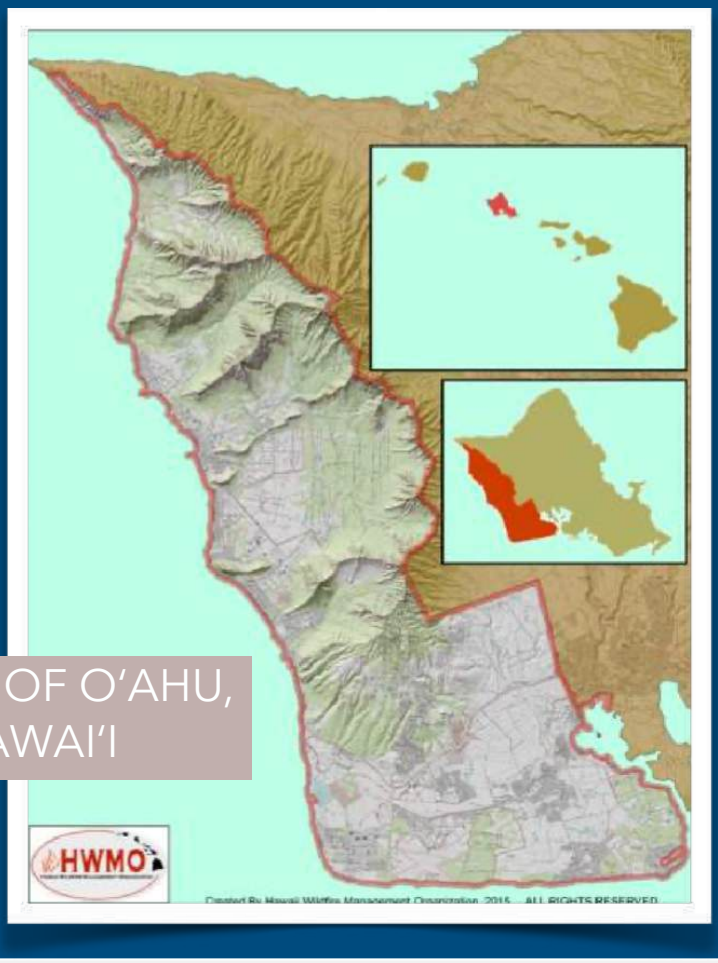
WESTERN O'AHU COMMUNITY WILDFIRE PROTECTION PLAN



ISLAND OF O'AHU, HAWAI'I

ORIGINAL PLAN: 2016

This document represents the collective efforts of community members, agencies, and stakeholders to reduce wildfire risks and enhance resilience. Originally developed in 2016, the CWPP established a comprehensive framework for wildfire hazard assessment, community values, and recommended strategies for risk reduction.

PRIORITY PROJECTS UPDATED: 2024

In 2024, the plan was updated to include a detailed list of priority projects, making it a dynamic, living plan that evolves with the community's needs and priorities. The CWPP remains a cornerstone for wildfire risk mitigation, project planning, and funding, ensuring a collaborative and proactive approach to wildfire resilience.

Coordinated and developed by Hawai'i Wildfire Management Organization, in partnership with Hawai'i Department of Land and Natural Resources, Division of Forestry and Wildlife. Funded by the USDA Forest Service.

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PLEASE READ BEFORE CONTINUING

Introduction to the Community Wildfire Protection Plan (CWPP) and Updates

The Community Wildfire Protection Plan (CWPP) is a vital tool for guiding communities, agencies, and stakeholders in reducing wildfire risks and enhancing resilience across our landscapes. Since its inception, the CWPP has provided a comprehensive foundation for understanding wildfire hazards, the characteristics of our landscapes, the values at risk, and the community and agency concerns that shape our wildfire mitigation strategies. The CWPP has always been designed to serve as a dynamic, living document that remains relevant and actionable over time.

Foundational Elements of the CWPP

The foundational elements of the CWPP were established during the original completion of the CWPP document. These remain steadfast and include:

- Detailed assessments of wildfire hazards and risks.
- Descriptions of the local and regional landscape.
- Identification of community values at risk, including natural resources, homes, infrastructure, and cultural heritage.
- Documentation of community and agency concerns regarding wildfire impacts.
- General recommended next steps and strategies to address wildfire risk.

When there are significant changes in risk, values, emergency operations, or similar, an entirely new CWPP document will be developed. Until such time, these core components ensure that the CWPP continues to provide a reliable, broad-based framework for understanding and addressing wildfire challenges.

The Evolution of the CWPP: Annual Priority Projects and Actions Updates

To ensure that the CWPP remains an actively utilized tool for project planning and funding, we have adopted a system of annual updates to the appendix. These updates focus specifically on identifying and prioritizing shovel-ready projects that align with the overarching goals of the CWPP. This approach allows us to:

- Keep the CWPP alive and relevant by incorporating evolving community needs and priorities.
- Enhance its utility as a foundational resource for securing funding and implementing wildfire mitigation projects.
- Ensure that project lists remain current, specific, and actionable.

While the foundational elements of the CWPP persist as written, the priority projects and actions list naturally shift and evolve over time. This flexibility ensures that the CWPP remains both a strategic guide and a practical resource for action.

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Mutual Agreement Signature Page

The following three entities mutually agree to the final contents of this Community Wildfire Protection Plan and the subsequent List of Priority Projects and Actions: State of Hawaii Department of Land and Natural Resources, Division of Forestry and Wildlife; Honolulu Fire Department; and City and County of Honolulu, Department of Emergency Management.

This plan:

- Was collaboratively developed by agencies, entities, community members, and individuals with interest or jurisdiction within the CWPP area.
- Describes wildfire hazards in the natural and built environment.
- Provides the concerns, recommended actions, and priorities of those who live and work in the area to better reduce wildfire threats, mitigate hazards, improve public safety, and protect natural resources from the impacts of wildfire.
- Is written to appropriately begin and inform wildfire mitigation action planning at the local level, and is not regulatory or binding.
- Includes both foundational information and updated lists of projects.

Pursuant to the 2003 Healthy Forest Restoration Act (HFRA), the following signatures represent mutual agreement of the contents of this CWPP.

Acknowledgment of the 2024 Update

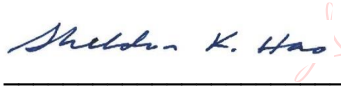
This 2024 update represents the latest step in the CWPP's evolution. It includes a brand-new list of priority projects and actions, each identified with detailed specifications to guide implementation.

By signing this document, we affirm our collective commitment to the CWPP's foundational principles and to the ongoing process of refining and advancing our wildfire mitigation project priorities and implementation efforts.

12/19/2024

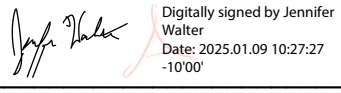
Michael J. Walker, State Fire Protection Forester
Department of Land and Natural Resources
Division of Forestry and Wildlife

Date



Sheldon K. Hao, Fire Chief
City and County of Honolulu
Honolulu Fire Department

Date



Jennifer Walter, Acting Director
City and County of Honolulu
Department of Emergency Management

Date

ACKNOWLEDGEMENTS From the orginal plan development in 2016

Project Developed and Coordinated by: Hawai'i Wildfire Management Organization (HWMO), a 501 (c)3 nonprofit organization dedicated to protecting communities and natural resources in Hawai'i and the Pacific from wildfire. hawaiiwildfire.org

Plan Written by: Elizabeth Pickett and Pablo Beimler, HWMO.

Contributor to Fire Environment and Fire Impacts Sections: Dr. Clay Trauernicht, University of Hawai'i, Manoa, College of Tropical Agriculture and Human Resources.

Public Input Meetings Led by: Elizabeth Pickett and Ilene Grossman, HWMO, with assistance from agency and community partners.

Public Input Process Coordinated, Advertised, and Planned by: Ilene Grossman, HWMO.

Maps Created by: Orlando Smith, HWMO.

Special Thanks to:

- ◊ O'ahu Wildfire Information and Education Coordinating Group.
- ◊ Assistant Chief Socrates Bratakos, Battalion Chief Terry Seelig, and Captain David Jenkins of Honolulu Fire Department.
- ◊ Ryan Peralta, Rob Hauff, Dietra A. Myers Tremblay, and Wayne Ching of Hawai'i Department of Land and Natural Resources- Division of Forestry and Wildlife.

Completed using funds from: 2014-16 US Forest Service Competitive Western WUI Grant from the Cooperative Fire Program of the U.S. Forest Service, Department of Agriculture, Pacific Southwest Region. In accordance with Federal law and U.S. Department of Agriculture policy, this institution is prohibited from discriminating on the basis of race, color, national origin, sex, age, or disability. (Not all prohibited bases apply to all programs.) To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326 W. Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.

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GOALS AND OBJECTIVES

This Community Wildfire Protection Plan (CWPP) was developed by the Hawai'i Wildfire Management Organization (HWMO) with guidance and support from government agency representatives, private resource managers, community members, and decision makers concerned about wildfire issues in Western O'ahu. State of Hawai'i Department of Land and Natural Resources- Division of Forestry and Wildlife (DLNR-DOFAW), Honolulu Fire Department (HFD), and O'ahu Wildfire Information and Education Coordinating Group (OWIE) were the primary partners in developing this plan.

This plan addresses elements of fire protection, hazard assessment, wildfire mitigation priorities, and community outreach and education. The process used to develop this plan engaged a diversity of agencies and individuals concerned with the at-risk area, following the guidelines and requirements of federal programs such as the Federal Emergency Management Agency (FEMA) Pre-Disaster Mitigation program and the National Fire Plan (NFP).

The goals and objectives of this plan follow the intent and requirements of the *Healthy Forests Restoration Act (HFRA) of 2003– HR 1904,* which describes a CWPP as a fire mitigation and planning tool for an at-risk community that:

- Is developed within the context of the collaborative agreements and the guidance established by the Wildland Fire Leadership Council and agreed to by the applicable local government, local fire department, and state agency responsible for forest management, in consultation with interested parties and the federal land management agencies managing land in the vicinity of the at-risk community.

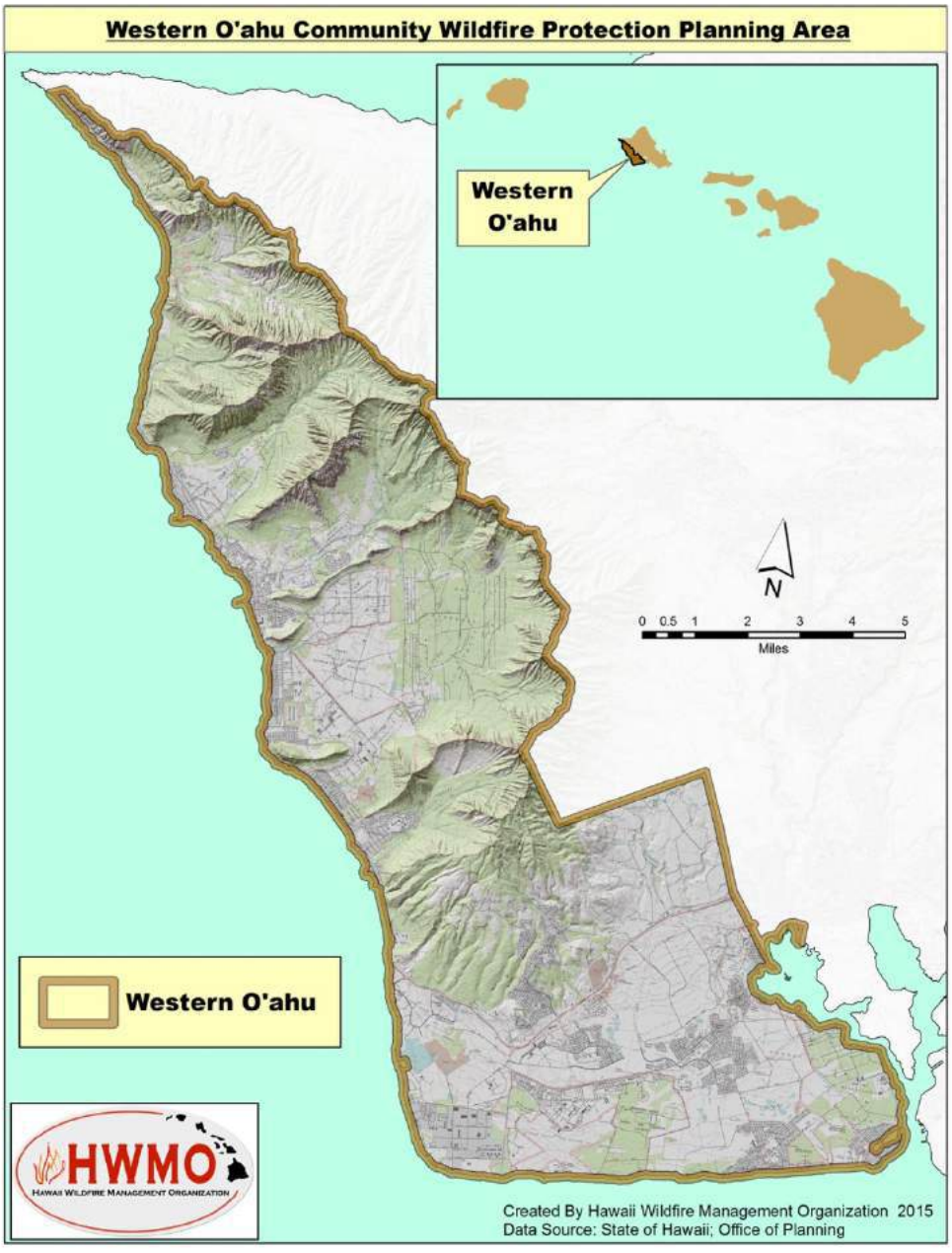
- Identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment on federal and non-federal land that will protect one or more at-risk communities and essential infrastructure.

- Recommends measures to reduce structural ignitability throughout the at-risk community.[1]

Stakeholder participants in the development of this plan agree that wildfire threats are imminent and can have widespread damage to Western O'ahu watersheds, natural resources, and human communities. The dangers and impacts of fire are related to high numbers of human-caused fires and high fire potential of vegetation. In the last decade, numerous areas of Western O'ahu have burned. The CWPP is an important step toward public-private collaborative action toward wildfire preparedness and protection.

PLANNING AREA BOUNDARIES AND OVERVIEW

The Western O‘ahu CWPP planning area lies on the Island of O‘ahu, Hawai‘i, and encompasses the Wai‘anae and ‘Ewa watershed management districts as defined by the Board of Water Supply. This includes the lands that lie between Ka‘ena Point in the north and ‘Ewa Beach in the south. For most of its length, the planning area is bounded by the Wai‘anae Mountain Ridge on the east and the Pacific Ocean on the west. The southeastern corner of the planning area is bounded by Pearl Harbor. This area encompasses over 71,000 acres, which is approximately 18 percent of O‘ahu’s 385,280-acre land mass.



Map 1. *Western O‘ahu CWPP Planning Area Map.*

PLANNING PROCESS, METHODS, AND PARTICIPANTS

CWPP PROCESS AND METHODS

The process of developing a CWPP helps to clarify and refine priorities for the protection of life, property, and critical infrastructure in the wildland-urban interface areas. Local residents, landowners, fire suppression agencies, and community leaders have participated in valuable discussions regarding wildfire history, resources at risk, areas of concern, and priority mitigation actions. The methods used to create this CWPP followed the guidelines established by the HFRA, which requires involving decision makers, government agency representatives, and interested parties during the planning process.

The Western Oʻahu CWPP followed these guidelines and additionally satisfies the requirements of the Federal Emergency Management Agency (FEMA) Pre-Disaster Mitigation program and the National Fire Plan (NFP).

PARTICIPANTS

State and Local Agencies

Representatives of the agencies that have jurisdictional responsibilities in the vicinity of the Western Oʻahu CWPP planning area, and who have been involved in the development of the Western Oʻahu CWPP are:

Agency	Representative(s)
Honolulu Fire Department	Socrates Bratakos, Assistant Chief, Support Services Terry Seelig, Battalion Chief, Fire Prevention Bureau 40+ firefighters who attended public meetings to provide input
Hawaiʻi Department of Land and Natural Resources- Division of Forestry and Wildlife	Robert Hauff, State Protection Forester Ryan Peralta, Forest Management Supervisor I Deitra A. Meyers Tremblay, Program Specialist David G. Smith, Administrator Deborah Ward, Public Information Officer

Table 1. *CWPP Participants: State and Local Agencies.*

Federal Agencies

The following federal agencies were consulted for area-specific and regional fire and environmental information and expertise:

Agency	Representative(s)
Federal Fire Department	Jeffrey Fernaays, Prevention Chief
US Fish and Wildlife Service	Dawn Bruns – Acting Assistant Field Supervisor Section 7 & Habitat Conservation Plans

Table 2. *CWPP Participants: Federal Agencies.*

Decision Makers

The decision makers contacted for input and involvement in the development of the Western Oʻahu CWPP are represented in the following table. HWMO called and emailed each of the following politicians for input and assistance in advertising about the public input meetings in their districts and region. Many responded via email or sent representatives from their offices to the public input meetings.

Local Government	Name	Representing
Hawai‘i State House of Representatives	Rep. Ty J.K Cullen	H District 39: Royal Kunia, Village Park, Waipahu, Makakilo, West Loch
	Rep. Sharon Har	H District 42: Kapolei, Makakilo
	Rep. Jo Jordan	H District 44: Wai‘anae, Makaha, Makua, Maili
	Rep. Matthew LoPresti	H District 41:‘Ewa, ‘Ewa Beach, ‘Ewa Gentry, ‘Ewa Villages, Hoakalei, Ocean Pointe
	Rep. Bob McDermott	H District 40: ‘Ewa, ‘Ewa Beach, ‘Ewa Gentry, Iroquois Point
	Rep. Andria P. L. Tupola	H District 43: ‘Ewa Villages, Kalaeloa, Honokai Hale, Nanakai Gardens, Ko Olina, Kahe Point, Nanakuli, Lualualei, Maili
Hawai‘i State Senate	Sen. Mike Gabbard	S District 20: Kapolei, Makakilo, and portions of ‘‘Ewa, Kalaeloa, and Waipahu
	Sen. Maile S. L. Shimabukuro	S District 21: Kalaeloa, Honokai Hale, Ko ‘Olina, Nanakuli, Ma‘ili, Wai‘anae, Makaha, Makua
	Sen. Will Esparo;	S District 19: ‘‘Ewa Beach, Ocean Pointe, ‘‘Ewa by Gentry, Iroquois Point, portion of ‘‘Ewa Villages
Honolulu City Council	Councilmember Kymberly Pine	District 1: ‘Ewa, ‘Ewa Beach, Kaplolei, Makakilo, Kalaeloa, Honokai Hale, Ko Olina, Nanakuli, Wai‘anae, Makaha, Keaau, Makua, Maili

Table 3. *CWPP Participants: Decision Makers.*

Interested Parties

The parties from our community that have shown interest in forest/fire management and contributed input into the Western O‘ahu CWPP are:

Interested Parties	Affiliation
Large Landowners	Gill Ewa Lands, LLC Ka‘ala Farms Palehua Ranch
Local Associations and Organizations	UH Honolulu Community College, Fire Science Program ‘Ewa Neighborhood Board Nanakuli/Maili Neighborhood Board Wai‘anae Neighborhood Board Wai‘anae Mountains Watershed Partnership
Private Citizens	General Public

Table 4. *CWPP Participants: Interested Parties.*

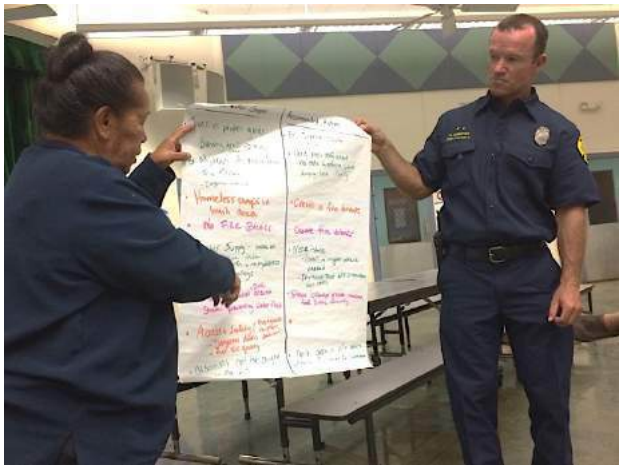


Photo 1 (above left). *Six community meetings were held throughout Western O'ahu to collect wildfire-related concerns and recommended action ideas from residents. HFD and DLNR-DOFAW were also represented at each meeting to provide input to the plan and information to public participants.* ***Photo 2 (above right).*** *Meeting participants separated into small groups to discuss wildfire issues and came back together toward the end of each meeting to share their highest priorities with the larger group.*

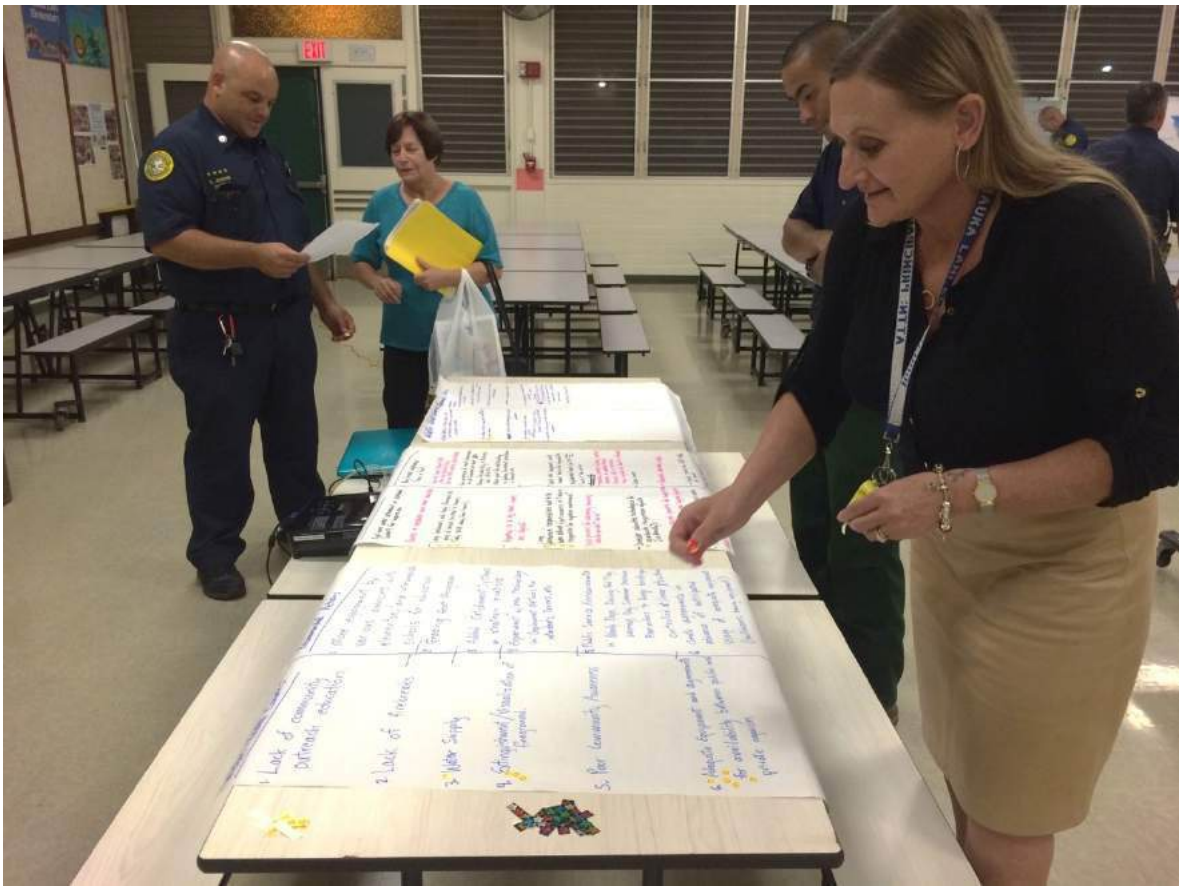


Photo 3. *Once all groups shared the wildfire-related concerns and suggestions generated by small group discussions, participants voted using stickers to identify their highest priorities.*

Photo 4. *Diverse groups of residents and firefighters shared their concerns and recommended actions regarding wildfire mitigation with each other at public meetings.*

Photo 5. *Agency-based meetings facilitated the collection of input from the leadership of HFD and DLNR-DOFAW, and many additional firefighters attended and provided input at community meetings.*

WILDFIRES IN WESTERN O‘AHU
BACKGROUND

Steep slopes, rough terrain, strong winds, and a large percentage of highly ignitable invasive grasses characterize the Western O‘ahu landscape. This, coupled with warm weather, recurring drought conditions, and a history of human-caused fire starts puts the area at increased risk of wildfire. The proximity of development to fire-prone wildlands present hazardous conditions that now threaten Western O‘ahu communities and natural resources. Overgrown vegetation close to homes, pockets of open space within subdivisions, and an increase of non-native high fire-intensity plants around developed areas pose increasing threats to commercial, community, environmental, and residential resources. Together, these factors create the fire environment that puts Western O‘ahu at risk of wildfire. This section discusses those factors in detail.

FIRE ENVIRONMENT

CLIMATE

Wildfire occurrence on O‘ahu is tied to broad climate patterns, in that more and larger fires typically occur in drier leeward areas. Rainfall in Western O‘ahu is highly variable over space and time and can greatly influence fire risk.

Typical of many areas, larger fires tend to occur during droughts and drier seasons, but wet periods may increase the quantity of available vegetative fuels, leading to an increase both in fire risk and in the frequency that mitigation measures such as firebreaks and fuels reduction need to be applied. Drier conditions tend to persist at lower elevations (Map 2), making neighborhoods and lands near the coast particularly vulnerable to wildfire starts. Rainfall is typically greater in mauka (upland) areas, which may result in lower fire risk on average in these areas. However, due to more abundant vegetation in the higher elevations, mauka areas frequently experience moderate to high wildfire risk during periods of drought. Daily weather patterns including diurnal thermal winds also influence fire risk.

Key factors indicating high fire danger in Hawai‘i are low relative humidity (RH), temperature, and high wind speeds (see Map 3). The combination of drought, low RH and high winds are tracked at the Honolulu International Airport by the National Weather Service and used to issue Red Flag warnings when high fire danger conditions are present.

TOPOGRAPHY

Wildfires spread more quickly as they progress upslope, and sun-exposed, south-facing slopes will be drier and burn at higher intensity. The Wai‘anae mountain range rises abruptly from the leeward coast and central plains of O‘ahu and is characterized by steep, rugged, and often inaccessible terrain (see Map 4). This topography creates dangerous conditions when wildfires occur, limits the ability of emergency response agencies to effectively contain and suppress wildfires, and constrains evacuation options for local communities.

All leeward communities (northward from Nanakuli) have only one egress option (south) along Farrington Highway (which turns from a four-lane route to a two-lane route in Makaha). In addition, many of the communities in valleys and ridges (i.e., Makakilo) have only single access routes. These constraints can often limit emergency response access to the fire-prone, wildland areas behind homes. Once wildfires

spread into steep, upland areas, the lack of roads and difficult terrain frequently limit fire response to costly aerial operations (i.e., bucket drops by helicopters), as conditions are often too dangerous to put firefighters on the ground.

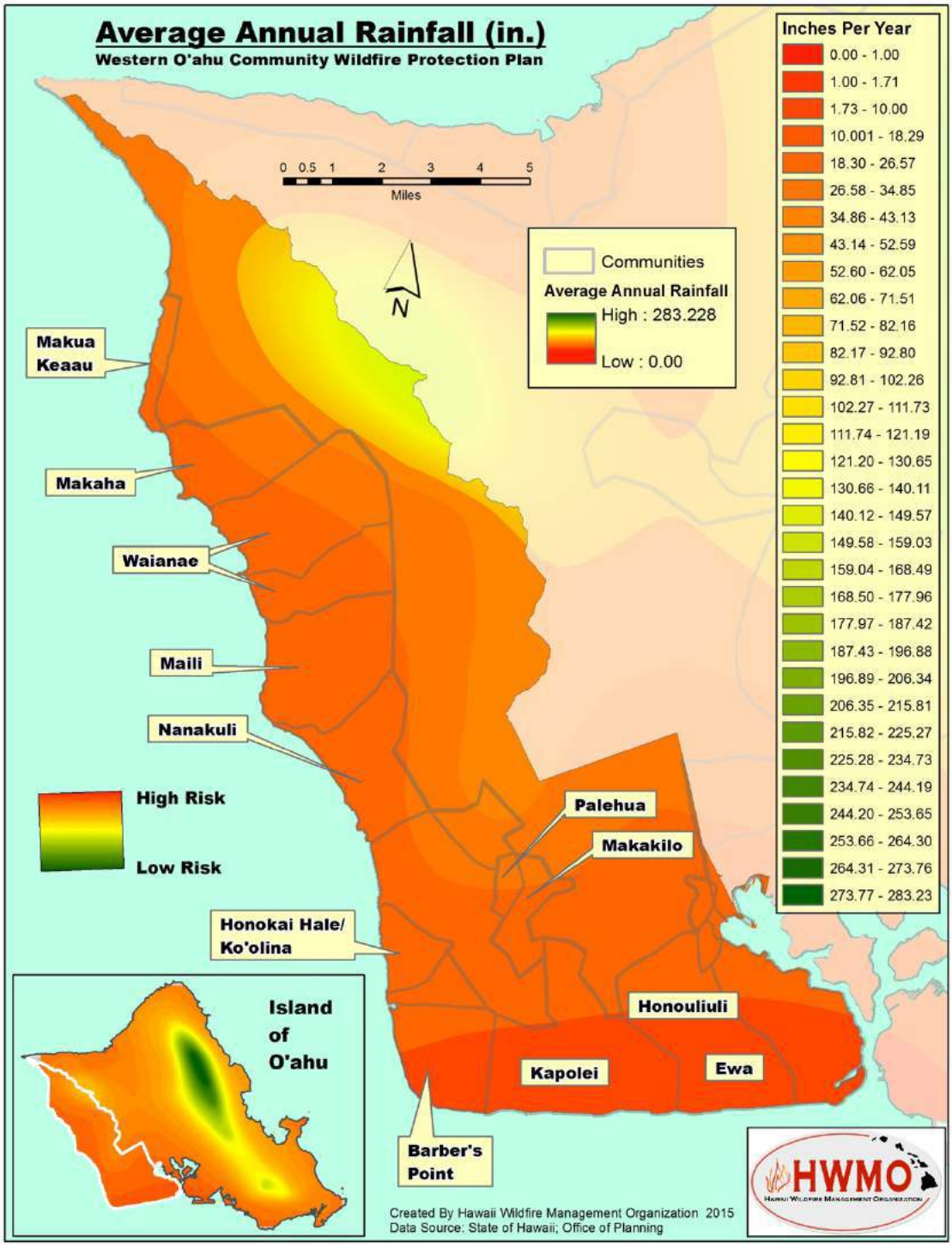
VEGETATION AND NATURAL RESOURCES

The widespread establishment of nonnative grasslands and shrublands, especially in lower elevation areas, is a leading cause of increased fire risk in Western O'ahu. Guinea grass (*Megathyrsus maximus*), buffel grass (*Cenchrus ciliaris*) and 'ekoa (*Leucaena leucocephala*) create continuous, highly flammable fuel beds over much of the landscape. These grasses provide abundant fine fire fuels that cure rapidly in dry conditions, are easily ignitable even in humid conditions, and allow fires to spread rapidly which create dangerous conditions for fire responders. In addition, interviews with firefighters indicate that 'ekoa produces abundant embers capable of traveling long distances, creating spot fires and endangering homes (most homes lost to wildfires are the result of embers). Nonnative grasslands and shrublands often act as uninterrupted 'wicks' that allow fires to spread from areas near communities (where ignition risk is highest) into the upland forested areas of the Wai'anae Mountains.

