to a sewer or septic system. The program has been limited to a total of \$5 million – roughly 500 cesspool upgrades per-year. To date, only about 50 taxpayers have utilized the program. A new strategy is therefore required to increase cesspool abatement participation. DOH is currently working on a pass-through loan program with the Counties of Kauai, Maui, and Hawai’i to fund cesspool replacement and upgrade projects. The DOH anticipates the loan program will be established by the end of State Fiscal Year 2023. This pass-through loan program includes providing Counties with principal forgiveness loans that are like grants. The Counties will provide this funding to homeowners to upgrade cesspools. We are working with the Counties to ensure that the funding is provided to cesspools that are posing the greatest risks to ground water contamination and/or surface waters using our Hazard Assessment and &amp; Prioritization Tool.</p> <p><b>Lead Agency:</b> DOH</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-033</p>





Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> State-2018-034 - Hardening State Laboratory Facility: Harden State laboratory facility to increase all-hazards resilience:</p> <ul style="list-style-type: none"> <li>•Add protective closure for cooling tower (est. \$116,000)</li> <li>•Add shatter proof window films (est. \$197,000)</li> <li>•Provide second transformer and double ended switchgear (est. \$1,251,000)</li> <li>•Provide separate feeders to mechanical equipment (est. \$878,000)</li> <li>•Provide redundant emergency generator (est. \$3,758,000)</li> <li>•Provide additional fuel tank for 7-day supply of emergency generator fuel (5 additional days from current capacity) (est. \$428,000)</li> </ul> <p><b>Comment:</b> An initial assessment of the facility was conducted in 2013 that identified the recommended hardening actions and provided an initial cost estimate. An additional analysis would likely be required to assess if the initial quotes provided (reflected in the project description) are still accurate and/or if additional hardening actions may be required. No further progress has been made on these hardening actions. Concern was raised that even with these hardening actions, the laboratory would still not be able to function in a power outage given that the current emergency power system does not allow lab work to be conducted in a power loss situation as it does not completely power the HVAC system. SLD is currently engaged with DAGS in construction of a 1200 +/- square foot Biosafety level 3 addition. This addition will have a separate emergency power system and would be able to function in the event of power loss using that emergency power system.</p> <p><b>Lead Agency:</b> DOH</p>	<p><b>No Progress</b></p> <p><b>2023 Action:</b> 2023-2018-034</p>
<p><b>Action:</b> State-2018-035 - Enhance Hawai'i Rain Gauge Network: To install more rain gauges and monitor and collect the data on a timely basis, maintain a website for this.</p> <p><b>Comment:</b> The Hawai'i Mesonet project was funded by the National Science Foundation in late 2021 to deploy 84 new meteorological stations in the Hawaiian Islands. The purpose is to collect and produce real-time weather data. In the past, efforts were made to identify the best new stations and contact land managers and station partners. Currently, on-site visits to verify some of the metrics defined by the Hawai'i Mesonet team for site selection and discussion with landowners in these areas are ongoing. Students will help install, calibrate, and maintain weather data. Recently, support staff on each island was hired for the project.</p> <p><u>References</u></p> <p>Chen, Y.R., and P.-S. Chu, 2014: Trends in precipitation extremes and return levels in the Hawaiian Islands under a changing climate. <i>International Journal of Climatology</i>, 34, 3913-3925.</p> <p>Huang and Coauthors, 2022: Hourly rainfall data from rain gauge networks and weather radar up to 2020 across the Hawaiian Islands: Scientific data. In review.</p> <p>Gayte, M., 2022: Characterizing rainfall regimes changes and estimating the timing of high streamflow events across the five main Hawaiian Islands. M.S. thesis, Department of Natural Resources and Environmental Management, University of Hawaii-Manoa, 97 pp.</p> <p><b>Lead Agency:</b> Hawai'i State Climate Office</p> <p><b>Funding Source:</b> National Science Foundation</p>	<p><b>Completed</b></p>







Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> State-2018-036 - High-resolution Numerical Simulation of the April 2018 Kaua’i Flooding Events: Use a high-resolution numerical weather model and the large-scale meteorological conditions to simulate the flooding event. Will use a dynamical downscaling approach and ensemble forecasting techniques to assess the probability of flooding.</p> <p><b>Comment:</b> Northern Kaua’i experienced a catastrophic flood event during April 14-15, 2018, with the greatest 24-hour total being 49.69 inches (1,262 mm). This set a new U.S. 24-hour rainfall record and wreaked havoc on the local community for weeks. The objective of this project is to know whether this immense downpour can be simulated using a state-of-the-art high-resolution mesoscale numerical model through dynamical downscaling because the operational weather center was unable to foreshadow this extraordinary event with sufficient lead time. Other objectives are to understand key meteorological factors that are conducive to this intense flooding event so that better preparation and hazard mitigation can be made in the future. This project has been funded by FEMA since 2020 for a three-year duration. The numerical weather model used is the Weather Research and Forecast (WRF) version 4.2 developed by the National Center for Atmospheric Research in Boulder, Colorado. For initial and boundary conditions, the European ERA5 Reanalysis data set at 31 km horizontal resolution and six hourly intervals is used to drive the WRF. Because of the small study area, a dynamical downscaling approach is applied to reproduce local weather at very fine-scale resolutions. The simulation is conducted with one-way nesting for three meshes of 12 km (domain 1), 4 km (domain 2), and 1.3 km (domain 3) horizontal grid spacing. That is, the WRF model will be able to simulate weather variables (e.g., rainfall, wind) at high-resolution (1.3 km) over the entire island of Kaua’i. The model configuration includes longwave and shortwave radiation schemes, boundary-layer scheme, cumulus parameterization scheme, cloud microphysics scheme, and a land surface model. The simulation period is April 13 to April 15, 2018.</p> <p>In the past two years, we rigorously conducted a suite of numerical experiments using five different cumulus schemes and eight different cloud microphysics schemes, and compared simulation results with observations from rain gauges, radar images, and satellite products. The purpose is to determine which pair of cumulus parametrization-cloud microphysics schemes most closely resembles the observations. The comparison focused on three episodes based on hourly and 15-min rainfall records at Waipa Garden near the epic center in northern Kaua’i. The first episode occurred from 1-7 pm on April 14 with a total of 20 inches of rainfall. The second episode ran from 12 am to 5 am on April 15 with 18 inches of rainfall. This is followed by the third episode which ran from 10:30 am to 12:45 pm on April 15 with eight inches rainfall. For five cumulus schemes, Grell-Freitas ensemble and Modified Tiedtke are better than the other three schemes in simulating hourly rainfall spatial distribution during episodes 2 and 3 when used in combination with WSM 6-class graupel (mp_physics=6) cloud microphysics scheme. Both cumulus schemes clearly simulate the eastward movement of the rainstorm, and a southward expansion of the convective system, as observed in the corresponding radar reflectivity images. Although the Grell-Freitas ensemble scheme can realistically simulate the northeast-southwest tilting of the rain-band, the intensity of rain rate is weaker, and the storm center is slightly to the east compared to observations. For instance, during the true 24-h period of peak rainfall (12:45 pm April 14 to 12:45 pm April 15), the simulated rainfall from Grell-Freitas ensemble scheme is ~400 mm, relative to &gt;1,000 mm from the Modified Tiedtke scheme.</p> <p>Northern Kaua’i features complex terrain with Mount Wai’ale’ale in central Kaua’i reaching an elevation of 1,569 m. Elevated terrains provide orographic uplift that enhances convection and convective rainfall along the northern slopes of Kaua’i. This may provide a key mechanism for enhancing the record-breaking rainfall. Our current effort is to reduce the terrain of Kauai using modeling techniques to investigate how the terrain may affect the development of thunderstorms.</p> <p><b>Lead Agency:</b> Hawai’i State Climate Office</p> <p><b>Funding Source:</b> FEMA HMGP (Hazard Mitigation Grant Program)</p>	<p><b>Completed</b></p>





Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> State-2018-037 - Estimating return periods of Extreme Rainfall Events for Kaua’i, Hawai’i: Collect and process high-frequency (hourly if available) rainfall data; quality control of raw rainfall data; use the extreme value distribution to compute extreme rainfall corresponding to different return periods (e.g., 20-yr, 50-yr); spatial analysis of extreme rainfall events defined by return values Reference: Chu, P.-S., coauthors, 2009: Extreme rainfall events in the Hawaiian Islands. Journal of Applied Meteorology and Climatology, 48, 502-516.</p> <p><b>Comment:</b> Historical hourly rainfall data for Kaua’i were obtained from diverse federal, state, and private sectors (Huang et al., 2022). The majority of data comes from the National Weather Service and the USGS. Initially, there were 41 rain gauges available from Kaua’i. After screening using an automated and manual quality control process, and to keep homogeneity and consistency in analyses, 20 stations were finally selected for the study. To estimate return periods of extreme rainfall events, a generalized extreme value (GEV) distribution is used. The GEV distribution is often found to be a good approximation for the statistics of the maxima of random variables. The probability density function of GEV can be integrated analytically to yield the cumulative distribution function (CDF), which can be inverted to yield an explicit formula of the quantile function. This makes GEV very appealing because once its distribution parameters are known, its extreme value corresponding to any desired return period (e.g., 50 or 100-yr) can be easily determined. This extreme value is known as the “return level”, which is expressed as the same unit as rainfall, mm, and exceeded by the annual maximum value in any particular year with probability p.</p> <p>Results indicate that windward Kaua’i exhibits high return levels with rainfall intensity ranging from 40 mm/hr (2-yr return period) to 100 mm/hr (100-yr return period) (Gayte, 2022). In comparison, sites in leeward Kaua’i show lower return levels, varying from 30 mm/hr (2-yr return period) to 70 mm/hr (100-yr return period). A nonparametric rank-based Mann-Kendall test and Sen’s method are applied to analyze whether the trends in return levels are statistically significant during 1990-2020 (Chen and Chu, 2014). Spatial analysis of trends in return levels indicates rather different patterns across Kaua’i. That is, rain gauges located on the northern coast are characterized by a downward trend while gauges on the eastern Kauai have a positive trend.</p> <p><u>References</u></p> <p>Chen, Y.R., and P.-S. Chu, 2014: Trends in precipitation extremes and return levels in the Hawaiian Islands under a changing climate. International Journal of Climatology, 34, 3913-3925.</p> <p>Huang and Coauthors, 2022: Hourly rainfall data from rain gauge networks and weather radar up to 2020 across the Hawaiian Islands: Scientific data. In review.</p> <p>Gayte, M., 2022: Characterizing rainfall regimes changes and estimating the timing of high streamflow events across the five main Hawaiian Islands. M.S. thesis, Department of Natural Resources and Environmental Management, University of Hawaii-Manoa, 97 pp.</p> <p><b>Lead Agency:</b> UH</p> <p><b>Funding Source:</b> FEMA HMGP (Hazard Mitigation Grant Program)</p>	<p><b>Completed</b></p>





Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> State-2018-038 - Model Resources for Streamlined and Resilient Disaster Reconstruction in Hawai'i: This Guidance is intended to help State and County agencies, communities, and other stakeholders:</p> <ul style="list-style-type: none"> <li>•Expand and support the institution of reconstruction guidelines and policies that will balance regulatory control and recovery speed, protect sensitive environmental and cultural resources, and incorporate mitigation and adaptation strategies throughout the process to increase resilience for future hazards;</li> <li>•Support Hawai'i Sea Grant in conducting reconstruction and resilience workshops to inform development of guidelines, ordinances, and policies;</li> <li>•Bring planners and emergency managers to a common understanding how their fields interact after a disaster; and</li> <li>•Inform the Climate Commission of guidelines and model resources for improving resilience to coastal flooding-related disaster events, building on the recommendations of the State SLR Report.</li> </ul> <p>Model resources developed through the project will include recovery preparedness plan outline, State-level emergency proclamation including considerations of resilient recover, model reconstruction ordinance, and model communication between agencies and community. The project is building on previous work by Maui County and Hawai'i Sea Grant.</p> <p><b>Comment:</b> This was published in July 2019. Guidance for Disaster Recovery Preparedness in Hawai'i: <a href="https://seagrants.soest.hawaii.edu/guidance-for-disaster-recovery-preparedness-in-hawaii/">https://seagrants.soest.hawaii.edu/guidance-for-disaster-recovery-preparedness-in-hawaii/</a> Through a National Oceanic and Atmospheric Administration (NOAA) Regional Coastal Resilience Grant, the Hawai'i Sea Grant College Program together with the State of Hawai'i Department of Land and Natural Resources (DLNR), Office of Planning, and Tetra Tech, Inc., developed statewide guidance documents and tools to improve community resilience to coastal hazards and sea level rise, building on the work of the 2017 Hawai'i Sea Level Rise Vulnerability and Adaptation Report. This guidance document, with recommended practices and model resources, was developed with State and County government in Hawai'i to assist them in establishing resilience-focused recovery practices before a disaster event to enable communities to recover quickly while also protecting sensitive coastal environments. Guidance and model resources include three potential outputs of disaster recovery preparedness: disaster recovery ordinance, disaster recovery framework, and disaster reconstruction ordinance.</p> <p><b>Lead Agency:</b> UH Sea Grant in partnership with State DLNR and OP through grant and cooperative agreement with NOAA.</p> <p><b>Funding Source:</b> (NOAA) Regional Coastal Resilience Grant 2017</p>	<p><b>Completed</b></p>





Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> State-2018-039 - Guidance for Addressing Sea Level Rise in Community Planning: This Guidance is intended to help State and County agencies, communities, and other stakeholders:</p> <ul style="list-style-type: none"> <li>•Use the best available science and tools in community planning for sea level rise.</li> <li>•Apply the State’s climate adaptation priority guidelines to enhance coastal resilience through planning.</li> <li>•Integrate policies, strategies, and actions in community-level plans to address existing and future chronic coastal flooding with sea level rise.</li> <li>•Identify ways to promote horizontal and vertical policy consistency.</li> <li>•Define a process for monitoring, evaluation, and learning to support adaptive management needed with evolving climate science and under changing conditions.</li> </ul> <p><b>Comment:</b> <a href="https://seagrant.soest.hawaii.edu/guidance-for-addressing-slr-in-community-planning-in-hi-2/">https://seagrant.soest.hawaii.edu/guidance-for-addressing-slr-in-community-planning-in-hi-2/</a> Through a National Oceanic and Atmospheric Administration (NOAA) Regional Coastal Resilience Grant, the Hawai’i Sea Grant College Program together with the State of Hawai’i Department of Land and Natural Resources (DLNR), Office of Planning, and Tetra Tech, Inc., developed statewide guidance documents and tools to improve community resilience to coastal hazards and sea level rise effects, building on the work of the State of Hawai’i Sea Level Rise Vulnerability and Adaptation Report. This Guidance for Addressing Sea Level Rise in Community Planning in Hawai’i is intended to assist County planners to build upon and improve existing efforts to address sea level rise and includes recommended practices, examples, and resources, to assist County government in addressing sea level rise and coastal hazards as part of County planning and implementation framework. Developed through extensive input from the County planning departments and based on Hawaii’s existing planning context, this guidance is organized under four key topics: vulnerability assessment, land use and development alternatives, plan and policy alignment, and adaptive management.</p> <p><b>Lead Agency:</b> UH Sea Grant in partnership with State DLNR and OP through grant and cooperative agreement with NOAA.</p> <p><b>Funding Source:</b> NOAA Regional Coastal Resilience Grant</p>	<p><b>Completed</b></p>
<p><b>Action:</b> State-2018-040 - Hawai’i Sea Level Rise Viewer: Viewer has been built and released. Developed and hosted by PacIOOS. <a href="http://hawaiisealevelriseviewer.org">hawaiisealevelriseviewer.org</a> Ongoing actions include trainings and demonstrations of utility of viewer, utilizing viewer in community planning. Project is part of larger Hawai’i Sea Grant –led program “Building Resilience to Coastal Hazards and Sea Level Rise in Hawaii” (see funding NOAA funding info, below). Viewer was accepted along with State SLR Report by State Interagency Climate Change Mitigation and Adaptation Commission.</p> <p><b>Comment:</b> The Hawai’i Sea Level Rise Viewer was completed and publicly released in December 2017: <a href="http://www.hawaiisealevelriseviewer.org">www.hawaiisealevelriseviewer.org</a> This Viewer provides localized and property scale maps of potential future exposure to sea level rise from high tide and high wave flooding and coastal erosion. The significance of the viewer is that it provides a tangible basis for planning and policy discussions. The SLR Viewer and the information it provides very quickly became part of household conversations and is becoming institutionalized as the basis of plans, policies, and decisions. As a result, it is now part of State and County Hazard Mitigation Plans, it is being incorporated into community plans that direct land use for the next 30 years, it is the basis of ongoing vulnerability assessments at the local level for capital improvement decisions, and as the basis for proposed shoreline development setbacks.</p> <p><b>Lead Agency:</b> UH Sea Grant in partnership with State DLNR and OP through grant and cooperative agreement with NOAA. Viewer was developed by PacIOOS at UH.</p> <p><b>Funding Source:</b> NOAA Regional Coastal Resilience Grant</p>	<p><b>Completed</b></p>





Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> State-2018-041 - Comprehensive Education/Outreach Plan for State: 2017 HB-571 – Require Comprehensive Education and Outreach Plan –Team with US Sea Grant to implement strategies to reach all individuals and all organizations. For 2022-2023, under the HMGP Program, this is being addressed with the Project Aloha Safe Homes - Community Behavior - which targets Unreceptive or difficult to reach citizens.</p> <p><b>Comment:</b> A Communication Plan to Reach the Whole Community was submitted to the legislature in 2020. See: <a href="https://seagrant.soest.hawaii.edu/wp-content/uploads/2020/09/Communication-Strategy-Outreach-Plan-V.1.pdf">https://seagrant.soest.hawaii.edu/wp-content/uploads/2020/09/Communication-Strategy-Outreach-Plan-V.1.pdf</a> - Minor elements of the Plan have been completed - about 5%. A major portion of the plan can be implemented with HMGP 4510 - Aloha Safe Homes Community Behavior, to be submitted in January of 2023. Education and Outreach for the entire community is a continuing task for preparation. This is already in the 2018 SHMP. Of the 84 action items in the Plan, this received the highest score of 59, along with two other items, one being the Companion to this Project - Aloha Safe Homes - Education and Outreach. The need for Education and Outreach should be further strengthened in the 2023 Plan. It was the top priority in the FEMA, ACOE, HI-EMA Hurricane Behavioral Study (2018).</p> <p><b>Lead Agency:</b> UH Sea Grant</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-041</p>
<p><b>Action:</b> State-2018-042 - Homeowners Handbook to Prepare for Natural Hazards: Update homeowners handbook for hazard events, obtain funding to reprint, and incorporate lessons learned such as from Hurricane Ida in Louisiana.</p> <p><b>Comment:</b> The Homeowner's Handbook has been informing citizens since 2007. The book is currently in the 4th Edition. This is an ongoing project with updating required for recent hazard events as well as new mitigation measures (e.g., damage assessed for Hurricane Ida in Louisiana). This is being funded with HMGP for 2022/2023 which calls for update of the book, printing 20,000 copies, and conducting 60 outreach and education events in the State of Hawai'i.</p> <p><b>Lead Agency:</b> UH Sea Grant</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-042</p>
<p><b>Action:</b> State-2018-043 - Comprehensive Wastewater Management Plan: Implement statewide wastewater management program with funding to inventory and maintain database of on-site systems. Implement statewide code that requires maintenance contracts. Develop robust education and outreach program.</p> <p><b>Comment:</b> DOH has an inventory of cesspools and other on-site systems that still needs to be validated. There are over 130,000 on-site systems in Hawai'i that will need to be validated. DOH is currently researching ways of how this validation will be done. DOH currently requires maintenance contracts for aerobic treatment units. The DOH has plans of amending the Hawai'i Administrative Rules to include the requirement of having maintenance contracts for septic systems. DOH with the assistance of the University of Hawai'i Water Resources Research Center has developed a geographic information system that is a Hazard Assessment and Prioritization Tool that includes sea level rise zones for on-site systems. This tool identifies areas in the State of Hawai'i that have on-site systems that are vulnerable to sea level rise. DOH is currently administering a Cesspool Conversion Working Group that is tasked to develop a long-term plan to address cesspool replacements by 2050. Education and outreach will be developed after the long-term plan is completed in December 2022.</p> <p><b>Lead Agency:</b> DOH</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-043</p>





Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> State-2018-044 - Building Code Amendments to Reduce Existing and Future Stock Vulnerability to Coastal Hazards &amp; Climate Impacts in the City &amp; County of Honolulu, Hawai'i: Report was produced for the City and County of Honolulu to implement as useful.</p> <p><b>Comment:</b> The state of Hawai'i and the County of Honolulu have adopted the 2015 International Residential Code and International Building code, both of which included improvements to improving existing and future stock vulnerability to coastal hazards. Undergoing final editorial revisions.</p> <p><b>Lead Agency:</b> Hawai'i State Energy Office</p> <p><b>Funding Source:</b> In kind</p>	<p><b>Completed</b></p>
<p><b>Action:</b> State-2018-045 - Building Code Amendments to Reduce Existing and Future Stock Vulnerability to Coastal Hazards &amp; Climate Impacts for the Counties of Hawai'i, Maui and Kaua'i, State of Hawai'i: Report to be produced for the Counties to implement as useful.</p> <p><b>Comment:</b> The state of Hawai'i and the Counties of Hawai'i, Maui and Kaua'i have adopted the 2015 International Residential Code and International Building code, both of which included improvements to improving existing and future stock vulnerability to coastal hazards Undergoing final editorial revisions.</p> <p><b>Lead Agency:</b> State of Hawai'i DBEDT</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-045</p>
<p><b>Action:</b> State-2018-046 - Green Infrastructure Study and Plan:</p> <ol style="list-style-type: none"> <li>1. Identify green infrastructure opportunities in the State, including any related costs and savings.</li> <li>2. Identify green infrastructure planning and development best practices in the State for potential application, including financing and community engagement practices.</li> <li>3. Complete a plan that details how the State can move forward to cost effectively take advantage of identified opportunities, including related costs and savings.</li> <li>4. Identify any legal or regulatory Changes that will be needed to execute the completed plan.</li> </ol> <p><b>Comment:</b> There was no measurable progress due to a lack of capacity. This action is still considered viable and will be carried over to the plan update.</p> <p><b>Lead Agency:</b> State of Hawai'i DBEDT</p>	<p><b>No Progress</b></p> <p><b>2023 Action:</b> 2023-2018-046</p>
<p><b>Action:</b> State-2018-047 - Report Assessing the Feasibility and Implications of Managed Retreat Strategies for Vulnerable Coastal Areas in Hawai'i: Information gathered will feed into a report covering the potential for and feasibility of a managed retreat framework in the state. This report will summarize the complex systems affected by potential managed retreat and provide a solid basis to inform future legislation for the State, under which funding and requirements for a managed retreat framework would occur.</p> <p><b>Comment:</b> This report was completed in February 2019. The final report can be found here: <a href="https://planning.hawaii.gov/czm/ormp/ormp-action-team-project-on-the-feasibility-of-managed-retreat-for-hawaii/">https://planning.hawaii.gov/czm/ormp/ormp-action-team-project-on-the-feasibility-of-managed-retreat-for-hawaii/</a></p> <p><b>Lead Agency:</b> State of Hawai'i DBEDT</p> <p><b>Funding Source:</b> NOAA CZM funds</p>	<p><b>Completed</b></p>
<p><b>Action:</b> State-2018-048 - Develop criteria to rank infrastructure most threatened by chronic coastal flooding, climate change, and sea level rise, develop mitigation strategy to either retreat threatened infrastructure or nature-based engineering solution to harden, if retreat is not possible, and retreat or harden infrastructure.</p> <p><b>Comment:</b> There was no measurable progress on this action specifically, but progress was made on related projects that would inform pilot projects/methodology for this action.</p> <p><b>Lead Agency:</b> State of Hawai'i DBEDT</p>	<p><b>No Progress</b></p> <p><b>2023 Action:</b> 2023-2018-048</p>





Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> State-2018-049 - Development of Comprehensive High-Resolution Probabilistic Tsunami Design Zone Maps Compatible with ASCE 7-16 for the Island of O’ahu, State of Hawai’i:                      This project is Phase I / Years 1 and 2 of a multi-phase and -year endeavor described as follows:                      Phase I /Year 1</p> <ul style="list-style-type: none"> <li>• Develop Phase I project work plan.</li> <li>• Conduct modeling/mapping of the City &amp; County of Honolulu (Urban core south coast and Hale’iwa)</li> </ul> <p>Phase I /Year 2.</p> <ul style="list-style-type: none"> <li>• Complete modeling/mapping for entire City &amp; County of Honolulu Island of O’ahu.</li> <li>• Conduct independent technical review to ensure compliance with the ASCE 7-16 Chapter 6 Probabilistic Tsunami Hazard Analysis mapping criteria.</li> <li>• Draft proposed language for the Honolulu City Council to consider amending the City &amp; County of Honolulu Building Code to adopt the probabilistic Tsunami Design Zone maps/model data developed pursuant to this project along with styles of maps appropriate for use in the City &amp; County of Honolulu Building Code and the ASCETsunami Design Geodatabase.</li> </ul> <p><b>Comment:</b> Phase 1, year 1 of this action has been started but has not made significant progress. It is still a priority for the State and will be included in the updated action plan.</p> <p><b>Lead Agency:</b> State of Hawai’i DBEDT</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-049</p>





Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> State-2018-050 - Development of Comprehensive High-Resolution Probabilistic Tsunami Design Zone Maps Compatible with ASCE 7-16 for the Counties of Hawai'i, Maui, and Kaua'i, State of Hawai'i:</p> <p>Phase I / Year 1</p> <ul style="list-style-type: none"> <li>• Develop Phase I project work plan.</li> <li>• Conduct modeling/mapping of City &amp; County of Honolulu (Urban core south coast and Hale'iwa).</li> <li>• Conduct independent technical review to ensure compliance with ASCE 7 criteria.</li> </ul> <p>Phase I / Year 2</p> <ul style="list-style-type: none"> <li>• Complete modeling/mapping for entire City &amp; County of Honolulu Island of O'ahu.</li> <li>• Conduct independent technical review to ensure compliance with ASCE 7 criteria.</li> <li>• Draft proposed language for the Honolulu City Council to consider amending the City &amp; County of Honolulu Building Code to adopt the probabilistic Tsunami Design Zone maps / model data developed pursuant to this project along with styles of maps appropriate to the City &amp; County of Honolulu Building Code and the ASCE Tsunami Design Geodatabase.</li> </ul> <p>Phase I / Year 3</p> <ul style="list-style-type: none"> <li>• Initiate modeling/mapping for Hawai'i, Maui, and Kaua'i Counties.</li> </ul> <p>Phase(s) I &amp; II/ Year 4</p> <ul style="list-style-type: none"> <li>• Complete modeling/mapping for Hawai'i, Maui, and Kaua'i Counties.</li> <li>• Conduct independent technical review to ensure compliance with ASCE 7 criteria.</li> <li>• Draft proposed language for County Councils of Hawai'i, Maui, and Kaua'i to consider amending their building codes to adopt the probabilistic Tsunami Design Zone maps / model data developed pursuant to this project along with styles of maps appropriate for use in their respective County building codes and the ASCE Tsunami Design Geodatabase.</li> </ul> <p>Phase II/ Year 5</p> <ul style="list-style-type: none"> <li>• Complete drafting proposed language for County Councils of Hawai'i, Maui, and Kaua'i to consider amending their building codes to adopt the probabilistic Tsunami Design Zone maps / model data developed pursuant to this project along with styles of maps appropriate for use in their respective County building codes and the ASCE Tsunami Design Geodatabase.</li> <li>• Draft proposed language to adopt the probabilistic Tsunami Design Zone maps / model data developed pursuant to this project along with style of maps appropriate for use in State of Hawai'i Building Code.</li> <li>• Present building code amendments for State Building Code Council (SBCC) review and approval.</li> <li>• Conduct rulemaking in accordance with HRS Chapter 91.</li> </ul> <p><b>Comment:</b> Phase I is in progress. Probabilistic Tsunami Design Zone Mapping of Hawaii, Maui, and Kauai Counties (Phase II) will occur after Probabilistic Tsunami Design Zone Mapping of O'ahu (Phase I) is completed.</p> <p><b>Lead Agency:</b> State of Hawai'i DBEDT</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-050</p>







Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> State-2018-051 - Flood Engineering Analysis of Waimanalo Watershed:</p> <ol style="list-style-type: none"> <li>1. Form workgroup of affected State and County agencies, affected land owners, and stakeholders.</li> <li>2. Develop a public information campaign including public service announcements, fact sheets, and other forms of communication on the types of insurance and the need to purchase flood insurance.</li> <li>3. Measure Change in the number of active flood insurance policies compared to baseline levels. As of February 2018, there are 60,423 active flood insurance policies statewide.</li> </ol> <p><b>Comment:</b></p> <ol style="list-style-type: none"> <li>1. Workgroup task was not handed over to current leadership in October 2021. Status unknown.</li> <li>2. External Affairs Branch has incorporated messaging on the value of flood insurance and the need to consult with insurers about flood and wind insurance as part of its social media, news releases, and other outreach products, particularly the campaign around the start of the annual hurricane season in May and June.</li> <li>3. As of Sept. 2, 2022, 55,244 NFIP flood insurance policies were active in the State of Hawaii, per the State's NFIP coordinator at DLNR. Assuming the baseline figure of 60,423 active policies in February 2018 also is based on NFIP policies, that reflects a decline of about 11.2%. However, there are complicating factors, as private flood insurance has become more widely available and there is currently no reliable routine source of data on private flood policies covering Hawai'i properties. The trend analysis is also complicated by the economic strain of the COVID-19 pandemic beginning in March 2020, and the rate of inflation in 2022, both of which created economic strains for households which may have dropped flood coverage to make more of their income available for food/shelter/etc.</li> </ol> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-051</p>
<p><b>Action:</b> State-2018-052 - Include Climate Change in North Shore Coastal Flooding Restudy:</p> <ol style="list-style-type: none"> <li>1. Coordinate with FEMA Region IX Risk Map staff to develop scope of work for north shore restudy, including climate change analysis.</li> </ol> <p><b>Comment:</b> Discontinue as currently written. This action no longer under the State's jurisdiction. This task is under the City and County of Honolulu purview.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>Discontinued</b></p>
<p><b>Action:</b> State-2018-053 - Coordinate the compilation of projected development to assist with future local and State HMPs:</p> <p>HI-EMA will work with other departments at the State and local levels, to coordinate the compilation of projected development in a spatial format to enable a more comprehensive analysis to identify problems and exposure prior to construction. This information will be included in the future update of local and State Hazard Mitigation Plans; and be available to all entities for planning use.</p> <p><b>Comment:</b> No progress due to lack of staffing. This mitigation action will be developed by HI-EMA GIS staff in coordination with OPSD in the future.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>No Progress</b></p> <p><b>2023 Action:</b> 2023-2018-053</p>
<p><b>Action:</b> State-2018-054 - Reduce number of repetitive loss properties:</p> <p>The State of Hawai'i Department of Land and Natural Resources (DLNR), HI-EMA and the four County Governments will continue to work together to reduce the number of properties remaining on the repetitive loss list. The State Hazard Mitigation Forum will provide technical and scientific assistance. Mitigation measures to be considered for each property are: acquisition, relocation, elevation, or small flood control project.</p> <p><b>Comment:</b> There is no measurable progress on this project, but it is an ongoing goal to reduce repetitive loss properties. This project will continue to be developed.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>Ongoing</b></p> <p><b>2023 Action:</b> 2023-2018-054</p>





Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> State-2018-055 - Reduce and/or convert hazardous fuels along roadsides: Roadways, portions of highways, and private streets shall be cleared of combustible vegetation and other combustible growth. Certain ground covers shall be permitted to be exempt provided that they do not form a means of readily transmitting fire. Keep invasive, fire-prone grasses, and shrubs short. Monitor vegetative regrowth due to year-round growing season and invasive, fire-prone grasses that grow back quickly.</p> <p><b>Comment:</b> Routine maintenance is performed on an ongoing basis to reduce fuels along roadsides.</p> <p><b>Lead Agency:</b> State HDOT</p>	<p><b>Ongoing</b></p> <p><b>2023 Action:</b> 2023-2018-055</p>
<p><b>Action:</b> State-2018-056 - Collaborate with partners and the State Hazard Mitigation Forum to evaluate and update the State Hazard Mitigation Plan on an annual basis.</p> <p><b>Comment:</b> Measurable progress was made over the past five years, including adding four new mitigation actions to the plan and evaluating funding opportunities to implement mitigation actions.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-056</p>
<p><b>Action:</b> State-2018-057 - Coordinate access to Hawai'i State Historic Preservation Division maintained cultural resource information: HI-EMA to work with the Department in order to access to cultural resource information for inclusion in future State Hazard Mitigation Plan updates.</p> <p><b>Comment:</b> Outreach and coordination with the Hawai'i State Historic Preservation Division has taken place to coordinate how GIS coordinates will be presented in public facing materials in order to share critical location information. This data is an exact copy of the SHPD GIS data derived from with the exception that all descriptive information has been removed, future planners can contact the SHPD GIS Specialist for updates. This database was used to update the vulnerability assessment in the 2023 SHMP.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-057</p>
<p><b>Action:</b> State-2018-058 - Implement recommendations of the Statewide Highway Shoreline Protection Study: Implement the mitigation measures as outlined in State Highway Shoreline Protection Study: Final Report of Preliminary Field Investigation, Rankings and Recommendations; August 2019. The study has recommendations for next steps and has prioritized the roadways that require attention.</p> <p><b>Comment:</b> Some of the shoreline erosion mitigation projects that have been initiated over the past five years include:</p> <ul style="list-style-type: none"> <li>• Kamehameha Highway at Kananelu – Short-term</li> <li>• Kamehameha Highway at Kaaawa Elementary School - Short-term</li> <li>• Kamehameha Highway in the vicinity of Kualoa, Kaaawa, Punaluu, and Hauula – Mid-term</li> <li>• Kamehameha Highway at Hauula – Short-term</li> <li>• Sandsaver Pilot at Wailua Beach</li> <li>• Sandsaver Pilot at Kualoa and Waimanalo</li> <li>• Kamehameha IV Highway in the vicinity of Niaupala Fishpond Short-term</li> <li>• Kamehameha IV Highway in the vicinity of Niaupala Fishpond and Kupeke Fishpond -Mid-term</li> </ul> <p><b>Lead Agency:</b> State of Hawai'i DOT</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2018-058</p>
<p><b>Action:</b> State-2018-2013-001 - By 2028, update the design standards for new high-occupancy public buildings that can provide enhanced hurricane protective areas and consider Mass Care Working Group recommendations.</p> <p><b>Comment:</b> Staffing shortfalls prevented progress on this action. Coordination will continue with the State Building Code Council (SBCC) and revitalized Mass Care Working Group. Legislative bill submitted to add HI-EMA to the SBCC. Building code changes are slow to be adopted.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>No Progress</b></p> <p><b>2023 Action:</b> 2023-2013-001</p>





Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> State-2018-2013-002 - Evaluate vulnerability of critical infrastructure systems in the storm surge inundation zone (power, water, fuel, communications, ports, airports) and identify protective measures or backup resources to the most practical extent.</p> <p><b>Comment:</b> This is an ongoing study that is 40% complete.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2013-002</p>
<p><b>Action:</b> State-2018-2013-004 - Improve Building Codes to the most current standards. Adopt wind design standards for the installation of photovoltaic panels, power walls, and other alternative energy sources on residential/commercial buildings.</p> <p><b>Comment:</b> This is an ongoing action that is slow to be implemented due, in part, to the limitations of volunteer staffing at the SBCC. The 2018 International Building Code, including design standards for rooftop solar panels, was adopted by the state on April 20, 2021.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2013-004</p>
<p><b>Action:</b> State-2018-2013-005 - When Hazus is updated to represent State of Hawai'i specific building types (anticipated late 2018), develop building geodatabase and incorporate into Hazus MH Hurricane loss estimation module, and make model adjustments to enable reasonable hurricane scenario loss estimates.</p> <p><b>Comment:</b> This action has been discontinued due to a lack of staffing capacity in the lead agency and the ability to manage the action. However, Hazus was used to model the hurricane hazard for the 2023 SHMP Update.</p> <p><b>Lead Agency:</b> PDC</p>	<p><b>Discontinued</b></p>
<p><b>Action:</b> State-2018-2013-006 - Develop hurricane shelter capacity estimates and identify alternative hurricane evacuation/sheltering policies prioritizing the most vulnerable population areas.</p> <p><b>Comment:</b> This action is no longer under the State's jurisdiction. This falls under the individual counties' purview and may be added to local hazard mitigation plan updates.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>Discontinued</b></p>
<p><b>Action:</b> State-2018-2013-007 - Identify the types of buildings that can function as temporary refuges and create a voluntary program for certifying "storm-ready" private facilities through a standardized procedure. Determine the number of low vulnerability buildings available for refuge in the private sector.</p> <p><b>Comment:</b> This is no longer the State's jurisdiction. This is under the counties' purview and may be added to local hazard mitigation plan updates.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>Discontinued</b></p>
<p><b>Action:</b> State-2018-2013-009 - Develop State of Hawai'i Hurricane Relief Fund standards for hurricane retrofits and debris protection, to enable insurance premium credits. Develop a post &amp; pier/single wall hurricane retrofit Expert Tool Graphical User Interface, similar to earthquake retrofits.</p> <p><b>Comment:</b> This mitigation action is no longer continued because the Hawai'i Hurricane Relief Fund is no longer active. The Fund has also been removed from the list of state capabilities.</p> <p><b>Lead Agency:</b> DCCA</p>	<p><b>Discontinued</b></p>





Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> State-2018-2013-018 - Continue to support the Counties in the evaluation of existing policies for the use of buildings for vertical evacuation and update as necessary. Develop a standard procedure for evaluating existing multi-story buildings as tsunami (and hurricane) refuge structures. This continues to be a priority for HETAC, and we did some work with the City and County of Honolulu who completed pilot studies of several buildings.</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2013-018</p>
<p><b>Comment:</b> Minimal progress was made on this action due to staffing shortfalls. HETAC worked with the City and County of Honolulu contractor to review selected buildings in Honolulu, but a report has not been produced yet. A review of the report will determine next steps for this project. FEMA Region IX will be engaged to initiate the vulnerability analysis and to develop priorities.</p>	
<p><b>Lead Agency:</b> HETAC</p>	
<p><b>Action:</b> State-2018-2013-021 - Develop maps of probabilistic tsunami inundation and runup for use in designing or retrofitting critical infrastructure facilities, including bridges, major multi-story buildings and vertical evacuation refuge buildings (required ASCE-7 implementation). Adopt tsunami-resistant design provisions. Enable "tsunami-ready" designation for risk Category III and IV structures.</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2013-021</p>
<p><b>Comment:</b> Project for the Development of Comprehensive High-Resolution Probabilistic Tsunami Design Zone Maps Compatible with ASCE 7-16 for the Island of O’ahu, State of Hawai’i is currently in the solicitation stage.</p>	
<p><b>Lead Agency:</b> DBEDT</p>	
<p><b>Action:</b> State-2018-2013-024 - Conduct all hazard evaluations and develop cost-effective seismic retrofits for priority facilities in the Counties of Hawai’i and Maui.</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2013-024</p>
<p><b>Comment:</b> Minimal progress was made on this action due to staffing shortfalls, but new work has begun that includes planning for home retrofit programs that can be supported by this initiative. FEMA Region IX will be engaged to initiate the vulnerability analysis and to develop priorities. The Hawai’i building code status needs to improve to increase eligibility for BRIC funding that will facilitate implementation of this project in the future.</p>	
<p><b>Lead Agency:</b> HETAC</p>	
<p><b>Action:</b> State-2018-2013-025 - Provide public outreach on how to retrofit and establish anchorage of post &amp; pier foundations of Hawai’i light-frame housing. New work has begun planning for home retrofit programs that can be supported by this initiative. Working with other State partners to implement.</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2013-025</p>
<p><b>Comment:</b> Minimal progress was made on this action due to staffing shortfalls, but new work has begun planning for home retrofit programs that can be supported by this initiative. HETAC is working with other State partners to implement the project. FEMA Region IX will be engaged to initiate the vulnerability analysis and to develop priorities. HETAC is considering tax incentives and encouraging retrofit of the entire load path.</p>	
<p><b>Lead Agency:</b> HETAC</p>	
<p><b>Action:</b> State-2018-2013-026 - Require implementation of seismic bracing requirements for equipment and ceiling systems in renovation and post-disaster repairs of schools, hospitals, and assisted living facilities.</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2013-026</p>
<p><b>Comment:</b> No measurable progress was made on this action due to staffing shortfalls. FEMA Region IX will be engaged to initiate vulnerability analysis and to develop priorities.</p>	
<p><b>Lead Agency:</b> State Building Code Council</p>	
<p><b>Action:</b> State-2018-2013-028 - Compile detailed County of Maui bridge seismic retrofit performance objective information from HDOT for 50-60 bridges, and update Hazus inventory to reflect more accurate expected bridge loss estimates in data products.</p>	<p><b>No progress</b></p> <p><b>2023 Action:</b> 2023-2013-028</p>
<p><b>Comment:</b> No measurable progress was made on this action due to a lack of capacity.</p>	
<p><b>Lead Agency:</b> State of Hawai’i DOT</p>	





Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> State-2018-2013-030 - Confirm Seismic Rating Criteria for Shelters in Counties of Hawai'i and Maui.</p> <p><b>Comment:</b> This action is no longer under the State's jurisdiction. This is now under the counties' purview and may be included in updates to their local hazard mitigation plans.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>Discontinued</b></p>
<p><b>Action:</b> State-2018-2013-033 - Conduct Testing of the Performance of current and future assets for the promotion of life-saving measures (Single Wall Construction, pillar and post-construction, and post-disaster housing) when subjected to major earthquakes and hurricanes.</p> <p><b>Comment:</b> Minimal progress has been made, but this action is still a priority and aligns with State goals, innovation, and development of new assets and could potentially take place at HI-EMA facilities.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2013-033</p>
<p><b>Action:</b> State-2018-2013-034 - Track and evaluate current development of Earthquake Early Warning systems.</p> <p><b>Comment:</b> HETAC is monitoring the development of these systems. HETAC has coordinated with UH scientists working on the development of these systems globally and is promoting local Hawai'i and subduction zone deployments that could significantly benefit data collection and early warning. This action was reworded slightly for the 2023 action plan to better meet the goals of the State.</p> <p><b>Lead Agency:</b> HETAC</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2013-034</p>
<p><b>Action:</b> State-2018-2013-035 - Generate ShakeMaps that incorporate soil conditions and the new seismic hazard model information for Hawai'i.</p> <p><b>Comment:</b> The action is still a priority and aligns with State goals; however, due to funding constraints and/or competing priorities but it is not underway with the USGS.</p> <p><b>Lead Agency:</b> HETAC</p>	<p><b>No Progress</b></p> <p><b>2023 Action:</b> 2023-2013-035</p>
<p><b>Action:</b> State-2018-2013-061 - Develop Zones of Required Special Investigations near hillsides. If mandated by the State Legislature, use these zones to define as a duty to notify during real estate transactions.</p> <p><b>Comment:</b> The action is still a priority and aligns with State goals; however, due to funding constraints and/or competing priorities, it has not seen measurable progress over the past five years.</p> <p><b>Lead Agency:</b> UH</p>	<p><b>No Progress</b></p> <p><b>2023 Action:</b> 2023-2013-061</p>
<p><b>Action:</b> State-2018-2013-070 - Develop clear Standard Operating Procedures for Medical Reserve Corps activation and deployment.</p> <p><b>Comment:</b> This project was needed to standardize the activation and deployment of the Medical Reserve Corps. It was completed in 2020 with clear Standard Operating Procedures established and shared with stakeholders.</p> <p><b>Lead Agency:</b> DOH</p> <p><b>Funding Source:</b> State General Funds</p>	<p><b>Completed</b></p>
<p><b>Action:</b> State-2018-2013-071 - Develop a pre-incident mission-ready package (MRP) for EMAC requests (Emergency Mutual Aid Compact) for licensed healthcare professionals. DOH OPHP has established a plan for responding to EMAC requests when needed.</p> <p><b>Comment:</b> With Hawai'i being a small and remote state, we are more likely to request assistance from other states rather than provide it. A plan has been developed for Department of Health Office of Public Health Preparedness Planners to handle EMAC requests as the need arises. This is an ongoing action that is being carried forward in the plan update.</p> <p><b>Lead Agency:</b> DOH</p>	<p><b>Ongoing</b></p> <p><b>2023 Action:</b> 2023-2013-071</p>





Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> State-2018-2013-072 - DOH to develop standard operating procedures for sharing information across agencies.</p> <p><b>Comment:</b> As documented in DOH's Emergency Operations Plan, sharing information across agencies occurs mainly occur via WebEOC, veoci, various data and reports from lab/disease investigation/GIS, etc. DOH maintains network communication infrastructure, including landline phones, computers, email, video conferencing, and fax. Satellite phones and 800 MHZ two-way radios are backup devices for communication. This is an ongoing action that is being carried forward in the plan update.</p> <p><b>Lead Agency:</b> DOH</p>	<p><b>Ongoing</b></p> <p><b>2023 Action:</b> 2023-2013-072</p>
<p><b>Action:</b> State-2018-2013-078 - Develop templates for public health emergency messaging.</p> <p><b>Comment:</b> DOH developed templates for various public health emergencies that could be modified depending on the situation. DOH continues to build capacity to provide just-in-time messaging and incorporate relevant templates from other sources like those found on ready.gov. This is an ongoing action that is being carried over to the plan update.</p> <p><b>Lead Agency:</b> DOH</p>	<p><b>Ongoing</b></p> <p><b>2023 Action:</b> 2023-2013-078</p>
<p><b>Action:</b> State-2018-2013-086 - Investigate how to warehouse supplies to account for supply chain disruption. Continue preparedness messaging to residents to have commodities on-hand for 14 days.</p> <p><b>Comment:</b> HI-EMA is currently investigating how to warehouse needed supplies. Preparedness messaging to residents to have food and water on-hand has been revised and increased to 14 days. Cost of project implementation changed to &gt;\$100,000 because of the resources required to execute this mitigation action.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2013-086</p>
<p><b>Action:</b> State-2018-2013-088 - Using the "Hurricane Shelter Retrofit Procedural Guide" HI-EMA will continue to retrofit public shelter buildings to increase capacity and decrease the statewide sheltering deficit.</p> <p>These shelter-hardening actions will result in EHPA-rated hurricane shelters. The goal of the program is to use federal HMGP funds, along with State CIP funds, in order to increase the overall fund amount available for the shelter-hardening actions needed to achieve Category 3 hurricane protection.</p> <p><b>Comment:</b> \$3 million in annual State CIP funding has been allocated for hurricane retrofits of State or county-owned facilities.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2013-088</p>
<p><b>Action:</b> State-2018-2013-095 - Augment and expand education and outreach for earthquake and tsunami hazard reduction activities.</p> <p><b>Comment:</b> Tsunami outreach activities are ongoing with HETAC members. A USGS cooperative agreement is being leveraged to support outreach activities on the Big Island with a 1/2 full-time equivalent for all hazards. As of March 2023, seven communities have reached recognition level in the Hazards Awareness and Resilience Program (HHARP) and another six communities are on the verge of program recognition. This program won the 2016 National Award in Excellence for Educational Outreach to the General Public from the Western States Seismic Policy Council.</p> <p><b>Lead Agency:</b> HETAC</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2013-095</p>





Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> State-2018-2013-116 - Continue to develop Operational Support Plans to account for adequacy of critical marine/ground transportation to address supply chain and alternate port operations plan. Future considerations may include Natural Systems Protection (NSP) elements.</p> <p><b>Comment:</b> This action is still a priority and aligned with State goals; however, due to staffing and funding limitations, it has not been completed. Work on this effort is ongoing. Regional Resiliency Assessment Program (RRAP) was completed by Cybersecurity &amp; Infrastructure Security Agency (CISA). The review of marine transportation systems is in progress and this mitigation action is 20% complete.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2013-116</p>
<p><b>Action:</b> State-2018-2013-121 - Continue to develop harbor maps to define regimes of currents and timeframes for several scenarios of tsunami to estimate necessary period of ship evacuation.</p> <p><b>Comment:</b> This action is considered to be 80% complete. Honolulu harbor maps were completed by HETAC; other harbor map development is in progress.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2013-121</p>
<p><b>Action:</b> State-2020-001 - Modernization and Hardening of the State Emergency Operations Center:</p> <ol style="list-style-type: none"> <li>1. Acquire suitable land.</li> <li>2. Acquire funds for design and engineering to include environmental assessment.</li> <li>3. Acquire funding for construction.</li> </ol> <p><b>Comment:</b> In 2022, HI-EMA received \$1M in federal funds to start the design phase of this project.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2020-001</p>
<p><b>Action:</b> State-2020-002 - Warning Systems and Outreach Programs: High-risk areas will be evaluated by subject matter experts to include governmental agencies having statutory responsibility for those activities.</p> <p><b>Comment:</b> HI-EMA has been conducting ongoing maintenance of Siren Program. Results of these assessments are pending.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2020-002</p>
<p><b>Action:</b> State-2020-003 - Hardening/Retrofit/Protection of Food and Agriculture Facilities which involve production, storage, distribution, and research functions:</p> <ol style="list-style-type: none"> <li>1. Structural Analysis of priority facilities</li> <li>2. Acquire funds for design and engineering</li> <li>3. Acquire funds for construction</li> </ol> <p><b>Comment:</b> The Lanakila Pacific Wind Retrofit project was funded under HMGP DR-4395, and the Komohana Research and Extension Center Wind Retrofit (at the UH College of Tropical Agriculture and Human Resources) project was funded under HMGP DR-4366. Both projects are ongoing.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2020-003</p>
<p><b>Action:</b> State-2020-004 - American Red Cross (ARC) Hawai'i Chapter will conduct Disaster Emergency Life Safety Sheltering and Outreach training programs throughout the state to increase the number of trained volunteers capable of responding and providing emergency support services at public shelter during a disaster.</p> <p><b>Comment:</b> No progress has been made due to a lack of grant funding. Other funding options are being explored.</p> <p><b>Lead Agency:</b> HI-EMA</p>	<p><b>In Progress</b></p> <p><b>2023 Action:</b> 2023-2020-004</p>





Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> Hawai'i-2018-001 - Damage Assessment Software Licenses &amp; Field Data Collection Equipment:</p> <ol style="list-style-type: none"> <li>1. Purchase licenses and tablets</li> <li>2. Install application software on tablets</li> <li>3. Test software in the field</li> <li>4. Conduct training</li> <li>5. Be Mission-ready for Recovery Phase damage assessment operations</li> </ol> <p><b>Comment:</b> Alternatives and a demo of the ArcGIS Collector program have been researched.</p> <p><b>Lead Agency:</b> Hawai'i County Civil Defense Agency</p>	<p><b>In Progress</b></p> <p>County-responsibility actions will be tracked in their respective local HMPs</p>
<p><b>Action:</b> Hawai'i-2018-002 - Waimea Operations Facility Emergency Power System Hardening:</p> <ol style="list-style-type: none"> <li>1. Gain proper approval for project and funding; execute agreements, as required.</li> <li>2. Execute professional services contract and obtain materials required for construction permit and solicitation.</li> <li>3. Solicit bids and award construction contract.</li> <li>4. Order materials, complete construction, and close out construction and professional services contracts.</li> <li>5. Close out with HI-EMA and FEMA, as required.</li> </ol> <p><b>Comment:</b> No progress, preparing to secure funding.</p> <p><b>Lead Agency:</b> Department of Water Supply</p>	<p><b>No Progress</b></p> <p>County-responsibility actions will be tracked in their respective local HMPs</p>
<p><b>Action:</b> Hawai'i-2018-003 - Hilo Operations Facility Hardening and Improvements:</p> <p>Gain proper approval for project and funding; execute agreements, as required.</p> <p><u>Phase 1</u></p> <ul style="list-style-type: none"> <li>• Execute professional services contract and obtain materials required for construction permit and solicitation.</li> </ul> <p><u>Phase 2</u></p> <ul style="list-style-type: none"> <li>• Solicit bids and award construction contract.</li> <li>• Order materials, complete construction, and close out construction and professional services contracts.</li> </ul> <p>Close out with HI-EMA and FEMA, as required.</p> <p><b>Comment:</b> No progress, preparing to secure funding.</p> <p><b>Lead Agency:</b> Department of Water Supply</p>	<p><b>No Progress</b></p> <p>County-responsibility actions will be tracked in their respective local HMPs</p>
<p><b>Action:</b> Hawai'i-2018-004 - Kona Operations Facility Emergency Power System Hardening:</p> <ol style="list-style-type: none"> <li>1. Gain proper approval for project and funding; execute agreements, as required.</li> <li>2. Execute professional services contract and obtain materials required for construction permit and solicitation.</li> <li>3. Solicit bids and award construction contract.</li> <li>4. Order materials, complete construction, and close out construction and professional services contracts.</li> <li>5. Close out with HI-EMA and FEMA, as required.</li> </ol> <p><b>Comment:</b> No progress, preparing to secure funding.</p> <p><b>Lead Agency:</b> Department of Water Supply</p>	<p><b>No Progress</b></p> <p>County-responsibility actions will be tracked in their respective local HMPs</p>







Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> Hawai'i-2018-005 - Kona Operations Facility Hardening and Improvements: Gain proper approval for project and funding; execute agreements, as required.</p> <p><u>Phase 1</u></p> <ul style="list-style-type: none"> <li>Execute professional services contract and obtain materials required for construction permit and solicitation.</li> </ul> <p><u>Phase 2</u></p> <ul style="list-style-type: none"> <li>Solicit bids and award construction contract.</li> <li>Order materials, complete construction, and close out construction and professional services contracts.</li> </ul> <p><b>Comment:</b> No progress, preparing to secure funding.</p> <p><b>Lead Agency:</b> Department of Water Supply</p>	<p><b>No Progress</b></p> <p><b>County-responsibility actions will be tracked in their respective local HMPs</b></p>
<p><b>Action:</b> Hawai'i-2018-006 - Community-based 2-way Radio Communications Repeater Equipment:</p> <ol style="list-style-type: none"> <li>Purchase repeater equipment.</li> <li>Train local licensed amateur radio licensed operators in handling emergency traffic of Emergency Alert Messaging (EAM), Situational Reporting (SitRep), Requests for Assistance (RFA), and Requests for Information (RFI).</li> <li>Program repeater equipment.</li> <li>Register repeater equipment with FCC and Frequency Controller.</li> <li>Install repeater equipment.</li> <li>Implement new capability and be Mission-Ready to standup Emergency Communications Operations.</li> </ol> <p><b>Comment:</b> Equipment is purchased. Installation sites have been selected. Amateur Radio training is ongoing. Installing equipment is waiting for contracting and permitting.</p> <p><b>Lead Agency:</b> Hawai'i County Civil Defense Agency</p>	<p><b>In Progress</b></p> <p><b>County-responsibility actions will be tracked in their respective local HMPs</b></p>
<p><b>Action:</b> Hawai'i-2018-007 - Hardening of the Parker No. 2, Waiaha and Keonepoko Nui Water Well:</p> <ol style="list-style-type: none"> <li>Gain project funding approval and execute agreements, as required.</li> <li>Execute professional services contract and obtain materials required for construction permit.</li> <li>Generate bid documents, solicit bids, and award contract.</li> <li>Order materials, complete construction, and close out contract.</li> <li>Close out with HI-EMA and FEMA, as required.</li> </ol> <p><b>Comment:</b> Funding secured (HMGP &amp; DWS funds). Professional engineer working on the project design and plans.</p> <p><b>Lead Agency:</b> Department of Water Supply</p>	<p><b>In Progress</b></p> <p><b>County-responsibility actions will be tracked in their respective local HMPs</b></p>
<p><b>Action:</b> Hawai'i-2018-008 - Furnishing two (2) Water Hauling Tankers to Harden the Potable Water System:</p> <ol style="list-style-type: none"> <li>Gain proper approval for project and funding; execute agreements, as required.</li> <li>Generate bid documents, solicit bids, and award contract.</li> <li>Receive tankers and close out project.</li> <li>Close out with HI-EMA and FEMA, as required.</li> </ol> <p><b>Comment:</b> No progress, preparing to secure funding.</p> <p><b>Lead Agency:</b> Department of Water Supply</p>	<p><b>No Progress</b></p> <p><b>County-responsibility actions will be tracked in their respective local HMPs</b></p>





Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> Hawai'i-2018-009 - Waimea Operations Facility Hardening and Improvements: Gain proper approval for project and funding; execute agreements, as required.</p> <p><u>Phase 1</u></p> <ul style="list-style-type: none"> <li>Execute professional services contract and obtain materials required for construction permit and solicitation.</li> </ul> <p><u>Phase 2</u></p> <ul style="list-style-type: none"> <li>Solicit bids and award construction contract.</li> <li>Order materials, complete construction, and close out construction and professional services contracts. Close out with HI-EMA and FEMA, as required.</li> </ul> <p><b>Comment:</b> No progress, preparing to secure funding.</p> <p><b>Lead Agency:</b> Department of Water Supply</p>	<p><b>No Progress</b></p> <p><b>County-responsibility actions will be tracked in their respective local HMPs</b></p>
<p><b>Action:</b> Honolulu-2018-001 - Long-term Recovery and Adaptation Plan:</p> <ul style="list-style-type: none"> <li>Hire a Planner to develop the Long-term Recovery &amp; Adaptation Plan.</li> <li>Work with C &amp; County + State Stakeholders to develop the plan, including development of specific recovery and adaptation projects to address the long-term impacts of climate change.</li> </ul> <p><b>Comment:</b> The City was awarded mitigation grant funding to develop a long-term recovery plan and has a position within the City's Climate Change and Resiliency Office who will work with the contractor on the long-term recovery strategy. Planning work is set to begin late 2022 and into 2023.</p> <p><b>Lead Agency:</b> City and County of Honolulu Department of Emergency Management</p>	<p><b>In Progress</b></p> <p><b>County-responsibility actions will be tracked in their respective local HMPs</b></p>
<p><b>Action:</b> Honolulu-2018-002 - Lualualei Navy Lands Drainage Improvements: The Navy should coordinate with DOH and the watershed coordinator to identify depressions or relatively flat areas along stream channels to construct small detention ponds and/or check dams to reduce peak flood flows. These are easier to construct than a full sediment basin and will help reduce some of the sediment load and peak flows, potentially reducing flooding downstream.</p> <p><b>Comment:</b> No progress by the City and County of Honolulu due to lack of capacity. This action is supported by Department of Health Clean Water Branch and will be led by DOH in the SHMP update.</p> <p><b>Lead Agency:</b> City and County of Honolulu Department of Design and Construction</p>	<p><b>No Progress</b></p> <p><b>2023 Action: 2023-001</b></p>
<p><b>Action:</b> Honolulu-2018-003 - Makiki Stream Flood Mitigation Project:</p> <ul style="list-style-type: none"> <li>Develop design specifics for flooding problem that are compatible with developed, urban areas along Makiki and Kanaha streams</li> <li>Channel improvements from Ala Wai Canal to King Street to handle a design flow of 5,600 cfs</li> <li>Channel improvements for Kanaha Stream makai of Roosevelt High School</li> <li>Accommodate multiple purposes in flood control features, including ecosystem improvements, recreational activities &amp; maintenance activities</li> </ul> <p><b>Comment:</b> No progress due to a lack of capacity.</p> <p><b>Lead Agency:</b> City and County of Honolulu Department of Design and Construction</p>	<p><b>No Progress</b></p> <p><b>County-responsibility actions will be tracked in their respective local HMPs</b></p>
<p><b>Action:</b> Honolulu-2018-004 - Hardening of Critical Facilities, Utilities, and Port Facilities:</p> <ol style="list-style-type: none"> <li>Prioritize facilities for hardening.</li> <li>Seek funding for drawing up hardening plans.</li> <li>Draw up plans for hardening.</li> <li>Seek funding for hardening retrofits.</li> </ol> <p><b>Comment:</b> The City does not have jurisdiction over ports, so the action will be reworded. No progress to report on other listed hazards due to a lack of capacity.</p> <p><b>Lead Agency:</b> City and County of Honolulu Department of Emergency Management</p>	<p><b>No Progress</b></p> <p><b>County-responsibility actions will be tracked in their respective local HMPs</b></p>





Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> Honolulu-2018-005 - Long-Term Congregate Care Shelters: Create long-term congregate care shelters at public parks and recreation centers and gymnasiums. This will require hardening and retrofitting these facilities.</p> <p><b>Comment:</b> The City plans to conduct structural assessments of Parks facilities in 2022 and 2023 as the initial step towards identifying City-owned facilities suitable for retrofit as these are the facilities most likely to be utilized for post-impact sheltering. The City has also prioritized buildings for retrofit using State CIP funding to focus on facilities that are most suitable for both evacuation and post-impact sheltering. The City is in the final stages of populating a recently created shelter database that will support the identification and analysis of facilities for post-impact sheltering.</p> <p><b>Lead Agency:</b> City and County of Honolulu Department of Emergency Management</p>	<p><b>In Progress</b></p> <p>County-responsibility actions will be tracked in their respective local HMPs</p>
<p><b>Action:</b> Honolulu-2018-006 - Post-Disaster Staging Areas: The City and County of Honolulu would like to build new staging facilities as opportunities allow and to harden existing staging facilities to create between 5 and 8 (optimal) disaster response staging areas.</p> <p><b>Comment:</b> This action as currently described is not a current priority and should be revised. The construction of new staging facilities is not an action that is being pursued. As staging facilities are located at existing critical government facilities, it is not clear this should be a standalone action as the purpose would not be to harden those types of facilities just for the purpose of serving as a staging area. The hardening of those facilities is captured under other mitigation actions.</p> <p><b>Lead Agency:</b> City and County Department of Emergency Management</p>	<p><b>Discontinued</b></p> <p>County-responsibility actions will be tracked in their respective local HMPs</p>
<p><b>Action:</b> Honolulu-2018-007 - Temporary Electrical Charging Stations for O’ahu Post-Disaster: Outfit staging areas and congregate care shelters with solar powered, battery-operated charging systems.</p> <p><b>Comment:</b> Discontinued as written. This action needs to be re-evaluated and expanded to include State agencies as lead or supporting this effort given the number of facilities the City owns that would be used for post-impact sheltering is very small. Would also recommend expanding this action to be more generalized to the temporary power needs at shelters. Microgrid project at one DOE facility is ongoing.</p> <p><b>Lead Agency:</b> City and County of Honolulu Department of Emergency Management</p>	<p><b>Discontinued</b></p> <p>County-responsibility actions will be tracked in their respective local HMPs</p>
<p><b>Action:</b> Honolulu-2018-008 - Tsunami Evacuation Signage: The City &amp; County of Honolulu has purchased signs to demarcate Tsunami Evacuation Routes, but does not currently have the funding to install them. Project requests funds for installing the signs, and also using templates to indicate evacuation lines and routes on the streets/ sidewalks under our jurisdiction.</p> <p><b>Comment:</b> In 2022, the City was awarded HMGP funding to install tsunami signs around the island. This project includes installation of signs at State and City beach parks with instructions for actions to take in the event of a tsunami warning, as well as Hazard Area signs along roadways to increase public awareness of Oahu's two evacuation zones.</p> <p><b>Lead Agency:</b> City and County of Honolulu Department of Emergency Management</p>	<p><b>In Progress</b></p> <p>County-responsibility actions will be tracked in their respective local HMPs</p>
<p><b>Action:</b> Honolulu-2018-009 - Micro Grids for Critical Health Infrastructure Support: Install micro grids to support medical facilities such as hospitals and dialysis centers in the event that the island’s primary power grid goes down.</p> <p><b>Comment:</b> No measurable progress on this action. This action has been re-assigned to the Department of Health and included in the SHMP update. While DEM supports this action and its importance, it is not the appropriate agency to lead its implementation.</p> <p><b>Lead Agency:</b> City and County of Honolulu Department of Emergency Management</p>	<p><b>No Progress</b></p> <p>2023 Action: 2023-002</p>





Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> Honolulu-2018-010 - Structural Retrofitting of Existing Buildings and Construction of Safe Rooms: Working with DDC engineers, the City would harden windows, doors, and roofs of identified facilities and/or install an interior safe room within or adjacent to the identified facilities. The goal is to create 15 such facilities that are retrofitted or constructed with a safe room.</p> <p><b>Comment:</b> No action taken to date due to a lack of capacity.</p> <p><b>Lead Agency:</b> City and County Department of Emergency Management</p>	<p><b>No Progress</b></p> <p>County-responsibility actions will be tracked in their respective local HMPs</p>
<p><b>Action:</b> Honolulu-2018-011 - Lualualei Drainage Improvements: As outlined in the Lualualei Flood Study, there are multiple culverts in residential areas in need of repair or replacement. The Army Corps of Engineers should coordinate with the City &amp; County of Honolulu to implement the upgrades identified in the flood study (2). \$740,000 estimated in Lualualei Flood Study for all necessary replacements.</p> <p><b>Comment:</b> No action taken to date due to a lack of capacity.</p> <p><b>Lead Agency:</b> City and County of Honolulu Department of Design and Construction</p>	<p><b>No Progress</b></p> <p>County-responsibility actions will be tracked in their respective local HMPs</p>
<p><b>Action:</b> Kaua'i-2018-001 - Wildfire Suppression Procurement of Water Tanker- included as mitigation action 2018-027 for the State as well: Procure new 4,000-gallon capacity water truck to assist in providing the public with potable water as well as assist other State and County agency efforts in disaster management activities. Vehicle will provide DLNR with a water truck capability of handling various incidents and addressing health and safety issues.</p> <p><b>Comment:</b> State DLNR-DOFAW has procured the 4,000-gallon capacity water truck and it is standing by, ready for use.</p> <p><b>Lead Agency:</b> DLNR-DOFAW</p> <p><b>Funding Source:</b> State DLNR Funding</p>	<p><b>Completed</b></p>
<p><b>Action:</b> Kaua'i-2018-002 - Hawai'i Wide Interoperable Network (HWIN) Compliant Equipment &amp; Structures: Replace existing equipment and structures that do not meet new FCC compliance standards to be included in the Hawaii-wide interoperable network.</p> <p><b>Comment:</b> DLNR-DOFAW reports the project is about 75% complete. The remaining actions (25%) will take some time.</p> <p><b>Lead Agency:</b> County of Kaua'i</p>	<p><b>In Progress</b></p> <p>County-responsibility actions will be tracked in their respective local HMPs</p>
<p><b>Action:</b> Kaua'i-2018-003 - Hardening of the Kilauea Gymnasium for Hurricane Shelter Purpose - included as mitigation action 2018-003 for the State as well: Install a hurricane shutter system to protect existing louver windows to allow the gymnasium to serve as an emergency shelter during natural disaster evacuations.</p> <p><b>Comment:</b> The engineering consultant for the County of Kauai Department of Parks and Recreation completed the engineering analysis and determined additional funding is necessary to complete the retrofit.</p> <p><b>Lead Agency:</b> County of Kaua'i Department of Parks and Recreation</p>	<p><b>In Progress</b></p> <p>County-responsibility actions will be tracked in their respective local HMPs</p>
<p><b>Action:</b> Kaua'i-2018-004 - Hardening of the Kaua'i War Memorial Convention Hall (KWMCH) – included as mitigation action 2018-012 for the State as well: Install a hurricane shutter system to protect all exhibit hall windows and glass doors to allow use of the hall as a disaster shelter during evacuations.</p> <p><b>Comment:</b> After a bumpy start due to County issues with Act 12/35/9 (State disaster recovery assistance to the County) funding that delayed the project initiation, the Department of Parks and Recreation has begun procurement of an engineering firm to assess the KWMCH (Phase 1).</p> <p><b>Lead Agency:</b> County of Kaua'i Department of Parks and Recreation</p>	<p><b>In Progress</b></p> <p>County-responsibility actions will be tracked in their respective local HMPs</p>
<p><b>Action:</b> Kaua'i-2018-005 - Fire Protection System Retrofit: Upgrade fire alarm system throughout campus and retrofit existing fire sprinkler systems in buildings designated as emergency shelters.</p> <p><b>Comment:</b> The Kauai Community College (KCC) POC reports that this retrofit is scheduled to begin in 2024.</p> <p><b>Lead Agency:</b> County of Kaua'i</p>	<p><b>In Progress</b></p> <p>County-responsibility actions will be tracked in their respective local HMPs</p>





Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> Kaua'i-2018-006 - Emergency Communication System Installation: Install public address system to ensure effective emergency communications to the campus and surrounding area.</p> <p><b>Comment:</b> The Kauai Community College (KCC) POC reports this project is scheduled to begin in 2024 together with the Fire Suppression Retrofit project (Kauai-2018-005).</p> <p><b>Lead Agency:</b> County of Kaua'i</p>	<p><b>In Progress</b></p> <p><b>County-responsibility actions will be tracked in their respective local HMPs</b></p>
<p><b>Action:</b> Kaua'i-2018-007 - Generators for Emergency Shelter Facilities: Purchase five diesel generators and install generator tie-ins to the electrical system for five shelter facilities.</p> <p><b>Comment:</b> The Kauai Community College (KCC) POC reports that KCC is not planning on purchasing generators for emergency shelter facilities.</p> <p><b>Lead Agency:</b> County of Kaua'i</p>	<p><b>Discontinued</b></p>
<p><b>Action:</b> Kaua'i-2018-008 - Lihue Airport Electrical Distribution Hardening: Provide alternate distribution feed to the Lihue Airport with the installation of auto transfer switchgear, and underground conduits and cables. Project will be designated to be integrated into Kauai Island Utility Coop smart grid and Lihue Hardening Plan, increasing reliability and hardening electrical service to critical and essential facilities in the Lihue Area.</p> <p><b>Comment:</b> The Kauai Island Utility Cooperative (KIUC) withdrew this project, for a variety reasons, primarily because the work will be overtaken by future development at the site.</p> <p><b>Lead Agency:</b> Kaua'i Island Utility Coop</p>	<p><b>Discontinued</b></p>
<p><b>Action:</b> Kaua'i-2018-009 - Church of the Pacific United Church of Christ:</p> <ol style="list-style-type: none"> <li>1. Survey facility – completed 11/20/2009</li> <li>2. Shelter agreement – signed 7/12/2010</li> <li>3. Work with the American Red Cross to have the Church of Pacific United Church of Christ serve as a shelter for flooding and fire, and post-impact shelter when possible for large disaster when people in Koloa an Poipu area are displaced.</li> </ol> <p><b>Comment:</b> Confirmed with Red Cross POC that they completed their survey of the Church of the Pacific (COP) building to potentially be used as a shelter.</p> <p><b>Lead Agency:</b> County of Kaua'i</p> <p><b>Funding Source:</b> American Red Cross</p>	<p><b>Completed</b></p>
<p><b>Action:</b> Kaua'i-2018-010 - Kaua'i Christian Fellowship:</p> <ol style="list-style-type: none"> <li>1. Survey facility – completed 7/8/14</li> <li>2. Shelter agreement – signed 8/27/18</li> <li>3. Work with the American Red Cross to have the Kauai Christian Fellowship serve as a shelter for flooding and fire, and post-impact shelter when possible for large disaster when people in Koloa an Poipu area are displaced.</li> </ol> <p><b>Comment:</b> Confirmed with Red Cross POC, that the Kauai Christian Fellowship (KCF) building could potentially serve as a shelter for Poipu &amp; Koloa residents.</p> <p><b>Lead Agency:</b> County of Kaua'i</p> <p><b>Funding Source:</b> American Red Cross</p>	<p><b>Completed</b></p>