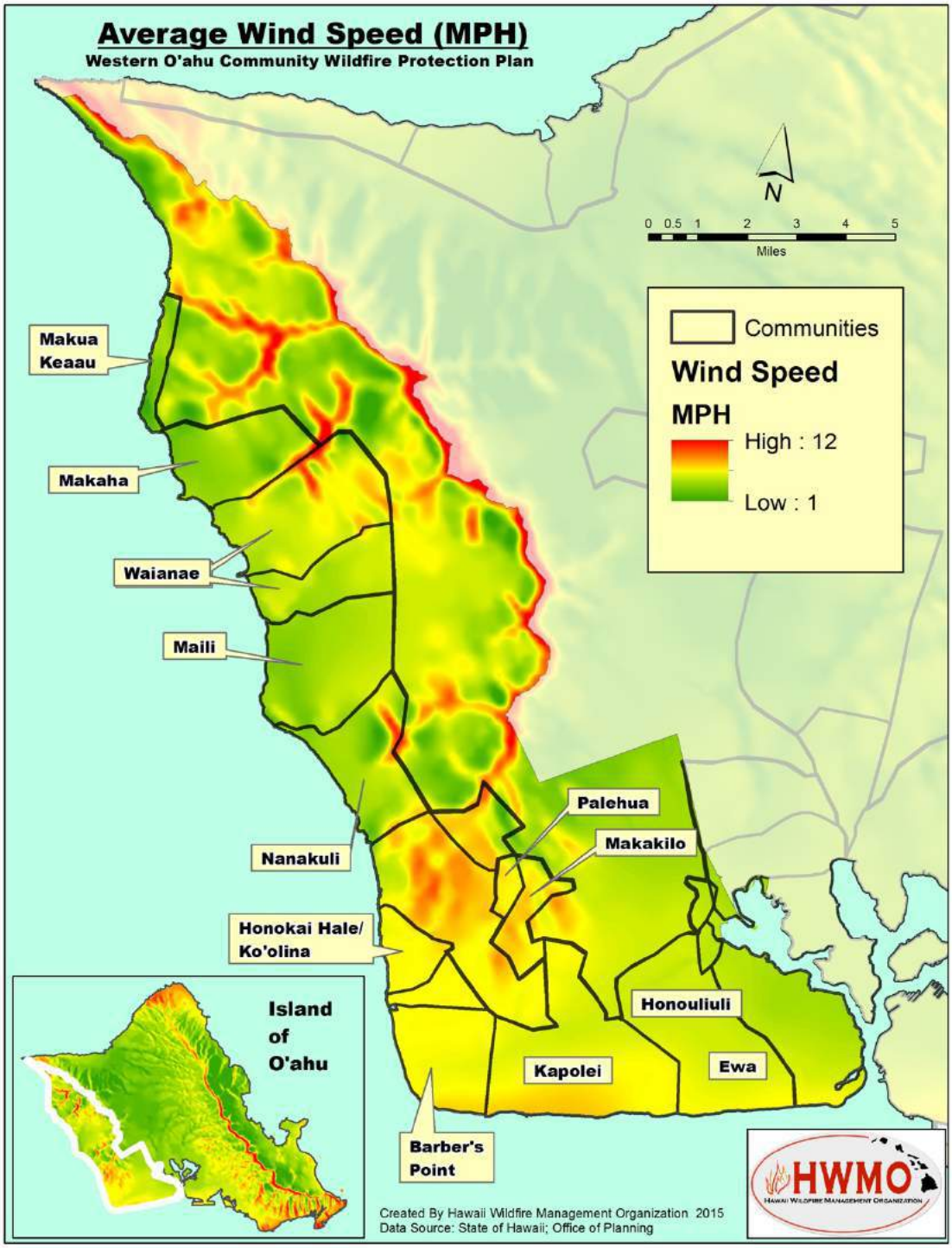
Recurrent fires in these lower elevation grasslands and shrublands effectively 'erode' the edges of upland forested areas, which become replaced by grasses and increase the risk of future fires over time. Lower elevation forests in typically consist of nonnative tree species such as silk oak (*Grevillea robusta*), strawberry guava (*Psidium cattleyanum*), Christmas berry (*Schinus terebinthifolius*), iron wood (*Casuarina equisetifolia*) and eucalyptus species. Fire behavior in these mixed forests is poorly documented, but the dominance of eucalyptus can create areas of high fire risk. Chemical content in eucalyptus leaves and bark prevents decomposition, resulting in large and persistent fuel loads beneath live trees. These increased fuel loads can result in high intensity fires that result in 'torching' or vertical fire spread into tree canopies as has been observed in eucalyptus stands during wildfires across the state. (See Map 5 for land cover type, which depicts the types of vegetation that exists within the Western O'ahu CWPP planning area).

Upper elevation forests in the Wai'anae mountains contain some of the few remaining tracts of native mesic forest (i.e., drier than rainforest) on O'ahu, with species such as koa (*Acacia koa*), 'ohi'a (*Metrosideros polymorpha*), alahe'e (*Psydrax odorata*), lama (*Diospyros sandwicensis*) and lonomea (*Sapindus oahuensis*). Western O'ahu's native forests are highly valuable for native habitat conservation with higher species diversity than wet forest areas and contain over 40 threatened and endangered plant and animal species. See Map 6 for densities of threatened and endangered species and Map 7 for the areas classified by the U.S. Fish and Wildlife Service (USFWS) as priority habitat conservation areas. Map 8 depicts the types of vegetation within the USFWS priority landscapes area. Map 9 demonstrates fire boundaries in relation to endangered species.

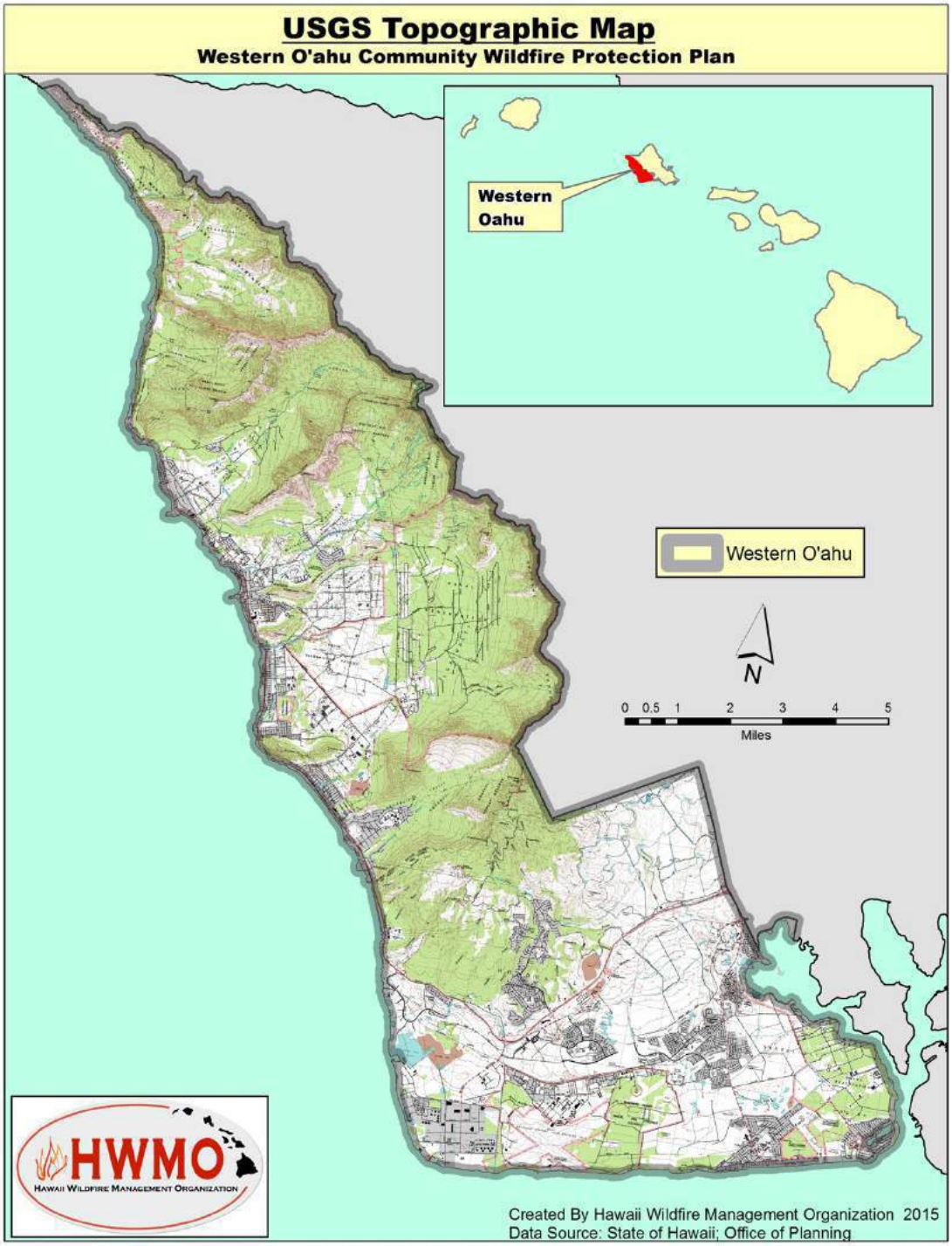
Lower elevation nonnative forests are more exposed to loss from wildfire due to the proximity of fire-prone grasslands and shrublands. However, several recent fires have impacted and/or threatened native forest both from starts within native forested areas – such as the 10 acre Kumaipo Ridge fire between Makaha and Wai'anae Kai valleys – as well as from lower elevation starts that have spread to upland areas – such as the 7,000 acre Waialua Fire in 2007 that destroyed several populations of endangered plant species including the Hawai'i State flower, ma'o hao hele (*Hibiscus brackenridgei*).



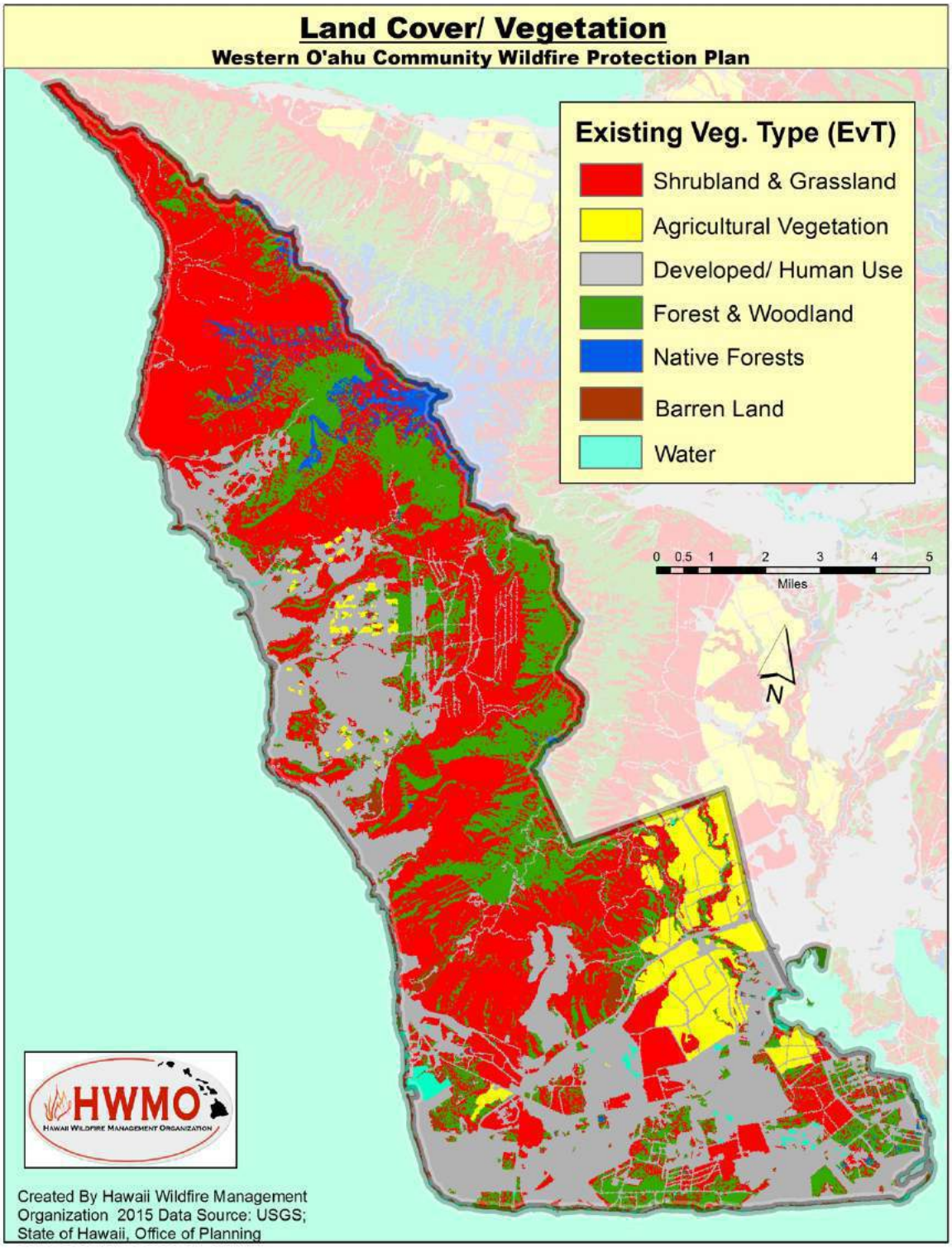
Map 2. *Average Annual Rainfall Map.*



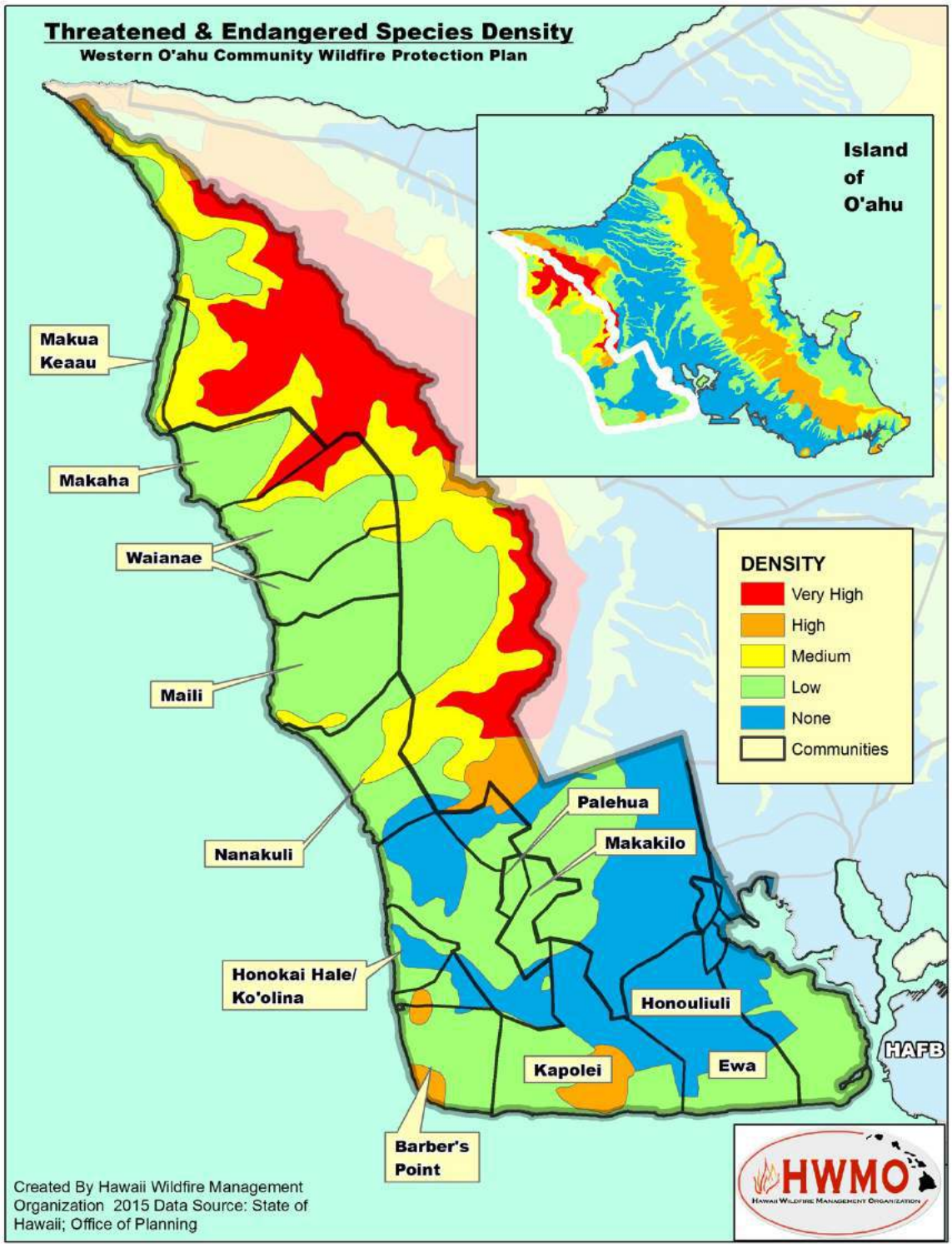
Map 3. *Average Wind Speed Map.*



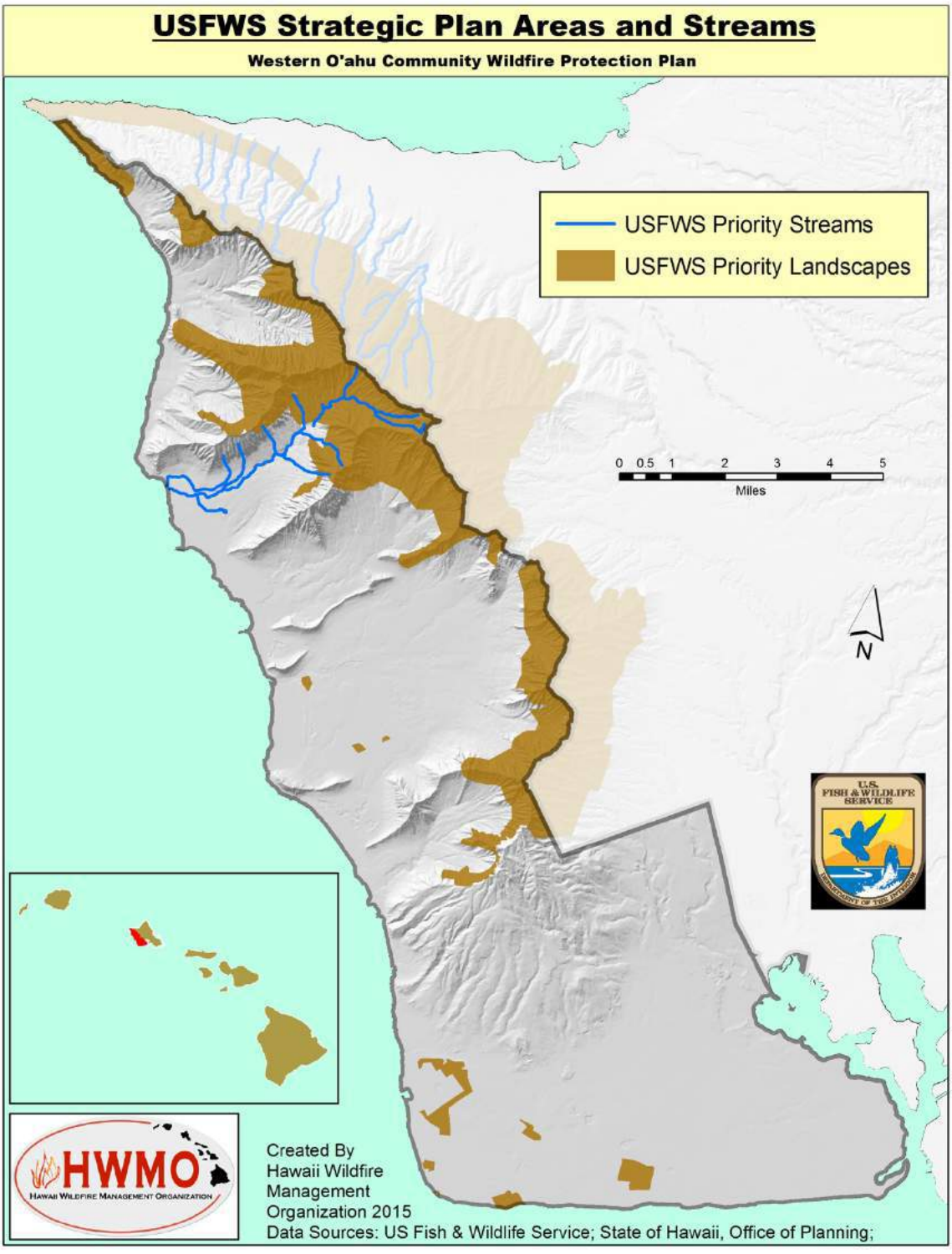
Map 4. *Topographic Map of Western O'ahu CWPP planning area, based on US Geological Survey data.*



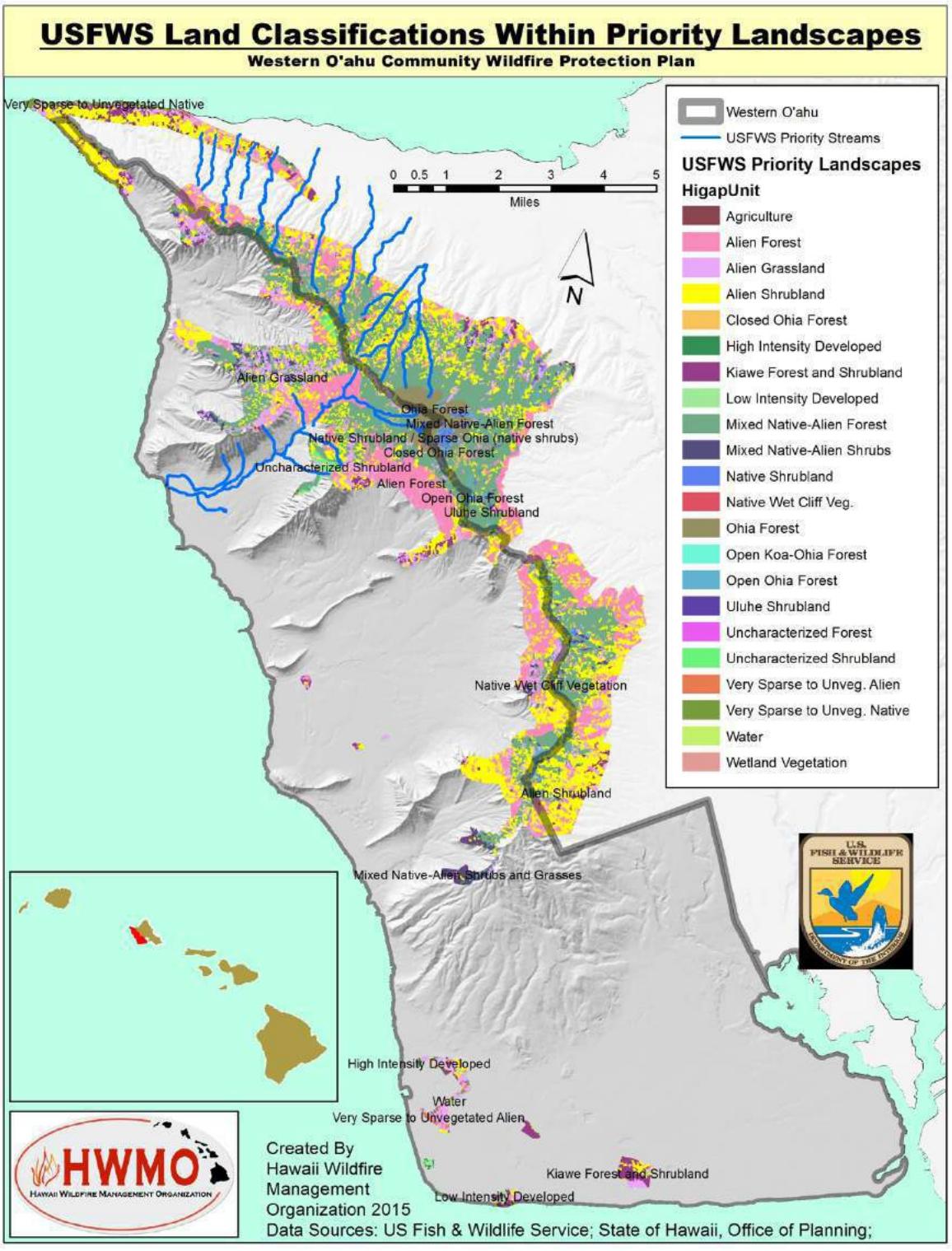
Map 5. *Land Cover/ Vegetation Map.*



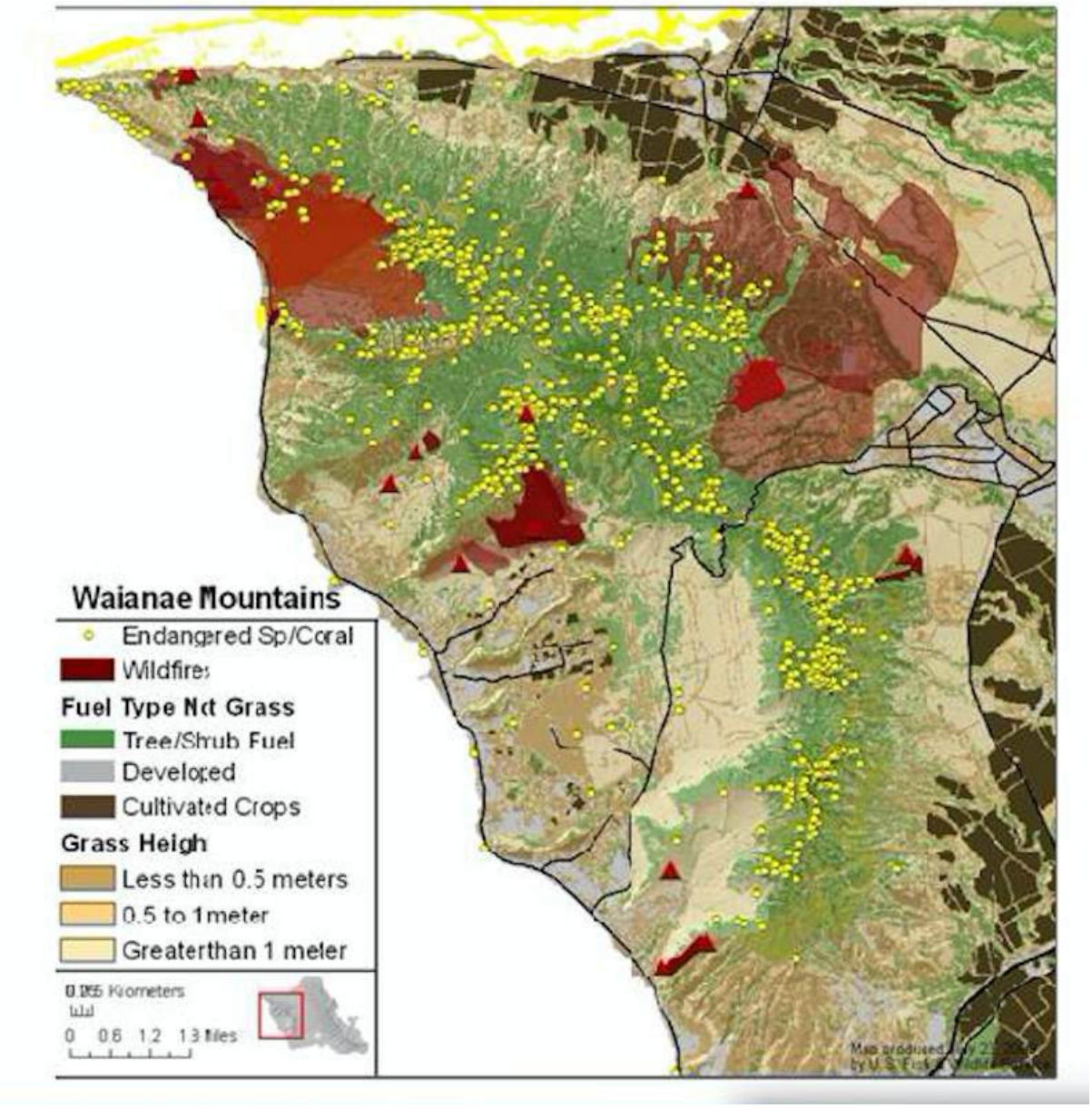
Map 6. *Threatened and Endangered Species Density Map.*



Map 7. *USFWS map of Priority Landscapes within the CWPP planning area.*



Map 8. *USFWS map of land cover type within their Priority Landscapes in and adjacent to the Western O'ahu CWPP planning area.*



Map 9. *Wildfire Threats to Endangered Species. Map provided by Dawn Bruns, USFWS.*

FIRE HISTORY

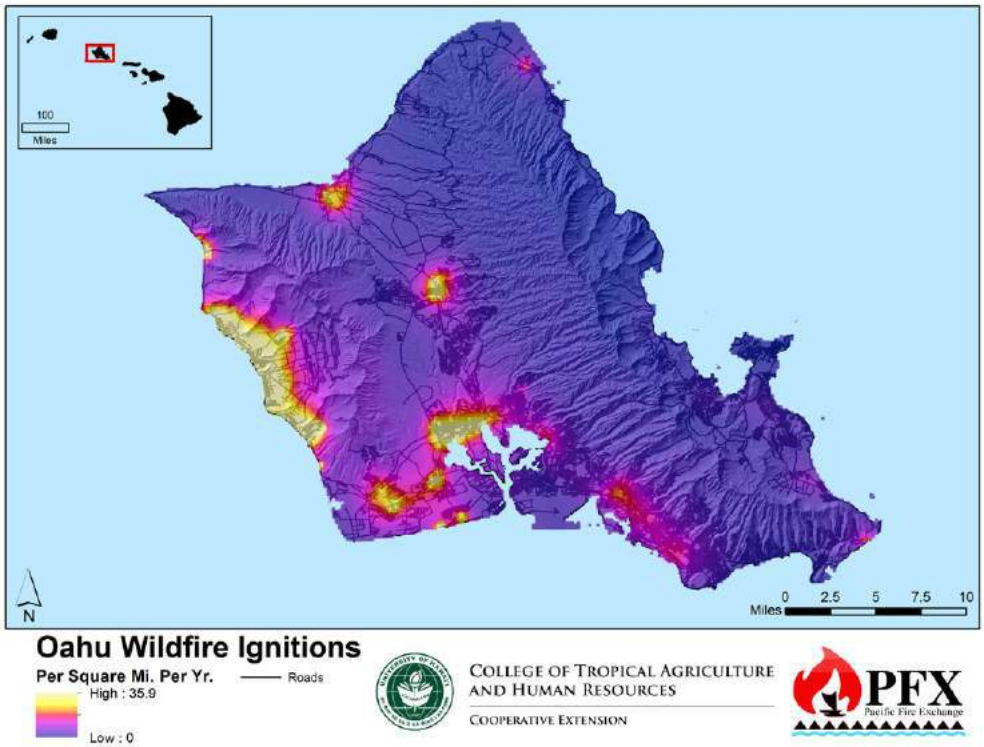
The WUI— the wildland-urban interface area along which developed areas, roads, and community infrastructure abut undeveloped land— is where the majority of wildfire ignitions occur in all of Hawai‘i. The Western O‘ahu CWPP planning area is no exception. Because of this, WUI areas often experience the greatest risk of loss of property, life, and natural resource function due to wildfire. The majority of wildfires on O‘ahu are caused by human error or arson, especially near developments, power line right of ways, and along roadsides. Additionally, sprawling dry, invasive, fire-prone grasslands surround many communities. Once ignited along the interface, wildfire can spread rapidly through residential areas, threatening both property and life. Wildfires can also spread from the interface to higher elevations, threatening natural areas, including protected species.