Action Item from Previous Plan	Status and/or New Action Number
<p><b>Action:</b> Kaua'i-2018-011 - Kaua'i Veteran's Center:</p> <ol style="list-style-type: none"> <li>1. Survey facility – completed 8/5/13</li> <li>2. Obtain shelter agreement – signed 2/24/14</li> <li>3. Add private facility to serve as a disaster shelter with Red Cross to serve as an evacuation shelter for flooding and fire, and post-impact shelter when possible for large disaster when people in Kola and Poipu are area displaced.</li> </ol> <p><b>Comment:</b> Confirmed with Red Cross POC that Kauai Veterans Center (KVC) is potentially available as shelter for Lihu'e residents.</p> <p><b>Lead Agency:</b> County of Kaua'i</p> <p><b>Funding Source:</b> American Red Cross</p>	Completed
<p><b>Action:</b> Maui-2018-001 - Dam Inundation - Public Awareness Campaign: Develop a public outreach awareness campaign targeting residents located within a dam inundation area. Include information about what to do in an emergency, community questions and answers, and where to receive information.</p> <p><b>Comment:</b> This action has become a capability. DLNR will publish Dam Inundation Maps. MEMA will work on the public messaging campaign to complement the publication.</p> <p><b>Lead Agency:</b> DLNR</p> <p><b>Funding Source:</b> N/A</p>	Completed
<p><b>Action:</b> Maui-2018-002 - Emergency Barge and Ferry Service: Make contact with each barge/ferry company and work toward formalizing agreements for prioritized shipments.</p> <p><b>Comment:</b> Progress has yet to be made on this action due to a lack of capacity.</p> <p><b>Lead Agency:</b> Maui Emergency Management Agency</p>	No Progress County-responsibility actions will be tracked in their respective local HMPs
<p><b>Action:</b> Maui-2018-003 - Realign Honoapi'ilani Highway: Realign Honoapi'ilani Highway outside of coastal hazard area – Initiate a planning process with HDOT; Document planning process steps and timeline; Develop environmental documents showing alternative alignments; Acquire/purchase any additional land needed for realignment; Implement construction for realignment.</p> <p><b>Comment:</b> A West Maui Transportation Working Group was established and will strategize possible solutions. County of Maui land purchase along Honoapi'ilani Highway. The Honoapi'ilani Highway Realignment project was identified in the Hele Mai Maui Long-Range Transportation Plan 2040, exemplifying how such investments can foster new ways of improving resilience in the transportation network.</p> <p><b>Lead Agency:</b> Maui County Mayors Office</p>	In Progress County-responsibility actions will be tracked in their respective local HMPs
<p><b>Action:</b> Maui-2018-004 - Retrofit Shelter Facilities: Harden emergency shelters throughout the planning area to ensure that they are able to withstand Category 3 hurricane-force wind speeds.</p> <p><b>Comment:</b> MEMA submitted ranked emergency shelters throughout Maui County for State of Hawai'i Hurricane Sheltering Retrofit Program. Moloka'i High School is currently funded for retrofit.</p> <p><b>Lead Agency:</b> Maui Emergency Management Agency</p>	In Progress County-responsibility actions will be tracked in their respective local HMPs

## G.3 2023 State Action Plan

### G.3.1 2023 MITIGATION ACTIONS BY HAZARD

Table G-3 summarizes the State 2023 mitigation actions and the hazards of concern each addresses.





Table G-3. 2023 SHMP Update State of Hawai'i Actions and Hazards of Concern Addressed

Action Number	Hazard(s) of Concern Addressed															
	All Hazards	Climate Change and Sea Level Rise	Cyber Threat	Drought	Earthquake	Flood	Hazardous Materials	Health Risks	Hurricane	Infrastructure Failure	Landslide/ Rockfall	Terrorism	Tsunami	Volcanic Hazards	Wildfire	Windstorm
2023-001						◆										
2023-002					◆	◆		◆	◆	◆	◆	◆			◆	◆
2023-003									◆							
2023-004	◆															
2023-005		◆				◆										
2023-006						◆										
2023-007		◆														
2023-008		◆		◆		◆										
2023-009		◆				◆		◆				◆				
2023-010																
2023-011																
2023-012																
2023-013																
2023-014																
2023-015																
2023-016																
2023-017																
2023-018																
2023-019															◆	
2023-2020-001	◆															
2023-2020-002					◆	◆		◆	◆	◆		◆	◆	◆	◆	◆
2023-2020-003		◆			◆	◆		◆	◆	◆		◆	◆	◆	◆	◆
2023-2020-004	◆															
2023-2018-001					◆											
2023-2018-002					◆	◆		◆								◆
2023-2018-004	◆															
2023-2018-005												◆	◆			
2023-2018-006	◆															
2023-2018-007																
2023-2018-009	◆															
2023-2018-011					◆	◆		◆								◆
2023-2018-012								◆								◆
2023-2018-013								◆								◆
2023-2018-016																
2023-2018-017				◆												
2023-2018-018				◆												





Action Number	Hazard(s) of Concern Addressed															
	All Hazards	Climate Change and Sea Level Rise	Cyber Threat	Drought	Earthquake	Flood	Hazardous Materials	Health Risks	Hurricane	Infrastructure Failure	Landslide/ Rockfall	Terrorism	Tsunami	Volcanic Hazards	Wildfire	Windstorm
2023-2018-019				◆											◆	
2023-2018-021				◆											◆	
2023-2018-022		◆				◆		◆					◆			◆
2023-2018-023		◆				◆							◆			
2023-2018-024															◆	
2023-2018-025															◆	
2023-2018-026															◆	
2023-2018-027				◆											◆	
2023-2018-028				◆											◆	
2023-2018-029															◆	
2023-2018-030								◆							◆	
2023-2018-031								◆							◆	
2023-2018-032				◆		◆		◆					◆		◆	
2023-2018-033		◆			◆	◆	◆	◆					◆			
2023-2018-034	◆						◆	◆								◆
2023-2018-041	◆							◆					◆		◆	◆
2023-2018-042	◆	◆						◆					◆		◆	◆
2023-2018-043		◆				◆		◆								
2023-2018-045		◆			◆	◆		◆	◆	◆			◆		◆	◆
2023-2018-046		◆		◆		◆		◆			◆					
2023-2018-048		◆				◆		◆					◆			
2023-2018-049								◆					◆			
2023-2018-050													◆			
2023-2018-051						◆		◆								
2023-2018-053	◆															
2023-2018-054		◆				◆							◆			
2023-2018-055															◆	
2023-2018-056	◆							◆								
2023-2018-057	◆							◆								
2023-2018-058		◆				◆		◆								
2023-2013-001								◆								
2023-2013-002								◆								
2023-2013-004					◆			◆								◆
2023-2013-018								◆					◆			
2023-2013-021													◆			
2023-2013-024	◆															
2023-2013-025					◆	◆		◆					◆			







Action Number	Hazard(s) of Concern Addressed															
	All Hazards	Climate Change and Sea Level Rise	Cyber Threat	Drought	Earthquake	Flood	Hazardous Materials	Health Risks	Hurricane	Infrastructure Failure	Landslide/ Rockfall	Terrorism	Tsunami	Volcanic Hazards	Wildfire	Windstorm
2023-2013-026					◆											
2023-2013-028					◆											
2023-2013-033					◆			◆								
2023-2013-034					◆											
2023-2013-035					◆											
2023-2013-061										◆						
2023-2013-071					◆	◆	◆	◆	◆	◆	◆		◆	◆	◆	◆
2023-2013-072	◆															
2023-2013-078	◆															
2023-2013-086	◆															
2023-2013-088					◆				◆							
2023-2013-095	◆															
2023-2013-116					◆	◆	◆		◆				◆	◆		
2023-2013-121													◆			

### G.3.2 ACTION PLAN PRIORITIZATION

As discussed in Section 6.4 (Mitigation Strategy - Action Plan Prioritization), all 2023 State mitigation actions were prioritized utilizing the established prioritization schema. Table G-4 summarizes the prioritization of the State mitigation actions.

Table G-4. 2023 SHMP Update State of Hawai'i Action Plan Prioritization

Action Number	Criteria															Priority
	Life Safety	Property Protection	Cost-effective	Technically Feasible	Climate Change	Legal Authority	Funding Available	Environmental Impact	Social Vulnerability	Administrative Capability	Multi-Hazard	Timeline	Local Champion	Other Objectives or Policies	Total Score	
2023-001	0	3	3	3	3	3	1	3	3	1	0	0	1	3	27	Medium
2023-002	3	3	3	3	3	3	1	1	3	1	3	1	1	3	32	High
2023-003	1	1	3	3	1	3	3	3	3	1	0	3	1	1	33	High
2023-004	0	0	3	3	0	3	1	0	3	1	3	3	3	3	26	Medium
2023-005	1	1	3	3	3	3	1	3	3	3	3	3	3	3	36	High
2023-006	0	3	3	3	3	3	1	3	3	1	3	3	3	1	33	High
2023-007	1	0	3	3	3	3	1	3	3	1	3	1	3	3	31	High





Action Number	Criteria														Priority	
	Life Safety	Property Protection	Cost-effective	Technically Feasible	Climate Change	Legal Authority	Funding Available	Environmental Impact	Social Vulnerability	Administrative Capability	Multi-Hazard	Timeline	Local Champion	Other Objectives or Policies		Total Score
2023-008	1	3	3	3	3	3	1	3	1	1	3	1	3	3	32	High
2023-009	1	3	3	3	3	3	3	3	3	3	3	1	3	3	38	High
2023-010	1	1	3	3	0	3	1	1	3	1	3	3	3	3	29	Medium
2023-011	3	3	3	3	3	3	1	1	3	1	3	1	3	3	34	High
2023-012	0	0	3	3	0	3	1	1	3	3	3	1	3	3	27	Medium
2023-013	0	0	3	3	0	3	1	1	3	3	3	3	3	3	29	Medium
2023-014	0	3	1	3	3	3	1	1	3	1	3	1	3	3	29	Medium
2023-015	0	0	3	3	1	3	1	0	1	1	3	3	3	3	22	Medium
2023-016	0	0	3	3	3	3	1	1	1	1	3	1	3	3	26	Medium
2023-017	1	0	3	3	1	3	1	1	3	1	1	3	3	1	25	Medium
2023-018	0	0	3	3	3	3	1	1	3	3	3	3	3	3	32	High
2023-019	3	3	3	3	3	3	3	3	3	3	3	3	3	3	42	High
2023-2020-001	3	3	3	3	1	3	1	1	3	1	3	0	3	3	31	High
2023-2020-002	3	3	3	3	0	3	1	1	3	1	3	3	3	3	33	High
2023-2020-003	1	3	1	3	3	3	1	0	3	1	3	3	3	3	29	Medium
2023-2020-004	3	0	3	3	1	3	1	0	3	1	3	3	3	3	30	Medium
2023-2018-001	3	3	3	3	3	3	1	1	3	3	3	1	3	1	34	High
2023-2018-002	1	3	3	3	3	3	1	1	3	3	3	3	3	1	34	High
2023-2018-004	1	0	3	3	3	3	3	0	3	3	3	0	3	0	28	Medium
2023-2018-005	3	3	3	3	0	3	0	3	3	3	3	3	3	3	33	High
2023-2018-006	3	3	1	1	1	1	1	1	3	1	3	3	1	3	26	Medium
2023-2018-007	3	3	3	3	3	3	1	3	3	3	3	3	3	3	40	High
2023-2018-009	3	1	3	3	1	3	1	1	3	3	1	3	3	3	32	High
2023-2018-011	3	3	3	3	3	3	1	1	3	3	3	3	3	1	36	High
2023-2018-012	3	3	3	3	3	3	3	1	3	3	3	3	3	1	38	High
2023-2018-013	3	3	3	3	3	3	1	1	3	3	3	3	3	1	36	High
2023-2018-016	3	3	3	3	1	3	1	1	3	3	3	3	3	3	36	High
2023-2018-017	3	1	1	3	3	3	0	0	3	1	3	3	3	1	28	Medium
2023-2018-018	3	0	0	3	3	1	0	3	3	1	3	1	3	3	27	Medium
2023-2018-019	3	0	1	3	3	3	1	3	3	3	3	1	3	3	33	High
2023-2018-021	3	0	1	1	3	3	1	0	3	1	0	3	3	3	25	Medium
2023-2018-022	3	3	3	3	3	3	3	0	3	3	3	3	3	1	37	High
2023-2018-023	3	3	3	1	3	3	0	3	3	3	3	3	3	1	35	High
2023-2018-024	1	1	3	3	3	3	3	3	3	3	0	3	1	3	33	High
2023-2018-025	1	1	3	3	3	3	1	3	3	3	0	3	0	3	30	Medium
2023-2018-026	1	3	3	3	3	3	1	3	1	3	0	1	3	3	31	High
2023-2018-027	1	3	3	3	3	3	1	3	3	3	3	1	3	3	36	High
2023-2018-028	1	3	3	3	3	3	3	3	3	3	3	3	3	3	40	High
2023-2018-029	1	3	3	3	3	3	3	3	3	3	3	3	3	3	37	High