Many of the valleys and ridges along the northeastern boundary of the planning area have access roads (multiple ignition points) and contain irreplaceable cultural and natural resources. These roads vary from paved with public access to unpaved and/or restricted in access. Significant fire hazards include unmanaged grasses and shrubs, unattended campfires, and sparking power lines. Once ignited, these fires spread rapidly and threaten nearby community infrastructure, neighborhoods, grazing lands, and valuable native flora and fauna.

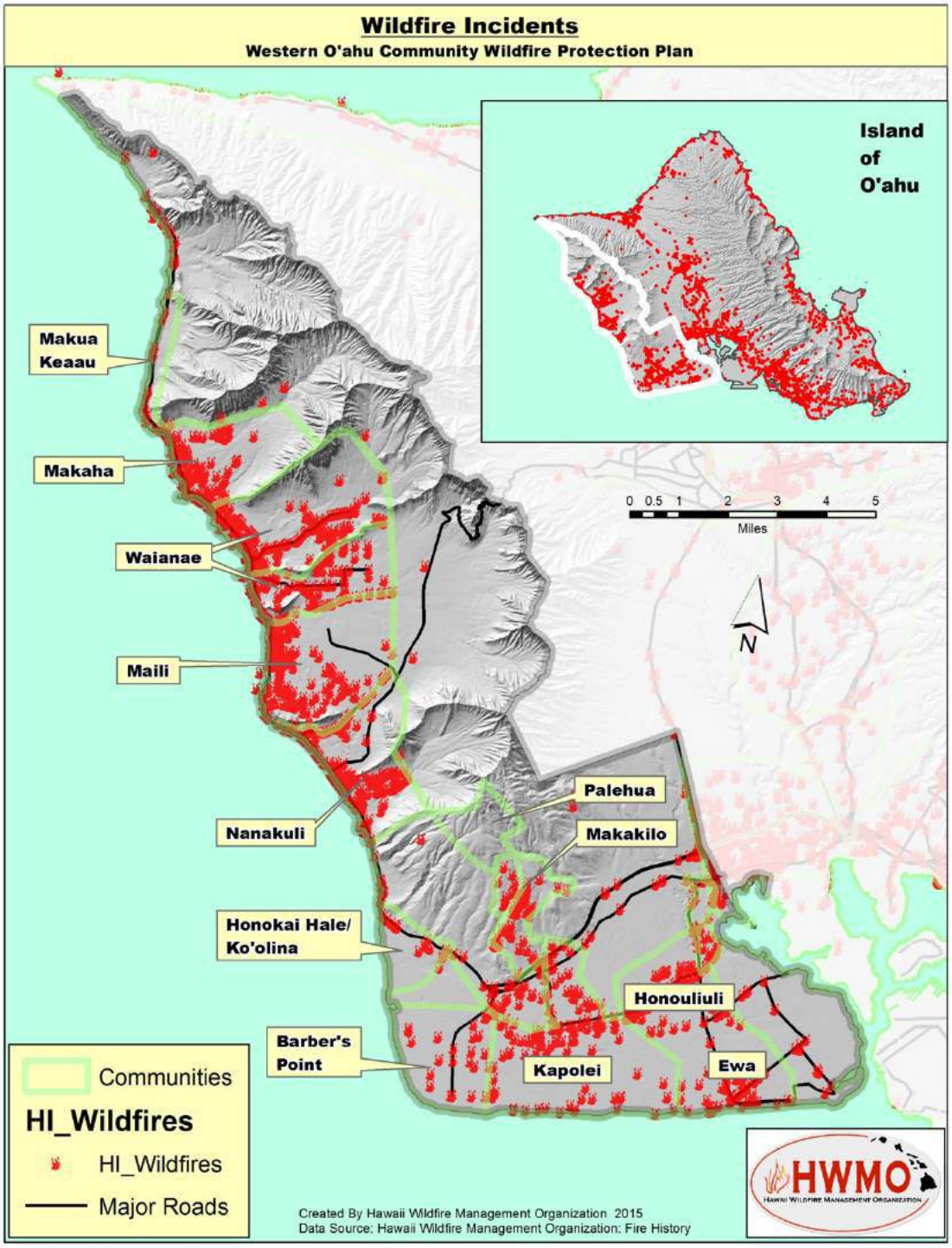
FIRE INCIDENTS AND IGNITION DENSITIES

In 2013, HWMO completed its effort to compile wildfire records from fire suppression agencies across the state, which resulted in a statewide wildfire database, as well as region-specific wildfire incident maps. The Western O'ahu Wildfire Incident Map (Map 11) includes HFD's documented responses to wildfires between January 2000 and January 2011 and wildfire ignition points recorded by DLNR-DOFAW since 1998. The map displays ignition points, and does not indicate the final perimeter of burned areas. However, using this and other information, Dr. Clay Trauernicht at University of Hawai'i Cooperative Extension, College of Tropical Agriculture and Human Resources was able to analyze the frequency of ignitions per area and create Map 10, which shows wildfire ignition densities. Western O'ahu emerges as a "hot spot" for its high density of ignitions per square mile.

Ignitions are important for understanding trends and patterns of fires. Map 11 demonstrates that WUI, roadside, and human access area fire starts are important trends across Western O'ahu, and the island in general. While larger fires tend to occur in the drier and/or less developed areas such as those in mauka (upland) regions, the high frequency of ignitions along every WUI interface road and trail is of concern. As drought conditions become more frequent (and they are predicted to increase), there are concerns that large fires in dense unmanaged vegetative fuels will also increase.



Map 10. *Wildfire Ignition Density Map. Bright regions on the map show areas with the highest number of wildfire ignitions per square mile. Note that Western O'ahu stands out for its high density of ignitions.*



Map 11. *Western O'ahu Wildfire Incidents Map. Incidents depicted were recorded from 1988-2011. Note: points displayed are ignition sites only and do not indicate perimeter boundaries of burned areas.*

SIGNIFICANT FIRES

Numerous large wildfires (over 100 acres) have taken place in the Western O'ahu region. Detailed records are scant before 2000, but many since that time have received media attention or been noted for their significant impacts. Table 5 highlights the fires on record that were significant in terms of size, media coverage, or impact between 2000-early 2016

Incident Name	Location	Date Started	Acres	Cause	Property/ Vegetation	Notes
Makua Valley	Makua Valley	June 14, 2005 (1:40 p.m. - first alarm)	2,820	Debris Burning	N/A	Between 2001 to 2012, largest brushfire in
Nanakuli ('Ewa) Fire	Upper slopes of Nanakuli Valley (makai) heading towards Makakilo	August 14, 2005 (1:15 p.m. - first alarm)	2,800	Arcing on utility pole	N/A	See detailed description below
Nanakuli	Pikaiolena Street, Waiea Pl., Huikala moving east	March 17, 2016 (3:00 p.m. - first alarm)	2500	N/A	N/A	
Makua	Makua	July 22, 2003 (2:12 p.m. - first alarm)	2,100	Misc.	N/A	See detailed description below
Wai'anae Valley '02	85-1570 Wai'anae Valley Road;	July 24, 2002 (8:20 p.m. - first alarm); Contained July 26, 2002	1,700	Misc.	State ag lease lands and Wai'anae Forest Reserve; Brush and grass mixture	See detailed description below
Yokohama	Yokohama (Keawaula) - 81-601 Farrington Highway	August 15, 2003 (7:45 p.m. - first alarm)	1,700	Incendiary	Brush and grass mixture	Also large fire in 1998 of 1500 acres in same area
Makakilo	Umena Street towards Honouliuli Forest Reserve	August 22, 2015 (afternoon - first alarm)	1,000+	Matches	Scalded 2-3 homes	HFD Cost: $54,060; See detailed description below
Makua-Kea'au	Makua-Kea'au & Kuaokala Forest Reserve	August 5, 1970 (9:00 a.m. - first alarm)	1,525	Incendiary	State land	
Nanakuli 2005	Ulei Loop, Nanakuli	May 10, 2005 (12:27 p.m. - first alarm)	1,508	Incendiary	N/A	
Yokohama	Yokohama (Keawaula)	August 24, 1998 (9:59 p.m. - first alarm)	1,500	N/A	Brush and grass mixture	Also large fire in 2003 of 1700 acres in same area
Nanakuli Valley 1990	Started between Maile Point and Nanakuli above BWS facility	June 20, 1990 (1:34 a.m. - first alarm)	1,000	Misc.	N/A	
Lualualei/ Wai'anae Kai	87-1041 Oheohe Street to 86-119 Kuwale Road	June 3, 2012 (2:28 p.m. - first alarm)	1,100	Railroads	Open land or field with brush-and-grass mixture. Excludes crops or areas under cultivation.	See detailed description below
Kea'au Fire 1993	Kea'au area (started in Makaha)	July 4, 1993 (9:30 p.m. - first alarm)	1,000	Misc.	N/A	
Kaneaki	Waianae Valley Road towards Punanaula Heiau	March 15, 2000 (2:00 p.m. - first alarm)	1,000	Misc.	N/A	
Yokohama '06	Keawaula State Park	July 12, 2006 (10:30 p.m. - first alarm)	760	Misc.	State land	

Kumaipo	Waianae Valley Road in vicinity of "Small Mountain"	October, 9, 2001 (12:13 p.m. - first alarm)	700	Misc.	Open land or field with brush-and-grass mixture. Excludes crops or areas under cultivation.	
Yokohama '93	Kaena Point Tracking Station Area (along road and next to Kuaokala Trail)	April 28, 1993 (6:30 p.m. - first alarm)	600	Smoking	State land	
Makakilo/ Palikua	Northeast of Makakilo - Campbell Estate lands	July 12, 1990 (1:12 p.m. - first alarm)	557	Debris Burning	Private land	
Waianae '07	84-680 Kili Drive to Farrington Highway	October 19, 2007 (3:10 p.m. - first alarm)	500	Hot ember or ash	Open land or field with brush-and-grass mixture. Excludes crops or areas under cultivation.	
Waianae '06	Kili Drive	January 3, 2006 (4:53 p.m. - first alarm)	500	Railroads	Brush-and-grass-mixture	
Waianae Valley 1995	Waianae Valley - Waianae Kai Forest Reserve	May 1, 1995 (3:30 p.m. - first alarm)	420	Incendiary	N/A	
Mauka of Yokohama Bay - Continuous Burn	Kaena Point AFS guard house - Makua Range Land	November 6, 1990 (6:39 a.m. - first alarm)	418	Misc.	N/A	
Pu'u Makakilo	Pu'u Makakilo	August 16, 1972 (11:14 a.m. - first alarm)	368	Smoking	N/A	
Nanakuli Valley 1990	Nanakuli Valley	June 18, 1990 (1:34 a.m. - first alarm)	350	Misc.	N/A	
Makakilo #2	Makakilo - 200' elevation; SE aspect along H1 Freeway	August 8, 1974 (12:07 p.m. - first alarm)	325	Smoking	N/A	
Farrington Highway - Kahe Point	Kahe Point in Honokai Hale	October 19, 1990 (1:25 p.m. - first alarm)	300	Misc.	N/A	
Waianae '03	82-180 to 83-501 Farrington Highway	November 20, 2003 (12:21 a.m. - first alarm)	300	Railroads	Brush-and-grass-mixture	
Makua Valley '05	87-739 Hakimo Road	August 2, 2005 (8:27 p.m. - first alarm)	300	Incendiary	Brush-and-grass-mixture	
Kamaileunu	85-180 Ala Akau Street - Kamaileunu Ridge	March 6, 2007 (10:30 a.m. - first alarm)	300	Misc.	Open land or field with brush-and-grass mixture. Excludes crops or areas under cultivation.	
Waianae Valley - Rekindle '92	Waianae Valley	July 30, 1992 (9:58 a.m. - first alarm)	300	Misc.	N/A	
Iroquois Point '12	Iroquois Point Road - 'Ewa Villages	November 10, 2012 (2:47 p.m. - first alarm)	100	Undeter-mined	Brush and grass mixture	See detailed description below

Table 5. *Western O'ahu Large and Significant Wildfires.*

Narrative accounts and published photos of some of the more notable fires in Western O'ahu are provided below. The majority of the following accounts were originally published as news articles by Hawaii News Now, Honolulu Star-Bulletin, Honolulu Advertiser, Star-Advertiser, and KHON, as noted. Wherever possible, additional information from fire agencies and HWMO has been added.

Nanakuli Fire- March 17, 2016

The following information is based largely on KHON[2] reporting:

On March 17th, 2016, one of the largest wildfires in Western O'ahu's history burned 2,500 acres in Nanakuli Valley. The wildfire began atop a steep cliff on the southeastern edge of the valley and headed downslope toward homes along Pikaiolena 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.

Photo 6. *Nanakuli 2016 fire burning upslope of residential areas. (Photo Credit: Kristopher Pinero/ KHON).*

Steep, inaccessible terrain and windy conditions made the wildfire a difficult one for firefighters to suppress. Firefighters commented at the time in local papers as follows:

"It's been difficult cause of weather, weather plays a big role cause in the daytime the wind usually comes down the slope but at night time things change and the wind changes direction and goes up slope so it plays tricks on the fire and helps go in a different direction," said HFD Capt. James Todd.

Photo 7. *The March 2016 Nanakuli fire burned along the wildland-urban interface, threatening community resources. (Photo Credit: Hawaii News Now).*

"The challenges are mainly because of terrain, it's kind of steep out there, even in the lower areas, it wasn't always easily accessible. But we got some guys down there. They did a great job putting out the edge of the fire…" explained Paul Miguel, HFD.

On the steep slopes, firefighters relied on additional helicopter support from DLNR-DOFAW, who was coordinating the helicopter base and logistics, as well as providing ground crews.[3] Along with threatening homes, the fire threatened nearby communication towers and lines, but firefighters were able to protect the homes and infrastructure. The fire, however, did burn from residential areas into natural areas, where it threatened pockets of sensitive native preserves.

The fire came at a time when drought conditions were worsening as a result of a strong El Niño. "Usually a fire like this doesn't happen until the summer but it's drier than normal for this time of year, so I think the brush fire season started a little bit early," said Battalion Chief Bill Steinke of HFD.

Makakilo Fire- August 22, 2015
The following information was originally published in Hawai'i News Now: [4]

Two seven-year-old brothers were playing with lighters behind their home when they accidentally sparked one of the largest wildfires in Makakilo's history. Starting on August 22, 2015, the 1,000-acre fire began near homes along Umena Street and up toward Honouliuli Forest Reserve, which is home to the endangered O'ahu elepaio and kahuli tree snails.

Photo 8. *Smoke from the Makakilo Fire can be seen billowing over the wildland-urban interface. The fire impacted both wildland areas and residents, who were evacuated. (Photo credit: Miguel Gonzalez/ Hawaii News Now).*

Homes along Palehua Ridge, a notoriously difficult area to access for firefighters due to tall vegetation, winding roads, and high elevation, were threatened. Firefighters were able to gain access with the help of Thomas Anuhealii, Forest Ranger for Gill Ewa Lands, to protect homes and phone towers. 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 40 or so residents.

The fire was one of the more challenging ones in recent history. "This fire is rather difficult. It's on steep, rough terrain. The wind has been gusting up to 20 to 30 mph. There are some inaccessible areas where the firefighters are unable to get to" explained Captain Jenkins of HFD. Water supply was also an issue as there were no hydrants to access at higher elevations. In all, a few homes suffered minor damage, but no homes or lives were lost. The family of the children who accidentally set the fire went through a fire safety class with HFD.

Iroquois Point '12 Fire- November 10, 2012
The following information was originally published in Hawai'i News Now[5] *and Star-Advertiser:* [6]

'Ewa Beach experienced its largest wildfire between 2001 and 2012 on November 10, 2012. The fire started near the intersection of Hoomaka Street and Iriquois Road in an area of dry grass and brush. According to Captain Gary Lum of HFD, "the blaze was 'complicated' by drought conditions, uncontrolled vegetation, strong winds and difficult access to water. Early on in the firefight, homes were threatened but there wasn't any immediate danger and thus no evacuation calls were made. Another fire near White Plains Beach in 'Ewa occurred on the same day, making firefighters stretched for resources. Both fires were suppressed relatively quickly.

Lualualei/ Wai'anae Kai Fire - June 6, 2012
The following information is based largely on agency[7] *and Star-Advertiser*[8] *reporting:*

Starting on June 3, 2012 and lasting three days, a 1,100-acre brush fire prompted over 100 firefighters to work to save homes in the Lualualei and Waianae Valleys. The fire began at the Lualualei Naval Magazine near a radio transmitting facility. The fire came dangerously close to two housing areas in

Lualualei and Wai‘anae Valley. The American Red Cross established a shelter at Wai‘anae District Park. Residents of Haleahi Road were prompted to evacuate although many chose to stay and watch or help the firefighting efforts. The cause of the fire was undetermined according to Federal Fire investigators.

Photo 9. *HFD battling the brush fire along Haleahi Road and the hills above. (Photo credit: F Morris/ Honolulu Star Advertiser).*

Photo 10*. Federal firefighter working on a hotspot from the Lualualei fire. (Photo credit: Federal Fire Department).*

The size of the fire, its rapid spread, and the proximity to rare endangered plants prompted helicopter water drops and aerial mapping of both the burn area and threatened/damaged natural resources. The fire also burned through remnant native shrublands, native cliff communities, and small remnant patches of native dry forest, significantly impacting several federally listed endangered species and their habitat.

Nanakuli (‘Ewa) Fire- August 14, 2005

The following information is based on articles published in Honolulu Star-Bulletin[9] *and Honolulu Advertiser:*[10]

Nanakuli residents experienced one of the area’s worst wildfires in recent years starting on August 14, 2005. According to HWMO data, it was the second largest wildfire between 2001 and 2012, and began due to electrical arcing on a utility pole near the west-facing ridge line of Nanakuli Valley. More than 100 firefighters battled the blaze in the initial hours of the fire, working to protect homes within the Valley and up on Palehua Road. The fire also threatened the Kahe Power Plant, utility towers, and the Nanakuli and Honouliuli Forest Reserves. The fire eventually burned areas where native plants were established.

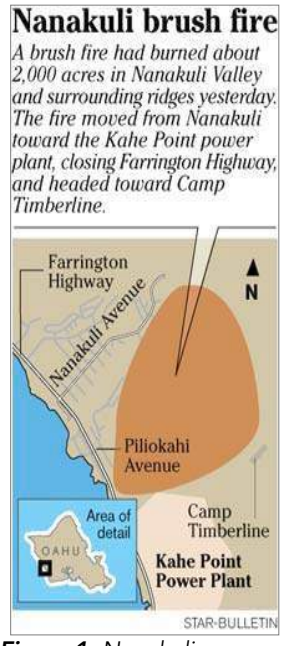


Figure 1. *Nanakuli Brushfire location. (Credit: Honolulu Star- Bulletin).*

The wildfire shut down Farrington Highway twice, cutting off access to and from Wai‘anae. Army personnel opened Kolekole Pass for emergency access for civilian traffic during the highway shut downs. Nearby schools also were closed as a safety precaution. Firefighters were staged at the end of various cul-de-sacs off of Nankuli Avenue in order to keep the blaze from burning homes. Residents, including a 79-year-old man, also joined the fight by using their garden hoses alongside firefighters. Many others decided to stay rather than evacuate their homes, even as “thick smoke blanketed the homes as black ash rained down.”

Newspapers captured the reactions of residents:

"I will not leave my property. If it consumes everything it will have to consume me with it,' said May Wright, 74, who sat outside her home with a white cloth held over her mouth as flames crept down a hill nearby. Edwin Wright, a 29-year-old Nanakuli resident, said "It was like a volcano… You know, like lava coming down the mountain."

Many residents feared the worst but showed much appreciation for the firefighters. "Jodie Makue watched as a helicopter made a water drop, hoping it would hit the flames getting close to homes. When it did she waved a 'thank you. "My house is not too bad, but we've known everybody so long," she said at the thought of losing her neighbors. 'It's scary."

Photo 11. *Fire approaches the Hawaiian Electric Co.'s Kahe Point power plant.[3] (Photo credit: Gregory Yamamoto/Honolulu Advertiser).*

The area has seen a number of wildfires over the years, and some residents explained they had grown accustomed to the frequent fires, a "hallmark of summertime" as was described in the Honolulu Advertiser article on June 16, 2005. "It can be kind of scary but I'm kind of used to it,' said Becky Dalere, 61, who has been a Nanakuli resident for 26 years…This was one of the worst fires I've seen."

Photo 12*. Smoke obscures the HECO power plant and firefighters, as flames move toward Farrington Highway.[3] (Photo credit: Carol Cunningham/Special to Advertiser).*

Makua Fire- July 22, 2003

The following information was originally published in Honolulu Star-Bulletin[11] and Honolulu Advertiser:[12,13]

A controlled burn at Makua Military Reservation turned into a large 2,100-acre wildfire that became the third largest wildfire between 2001 and 2012. Army officials originally planned for a 500 acre burn in Kahanahaiki Valley, but an increase in wind speed and change in direction caused the fire to burn outside the area the Army had intended to clear. Areas listed as critical habitat to native and endangered plants and animals, including snails and Oʻahu elepaio, were destroyed due to the blaze. As explained by Gina Shultz, assistant field supervisor for USFWS in Hawaiʻi, "even if the elepaio were able to fly away, if their habitat burned, it's definitely an impact to the species… Elepaio are territorial and there is a limited amount of suitable habitat for them."

Photo 13. *An Army Black Hawk helicopter dropping a load of water on the blaze at Makua Valley. (Photo credit Spc. Daniel P. Kelly/U.S. Army).[6]*

The fire also jumped Farrington Highway, burning 10 acres of public land along Makua Beach. The controversial fire brought the Army's environmental management planning into question from various agency representatives and community groups. Fires in the reservation, which at the time was used by soldiers for live ammunition training, are part of the Army's

overall plan to manage the area, conduct ordinance clearing and continue archaeological surveys. Col. David Anderson, U.S. Army Hawai'i Garrison commander at the time, stated the burn "was part of a 'good-faith effort' to clear the area of ordinance and get more access to cultural sites as the Army is supposed to do under the settlement agreement with Malama Makua."

Wai'anae Valley '02 Fire- July 24, 2002

The following information was originally published in Honolulu Advertiser:[14]

One of the "biggest ever in Wai'anae Valley," as described by fire officials, the Wai'anae Valley '02 fire that began on July 24, 2002 burned nearly 1,700 acres. With variable winds swirling at 25 mph, a lot of brush providing fuel, and the valley sides sweeping up into cliffs and gorges, the conditions for a bad blaze, foresters and firefighters agreed, were perfect. Firefighters were able to contain the fire by Friday, July 26, 2002, avoiding major damage to the livestock and agricultural farm lots.[15]

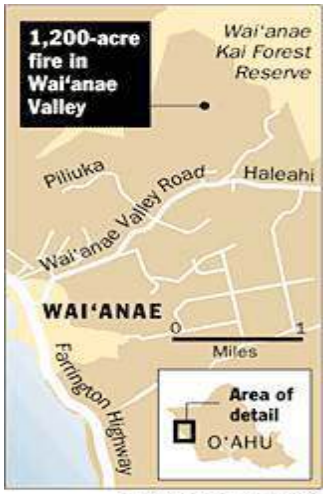


Photo 14 (above left). *Fire Department helicopter, Air One, was joined by a helicopter chartered by the DLNR-DOFAW from Cherry Helicopters, and two Army UH-60 Black Hawks from the 25th Infantry Division at Schofield Barracks to aid suppression for the Wai'anae 2002 fire.*[7] *(Richard Ambo/Honolulu Advertiser).*
Figure 2 (above right). *Wai'anae Valley Fire '02 location. (Source: Honolulu Advertiser).*

The fire, which sparked firefighting efforts from Honolulu FD and federal and state agencies, threatened a number of floral nurseries and livestock operations. Also in harm's way were native forest reserves under DLNR-DOFAW's jurisdiction. Native plants in those reserves included nehe and uhiuhi, according to Kapua Kawelo of U.S. Army Garrison Hawai'i.

WILDFIRE IMPACTS

IMPACTS TO NATURAL AND CULTURAL RESOURCES

Many of the natural and cultural resources in Western O'ahu are exposed to wildfire impacts given the dominance of highly flammable surrounding fuels (grasslands and shrublands), its dry climate and episodic droughts, and the high number of human-caused ignitions. These impacts are compounded by the fact that land-based, aquatic, and marine-based natural and cultural resources all lie within close proximity across the region.

Recurrent wildfires result in the conversion of both native and nonnative forested areas to fire-adapted grasslands and shrublands – and are one of the reasons these fire-prone ecosystems are expanding in many parts of the state. Wildfire is a major cause of the loss and degradation of native forest and other habitat. The upland areas of the Wai'anae mountains contain O'ahu's most biologically diverse native ecosystems with high concentrations of threatened and endangered species. Most of the plant and animal species within these native ecosystems do not survive and/or recover from wildfires. More

generally, the conversion of forest to grasslands due to fire increases the potential for future and larger fires by expanding the availability of fine fuels.

Wildfire also increases the potential for erosion and sediment delivery from upland to coastal and nearshore areas. The immediate loss of vegetation after a wildfire directly exposes soils to rainfall, which can dramatically increase erosion. Wildfire can also alter the physical and chemical properties of soils, making them more prone to surface run-off which can increase the downstream flooding and sediment delivery. Forest conversion to grassland due to recurrent wildfires over the long-term also alters water cycling. The replacement of deep-rooted trees by shallow, matted root systems of grasses results in a higher water table and reduces the ability of rainfall to infiltrate into the soil. This causes an increase in surface runoff during rainfall events and thus the risk of flooding and sediment delivery downstream.