Action Number	Criteria														Priority	
	Life Safety	Property Protection	Cost-effective	Technically Feasible	Climate Change	Legal Authority	Funding Available	Environmental Impact	Social Vulnerability	Administrative Capability	Multi-Hazard	Timeline	Local Champion	Other Objectives or Policies		Total Score
2023-2018-030	1	3	3	3	3	3	3	3	3	3	3	3	3	3	37	High
2023-2018-031	1	3	3	3	3	3	3	0	3	3	3	3	1	3	35	High
2023-2018-032	1	1	3	3	3	3	3	3	3	3	3	3	3	3	38	High
2023-2018-033	1	0	3	3	3	0	0	3	3	0	3	0	3	3	25	Medium
2023-2018-034	3	3	3	3	3	3	0	1	1	3	3	1	3	3	33	High
2023-2018-041	3	3	3	3	3	3	1	3	3	3	3	3	3	3	40	High
2023-2018-042	3	3	3	3	3	3	1	3	3	3	3	3	3	3	40	High
2023-2018-043	3	3	3	1	3	1	0	3	3	0	3	0	3	3	29	Medium
2023-2018-045	3	3	3	3	3	3	1	3	1	1	3	3	1	3	34	High
2023-2018-046	1	1	3	3	3	3	0	3	3	3	3	3	3	3	35	High
2023-2018-048	3	3	1	1	3	2	1	2	3	2	3	1	1	3	29	Medium
2023-2018-049	3	3	1	3	1	1	1	1	3	1	0	1	3	3	25	Medium
2023-2018-050	3	3	1	3	1	1	1	1	3	1	0	1	3	3	25	Medium
2023-2018-051	3	3	1	1	3	1	1	0	3	1	3	3	1	3	27	Medium
2023-2018-053	1	3	3	3	3	3	0	0	3	0	3	3	3	3	31	High
2023-2018-054	3	3	3	3	3	3	0	0	3	0	3	3	3	3	33	High
2023-2018-055	1	1	3	3	3	3	3	3	3	3	0	3	3	3	35	High
2023-2018-056	3	3	3	3	1	3	3	1	1	3	3	3	3	3	36	High
2023-2018-057	1	3	3	3	3	1	3	3	3	3	3	3	3	3	38	High
2023-2018-058	1	3	3	3	3	3	1	1	3	1	3	1	3	3	32	High
2023-2013-001	3	3	1	3	3	1	0	0	3	3	3	3	3	3	32	High
2023-2013-002	3	3	3	3	3	3	0	0	3	3	3	0	3	3	33	High
2023-2013-004	3	3	3	3	3	3	3	0	3	3	3	3	3	3	39	High
2023-2013-018	3	0	0	1	3	3	1	1	3	1	3	3	1	3	26	Medium
2023-2013-021	1	3	3	3	1	3	0	0	3	3	3	3	3	3	32	High
2023-2013-024	3	3	3	3	3	3	0	0	3	3	3	3	3	3	36	High
2023-2013-025	3	3	1	3	3	3	0	3	3	3	3	3	3	3	37	High
2023-2013-026	3	3	3	3	1	3	0	0	3	3	3	3	3	3	34	High
2023-2013-028	3	1	3	3	1	3	0	0	3	1	0	3	3	3	27	Medium
2023-2013-033	1	3	3	1	3	3	0	0	3	0	3	0	3	3	26	Medium
2023-2013-034	1	1	1	3	1	3	0	0	3	0	3	3	1	3	23	Medium
2023-2013-035	1	1	1	3	0	3	0	0	3	0	3	3	2	3	23	Medium
2023-2013-061	1	1	3	1	3	3	0	0	3	0	3	0	3	3	24	Medium
2023-2013-071	2	0	1	3	0	3	1	0	3	3	3	1	3	1	22	Medium
2023-2013-072	1	0	3	1	0	3	1	0	3	1	3	1	3	3	23	Medium
2023-2013-078	1	0	1	3	0	3	1	0	3	1	3	1	3	3	23	Medium
2023-2013-086	3	1	3	1	3	3	1	1	3	1	3	3	3	3	32	High
2023-2013-088	3	3	3	1	3	1	0	0	3	1	3	0	3	3	27	Medium
2023-2013-095	1	1	1	3	0	0	1	0	3	0	3	3	3	3	22	Medium





Action Number	Criteria															Priority
	Life Safety	Property Protection	Cost-effective	Technically Feasible	Climate Change	Legal Authority	Funding Available	Environmental Impact	Social Vulnerability	Administrative Capability	Multi-Hazard	Timeline	Local Champion	Other Objectives or Policies	Total Score	
2023-2013-116	1	3	1	1	3	3	0	0	3	0	3	1	3	3	25	Medium
2023-2013-121	1	3	1	1	0	3	0	1	3	0	0	1	1	1	16	Medium

## G.4 Mitigation Funding

Cost share percentages across FEMA mitigation funding streams are detailed in Table G-5. Eligible activities under the HMGP, BRIC, FMA, and HHPD grant programs are listed in Table G-6.

**Table G-5. FEMA Hazard Mitigation Assistance Grant Program Cost Share**

Programs	Mitigation Activity (Percent of Federal/Non-Federal Share)	Recipient Management Costs (Percent of Federal/Non-Federal Share)	Subrecipient Management Costs (Percent of Federal/Non-Federal Share)
HMGP	75/25	100/0	—/— <sup>(a)</sup>
BRIC	75/25	75/25	75/25
BRIC – subrecipient is small and impoverished community	90/10	100/0	90/10
PDM	75/25	95/5	95/5
PDM – subrecipient is small and impoverished community	90/10	95/5	95/5
FMA – insured properties and planning grants	75/25	75/25	75/25
FMA – repetitive loss property	90/10	90/10	90/10
FMA – severe repetitive loss property <sup>b</sup>	100/0	100/0	100/0

- a. Subapplicants should consult their State Hazard Mitigation Officer (SHMO) for the amount or percentage of HMGP subrecipient management cost funding their State has determined to be passed through to subrecipients.
- b. To be eligible for an increased Federal cost share, a FEMA-approved State or Tribal (Standard or Enhanced) Mitigation Plan that addresses RL properties must be in effect at the time of award, and the property that is being submitted for consideration must be a RL property.

**Table G-6. FEMA Hazard Mitigation Grant Program Eligible Activities**

Eligible Activities	HMGP	BRIC	FMA	HHPD
Property Acquisition and Structure Demolition	✓	✓	✓	
Property Acquisition and Structure Relocation	✓	✓	✓	
Structure Elevation	✓	✓	✓	
Mitigation Reconstruction	✓	✓	✓	✓
Dry Floodproofing of Historic Residential Structures	✓	✓	✓	
Dry Floodproofing of Non-residential Structures	✓	✓	✓	
Generators	✓	✓		
Localized Flood Risk Reduction Projects	✓	✓	✓	
Non-Localized Flood Risk Reduction Projects	✓	✓		





Eligible Activities	HMGP	BRIC	FMA	HHPD
Structural Retrofitting of Existing Buildings	✓	✓	✓	
Non-structural Retrofitting of Existing Buildings and Facilities	✓	✓	✓	
Safe Room Construction	✓	✓		
Wind Retrofit for One- and Two-Family Residences	✓	✓		
Infrastructure Retrofit	✓	✓	✓	
Soil Stabilization	✓	✓	✓	✓
Wildland Fire Mitigation	✓	✓		
Post-Disaster Code Enforcement	✓			
Advance Assistance	✓			
5 Percent Initiative Projects*	✓			
Aquifer and Storage Recovery**	✓	✓	✓	
Flood Diversion and Storage**	✓	✓	✓	
Floodplain and Stream Restoration**	✓	✓	✓	
Green Infrastructure**	✓	✓	✓	
Miscellaneous/Other**	✓	✓	✓	
Hazard Mitigation Planning	✓	✓	✓	✓
Technical Assistance			✓	✓
Management Costs	✓	✓	✓	

\* FEMA allows increasing the 5% Initiative amount up to 10% for a Presidential major disaster declaration under HMGP. The additional 5% Initiative funding can be used for activities that promote disaster-resistant codes for all hazards. As a condition of the award, either a disaster-resistant building code must be adopted or an improved Building Code Effectiveness Grading Schedule is required.

\*\*Indicates that any proposed action will be evaluated on its own merit against program requirements. Eligible projects will be approved provided funding is available.

Note: Eligible activities for the PDM Grant Program will be listed in future updates.





# Appendix H. 2023 SHMP Annual Progress Reports



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<sup>1</sup> Section Cover Photo: Īao Valley State Monument, Maui. Photo courtesy of DLNR





## APPENDIX H. ANNUAL PROGRESS REPORTS

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This appendix will serve as the location in the plan where annual plan reviews, updates, and progress reports will be included. Each year, the annual review progress report will be added, and the updated appendix posted on the HI-EMA website. A summary of each FEMA annual consultation throughout the plan performance period will be included as well. Below are placeholder pages for the anticipated annual review reports and FEMA annual consultations between 2023 and 2027.







## H.1 2023 FEMA Consultation Report





## H.2 2023 SHMP Update Annual Review Report





## H.3 2024 FEMA Consultation Report





## H.4 2024 SHMP Update Annual Review Report





## H.5 2025 FEMA Consultation Report





## H.6 2025 SHMP Update Annual Review Report





## H.7 2026 FEMA Consultation Report





## H.8 2026 SHMP Update Annual Review Report







## H.9 2027 FEMA Consultation Report





## H.10 2027 SHMP Update Annual Review Report





# Appendix I. FEMA State Mitigation Plan Review Tool



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<sup>1</sup> Section Cover Photo: View of Waikiki and Honolulu from Diamond Head State Monument. Photo courtesy of DLNR





# APPENDIX I. STATE MITIGATION PLAN REVIEW TOOL

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The State Mitigation Plan Review Tool (Plan Review Tool) demonstrates and documents how the state mitigation plan meets the regulations set forth in 44 CFR Part 201 and offers FEMA mitigation planners an opportunity to provide feedback to the state.

The Regulation Checklist must be completed by FEMA. The FEMA Plan Approver must reference the State Mitigation Planning Policy Guide when completing the Plan Review Tool. The purpose of the checklist is to identify the location of relevant or applicable content in the plan by element/sub-element and to determine if each requirement has been “Met” or “Not Met.”

The Required Revisions summary at the bottom of each element must clearly explain the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is “Not Met.” Sub-elements should be referenced by the appropriate number, where applicable (e.g., S2-a, S2-b). Requirements for each element and sub-element are described in detail in Sections 3 and 4 of the State Mitigation Planning Policy Guide.

The HHPD section and FMAG sub-elements only need to be completed if the state is pursuing eligibility for those grant programs.

The Plan Assessment must be completed by FEMA. This assessment provides more comprehensive feedback to the state to acknowledge where the plan exceeds minimum requirements and provides suggestions for improvements. FEMA will describe the strengths that are demonstrated and highlight examples of best practices. FEMA’s suggestions for improvement are not required to be made for plan approval.

*For greater clarification of the elements in the regulation checklist, please see [Sections 3](#) and [4](#) in the State Mitigation Planning Policy Guide. This document defines terms and phrases used within this review tool.*





## I.1 Plan and Review Information





## I.2 Standard State Mitigation Plan Regulation Checklist





## I.3 Plan Assessment







## I.4 Standard State Mitigation Plan Requirements





## I.5 Enhanced State Mitigation Plan Requirements