Forest loss and increased downstream sediment delivery to nearshore reefs have important implications for cultural resources as well in terms of tourism, recreation, food resources, and spiritual practices. Sediment loading destroys reefs and impacts nearshore fisheries which are critical subsistence resources to many Western O'ahu families. Burned areas can remain closed to the public for days to months due to landslide and tree-fall danger, limiting access to areas for hiking, hunting, gathering plants, and tending cultural sites. The valleys of Western O'ahu contain some of the highest concentrations of archaeological sites in the state. Although fire may have limited direct impacts on these resources, suppression efforts, such as water drops and the use of bulldozers, can damage these culturally important landscape features.

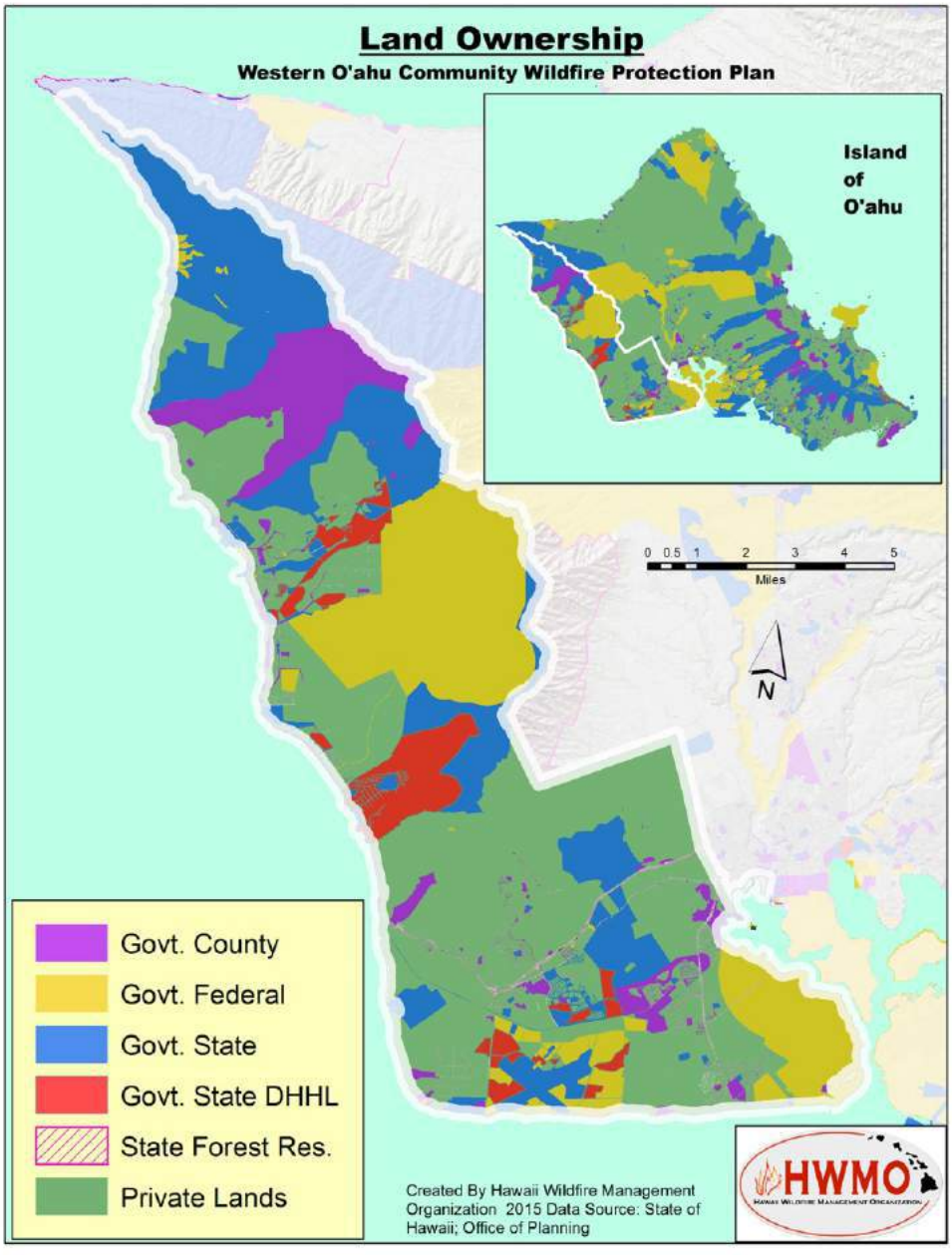
IMPACTS TO COMMUNITIES AND MUNICIPAL ACTIVITIES

Wildfires threaten lives, homes, and human health in several ways. Many neighborhoods have unmanaged/untended fire fuels interspersed within developed areas, promoting fire spread through communities and into surrounding areas. This creates an increased hazard to lives and homes in the area. Air quality is greatly reduced from smoke during fires and for months to years after fire due to high levels of wind-born dust. This dust is due to fire-caused changes to soil that leaves it water-repellant, and therefore easily lifted into the air.

Wildfires also impact economic and municipal infrastructure and activities. Burned soil from wildfires decreases groundwater recharge, which can affect drinking water supplies. As noted above, post-fire rain events cause erosion that damages nearshore resources (coral reefs, fisheries), which can have effects on one of the area's primary economic bases— coastal and marine-based tourism, as well as resident and visitor recreational activities. Frequent fires also impact powerlines, communication infrastructure and lead to road closures – exacerbating the already congested traffic of Western O'ahu. Traffic and road closures during fire events and post-fire flooding can block access routes and keep people from their homes and work, and are costly to local government.

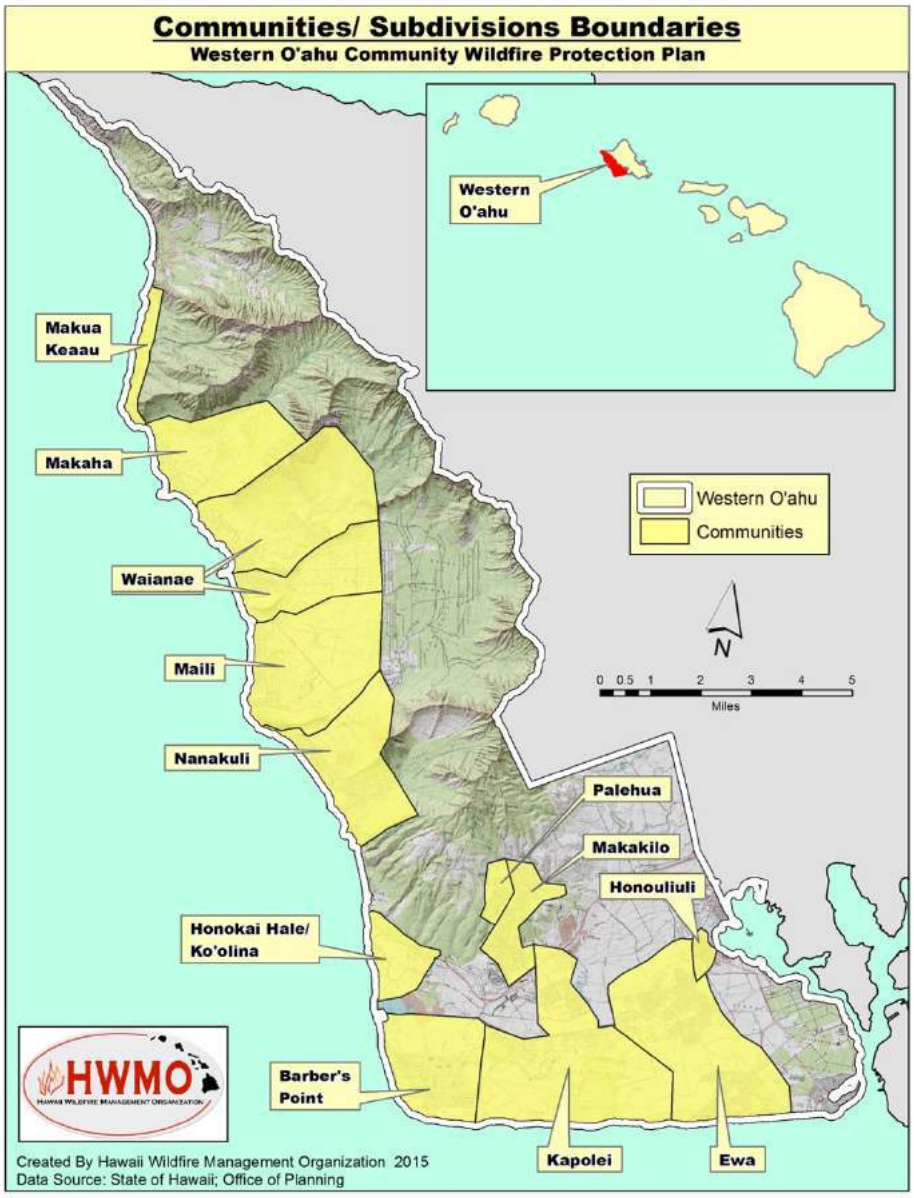
GENERAL OVERVIEW OF CWPP PLANNING AREA
WESTERN O'AHU

The area comprising Western O'ahu, as defined in this plan, includes government and privately owned lands (see Map 12). The CWPP planning boundaries also concurrently define the WUI, which include both developed and undeveloped areas to ensure adequate protection of both. This area was chosen through stakeholder meetings and addresses one of O'ahu's priority fire prone regions.



Map 12. *Land Ownership Map for the Western O'ahu CWPP planning area.*

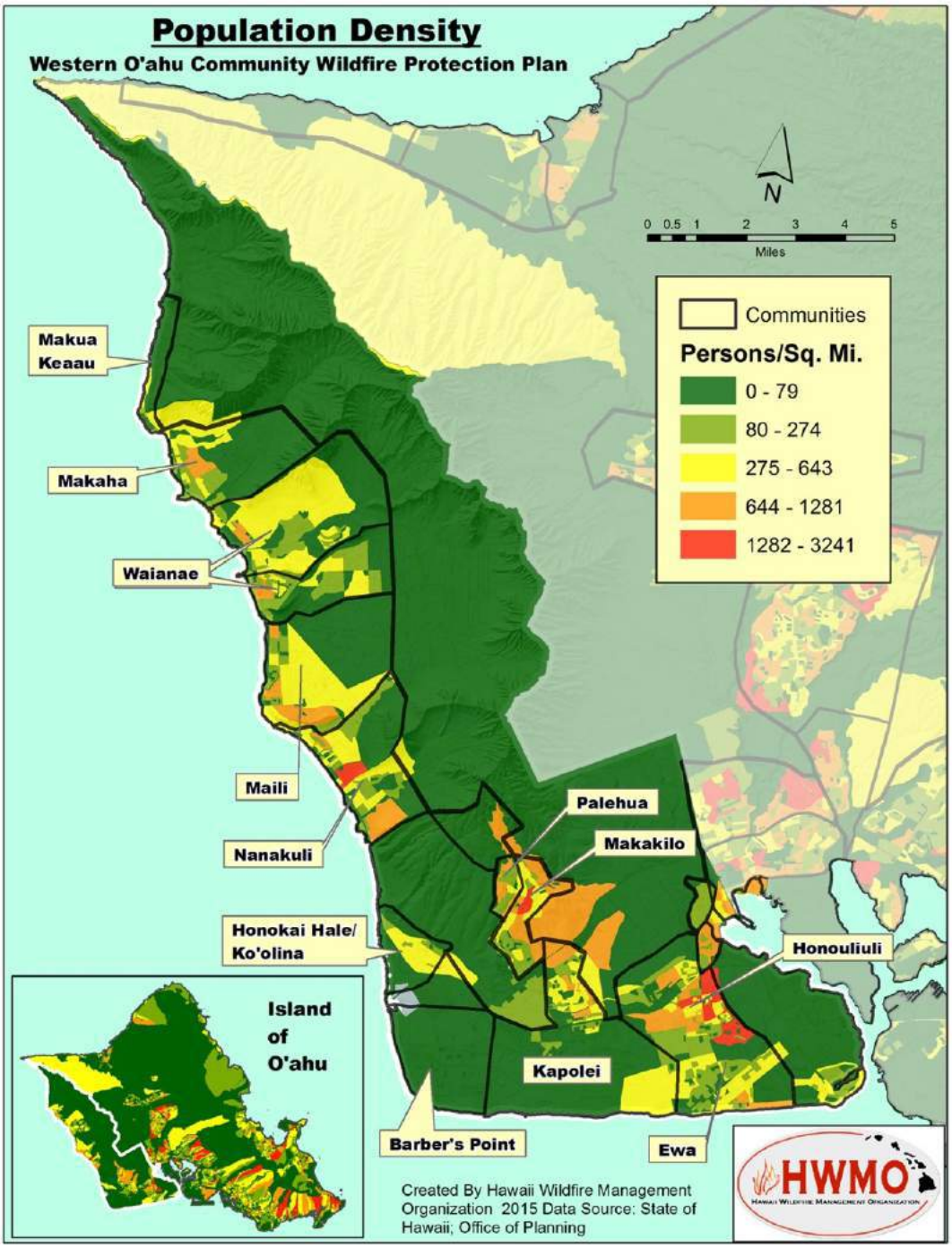
For the purposes of assessing hazards and wildfire threats to resources, residential areas within the Western O'ahu CWPP planning area were simplified into thirteen "communities" (see Map 13). The boundaries depict the areas determined by DLNR-DOFAW to have similar features in terms of wildfire hazard characteristics and have long been the boundaries used in the Division's Communities at Risk from Wildfire Maps, which are developed every few years to assess Hawai'i's communities for wildfire threats (See next section, *Communities at Risk from Wildfires* for more information and maps).



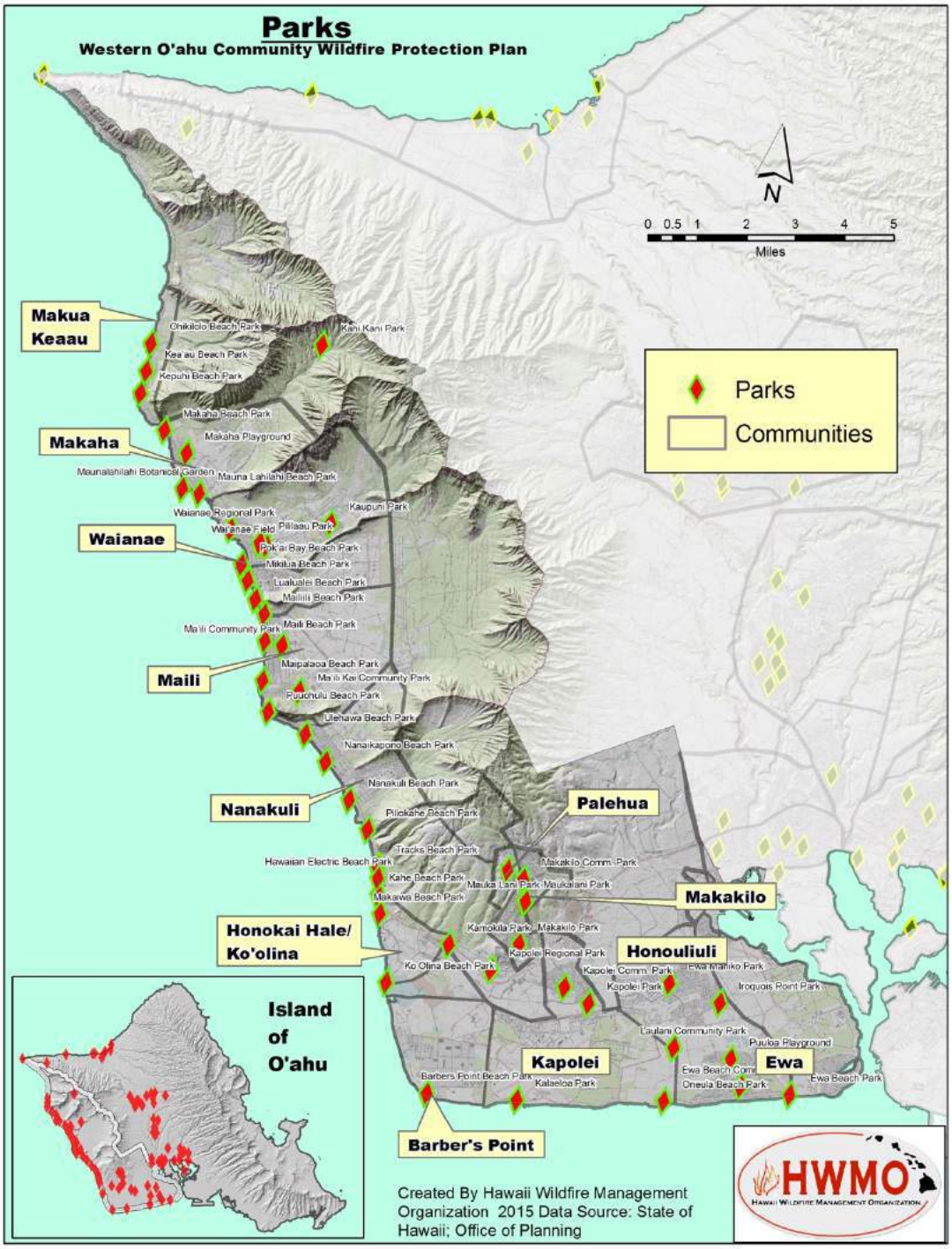
Map 13. *Simplified community delineations used within the Western O'ahu CWPP planning area. These boundaries were provided by DLNR-DOFAW to replicate those used in the Division's Communities at Risk from Wildfires Maps.*

Western O'ahu exemplifies a WUI, in that it contains both undeveloped fire prone wildland areas adjacent to heavily populated subdivisions and developed areas (see Map 14). There are numerous community assets, resources, and infrastructural features at risk of wildfire in Western O'ahu, to include civil,

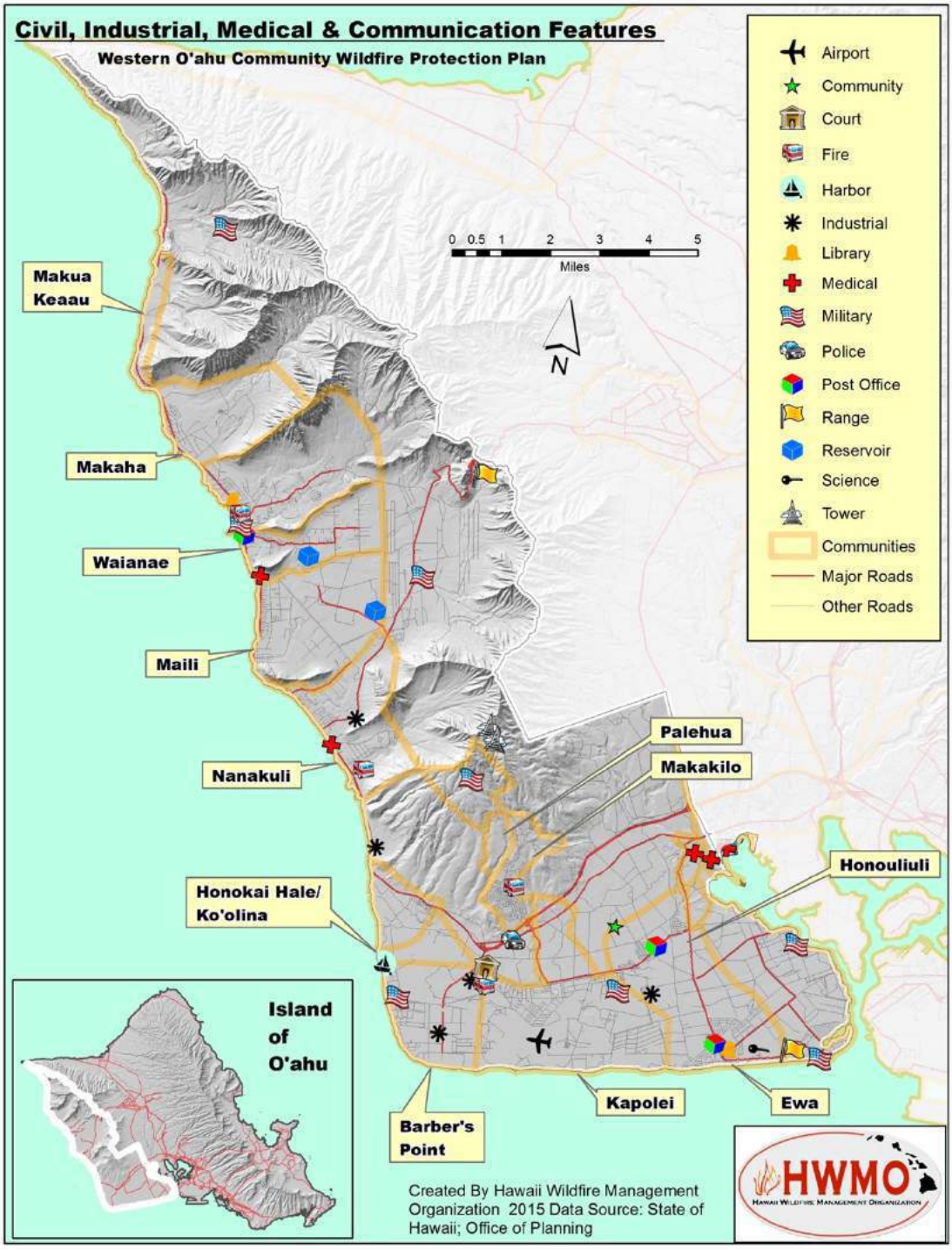
industrial, medical, educational, and recreational features. These are depicted on Maps 15-18. These features may or may not be directly threatened by the flames of wildfire, but all are subject to the broader impacts of wildfire, such as changes in water quality and availability, post-fire erosion and mudslides, smoke and dust, changes in access, traffic, and more.



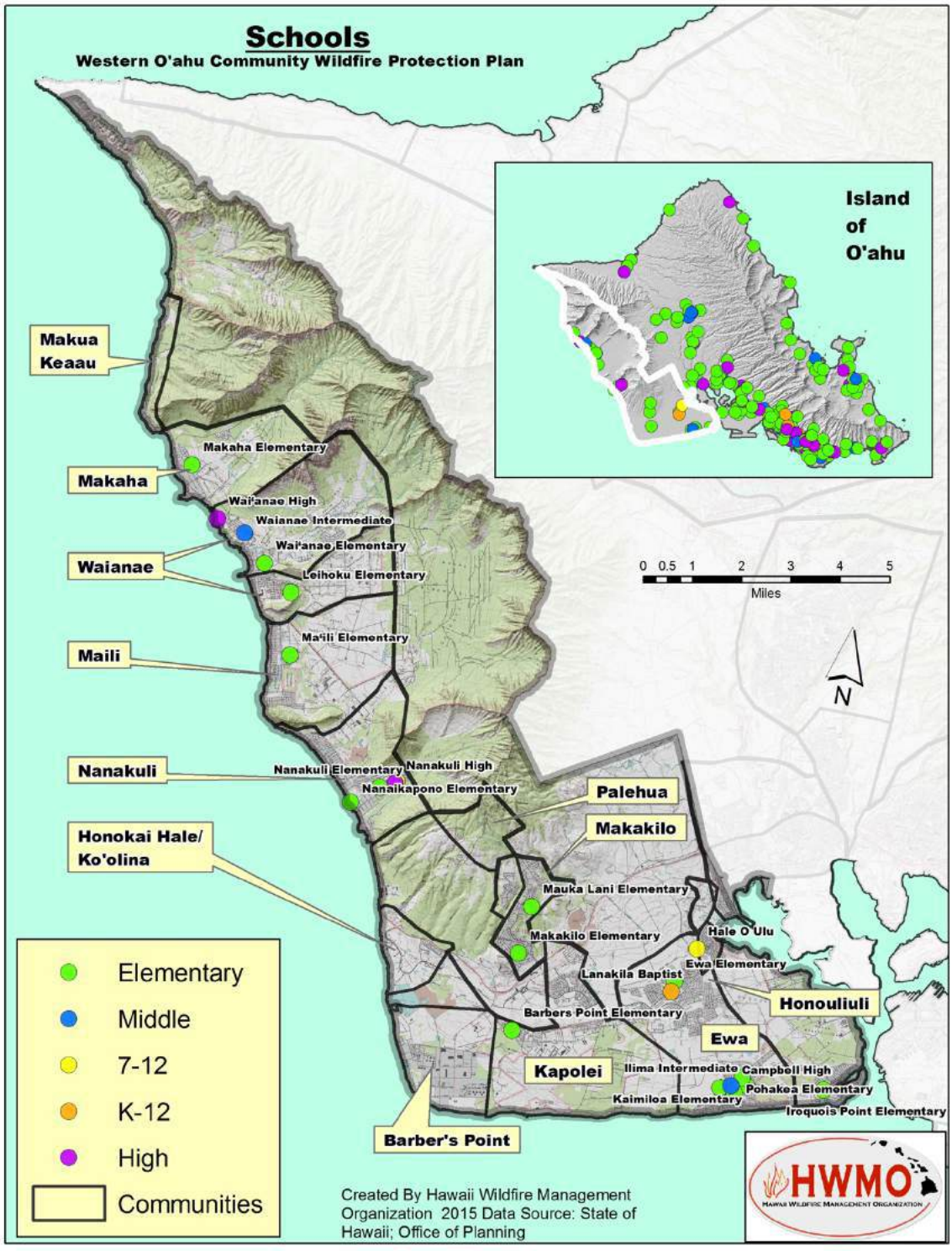
Map 14. *Western O'ahu Population Density Map.*



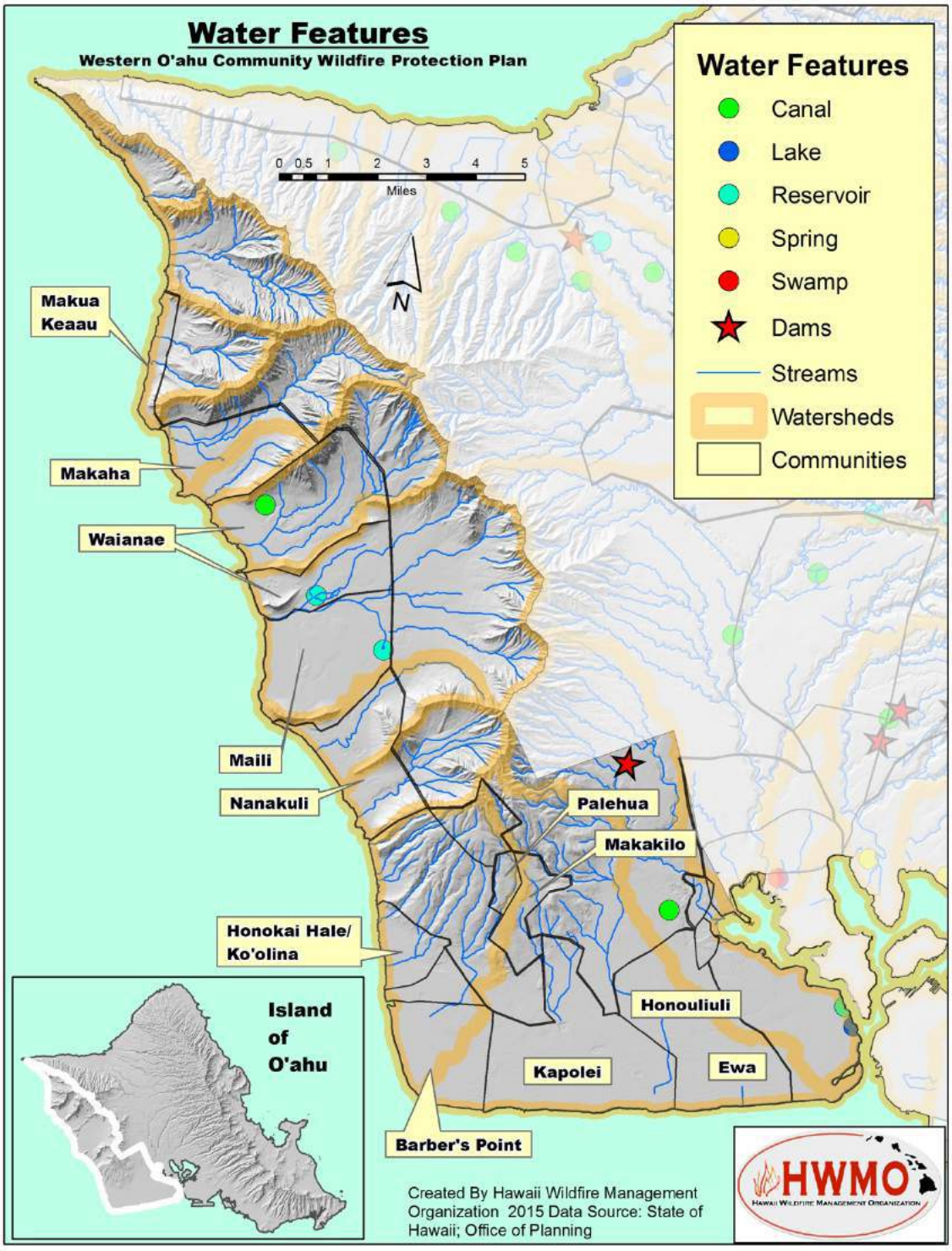
Map 15. *Parks in the Western O'ahu CWPP planning area.*



Map 16. *Civil, industrial, medical, and communication features in the Western O'ahu CWPP planning area.*



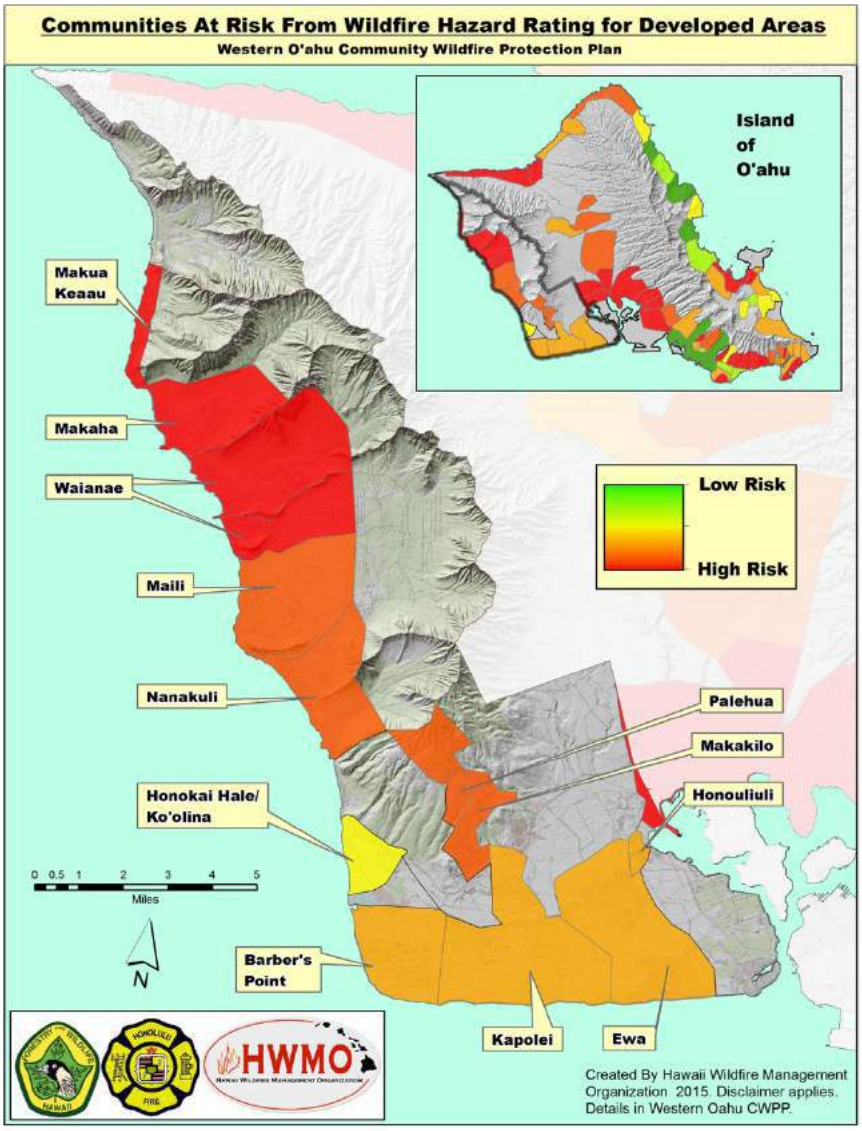
Map 17. *Schools in the Western O'ahu CWPP planning area.*



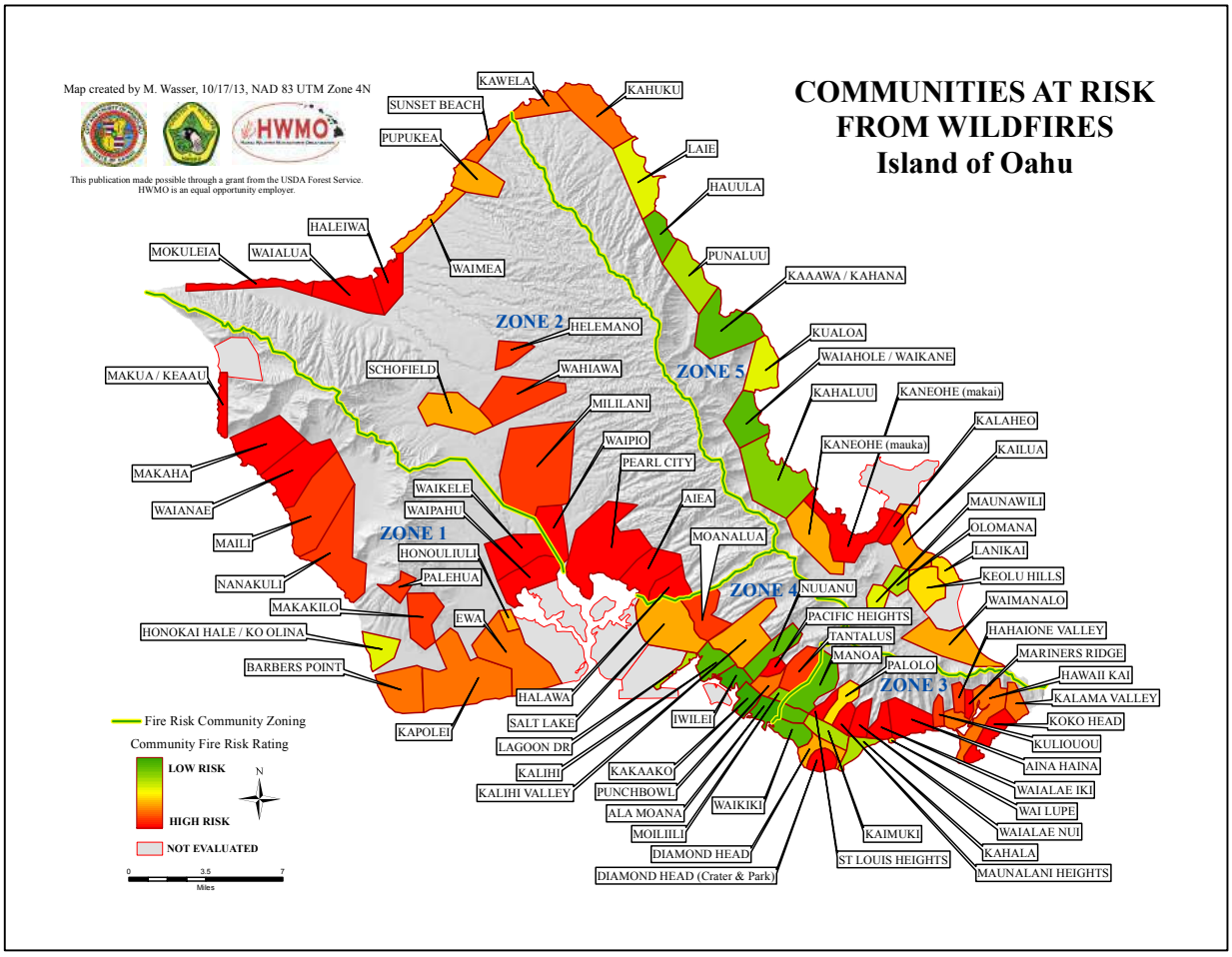
Map 18. *Water features in the Western O'ahu CWPP planning area.*

COMMUNITIES AT RISK FROM WILDFIRE

Nationally, Communities at Risk from Wildfires (CARW) Maps delineate communities that share similar environmental conditions, land use characteristics, fuel types, hazards, and general wildfire issues, and provide ratings to characterize generalized hazards in each area. DLNR-DOFAW has been developing Hawai‘i CARW maps for more than a decade, and has developed streamlined community boundaries for the purposes of the Hawai‘i CARW map. In 2013, HWMO partnered with DLNR-DOFAW and the county fire departments across Hawai‘i to update the Hawai‘i CARW maps. The original community boundaries were replicated in the 2013 map update, with changes made to reflect current hazards and subdivision expansions. Map 19 depicts the hazard ratings for Western O‘ahu developed areas. Map 20 provides the Island of O‘ahu map for context.



Map 19. *Western O‘ahu Communities at Risk from Wildfires Map- Hazard Ratings for Developed Areas.*



Map 20. *Island of O'ahu 2013 Communities at Risk from Wildfires Map.*

WILDFIRE RISK ASSESSMENT

PURPOSE AND METHODS

The purpose of the required community risk assessment is to:

- Provide site-specific information to the public to promote wildfire awareness;
- Help identify and prioritize areas for treatment; and
- Determine the highest priority uses for available financial and human resources.

The methods for this plan's community wildfire risk assessment followed the guidelines established by the HFRA, which requires the following actions:

- Establish Community Base Maps (see Maps 12-18, 26)
- Develop a Community Hazard Assessment (see *Wildfire Hazard Assessment* section)
- Identify Overall Community Priorities (see *Hazard Reduction Priorities*)

The wildfire risk assessment also follows the guidelines and requirements of the Federal Emergency Management Agency (FEMA) Pre-Disaster Mitigation program and the National Fire Plan (NFP). Locally, we have opted to name the effort Wildfire *Hazard* Assessment, rather than Wildfire *Risk* Assessment.

WILDFIRE HAZARD ASSESSMENT

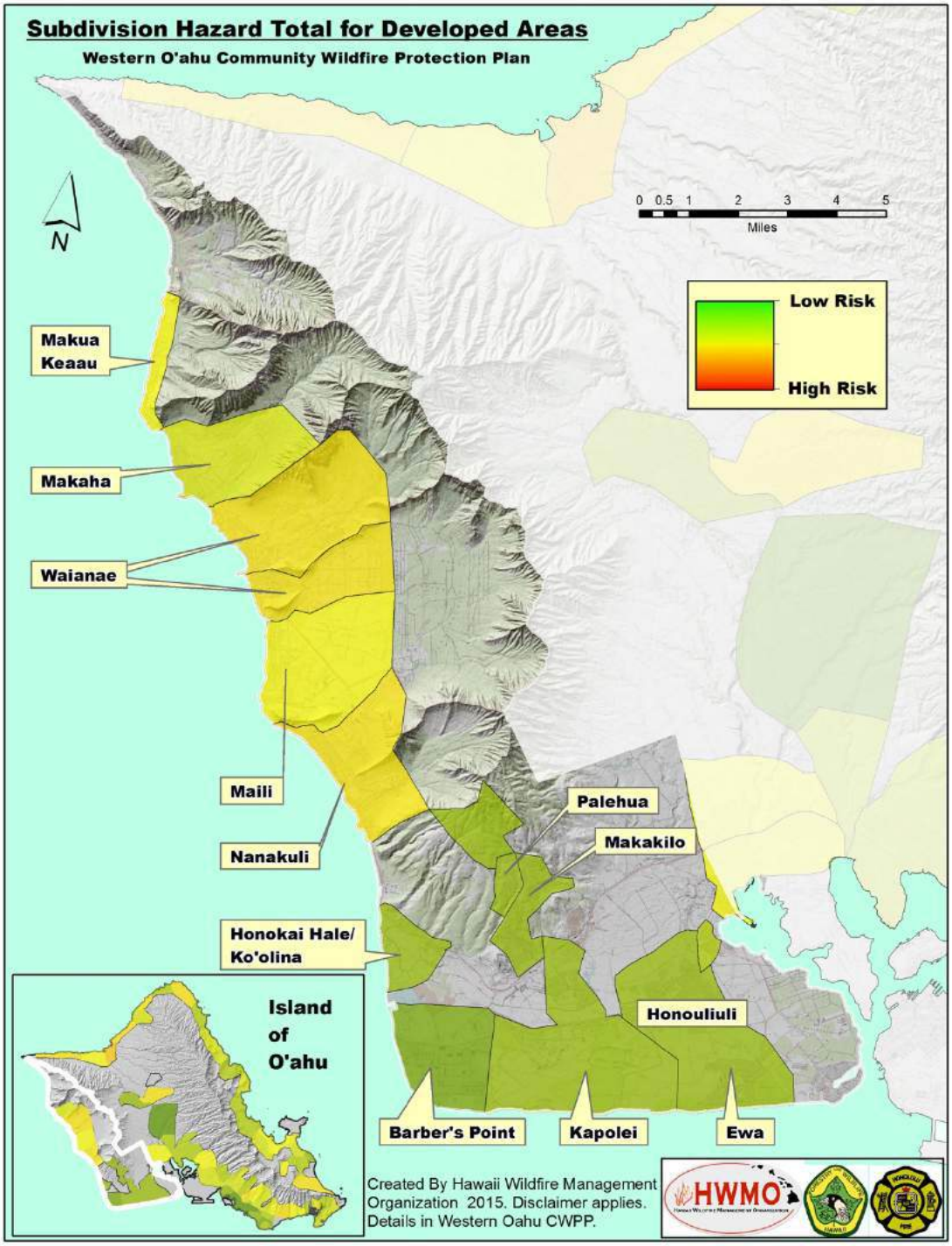
In partnership with DLNR-DOFAW and HFD, HWMO assessed the communities within Western O'ahu for 36 wildfire hazard characteristics, which have been further grouped into 5 categories. Community delineations for the assessment followed those for the CARW map. The five categories assessed for wildfire hazard are as follows.

- Subdivision Hazard
- Vegetation Hazard
- Building Hazard
- Fire Environment Hazard
- Fire Protection Hazard

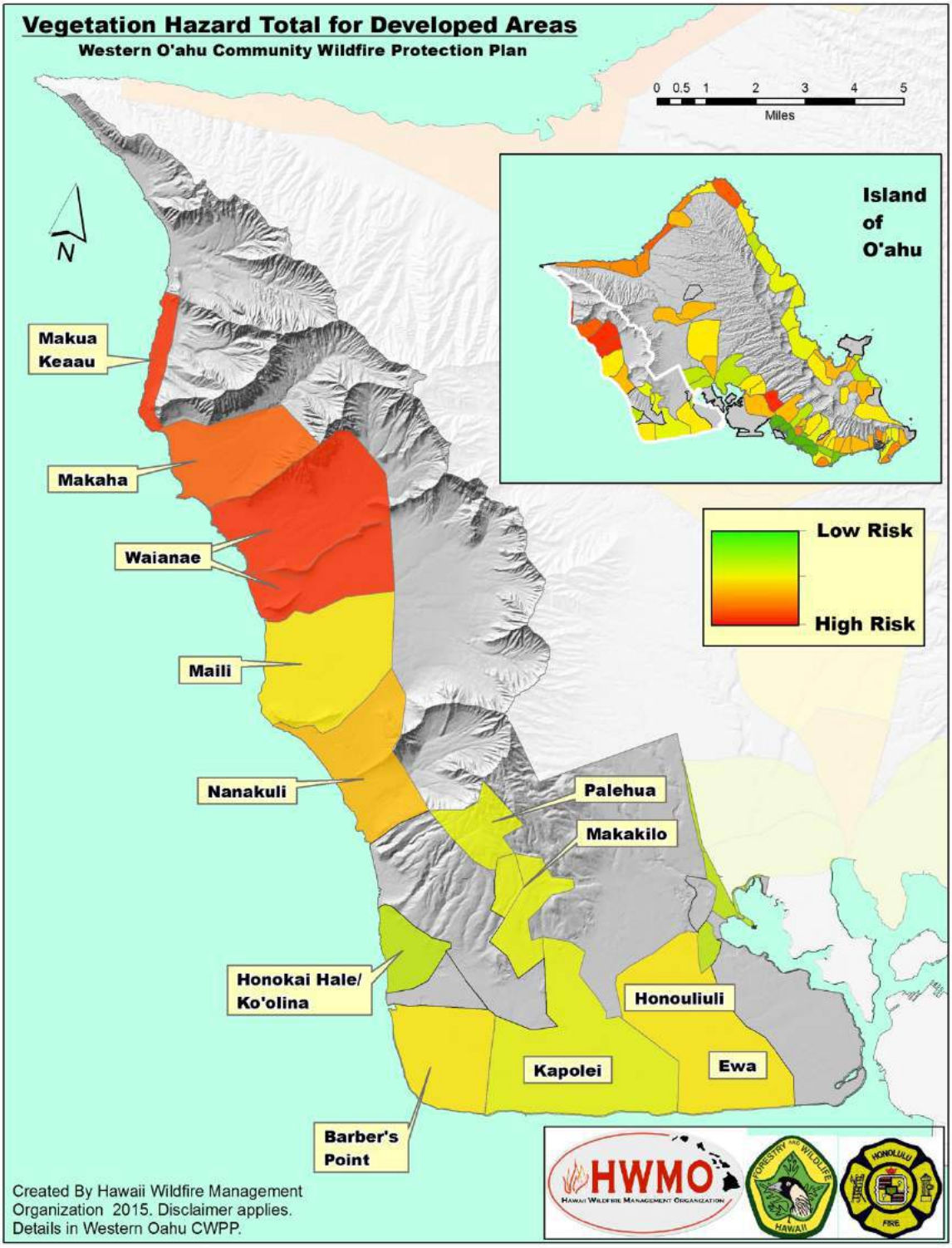
Maps are provided for each of the five categories below, and demonstrate the total hazard per category based on a calculation of that category's individual hazards, as detailed in Table 6. Individual hazard maps can be found in Appendix C.

Hazard Category (See Maps 21-25)	Individual Hazards Assessed
Subdivision Hazard Total	• Fire Service Access • Home Setbacks • Ingress/Egress • Private Landowner Firewise landscaping & Defensible Space • Proximity of Subdivision to Wildland Areas • All Season Road Condition • Road Maintenance • Road Width • Street Signs • Structure Density • Unmanaged, Untended, Undeveloped Lands
Vegetation Hazard Total	• Defensible Space: Fuels Reduction Around Homes & Structures • Fuel Loading • Fuel Structure & Arrangement • Proximity of Flammable Fuels Around Subdivision • Vegetation Within 300' of Homes
Building Hazard Total	• Siding/Soffits • Roofing Assembly • Structural Ignitability • Under skirting Around Decks, Lanais, Post & Pier Structures • Utilities Placement; Gas & Electric
Fire Environment Hazard Total	• Average Rainfall • Prevailing Wind Speeds & Direction • Slope • Topographic Features that Adversely Affect Wildland Fire Behavior • Seasonal or Periodic High Hazard Conditions • Ignition Risk
Fire Protection Hazard Total	• Response Time • Community Planning Practices & Ordinances • Community Fire Safe Efforts & Programs Already in Place • Fire Department Structural Training & Expertise • Local Emergency Operations Group or Citizen Group • Proximity to Fire Stations • Water Source Availability • Wildland Firefighting Capacity of Initial Response Agency

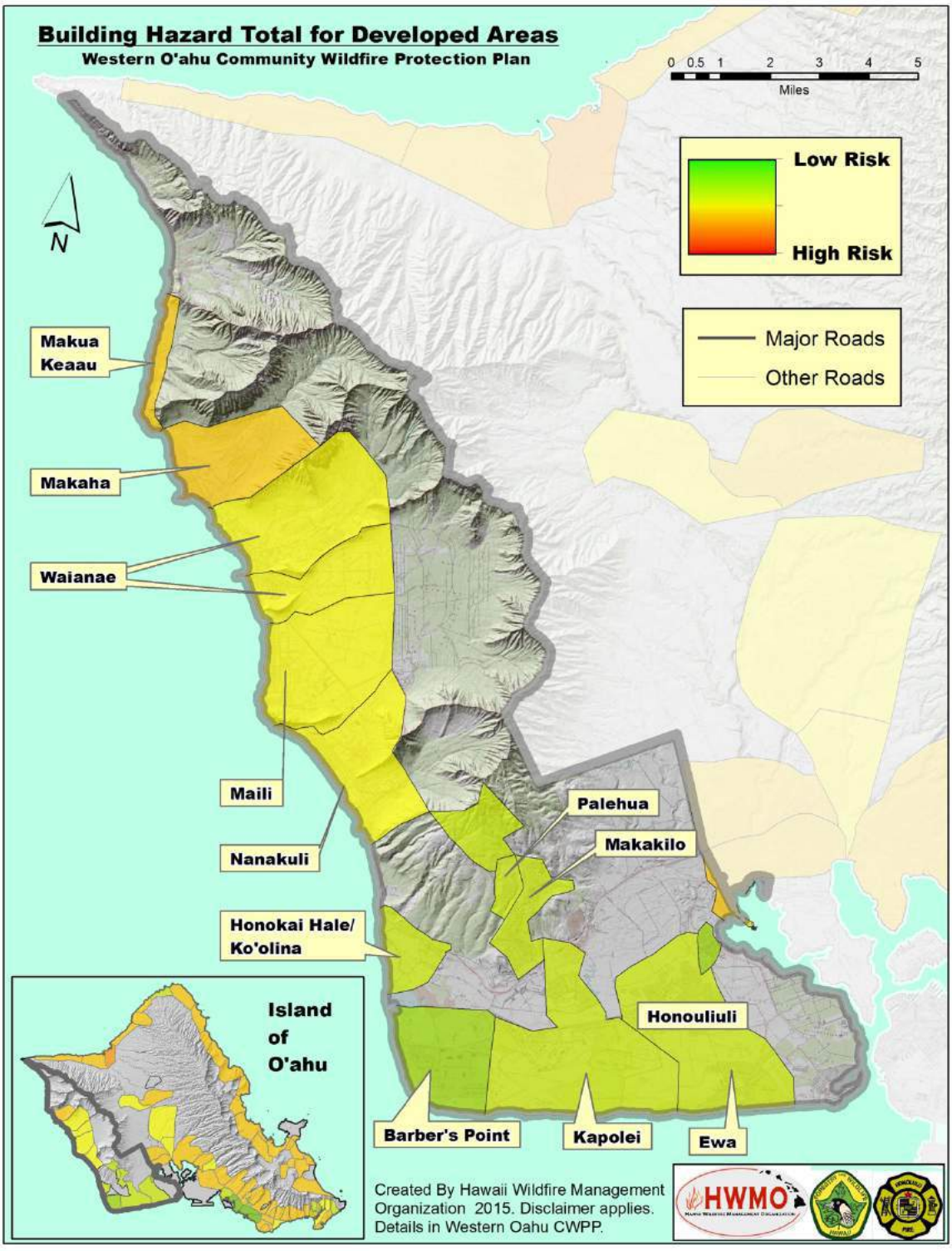
Table 6. *Overview of hazard assessment categories and the individual hazards that comprise each category.*



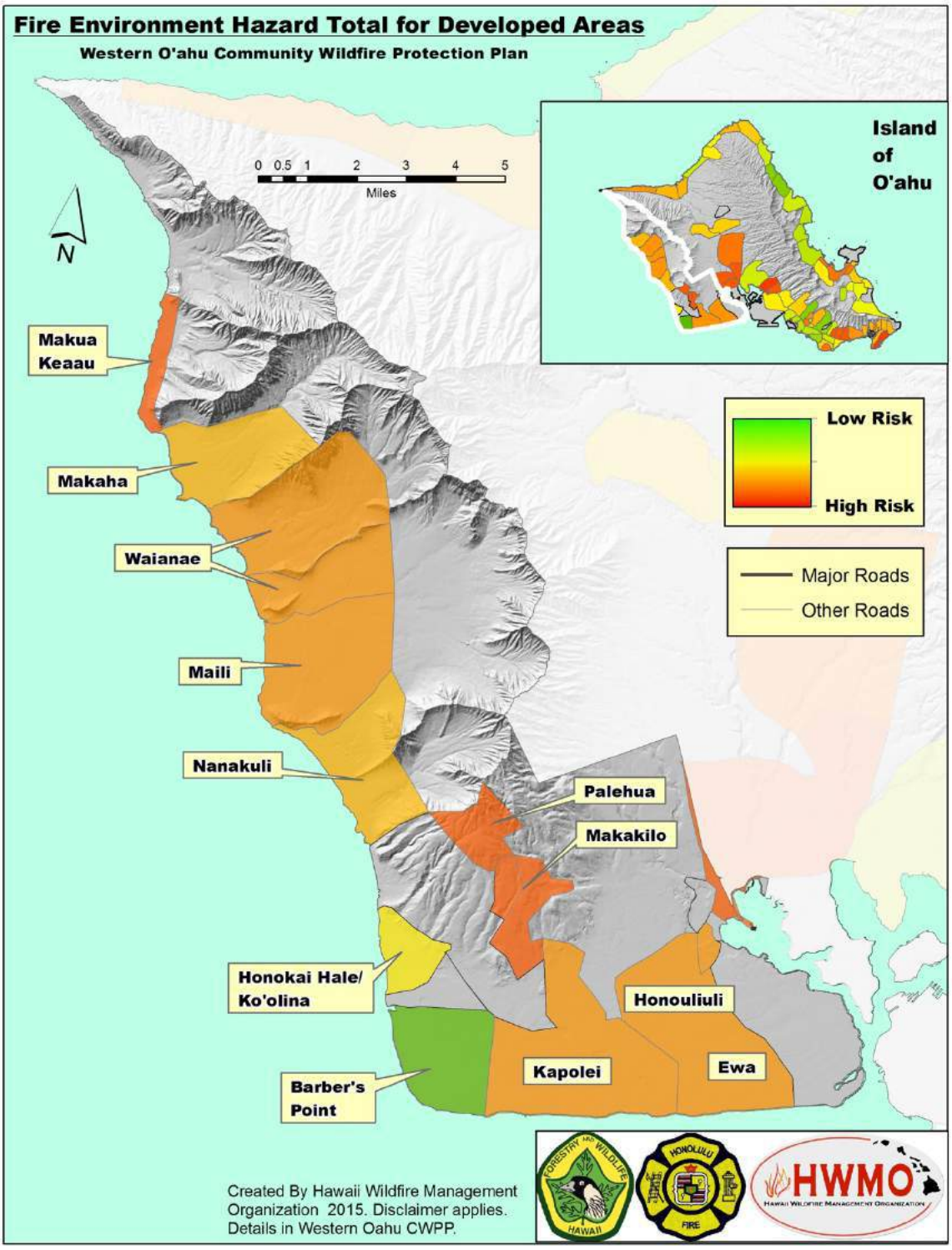
Map 21. Subdivision Hazard Total for Developed Areas of Western O'ahu CWPP planning area. *Reflects hazard assessment findings related to the following categories: Fire Service Access; Home Setbacks; Ingress/Egress; Private Landowner Firewise landscaping & Defensible Space; Proximity of Subdivision to Wildland Areas; All Season Road Condition; Road Maintenance; Road Width; Street Signs; Structure Density; and Unmanaged, Untended, Undeveloped Lands.*



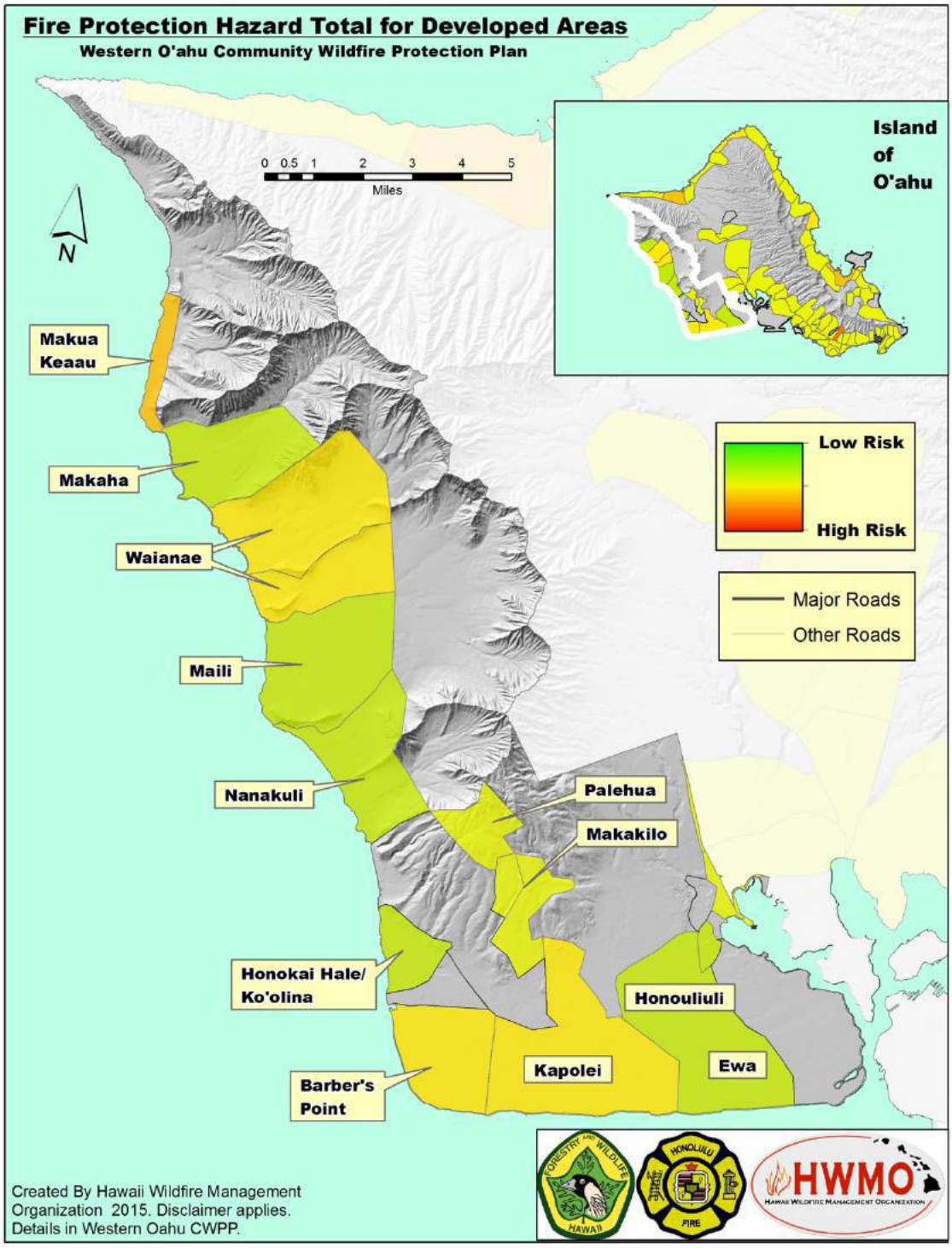
Map 22. Vegetation Hazard Total for Developed Areas of Western O'ahu CWPP planning area*. Reflects hazard assessment findings related to the following categories: Defensible Space: Fuels Reduction Around Homes & Structures; Fuel Loading; Fuel Structure & Arrangement; Proximity of Flammable Fuels Around Subdivision; Vegetation Within 300' of Homes.*



Map 23. Building Hazard Total for Developed Areas of Western O'ahu CWPP planning area*. Reflects hazard assessment findings related to the following categories: Sidings/Soffits; Roofing Assembly; Structural Ignitability; Under Skirting Around Decks, Lanais, Post & Pier Structures; Utilities Placement.*



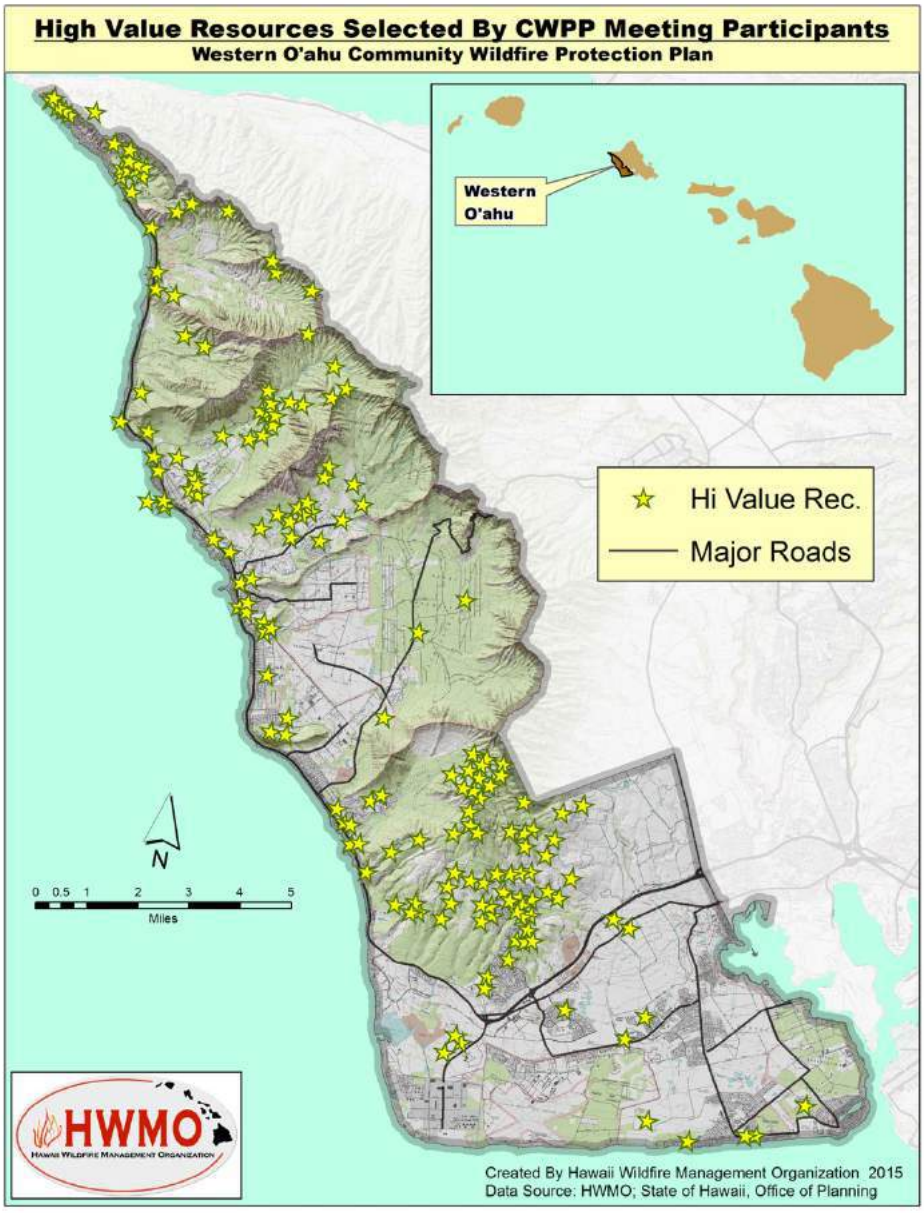
Map 24. Fire Environment Hazard Total for Developed Areas of Western O'ahu CWPP planning area*. Reflects hazard assessment findings related to the following categories: Average Rainfall; Prevailing Wind Speeds & Direction; Slope; Topographic Features that Adversely Affect Wildland Fire Behavior; and Seasonal or Periodic High Hazard Conditions; and Ignition Risk.*



Map 25. Fire Protection Hazard Total for Developed Areas of Western O'ahu CWPP planning area. *Reflects hazard assessment findings related to the following categories: Response Time; Community Planning Practices & Ordinances; Community Fire Safe Efforts & Programs Already in Place; Fire Department Structural Training & Expertise; Local Emergency Operations Group or Citizen Group; Proximity to Fire Stations; Water Source Availability; and Wildland Firefighting Capacity of Initial Response Agency*

COMMUNITY VALUES

Civic, environmental, and cultural value were determined for the Western O'ahu CWPP planning area by stakeholders during input meetings. Map 26 demonstrates the points on the map selected by the public and agency participants during CWPP meetings as high priorities for mitigation/protection based on their personal, cultural, and community values, priorities, and overall risk of wildfire. Due to the sensitive nature of cultural resources in Hawai'i, participants were not required to name the priority resources, only to share the area or location of the valued resources by marking the map poster with stickers. See also Photos 15-17.



Map 26. *Stakeholder-determined High Value Priority Resources to Protect from Wildfire in the Western O'ahu CWPP planning area.*

Photo 15. *High value resources were selected by participants.*

Photo 16. *(Above left). Firefighters selected areas they believe need greater fire protection based on their experience.* ***Photo 17. (****Above right). Meeting participants discussed their own fire-related priorities as they identified places of high personal importance to them.*

FIRE SUPPRESSION CAPABILITIES AND RESOURCES

HFD has the following equipment available for round-the-clock use in the Western O'ahu CWPP planning area. Additional resources and equipment are spread across the entire island and are made available when needed if they are not already in use.

Honolulu Fire Department (HFD) CWPP Planning Area-Specific Suppression Resources	
Helicopters	2 x McDonnell-Douglas MD 520N No Tail Rotor (NOTAR®) helicopters
Engines and Vehicles	Communications Vehicle 43 x Fire Engines (500-750 gallons) 5 x Tractor-Driven Ladder Apparatuses (Tillers) 8 x Quintuple Combination Pumpers (Quints) 2 x Towers 1 x Mobile Command Center 1 x Prime Mover 2 x Rescue Squads
Other Resources	HAZMAT Response Units BAMBI Bucket for aerial suppression of wildfires Live Fire Training Simulator Mass Decontamination Trailer 2 x Rescue Boats

Table 7. *HFD Suppression Resources.*

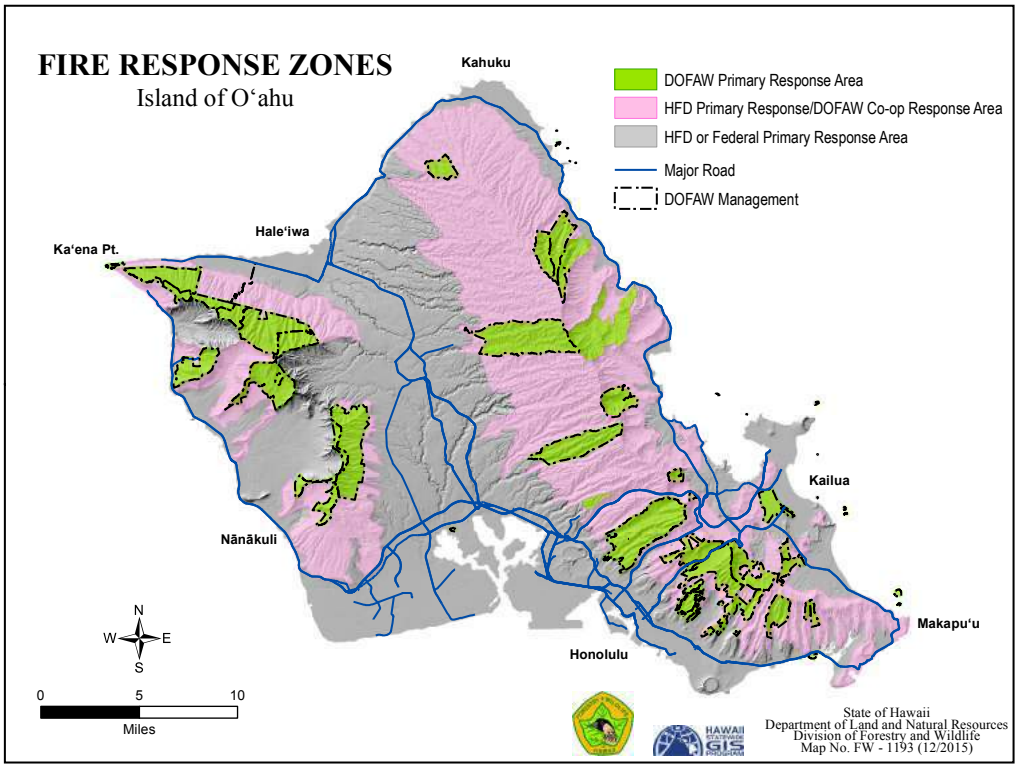
The following DLNR-DOFAW wildland fire suppression resources are available for use in the event of a wildfire in the Western O'ahu CWPP planning area:

Department of Land and Natural Resources – Division of Forestry and Wildlife (DLNR–DOFAW) Suppression Resources	
Helicopters (contract services)	Type II and Type III
Engines and Vehicles	6 x Type VI (2 x 150 gallon and 4 x 300 gallon) 4x4 Vehicle
Other Resources	6 x portable pumps 4 x Helicopter tanks (2 x 1000 gallon and 2 x 500 gallon) Contract heavy equipment, dozers, backhoes, skid steers, etc

Table 8. *Division of Forestry and Wildlife (DLNR–DOFAW) Suppression Resources.*

Initial response to the majority of wildfires (as well as all medical and other emergencies) is the responsibility of the HFD. DLNR-DOFAW responds to wildfire events on State of Hawai'i lands and

provides additional wildland fire fighting assistance when State of Hawai'i lands are threatened and/or mutual aid agreements are invoked. Map 27 was developed by DLNR-DOFAW and demonstrates the independent and shared response zones of each agency in the CWPP planning area.



Map 27. *HFD and DLNR-DOFAW Fire Suppression Response Zones. (Map Source: DLNR-DOFAW).*

EMERGENCY MANAGEMENT DOCUMENTS AND PLANS

The CWPP is non-regulatory and cooperative in nature. The plan provides (1) a foundation for increased communication, coordination and collaboration among agencies and the public, (2) identification and prioritization of areas for hazardous fuel reduction projects and wildfire mitigation actions, and (3) assistance meeting federal and state planning requirements and qualifying for assistance programs.[16]

The CWPP is intended to complement and support existing policies, practices, efforts, plans, programs, statutes, and mandates, including but not limited to:

<u>City and County of Honolulu</u>:
City and County of Honolulu Drought Mitigation Strategies[17]
Multi-Hazard Pre-Disaster Mitigation Plan, Department of Emergency Management
Board of Water Supply Watershed Management Plans:
- Wai'anae Watershed Management Plan[18]
- 'Ewa Watershed Management Plan (in development at time of CWPP plan writing)

State of Hawai‘i:
State Drought Plan and the County Drought Mitigation Strategies[19]
State of Hawai‘i Multi-Hazard Mitigation Plan[20]
Hawai‘i Forest Action Plan/ Statewide Assessment of Forest Conditions and Resource Strategies[21]
State Division of Forestry and Wildlife Operational Policy for Wildfire Control[22]

MULTIPLE-AGENCY AGREEMENTS

Federal, State of Hawai‘i, and Honolulu City and County fire agencies have organized into the O‘ahu Wildfire Information and Education coordinating group (OWIE). OWIE coordinates the public relations, information, and educational programs of the participating wildland fire agencies on O‘ahu and provides a forum for leadership, cooperation and the exchange of information. Additionally, all fire suppression agencies on O‘ahu have mutual aid agreements in place.

Multiple-agency agreements exist among the fire suppression agencies across O‘ahu. As an example, DLNR-DOFAW has established Memorandums of Agreement, Memorandums of Understanding, and/or Mutual Aid Agreements in place with all four county fire departments as well as with federal land management agencies, such as National Park Service, U.S. Fish and Wildlife Service, and U.S. military. According to DLNR-DOFAW,[23] these, “are the cornerstones by which DLNR-DOFAW’s Fire Management Program is based. These. . . identify the responsibilities of each party as well as other fire management activities such as joint participation in prevention, training, and equipment acquisition.”

EVACUATION PROTOCOLS AND NEEDS

Evacuation protocols for neighborhoods and areas in Western O‘ahu have been determined for natural hazards such as tsunamis, and can be found on the Department of Emergency Management website and public education materials.[24] However, fire safety zones for all neighborhoods and areas of Western O‘ahu are yet to be determined, and are a priority action determined by the public as part of this CWPP process.

Additionally, there is now an app for digital devices to enable residents of O‘ahu to be ready for hurricanes, tsunamis, and other natural or man-made disasters.[25] It can be downloaded from Google play and iTunes. Features include real time local weather and public health alerts, customized emergency plans, maps of shelters and tsunami evacuation zones, emergency supplies checklists, what to do during various emergencies, and disaster history across Hawai‘i.

FIRE CODE RELATED TO WILDFIRE ISSUES IN THIS CWPP[26]

The Hawai‘i State Fire Code is the 2012 NFPA 1, Uniform Fire Code. It has both State of Hawai‘i and Honolulu City and County amendments. The State of Hawai‘i amendments contribute to the State Fire Code. Each county then adopts amendments to the State Fire Code to create the County Fire Code.

Most relevant to the discussion and public input for the Western O‘ahu CWPP Update is the chapter on the WUI, which is described in 2012 NFPA 1, Chapter 17.

HAZARD REDUCTION PRIORITIES
WESTERN O'AHU

PURPOSE AND METHODS

Public and agency participants during the CWPP planning process identified hazard reduction priorities for Western O'ahu. The wildfire-related concerns and actions provided by stakeholders were focused toward enhancing wildfire response capabilities, addressing priority public concerns and wildfire impacts, and reducing risk and hazards through proactive wildfire mitigation. HFRA guidelines were followed by including community hazard reduction priorities, hazardous fuels reduction, and recommendations to reduce structural ignitability.

STAKEHOLDER CONCERNS AND RECOMMENDED ACTIONS

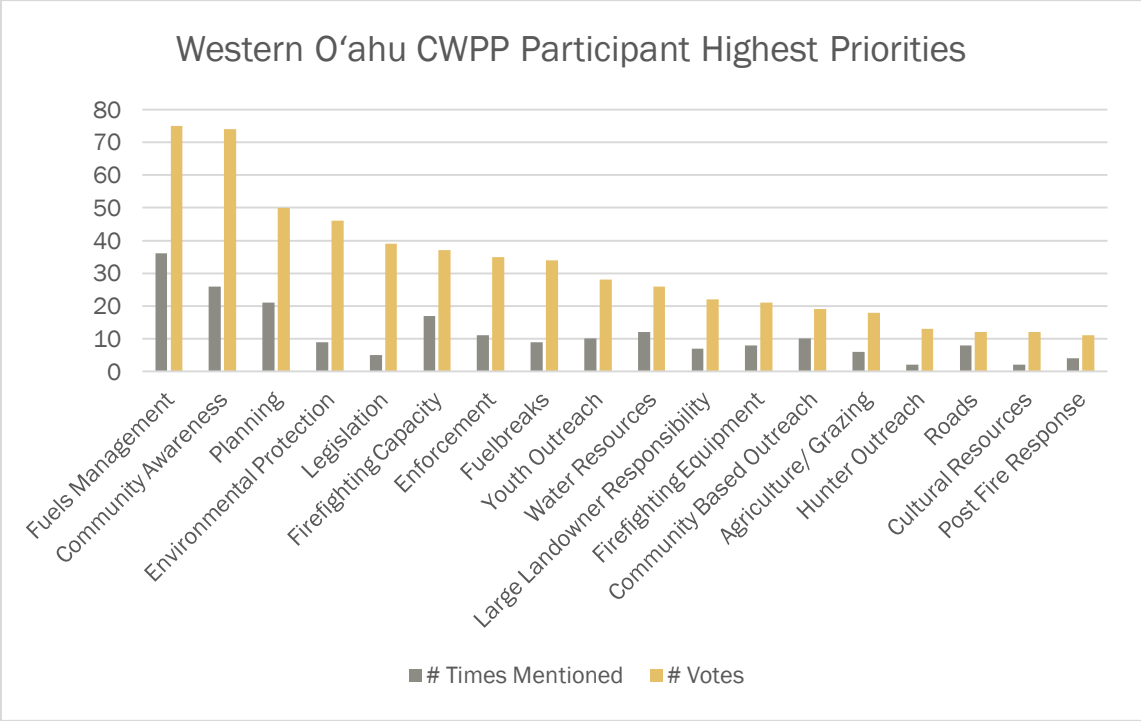


Figure 3. *Western O'ahu CWPP Participant Highest Wildfire-Related Priorities.*

A total of ten agency and public meetings were held to allow interested public participants to provide their wildfire concerns and recommended actions. HWMO held six meetings for the general public and four meetings with fire response agencies and natural resource managers. Additional meetings were held with decision makers and large landowners as noted in the Planning Process chapter of this document.

Agency partners provided input at both public meetings and at separate meetings for OWIE and Wai'anae Mountains Watershed Partnership. Additionally, fire response agency representatives were offered an opportunity to provide written input regarding concerns, challenges, priorities and recommendations for improved wildfire mitigation and management.

While Western O'ahu CWPP participant input yielded diverse and broad concerns and recommended actions, certain topics came up with greater frequency. All input was aggregated and analyzed to capture an overview of the most frequently raised concerns. Figure 3 displays the highest concerns and priorities of CWPP participants, based on the number of times the issue was raised and how many votes the topic received at meetings as a top priority.

THREE CATEGORIES OF STAKEHOLDER CONCERNS AND RECOMMENDED ACTIONS

Public, agency, and decision maker input yielded stakeholder-prioritized feedback regarding wildfire-related concerns and recommended actions. The input was extensive and has been organized to align with the categories used within the National Cohesive Wildland Fire Management Strategy.[27] Refer to Appendix A for comprehensive list of public input per category.

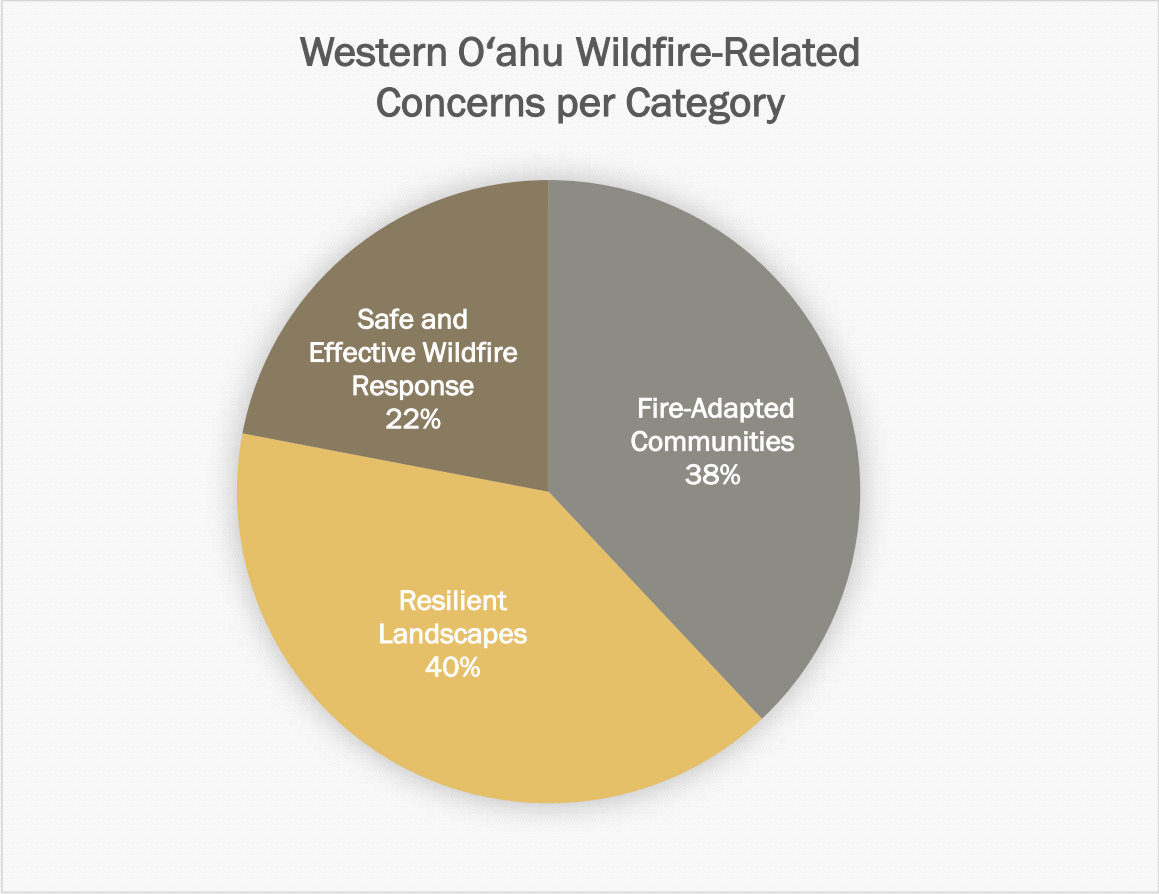


Figure 4. *Community Concerns Organized by National Cohesive Strategy Categories.*

The National Cohesive Wildland Fire Management Strategy encourages communities to develop a dynamic approach to planning for, responding to, and recovering from wildland fires. It provides a framework for wildfire-related discussion, efforts, and goals across the United States. The overarching national strategy is further divided into three regions for tighter collaboration and coordination in each area. Hawai'i falls into the Western Region. Public input details for Western O'ahu are organized

according to the following categories so that they fit into the national framework of priorities and funding opportunities.

- Resilient Landscapes
- Fire-Adapted Communities
- Safe and Effective Wildfire Response

Figure 4 indicates how much of the participant concerns for Western O'ahu fall within each category.

RESILIENT LANDSCAPES

The Resilient Landscapes category of CWPP participant input focuses on all input related to restoring, protecting, or maintaining landscapes. For Western O'ahu, this includes the protection of native species and watersheds from wildfire impacts and the management of vegetation to reduce the ignition capacity and spread of wildfire. The top concerns were prioritized as follows, also depicted in Figure 5:

1. Vegetative fuel management
2. Environmental protection
3. Improved planning
4. Increased enforcement, cultural resource protection, improved access, public awareness about resilient landscape issues, water (tied at less than 2% each).

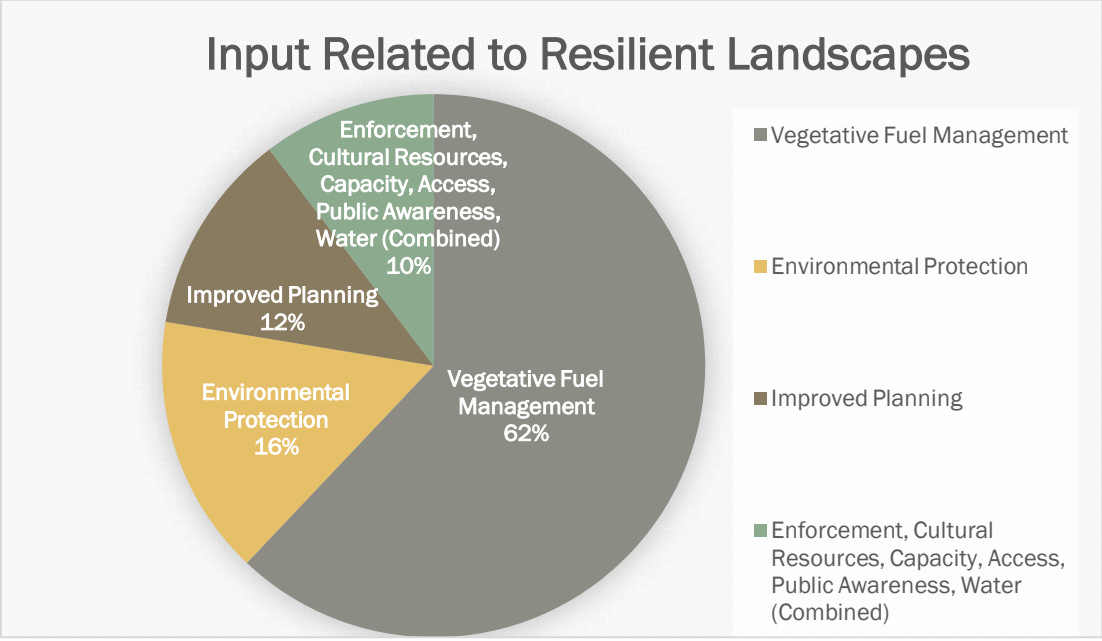


Figure 5. *CWPP participant input related to restoring and maintaining landscapes to reduce wildfire impacts.*

FIRE-ADAPTED COMMUNITIES

38% of Western O'ahu CWPP participant input was related to the need to work toward fire awareness, readiness, prevention, and general fire-adaptation by communities and residents. These goals support the concept of Fire-Adapted Communities, defined by the United States Forest Service as "a

knowledgeable and engaged community in which the awareness and actions of residents regarding infrastructure, buildings, landscaping, and the surrounding ecosystem lessens the need for extensive protection actions and enables the community to safely accept fire as a part of the surrounding landscape."[28] The Wildland-Urban Interface Mitigation Committee of the National Wildfire Coordinating Group defines a Fire-Adapted Community as "A human community consisting of informed and prepared citizens collaboratively planning and taking action to safely co-exist with wildland fire."[29]

The primary goal of working toward fire adaptation is that wildfire preparedness and readiness efforts in a community become an ongoing and broadly supported part of living in, working in, and civically managing an area, and that all activities, from roadside fuels management and agriculture to development designs and community activities, work together to consistently and regularly support wildfire protection. This is opposed to the idea that wildfire preparedness is seasonal or can wait until the last minute, or that it is the responsibility of only one party (community association, fire department, etc.) to aid the community in wildfire preparedness. Generally across Hawai‘i, wildfires are addressed on an as-needed, reactive basis. With the development of this and other CWPPs across Hawai‘i, communities, organizations, and agencies are coming together to move toward becoming proactive, consistent, and collaborative, which is aligned with the framework and objectives for Fire-Adapted Communities. Figure 6 portrays the various roles each member of society can take to work toward fire adaptation.

This CWPP was developed via a collaborative process that included a diversity of stakeholders with homes, businesses, personal interests, and jurisdictions in the Western O‘ahu CWPP planning area. The wildfire-related concerns and recommended actions demonstrate the range of responsible parties, timelines, and actions that need to be taken toward comprehensive wildfire prevention, preparedness, and protection of Western O‘ahu. These are the basic tenets of becoming fire-adapted. For the purposes of analyzing and presenting the Western O‘ahu CWPP stakeholder input, stakeholder concerns and recommendations related to the human side of fire adaptation are presented in this section. Managing vegetation and increasing fire suppression capacity are presented individually (See *Resilient Landscapes and Safe and Effective Wildfire Response* sections).

Participant input related to the human side of wildfire preparedness in Western O‘ahu resulted in four categories of concern, prioritized as follows:

1. Increasing community awareness
2. Increasing or ensuring enforcement of wildfire-related codes and ordinances
3. Improving planning efforts (of many types and scales) to include wildfire prevention and risk reduction
4. Improvement in military participation in preventing wildfires in and around communities.

Figure 7 depicts the breakdown of how much input was provided within each of these categories.

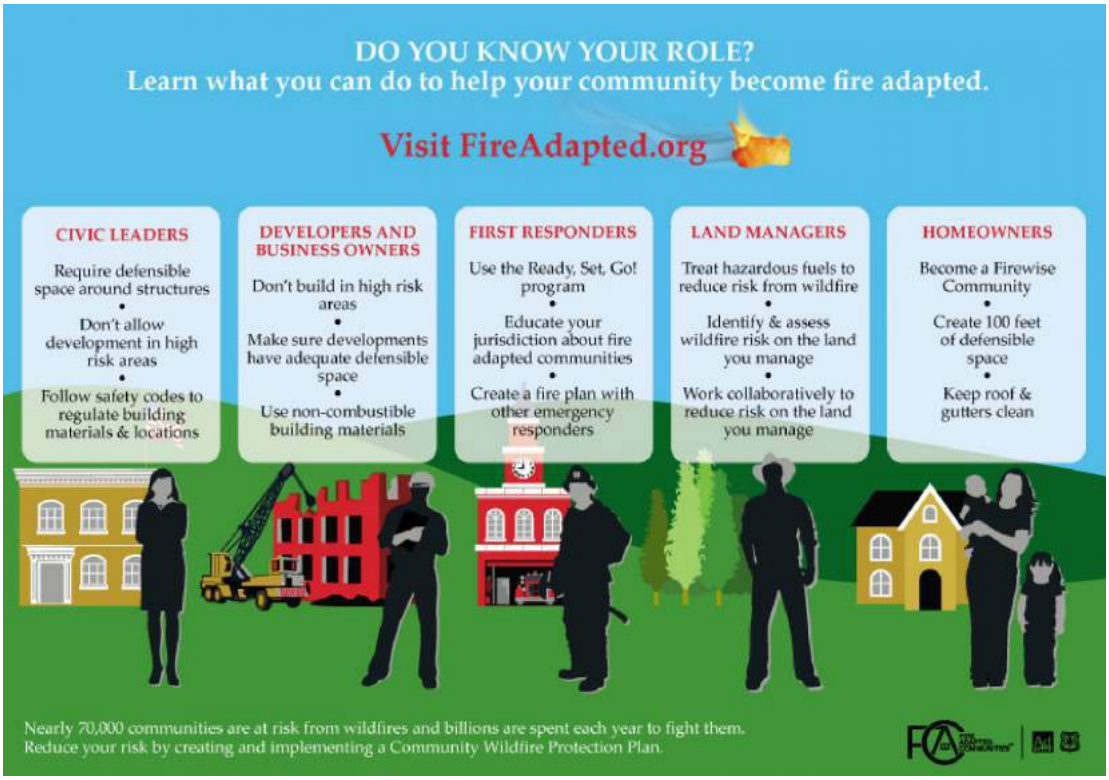


Figure 6. *Fire-Adapted Communities Infographic.*[30] *There is a role for everyone when working toward a region becoming Fire-Adapted, as seen in this infographic from the Fire-Adapted Communities website, FireAdapted.org.*

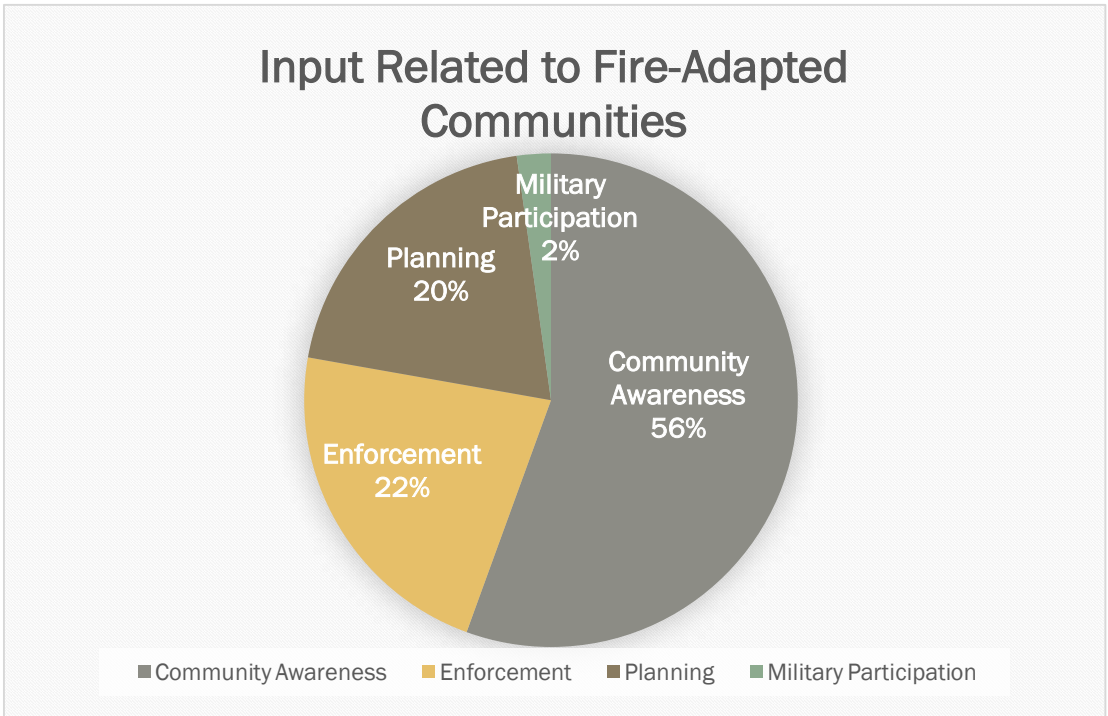


Figure 7. *Community concerns related to the human side of wildfire preparedness and protection, as part of working toward Fire-Adapted Communities goals.*

56% of all community-focused input was related to increasing community awareness. There was an urgency and emphasis of participant concerns regarding the general lack of awareness of the threats and impacts of wildfire among all community members from residents to decision makers.

Further analysis revealed a more detailed understanding of the community-recommended strategies for bolstering wildfire awareness. This yielded a breakdown of suggested outreach methods (see Figure 8), which is of great help to those in the area working toward increasing community awareness.

The next highest percentages of concerns related to the goals of Fire-Adapted Communities were the need for improved enforcement and planning. Both of these categories were diverse in their concerns and recommendations, having no one topic clearly dominate the category.

Enforcement-related concerns covered arson, vegetation management by large landowners, illegal dumping, collaboration among decision makers and residents toward improved wildfire legislation, and fireworks.

Input related to improved planning included the need for fire management plans, better legislation, point of contact for wildfire information, wildfire risk reduction for new and current developments including required buffer zones, increased collaboration and planning for wildfire education among agencies, an established process for addressing wildfire related concerns, and increased participation from the Department of Planning, planners, and policy makers in wildfire protection.

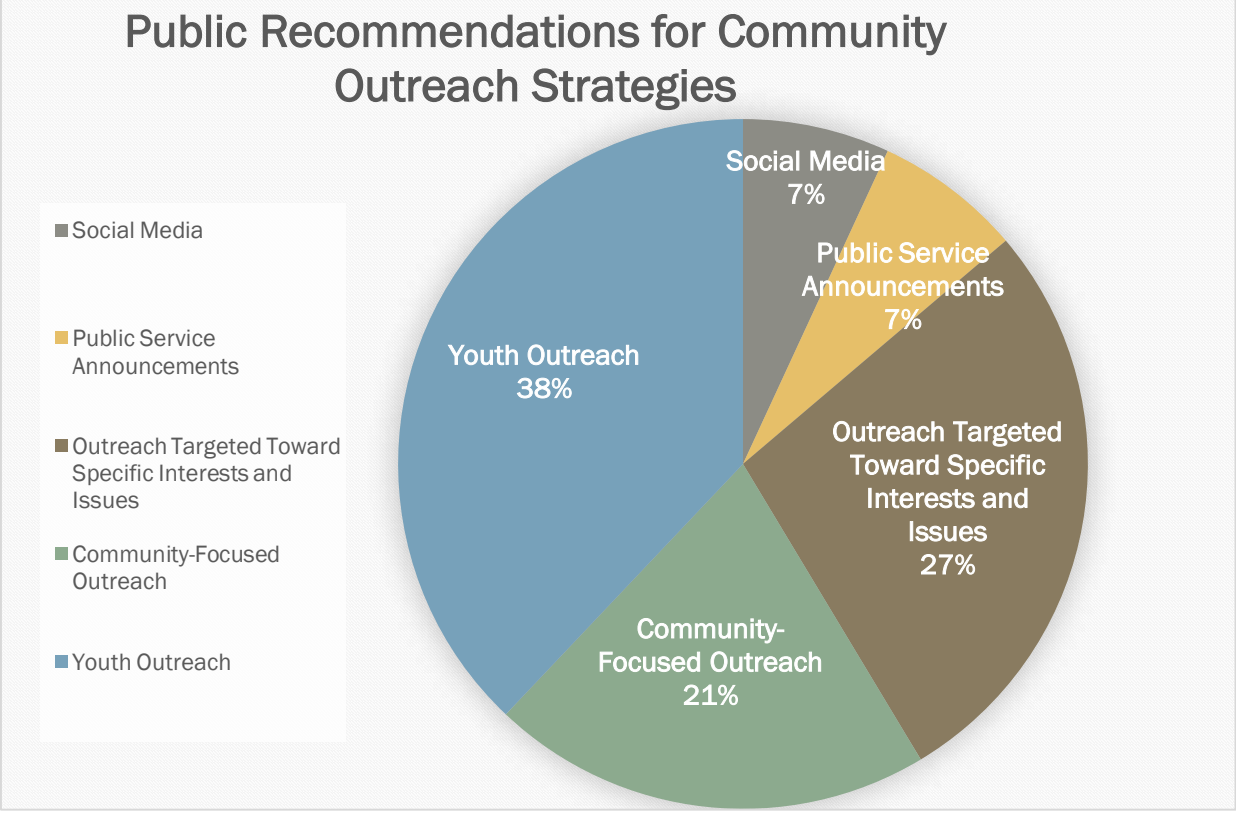


Figure 8. *CWPP participant recommended methods for increasing public awareness regarding wildfire threats, impacts, and preparedness strategies.*

SAFE AND EFECTIVE WILDFIRE RESPONSE

Comprehensive and effective wildfire preparedness and protection includes preventing ignitions, minimizing the ability of fire to travel across structures and landscapes, and maximizing the likelihood for fires to be suppressed quickly to keep them as small and minimally impacting as possible. Since the majority of all fires in Western O'ahu (and Hawai'i in general) are human-caused, ignition prevention largely is a matter of community outreach and education (addressed in *Fire-Adapted Communities* section). Minimizing vegetative fuels and structural ignitability can help keep fires from spreading (see *Resilient Landscapes* section and *Reducing Structural Ignitability* section).

Once a fire is ignited, however, the responsibility for taking action rests solely on fire suppression and emergency management departments and personnel. While prevention and preparedness are key to reducing the threats and impacts of wildfire, suppression is the final piece of the protection equation that needs to be proficient, equipped, effective, and adequately supported. Western O'ahu CWPP participants demonstrated an understanding of this and provided prioritized concerns related to wildfire response (firefighting). Additionally, while the protection of life, property, and natural resources are the functions of fire and emergency management efforts, the safety and health of firefighters was also of utmost importance to CWPP input meeting participants. The input was clustered into like categories and resulted in the following action steps, prioritized as follows: (See also Figure 9)

1. Increasing capacity (such as personnel, training, and resources such as equipment and vehicles).
2. Improving and increasing water infrastructure and availability.
3. Improving and increasing firefighting access (through road and firebreak development and maintenance).
4. Improved planning.
5. Increased collaboration.
6. Firefighting efforts better connecting to environmental protection efforts.
7. Concerns about fires originating on federal land.

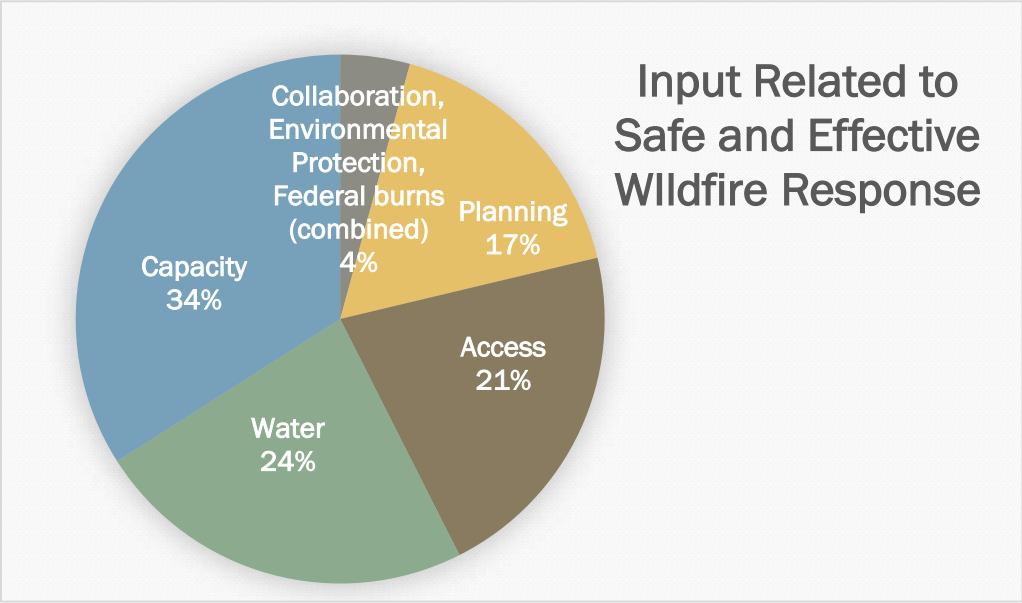


Figure 9. *Public input related to safe and effective wildfire response.*

HAZARDOUS FUELS REDUCTION

A CWPP must identify and prioritize areas for hazardous fuel reduction treatments and recommend the types and methods of treatment that will protect one or more at-risk communities and essential infrastructure. Based on the fuel hazard ratings acquired during the hazard assessment, recommendations for the type and method of vegetative fuels reduction treatments for high fuel hazard areas are listed in Table 9.

Community Resource, Structure, or Value at Risk	Fuel Hazard Rating	Type of Treatment	Treatment Method Options
Mauka forested lands, parks, and reserves	HIGH OR EXTREME IF UNMANAGED	Mechanical, hand labor, chemical, animal, fuels conversion	Utilize well-managed grazing, weed whip, mow, hand-pull, herbicide where appropriate with follow-up vegetation removal. Reforestation and restoration. Fuels conversion and "living" or "shaded" fuelbreaks.
Homes and structures with large lots	MOD-EXTREME	Mechanical, hand labor, chemical, animal, fuels conversion	Firewise home ignition zones. Reduce fuel along property boundaries and roadsides. Convert fuels to drought-tolerant, fire-resistant (preferably native) plants. Reduce ladder fuels.
Densely arranged homes and structures	MOD-EXTREME	Mechanical, hand labor, chemical, fuels conversion	Firewise home ignition zones. Weed whip, mow, hand-pull, and herbicide where appropriate. Convert fuels to drought-tolerant, fire-resistant (preferably native) plants. Reduce ladder fuels.
Historical sites throughout Western O'ahu	MOD-EXTREME	Hand labor, chemical, animal, fuels conversion	Weed whip, mow, hand-pull, well managed grazing, and herbicide where appropriate. Convert fuels to drought-tolerant, fire-resistant plants.
Roadsides	MOD-EXTREME IF UNMANAGED	Mechanical, chemical, animal, fuels conversion	Conduct roadside fuels treatments in accordance with fuel growth (keep low), maximize width of roadside reduction areas. Convert roadside fuels to fire-resistant plants that require little or no maintenance and are less ignitable.
Resorts	LOW-MOD	Mechanical, hand labor, chemical, fuels conversion	Continue regular maintenance and irrigation. Convert fuels to drought-tolerant, fire-resistant plants.
Fallow Agricultural lands	HIGH OR EXTREME IF UNMANAGED	Mechanical, animal, chemical, re-establish active agriculture	Install fuelbreaks along roads and property boundaries, or in lines perpendicular to slope to provide access and minimize erosion. Reduce fuels in patches to create fuel mosaics. Utilize well-managed grazing. Re-establish active agriculture. Initiate reforestation and/or restoration while also maintaining fuels.

Table 9. *Hazardous Fuels Treatment Recommendations.*

REDUCING STRUCTURAL IGNITABILITY

A CWPP must recommend measures that homeowners and communities can take to reduce the ignitability of structures. Individuals and community associations can reduce structural ignitability throughout their community by taking the following measures recommended by the Firewise, Ready, Set, Go!, and HWMO outreach programs, summarized below.[31, 32, 33]

The following pages are written with the resident in mind, and can be removed and used independently from the CWPP as a general set of guidelines for reducing hazards in the home ignition zone. It is highly recommended that individuals and communities conduct a simple native vegetation assessment and/or consult with appropriate biologists or foresters before clearing trees and significant amounts of vegetation that may be important to protect, or may be important to leave in place to prevent erosion.

Creating defensible space does not necessarily mean eliminating the presence of greenery on your property. You can still landscape around your home to make it fire-safe without compromising beauty and aesthetics. By planting native, drought-tolerant plants (xeriscaping) around your home, you can:

- Protect your home from wildland fire ignition and spread
- Beautify your property
- Perpetuate an important natural and cultural resource
- Decrease the maintenance needs of your landscaping

For the drier areas of Hawai‘i, consider that native dryland plants are specially adapted to local conditions and require less upkeep, water, and fire maintenance, saving yourself a great deal of time, money, and resources. Non-native, lush plants often drop hazardous debris and can become fire-prone in drought conditions.

DEFENSIBLE SPACE ZONES AROUND STRUCTURES

To reduce structural ignitability, it is recommended that residents think in zones around their home, and begin addressing risk reduction activities in Zone 1, working out from there to Zone 2 and beyond.

Figure 10. *Defensible space zones around structures.*[28]

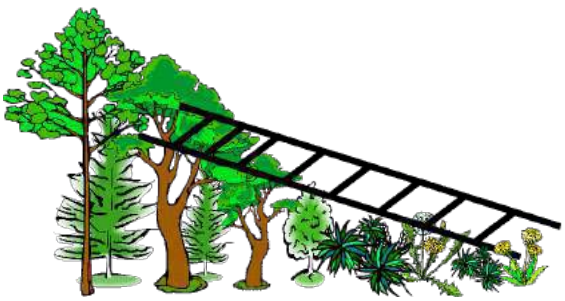


Figure 11. *Ladder Fuels Diagram.*[34] *Ladder fuels form a pathway for ground fires to climb vegetation and become crown fires, which are much more difficult to suppress. It is important to limb low hanging branches and keep ground vegetation short so that vegetation is separated inhibiting fire from easily "climbing" up to canopy where wind is often stronger.*

The following actions are recommended per zone:

Zone One extends 30 feet out from buildings, structures, decks, etc.

- Remove all dead or dying vegetation.
- Remove "ladder fuels" (low-level vegetation that allows the fire to spread from the ground to the tree canopy, see Figure 11). Create at least 6 feet of separation between low-level vegetation and tree branches. This can be done by reducing the height of low-level vegetation and/or trimming low tree branches.
- Create "fire-free" area within 5 feet of home, using non-flammable landscaping materials and/or high-moisture content, drought-resistant vegetation.
- Trim tree canopies regularly to keep their branches a minimum of 10 feet from structures and other trees.
- Remove leaf litter (dry leaves/pine needles) from yard, roof and rain gutters.
- Relocate woodpiles or other combustible materials into Zone Two.
- Remove combustible material and vegetation from around and under decks, lanai, or the entire house if foundation is post-and-pier.
- Remove or prune vegetation near windows.

Zone Two extends 30 to 100 feet out from buildings, structures and decks. You can minimize the chance of fire jumping from plant to plant by removing dead material and removing and/or thinning vegetation. The minimum spacing between vegetation is three times the dimension of the plant.

- Remove "ladder fuels" (see Figure 11).
- Cut or mow annual grass down to a maximum height of 4 inches.
- Trim tree canopies regularly to keep their branches a minimum of 10 feet from other trees/cluster of trees.
- For larger properties, consider areas outside of Zone Two as a third zone to address. Continue reducing ladder fuels, managing fuels, hardening structures, and properly storing combustible materials.

GENERAL DEFENSIBLE SPACE RECOMMENDATIONS

- As stated above, ensure you have at least a 100-foot radius of defensible space (cleared, managed, and maintained vegetation) around your home. Note that even more clearance may be needed for homes in severe hazard areas. This means looking past what you own to determine the impact a common slope or neighbors' yard will have on your property during a wildland fire.
- Cut dry weeds and grass before noon when temperatures are cooler to reduce the chance of sparking a fire.
- Landscape with drought-resistant plants that have a high moisture content and are low-growing.
- Keep woodpiles, propane tanks and combustible materials away from your home and other structures such as garages, barns and sheds.
- Ensure that trees are far away from power lines.
- Weed around the property regularly, especially areas that a lawn mower is not appropriate for (tall dry grasses, rocky terrain, etc.)
- Remove leaf litter and other debris that accumulate around the building, under vegetation, and

other collection areas.

- Remove leaf litter, straw and other debris from under and around propane tanks to create 10 feet of clearance around it.
- Eliminate ladder fuels by pruning tree branches on trees around the property to within at least 6 feet of the ground, using a bypass lopper, pruner saw, or long reach/hand pruner.
- Remove flammable materials from underneath the house, decks, porches, and lanai.
- Common flammables include scrap-wood, firewood, and combustible furniture.
- Mow the lawn regularly to keep grasses shorter than 4 inches tall around the home. Do not mow in the heat of the day or when the wind is blowing. Never mow in dry vegetation.
- Non-native trees, such as ironwood constantly drop needles, leaves, branches, and other debris, so it's best to stay on top of removing them from the ground before the pile becomes a major project. Consider reforesting these areas with native trees that don't drop large amounts of debris.
- Invasive grasses such as guinea and fountain grass grow rapidly when unmanaged and can dry out very quickly, creating a major fire hazard. Weed them often and consider replanting with low-lying, drought-tolerant, native ground cover.

HARDEN YOUR HOME

Creating defensible space, as detailed above, decreases the likelihood of wildfire spreading through vegetation that surrounds structures on the home site or yard. The second and equally important set of actions to reduce wildfire-caused ignitions of residences and structures is to harden the home or structure with non-combustible building materials and ignition-reducing strategies. The following is a step-by-step list of recommended actions per component of a structure or home. Some of these actions are inexpensive and some are costly. All are important. It is recommended that residents take the simple and easier steps right away, and prioritize hardening the rest of the home or structure as soon as possible. Note: relying on the ability to water the roof when fire is approaching will not necessarily provide adequate structural protection, and it puts you in danger. It also takes water and personnel resources away from firefighters, who need the water and full attention toward firefighting rather than search and rescue for late evacuators. Preparation and early evacuation are key actions recommended by the national Ready, Set, Go! Program. Prepare your home as follows:

Figure 12. *Covering vents with 1/8-inch or smaller metal mesh blocks embers from entering a home or structure.*

Figure 13. *Keep windows free of vegetation to reduce likelihood of heat-caused breakage that lets embers into your home.*

Roof: Your roof is the most vulnerable part of your home because it can easily catch fire from wind-blown embers. Homes with wood-shake or shingle roofs are at high risk of being destroyed during a wildland fire. Build your roof or re-roof with fire-resistant materials such as composite, metal, or tile. Block any spaces between roof decking and covering to prevent ember intrusion. Clear leaves and other debris from your roof and gutters. Cut any tree branches within 10 feet of your roof.

Figure 14. *Make sure your eaves are enclosed with non-combustible materials to prevent ember entry.*

Vents: Vents on homes are particularly vulnerable to flying embers. All vent openings should be covered with 1⁄8-inch or smaller metal mesh. Do not use fiberglass or plastic mesh because they can melt and burn. Attic vents in eaves or cornices should be baffled or otherwise protected to prevent ember intrusion (mesh is not enough).

Figure 15. *Rain gutters should have screens to keep leaf debris from accumulating. Maintain gutters to keep them clear and clean.*

Deck/Patio Cover: Use heavy timber or non-flammable construction material for decks. Enclose the underside of balconies and decks with fire-resistant materials to prevent embers from blowing underneath. Keep your deck clear of combustible items, such as baskets, dried flower arrangements and other debris. The decking surface must be ignition resistant if it's within 10 feet of the home.

Windows: Heat from a wildland fire can cause windows to break even before the home ignites. This allows burning embers to enter and start internal fires. Single-paned and large windows are particularly vulnerable. Install dual-paned windows with the exterior pane of tempered glass to reduce the chance of breakage in a fire. Limit the size and number of windows in your home that face large areas of vegetation.

Figure 16. *Wood fencing can act like a fire wick straight to a home. Use non-combustible materials for all fencing and yard structures.*

Non-Combustible Enclosed Eaves: Box in eaves with non-combustible materials to prevent accumulation of embers.

Walls: Wood products, such as boards, panels or shingles, are common siding materials. However, they are combustible and not good choices for fire-prone areas. Build or remodel with fire-resistant building materials, such as plaster, cement, masonry or stucco. Be sure to extend materials from foundation to roof.

Rain Gutters: Screen or enclose rain gutters to prevent accumulation of plant debris.

Chimney: Cover your chimney and stovepipe outlets with a non-flammable screen of 1⁄4-inch wire mesh or smaller to prevent embers from escaping and igniting a fire. Make sure that your chimney is at least 10 feet away from any tree branches.

Garage: Have a fire extinguisher and tools such as a shovel, rake, bucket and hoe available for fire emergencies. Install a solid door with self-closing hinges between living areas and the garage. Install weather stripping around and under door to prevent ember intrusion. Store all combustibles and flammable liquids away from ignition sources.

Non-Combustible Fencing: Make sure to use non-combustible fencing materials, and to keep combustible fences away from homes. Wooden fences leading straight to the home act as wicks and bring the fire straight to the structure, greatly increasing the likelihood of the home igniting.

Driveways and Access Roads: Driveways should be designed to allow fire and emergency vehicles and equipment to reach your house. Access roads should have a minimum 10-foot clearance on either side of the traveled section of the roadway and should allow for two-way traffic. Ensure that all gates open inward and are wide enough to accommodate emergency equipment. Trim trees and shrubs overhanging the road to a minimum of 13 1⁄2 feet to allow emergency vehicles to pass.

Address: Make sure your address is clearly visible from the road.

Water Supply: Have multiple garden hoses that are long enough to reach any area of your home and other structures on your property. If you have a pool or well, consider getting a pump.

Inside: Keep fire extinguishers on hand and in good working order. Install smoke alarms on each level of your home and near bedrooms. Test them monthly and change the batteries twice a year.

ACTION PLAN
WESTERN O'AHU COMMUNITY WILDFIRE PROTECTION PLAN

The Western O'ahu CWPP Action Plan follows the guidelines for HFRA, which includes developing an action plan along with an implementation and maintenance strategy, and finalizing the plan.

The Western O'ahu CWPP Action Plan was developed through an analysis of the issues identified in the hazard assessments and overall risk assessment, public and agency meetings, and through a review of other Community Wildfire Protection Plans throughout Hawai'i. Federal, state, and county agencies, private entities and landowners, and area residents and homeowners were invited to submit projects that provide protection and reduce risk. Public concerns and input served as the basis for the projects listed below that will guide hazard reduction efforts in the future.

Landowners and agencies are invited to continue to submit projects that provide community protection and mitigate wildfire risk. OWIE, along with HWMO when possible, intend to meet periodically to evaluate progress on projects and mutually agree on treatment priorities. Additional projects will be attached as appendices and included in updated versions of this plan.

NEAR-TERM ACTION PLAN

Agencies and organizations involved in the CWPP process provided a list of action item projects for the next 1-5 years. Community meeting participants provided their concerns and priorities during the public meetings. This information was used to inform and develop the following project list.

1-5 Year Projects

Proposed and/or Planned Project	Anticipated Cost	When	Lead
Wai'anae Kai Forest Reserve – Green Break: breaking the grass fire cycle by replacing guinea grass with mostly native shrubs and trees that will shade out the grass. Weed mat is also laid down to inhibit grass growth. Education is a strong component of this project. Thousands of volunteer hours by school kids have been logged for this project.	$100,000/ year	Ongoing	Wai'anae Mountains Watershed Partnership, DLNR-DOFAW
Wai'anae Kai Forest Reserve Fuels Conversion– Honua Riparian Project: Restore and reestablish abandoned lo'i to create a riparian area in the FR. This riparian area will be a living fire break to inhibit fire spread.	$50,000/ year	In Initial Phases	DLNR-DOFAW
Wai'anae Kai Forest Reserve Fuel break: Maintenance of approximately ¾ of a mile to prevent fire from hitting the FR from neighboring ranch.	$40,000/year	Ongoing	DLNR-DOFAW
Wai'anae Kai Forest Reserve: Retardant treatment- Spraying retardant along roads and plantings to inhibit fire spread.	$30,000/ year	Ongoing	DLNR-DOFAW

Honouliuli Forest Reserve – Fuel break and access: maintenance of roads for firebreaks and fire access.	$20,000/ year	Ongoing	DLNR-DOFAW
Makua Keaau Forest Reserve - Fuel break and access: maintenance of roads for firebreaks and fire access. Approx $20K per year	$20,000/ year	Ongoing	DLNR-DOFAW
Kuaokala Game Management Area - Fuel break and access: Maintenance of roads for firebreaks and fire access. Approx $15K per year	$15,000/ year	Ongoing	DLNR-DOFAW
Nanakuli Ranch - Fuel break and access: maintenance of roads for firebreaks and fire access.	$10,000/ year	Ongoing	DLNR-DOFAW
Smokey Bear and other signage – Install and maintain "Smokey Bear, Prevent Wildfire Signs" throughout project area.	$10,000/ year	ASAP	DLNR-DOFAW
Assist interested communities in completing Firewise Communities certification process	$5,000/ community	Ongoing	HWMO
Provide outreach to students at schools in fire-prone communities	Varies, part of broader workplan and set of expenses	Ongoing	HWMO, OWIE
Develop wildfire prevention and drought awareness and preparedness materials	Variable	In Initial Phases	HWMO, OWIE
Launch wildfire and drought awareness campaign	Variable, depending on strategies employed	In Initial Phases	HWMO, OWIE, DLNR-DOFAW
Host wildfire preparedness information and materials for residents and decision makers on website	Variable	Ongoing	HWMO, DLNR-DOFAW
Utilize social media to promote wildfire awareness	Variable	Ongoing	HWMO, OWIE
Consult county land use planners regarding wildfire issues and input	Variable	ASAP, as part of CWPP process	HWMO

Table 10. *Near-Term Action Plan and Projects.*

RECOMMENDED NEXT STEPS

In addition to projects that are ongoing or being initiated at the time of writing this CWPP, numerous other priority projects were proposed by participating agencies and organizations involved in the CWPP planning process. Table 11 details the proposed projects in no priority order. Projects are to be completed as funding, personnel, and opportunities become available for implementation.

Longer-Term Projects		
Proposed Project	Anticipated Cost	Lead
Continue and expand all-agency unified wildfire outreach campaign, such as Wildfire & Drought Lookout	TBD	HWMO, OWIE
Improve national reporting of wildfires in Hawai‘i	TBD	DLNR-DOFAW, USFS, HWMO
Improve initial attack capacity	Project dependent	TBD
Work to appropriately graze fallow areas where fuels are building, Fund fencing and water troughs to make lease areas more economically feasible to graze	200,000 for fencing multiple areas	DLNR-DOFAW
Install water tanks around margins of communities to serve as dip tanks for helicopter fire suppression. Have tanks double as water troughs for ranching and conservation/restoration efforts	$20-60,000 per diptank	TBD
Increase outreach to community associations (workshops, presentations)	Variable	HWMO, OWIE
Increase K-12 wildfire-focused outreach and education	TBD	HWMO, OWIE
Provide wildfire education for decision makers	TBD	HWMO, OWIE
Seed collection and storage for post-fire replanting	TBD	DLNR-DOFAW
Create fuelbreak maps (existing and desired)	$50,000	HWMO
Work with large landowners to encourage fuels management	TBD	OWIE, HWMO
Develop plan for increased water to areas such as Yokohama Bay	TBD	OWIE, DOFAW
Maintain and add RAWS	TBD	DLNR-DOFAW, OWIE
Work with partners and residents to garner support for increasing DOFAW’s budget for fire response	TBD	HWMO
Extend successes in Wai‘anae Kai to other Forest Reserves and Makaha (Honolulu Board of Water Supply)	TBD	DLNR-DOFAW
Increase DOFAW nursery capacity (i.e., add a horticulturalist position)	TBD	DLNR-DOFAW
Submit WUI proposals for projects in the CWPP area	TBD	DLNR-DOFAW
Work with state and federal land-owner assistance programs to incorporate wildland fire concerns	TBD	DLNR-DOFAW
Develop fire-specific situational awareness and evacuation plans, education, and resources for communities	TBD	TBD
Increase community and agency fire danger and fuels monitoring capacity	TBD	HWMO, UH

Table 11. *Proposed Future Projects.*

CWPP IMPLEMENTATION AND MAINTENANCE

PLAN IMPLEMENTATION AND MAINTENANCE

The Healthy Forest Restoration Act (HFRA) requires that HFD, Honolulu Department of Emergency Management, and DLNR-DOFAW all agree on the final contents of the Western Oʻahu CWPP. The plan is signed by each agency in order to meet HFRA and FEMA requirements. Because of the non-regulatory nature of the CWPP, the relevance and effectiveness of the Western Oʻahu CWPP will rely heavily upon agency and community initiative and involvement. Expertise, technical support, and implementation assistance will be provided by the appropriate agencies and organizations involved in fire issues in the Western Oʻahu CWPP area. Area residents are urged to contribute time and effort toward creating defensible space, reducing structural ignitability, and working at the community level to initiate and maintain wildfire protection projects.

HWMO, in cooperation with the OWIE coordinating group, will provide technical support, identify and coordinate funding when possible, and serve as a centralized resource for wildfire risk reduction efforts in Western Oʻahu. Together, representatives will work to identify sources of funding for projects, initiate projects, document the successes and lessons learned from those projects, and evaluate and update the CWPP as needed.

HWMO will provide outreach and educational programs to youth and adults through school programs, community events, homeowners/community association programs, and workshops in the coming years to catalyze and support community involvement in implementing the actions identified in this plan. Additionally, HWMO will work with interested communities to go through the Firewise certification process, to include forming local Firewise committees and action teams and completing comprehensive hazard assessments and plans specific to their subdivisions.

Many Western Oʻahu CWPP action items will require continuing support for wildfire risk mitigation projects. This will involve actively pursuing funding for projects, staying informed and in contact with one another, and updating the CWPP regularly so that it remains a “living” document. Continuing to build community awareness of these issues and actions will assist with fostering individual and community investment in projects.

Note: This page and its information are part of the original 2016 plan and have been retained to preserve the record from the base document. The current signatories can be found on the mutual agreement page at the beginning of this plan.

SIGNATORY CONTACT INFORMATION

The following agencies have a high level of interest in the protection of the Western O'ahu region from wildfire, and have reviewed and support this CWPP. Contact information for principal government stakeholders is listed below.

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The Signature Page presented at the beginning of this document demonstrates the required multi-agency participation and acknowledgement of this plan.

For inquiries related to the development of this plan, to add supplementary action plan projects, or for printed copies, please contact:

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LISTS OF TABLES, FIGURES, MAPS, PHOTOS

TABLES

FIGURES

MAPS

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APPENDICES

Appendix A: Detailed Public Input Per National Cohesive Strategy Category
Appendix B: WUI Community Assessment Photos
Appendix C: Wildfire Hazard Assessment Maps for Western Oʻahu
Appendix D: DLNR-DOFAW Forest Reserves on Oʻahu

Western O'ahu Community Wildfire Protection Plan
APPENDIX A
Detailed Public Input Per National Cohesive Strategy Category

Public Input Related to FIRE ADAPTED COMMUNITIES	
Wildfire Concern (In public-prioritized order)	**Recommended Actions** (Summarized from all public input statements)

1. Community Awareness (Education and Outreach)	• Create a culture of community-level fire awareness:
	  ○ Involve schools and youth
	  ○ Send information home through Department of Education (DOE), post on DOE and school websites, school email blasts
	  ○ Stress parent involvement
	  ○ Focus on elementary and middle schools
	  ○ Deter senior classes from burning behind Nanakuli
	  ○ Get into schools and grow existing programs
	  ○ Add wildfire to Fire Prevention Week
	  ○ Begin a juvenile fire setter program, target concern areas
	  ○ Add wildland firefighting to career days
	• Develop and offer classes/training/information for neighborhood boards and community associations. Include:
	  ○ Fire history & impacts
	  ○ Fire threat signs
	  ○ Non-combustible building materials
	  ○ Firewise landscaping
	  ○ Defensible space
	  ○ Proper storage of ignitable materials
	  ○ Fire suppression details (evacuation, emergency response teams, resident and neighbor roles)
	  ○ Clutter and combustible materials around homes
	• Improve public outreach
	  ○ PSAs, videos, tv, social media
	  ○ Public announcements when conditions have high fire likelihood
	• Provide targeted outreach to:
	  ○ Large landowners
	  ○ Hunters (who might be able to help with students)
	  ○ Specific communities
	• State should provide funding & increase/contribute to outreach & education
	• Talk to politicians about fire education and enforcement issues

2. Enforcement	• Increase capacity of fire department and others who are supposed to enforce fire code • Change fire code policy on fuelbreaks from 30 feet to 50 feet • Enforce fuel abatement codes on large landowners and vacant lot owners • Enforce codes and rules regarding: ○ Fire threats and junk in people's yards

Public Input Related to FIRE ADAPTED COMMUNITIES	
Wildfire Concern (In public-prioritized order)	**Recommended Actions** (Summarized from all public input statements)
	○ Trash burning ○ Illegal dumping ○ Homeless encampments ○ Fireworks • Develop partnerships to help notify authorities of violations to fire code • Catch arsonists and charge with suppression costs • Add fuel-abatement to Adopt-A-Highway expectations • Address underlying issues to fire ignitions such as homeless encampments
3. Planning (and Legislative Actions)	• Involve planners and policy makers in wise development, to emphasize wildfire preparedness: ○ Be Firewise from the start (of new developments) ○ Require buffer zones ○ Communicate with City and County Department of Planning, Land use planners, policy makers • Develop fire management plans for the region • Establish a process, hotline, or contact for addressing wildfire preparedness or violation issues • Regulate urban expansion so it does not impact native species
4. Military participation	• Work with military (Navy) on arson and fire starts on old structures on Navy properties

Public Input Related to RESILIENT LANDSCAPES	
Wildfire Concern (In public-prioritized order)	**Recommended Actions** (Summarized from all public input statements)
1. Vegetative fuels management	General fuels management recommendations: • Manage fuels around subdivisions • Manage fuel loads below natural areas to prevent spread into forests and biologically sensitive areas • Create a service road around community perimeters to serve as both a fuelbreaks and access • Maintain access roads and firebreaks in large unused agricultural areas • Communities should all have chippers to decrease fuel load Grazing: • Sheep/goat grazing in interface; Naked Cow Dairy needs 500+ acres of grazing lands • Create goat grazing programs in small unmanaged fuel areas • Work with UH grazing specialist to develop grazing paddocks around Ka'ala farms • Support leasing of federal properties for grazing to reduce fuels Large landowners: • Support, educate, and enforce large landowners to manage vegetation on residential boundaries • Work toward grant to help large landowners plant native groundcover or convert flammable fuels to less flammable vegetation • Help define large landowners' roles in fire mitigation better Fuelbreak standards and policies: • Increase HFD policy from 30 feet to 50 feet of vegetation management for fuel abatement • Help smaller homeowners get permission to cut fuelbreaks 24 feet beyond own property boundaries when adjacent to high fuels Government-related fuels reduction: • Deal with unexploded ordinance in Army range areas • Involve Department of Transportation in better roadside fuels management and converting roadside vegetation to Firewise plants • All government lands should prioritize and fund fire access roads and fuels management
2. Environmental Protection	Constructed wetlands: • Aquifer recharge through fishpond/constructed wetlands (lo'i) • Constructed wetlands (increase political will DLNR) and restore lo'i & fish ponds; grazing lands designation Post fire: • Increase post fire restoration efforts and capabilities, including temporary water lines • Develop common native seed bank and sources • Schedule re-planting immediately after fire and replant with less combustible plants

Public Input Related to RESILIENT LANDSCAPES	
Wildfire Concern (In public-prioritized order)	**Recommended Actions** (Summarized from all public input statements)
	• Plan post fire planting efforts with nurseries and seed providers • Fund and create a post-fire team Protected and sensitive species and areas: • Provide locations of threatened and endangered species to firefighters for prioritized fire protection • Protect natural resources in protected valleys • Conduct fuels management below forests to prevent fire from traveling from below natural areas into forests • Protection for Waianae watershed Other environmental: • Beautification projects to convert flammable fuels to less flammable
3. Planning	• Support legislation in session to allow "Taro Lands Designation" for constructed wetlands and loʻi • Identify responsible parties for mitigation and recovery when fires cross boundaries (for example, fires in Waianae Valley crossed back and forth across jurisdictions) • Identify at-risk communities and work with them most • Develop fire management plan for region • Fund and develop maps of the network of trails and roads for firefighters
4. Enforcement	• Enforce fuel abatement laws, especially by large landowners with unmanaged fuels next to populated subdivisions
5. Cultural Resources	• Restore and protect loʻi and fishponds
6. Capacity	• Increase post-fire response and restoration capacity ○ Develop common seed bank and sources of seeds for after fire • Increase funding and support for fuels management between residential and natural areas
7. Access	• Create better access/roads around subdivisions that can also serve as fuelbreaks to protect natural areas from fires that start within subdivisions and spread into native and protected areas
8. Public Awareness	• Education and outreach to large landowners about importance of managing fire fuels • Work with landowners, work toward buy-in for responsibility; Neighborhood boards (ex. PCA Palehua Community Assn.); County & State entities
9. Water	• Recharge aquifer. “More water in streams equals more green not brown on mountain”

Public Input Related to SAFE AND EFFECTIVE WILDFIRE RESPONSE	
Wildfire Concern (In public-prioritized order)	**Recommended Actions** (Summarized from all public input statements)
1. Capacity	Equipment: • Ensure adequate firefighting equipment, more aircrafts for response • Explore new technologies for fire suppression (i.e. deployment methods, eco-friendly retardant, drones, etc.) • Increase air support • Add additional resources and partnerships to increase air assets & maintenance • Pursue research & development funding for wildland firefighting techniques, equipment, and resources Personnel: • Need fire crew dedicated to wildland fire and pre-suppression activities and mitigation • Increase personnel Pre-Suppression and Mitigation • Supplement medical services in region via mobile organizations to assist with disaster • Develop pre-suppression crew • Increase dedicated funding for pre-suppression Training • More training for Hawai'i DOFAW staff; Need funding for staff to train on the mainland on larger scale fires Other Firefighting resources: • Funding for firefighting infrastructure- water lines, diptanks • Funding for informational traffic signs for HPD and HFD use • Funding to develop quicker public notification system for incidents • Develop better traffic management strategies for firefighting and community safety

2. Water	• Increase water supply and infrastructure for firefighting
	  ○ Establish more diptanks, water tanks, reservoirs
	  ○ Add catchment systems in strategic locations
	  ○ Add tanks or tankers
	  ○ Improve water supply from the Board of Water Supply
	  ○ Install more fire hydrants and pressurized water on both sides of road
	• Install fire hydrants between Kea'au beach park and Ka'ena Point
	• Research suitable water supplies/infrastructure for air operations with landowners and agencies

3. Access	• Increase access by developing and maintain roads and fuelbreaks in all areas • Add bypass roads to aid evacuations and traffic • Increase access for firefighting in remote areas

Public Input Related to SAFE AND EFFECTIVE WILDFIRE RESPONSE	
Wildfire Concern (In public-prioritized order)	**Recommended Actions** (Summarized from all public input statements)
4. Planning	• Provide firefighters with plans and maps of protected species • Plan for better traffic management • Conduct surveys and map trail networks • Develop visitor evacuation plan • Landowners should develop plans and practice staff and visitor evacuations
5. Collaboration	• Work to better determine fire causes • Develop more streamlined process between agencies for aerial firefighting • Create agreements in advance of anticipated usage of equipment (bulldozers, heavy equipment)
6. Environmental Protection	• Work better during fire to minimize post fire damage • Implement post-fire planting immediately after fire
7. Federal Burns	• Manage federal controlled burns more appropriately

Western O‘ahu Community Wildfire Protection Plan
APPENDIX B
WUI Community Assessment Photos

The following photos provide examples of community resources/assets at risk, hazards, and existing protective features in the Western O‘ahu CWPP planning area.

Photo assessments were completed for developed areas from Maili and Makua through Kapolei and Ewa.

Wildland-Urban Interface Communities in the West Oʻahu CWPP planning area.
Photo assessment of community resources at risk, hazards, and examples of existing protective features and actions.

Māili

Waiʻanae Comprehensive Health Center – entrance to parking lot

Roadside fuels between Māʻiliʻili Road and canal

Example of homes surrounded by tall kiawe and grasslands

Example of homes surrounded by steep grassy hillside and kiawe

Empty lots with trash dumped are a fire hazard

Example of roads with no vegetation management on shoulders under powerlines

Example of some vegetation management along roadside on Māʻiliʻili Road

Empty lot on Māʻiliʻili Road with heavy dead and down fuels

Naval Transmitting Facility along Paakea Road

Homes along the canal with dense fuels surrounding them

Empty lot with abandoned cars buried in tall grasses a fire hazard

Paakea Road with shoulders overgrown with grasses and ʻekoa

Wildland-Urban Interface Communities in the West Oʻahu CWPP planning area.
Photo assessment of community resources at risk, hazards, and examples of existing protective features and actions.

Mākaha

Mākaha Community Center with tall grasses and kiawe forest surrounding it

Mākaha Beach with high surf

Kill Drive with no shoulders and Mākaha Valley in the background

Succulents planted along roadside on Kill Drive an example of good Firewise landscaping

Mākaha Valley Towers

Mākaha Valley Country Club bordered by dead trees and tall grassland

Mākaha Valley Country Club structure with shake roof and lack of defensible space

Mākaha Resort with unmanaged vegetation

Mākaha Valley Country Club homes surrounded by kiawe forest

Mākaha Valley Country Club entrance with dead trees next to powerlines

Mākaha Valley Road home with tall fuels surrounding it

Example of cars parked in overgrown vegetation in empty lot

Wildland-Urban Interface Communities in the West Oʻahu CWPP planning area.
Photo assessment of community resources at risk, hazards, and examples of existing protective features and actions.

Mākaha (cont.)

Example of home with tall grasses between structure and roadside

Road shoulders with overgrown grass next to homes a fire hazard

Shake roof home with tall kiawe overhanging it

Home surrounded by flammable palms, shrubs, and grasses

Tall, dense, overgrown bougainvillea near homes common in area

Road shoulders on Jade Street recently cleared of fuels

Example of the many vacant homes in the area

Mākaha Valley Shopping Center with tall grasses next to parking lot

Wildland-Urban Interface Communities in the West Oʻahu CWPP planning area.
Photo assessment of community resources at risk, hazards, and examples of existing protective features and actions.

Mākua/Keaʻau

Road to Our Lady of Keaʻau - example of good fuels management next to unmanaged grassland

Public Hunting access road an ignition hazard

Camping at Keaʻau Beach Park (north end)

Highway along Keaʻau Beach Park with no drivable shoulders

Unmanaged fuels under powerlines along main highway a high ignition risk

Continuous grasses and kiawe on the south end of Keaʻau Beach Park

Homes across from south end of Keaʻau Beach Park surrounded by unmanaged kiawe forest

Keaʻau Beach Park

Homes and vehicles across from Keaʻau Beach Park with tall kiawe and grasses

Home in makai neighborhood with yard kept maintained and vegetation piled along roadside for pickup

Abandoned lot with various types of overgrown vegetation and dead and down fuels

One of many vacant lots with overgrown vegetation next to occupied homes

Wildland-Urban Interface Communities in the West Oʻahu CWPP planning area.
Photo assessment of community resources at risk, hazards, and examples of existing protective features and actions.

Mākua/Keaʻau (cont.)

Commonly used bougainvillea overgrown on fenceline

Overgrown vegetation next to one of a few abandoned homes

Example of home with well-maintained yard

Well-maintained grass lawn with minimal vegetation

Wildland-Urban Interface Communities in the West Oʻahu CWPP planning area.
Photo assessment of community resources at risk, hazards, and examples of existing protective features and actions.

Waiʻanae

Waiʻanae High School

Back of Waiʻanae High School with tall grasses and kiawe forest

Waiʻanae Regional Park fields with Waiʻanae Mountains in background

Waiʻanae Intermediate School with well-maintained vegetation next to unmanaged adjacent land

Waiʻanae Community Center with sculpture and sitting area

Waiʻanae Fire Station

Active tree trimming at Pililaau Park

Homes along canal off of Plantation Road across from overgrown wildland

Canal-side path with overgrown vegetation off of Plantation Road

Shoulders with tall shrubs (mostly bougainvillea) off of Plantation Road

Dense and tall kiawe and ekoa forest near homes (Plantation Road)

Waiʻanae Valley homes next to tall ekoa and grass along shoulders of street

Wildland-Urban Interface Communities in the West O'ahu CWPP planning area.
Photo assessment of community resources at risk, hazards, and examples of existing protective features and actions.

Wai'anae (cont.)

Wai'anae Valley homes with dead trees on road shoulder

Example of agricultural field (basil) in back of Wai'anae Valley

Pockets of dense vegetation surrounding and within Kaneaki Street subdivision

Kaneaki Street subdivision home with tall grass on berm

Kolealiilii Street an ignition hazard with tall grass and 'ekoa on shoulders and ATV traffic

End of Kolealiilii Street an illegal dumping ground

End of Kolealiilii Street a fire hazard with illegal green waste dumping

Kolealiilii Street abandoned nursery with overgrown vegetation

Kaneaki Street subdivision surrounded by tall grasses and dead and down fuel

Kaneaki Street subdivision WUI

Plantation Road homes protected from roadside fuels with neighboring agricultural fields

Wildland-Urban Interface Communities in the West Oʻahu CWPP planning area.
Photo assessment of community resources at risk, hazards, and examples of existing protective features and actions.

Nānākuli

Hakimo Road homes next to agricultural lot

Example of good defensible space and fire-free zone

Tall grasses and kiawe on Hakimo Road shoulders

Hakimo Road homes along WUI

Example of waste dumped along residential street with no shoulders

Example of one of a few abandoned vehicles on road shoulders with overgrown vegetation

Mulch piles surrounded by heavy fuels a fire hazard for nearby homes

Row of abandoned homes with overgrown vegetation

Example of home with flammable sidings but good defensible space

Sea Country subdivision WUI

Sea Country subdivision homes with tall kiawe on berm

Example of good defensible space in Sea Country subdivision

Wildland-Urban Interface Communities in the West Oʻahu CWPP planning area.
Photo assessment of community resources at risk, hazards, and examples of existing protective features and actions.

Nānākuli (cont.)

Example of home in Sea Country subdivision with overgrown berm behind structure

Sea Country subdivision example of xeriscaping

Rush hour traffic on main highway

Nānāikapono Elementary School

Nānāikapono High and Intermediate School with mowed grass and pockets of overgrown grass

Homes near Nānāikapono Schools with tall kiawe behind them (pre-2016 Nānākuli Fire)

Lyman Ranch

WUI view of homes near Nānākuli Schools

Nānākuli Beach Park lifeguard towers

Nānākuli Beach Park area with fuels next to parking lot

Wildland-Urban Interface Communities in the West Oʻahu CWPP planning area.
Photo assessment of community resources at risk, hazards, and examples of existing protective features and actions.

ʻEwa

ʻEwa Makai Middle School front entrance

Kapolei Parkway Community Center with large green grass lawn

Kapolei Parkway neighborhood with wide road and well-maintained sidewalks

House on Peeone Place that burned down in structure fire

ʻEwa Beach Road home with fire-free zone along combustible fenceline

ʻEwa Beach Road – one of a few vacant homes with fuel buildup

ʻEwa Beach Park

Puʻuloa Range Training Facility overgrown vegetation and pockets of dense kiawe

Homes along North Road across from unmanaged kiawe forest

Tall kiawe and unmanaged vegetation along road shoulder on North Road

Mowed grass shoulders near Neal Burton Memorial Field

Contrast between unmanaged and managed road shoulders on West Lock Drive

Wildland-Urban Interface Communities in the West Oʻahu CWPP planning area.
Photo assessment of community resources at risk, hazards, and examples of existing protective features and actions.

ʻEwa (cont.)

Agricultural lands with unmanaged adjacent grasslands along Highway 746

Clear turnout along Highway 746 with barricade along unmanaged lands

Pōhinahina fuelbreak along road shoulder in neighborhood near Holomua School

Area in need of a fuelbreak in Holomua School neighborhood

Fuelbreak behind homes in Holomua School area

Thomas Gentry Community Association next to large green lawn – a buffer between homes and wildland

ʻEwa Beach Fire Station

ʻEwa USPS

Wildland-Urban Interface Communities in the West O'ahu CWPP planning area.
Photo assessment of community resources at risk, hazards, and examples of existing protective features and actions.

Barber's Point/Kapolei

Turnout across from Chevron Refinery with mulch piles and tall kiawe

Unmanaged vegetation on road shoulders across from Chevron Refinery

Unmanaged 'ekoa on road shoulders across from Chevron Refinery

Ships docked at Barber's Point Harbor with Palehua WUI in background

High truck traffic at Barber's Point Harbor with unmanaged vegetation along road shoulders

Example of typical street in Industrial Park

Example of mulch piles and dry grass surrounding a business

One of many areas in Industrial Park with unmanaged fuels along sidewalks

Dense shrubs and trees touching building in Industrial Park

Canal with dry unmanaged dry grasses within Industrial Park

Example of good defensible space around Industrial Park building

Lumber yard adjacent to lot with unmanaged 'ekoa and grasses

Wildland-Urban Interface Communities in the West Oʻahu CWPP planning area.
Photo assessment of community resources at risk, hazards, and examples of existing protective features and actions.

Barber's Point/Kapolei (cont.)

Dry grasses in Kapolei along Farrington Highway

Turnout along Farrington Highway with tall grasses on shoulder

Wildland area bordering UH West Oʻahu campus

Use of native plants (pōhinahina and naupaka) for landscaping around UH West Oʻahu campus

UH West Oʻahu parking lot with small fuelbreak separating it from grassland

UH West Oʻahu student garden with hale

UH West Oʻahu building adjacent to area of flammable unmanaged grass

Small fuelbreak cleared alongside sidewalk on Kualakaʻi Parkway

Dry grass on sidewalk along Kekahili Street

High density, non-combustible roofs, and green lawns - characteristics of homes in Kekahili Street neighborhood

Mailbox pick-up area in Kekahili Street neighborhood with tall dry grasses on edges

Kekahili Street homes directly abut dry grassland

Wildland-Urban Interface Communities in the West O'ahu CWPP planning area.
Photo assessment of community resources at risk, hazards, and examples of existing protective features and actions.

Barber's Point/Kapolei (cont.)

Home with minimal vegetation and good defensible space

Dry grass growing up onto combustible fence near home

Fire hydrant and hose on Kekahili Street

East Kapolei Fire Station

Ho'okele Elementary School with fire hydrant

Kapolei High School

Overgrown vegetation directly borders new development at Mohana

Large turnaround area at end of Kunehi Street

Firebreak behind homes near Kunehi Street

Construction for new Kekala Street development with pockets of unmanaged vegetation

Grassland next to Home Depot at Kapolei Parkway Shops

Turnout with tall grasses and shrubs along driveway next to Kapolei Parkway Shops

Wildland-Urban Interface Communities in the West Oʻahu CWPP planning area.
Photo assessment of community resources at risk, hazards, and examples of existing protective features and actions.

Barber's Point/Kapolei (cont.)

Green waste and logs alongside Boxer Road – high hazard area

Tall flammable fuels directly adjacent to lamp post on Boxer Road

Walking path next to wildland area along FDR Avenue

Downed utility pole next to wildland area along FDR Avenue

Electric facility surrounded by kiawe and grass along FDR Avenue

Snags and downed utility pole on decommissioned road off of FDR Avenue

Waiākea Gardens apartments with well-maintained green lawn

Turnaround area in Barber's Point Housing neighborhood

Wildland area between commercial area and Barber's Point Housing

Tall kiawe forest across from Barber's Point Housing homes

Living fuelbreak between wildland and Barber's Point Housing

Christmas tree dumped in wildland area near Barber's Point Housing homes

Wildland-Urban Interface Communities in the West O'ahu CWPP planning area.
Photo assessment of community resources at risk, hazards, and examples of existing protective features and actions.

Barber's Point/Kapolei (cont.)16

Kalaeloa Airport

One of many abandoned buildings with unmanaged fuels near Kalaeloa Airport

Dead trees along powerlines next to Barber's Point Golf Course

Geiger Park with sprinklers on

East Kapolei Fire Station No. 43

Busy intersection – Farrington and Kealanani

Farrington Highway traffic next to Kapolei during rush hour

Wildland-Urban Interface Communities in the West Oʻahu CWPP planning area.
Photo assessment of community resources at risk, hazards, and examples of existing protective features and actions.

Iroquois Point

Pualena Dog Park


Iroquois Point Elementary


Iroquois Point Elementary School rainbow eucalyptus and plumeria


Kiawe forest close to homes


Typical street in the area


Elua Cove parking lot, facilities, and beach


Elua Cove beach looking out toward Honolulu


Makai home with green grass lawn next to unmanaged grassland and kiawe


No dumping sign on makai side


Event along waterfront

Wildland-Urban Interface Communities in the West O'ahu CWPP planning area.
Photo assessment of community resources at risk, hazards, and examples of existing protective features and actions.

Makakilo

Welo Street homes WUI

Kalihi Street neighborhood canal with dense 'ekoa

Park sign with no open fires in Kalihi Street neighborhood

Homes along fuelbreak with non-combustible wall in Kalihi Street neighborhood

Homes with non-combustible roofs and green front lawns in Kalihi Street neighborhood

Example of homes along WUI with grasses on steep slopes

Turnaround area at the end of Kalihi Street

Small fuelbreak next to home at the end of Kalihi Street

Commonly found in area: mix of 'uhaloa, dry grass and 'ekoa

Wildland area alongside bougainvillea shrubs and sidewalk on Kalihi Street

View of WUI from Kalihi Street

Christmas trees left on curb in end of February

Wildland-Urban Interface Communities in the West Oʻahu CWPP planning area.
Photo assessment of community resources at risk, hazards, and examples of existing protective features and actions.

Makakilo (cont.)

Makakilo Fire Station


Steep ʻekoa and kiawe forest below Makakilo Fire Station


View of Kapolei-ʻEwa


Tall eucalyptus trees and norfolk pines at top of Makakilo Drive


Wildland area across from condos at top of Makakilo Drive


Tall dry grass and bougainvillea along sidewalk on top of Makakilo Drive


Turnaround area in Pueonani neighborhood – homes next to fuelbreak


Puʻu with kiawe forest behind homes in Pueonani neighborhood


Layers of WUI in Makakilo


Fuelbreak on steep slope under homes in Pueonani neighborhood


Turnaround area in Pueonani neighborhood


Example of fuels on steep slope right below homes

Wildland-Urban Interface Communities in the West Oʻahu CWPP planning area.
Photo assessment of community resources at risk, hazards, and examples of existing protective features and actions.

Makakilo (cont.)


Pōhinahina on berm


Mixed fuels near home with good defensible space


Workers weedwhacking grasses on berm next to homes


Hookomo neighborhood WUI


Example of xeriscaping


Tiled roofs in Hookomo neighborhood


Makakilo Community Center and Park


Irrigated berm behind homes near Makakilo Community Park


Mauka Lani Elementary School


Homes near Makakilo Schools – high density


Dry unmanaged grasses on sidewalk near Makakilo Schools


Makakilo Elementary School

Wildland-Urban Interface Communities in the West Oʻahu CWPP planning area.
Photo assessment of community resources at risk, hazards, and examples of existing protective features and actions.

Palehua

Fuels along roadside to Camp Timberline

Homes along gulch near Camp Timberline

Gulch with tall grasses and eucalyptus on road to Camp Timberline

Grazed area on road to Camp Timberline

Example of heavy erosion

Grazing using cattle near homes

Example of heavy erosion near Camp Timberline

Homes along Makakilo Fire 2014 – grasses returned within a few months

Post-fire 2014

Makakilo Fire 2014 wildland

Makakilo Fire 2014 – burned to edge of homes

Makakilo Fire 2014 – burned to edge of homes

Wildland-Urban Interface Communities in the West O'ahu CWPP planning area.
Photo assessment of community resources at risk, hazards, and examples of existing protective features and actions.

Palehua (cont.)


Palailai Neighborhood Park


Homes along interface on Waiko Place


Xeriscaping in fire-free zone


Palahia Street (north end) turnaround


Examples of non-combustible tile roofs


Example of good defensible space with clumps of shrubs


High home density on Eleele Street


View of Barber's Point


Vegetated fuelbreak on slope in Eleele Street neighborhood


Condos with wildland below


Gulch on Palaia Street

Wildland-Urban Interface Communities in the West Oʻahu CWPP planning area.
Photo assessment of community resources at risk, hazards, and examples of existing protective features and actions.

Aerial Photos

Aerial view of Kapolei/ʻEwa

Aerial view of Kapolei/Makakilo

Aerial view of Barber's Point with large swell

Aerial view of Nānākuli

Aerial view of Nānākuli Valley

Western O'ahu Community Wildfire Protection Plan

APPENDIX C

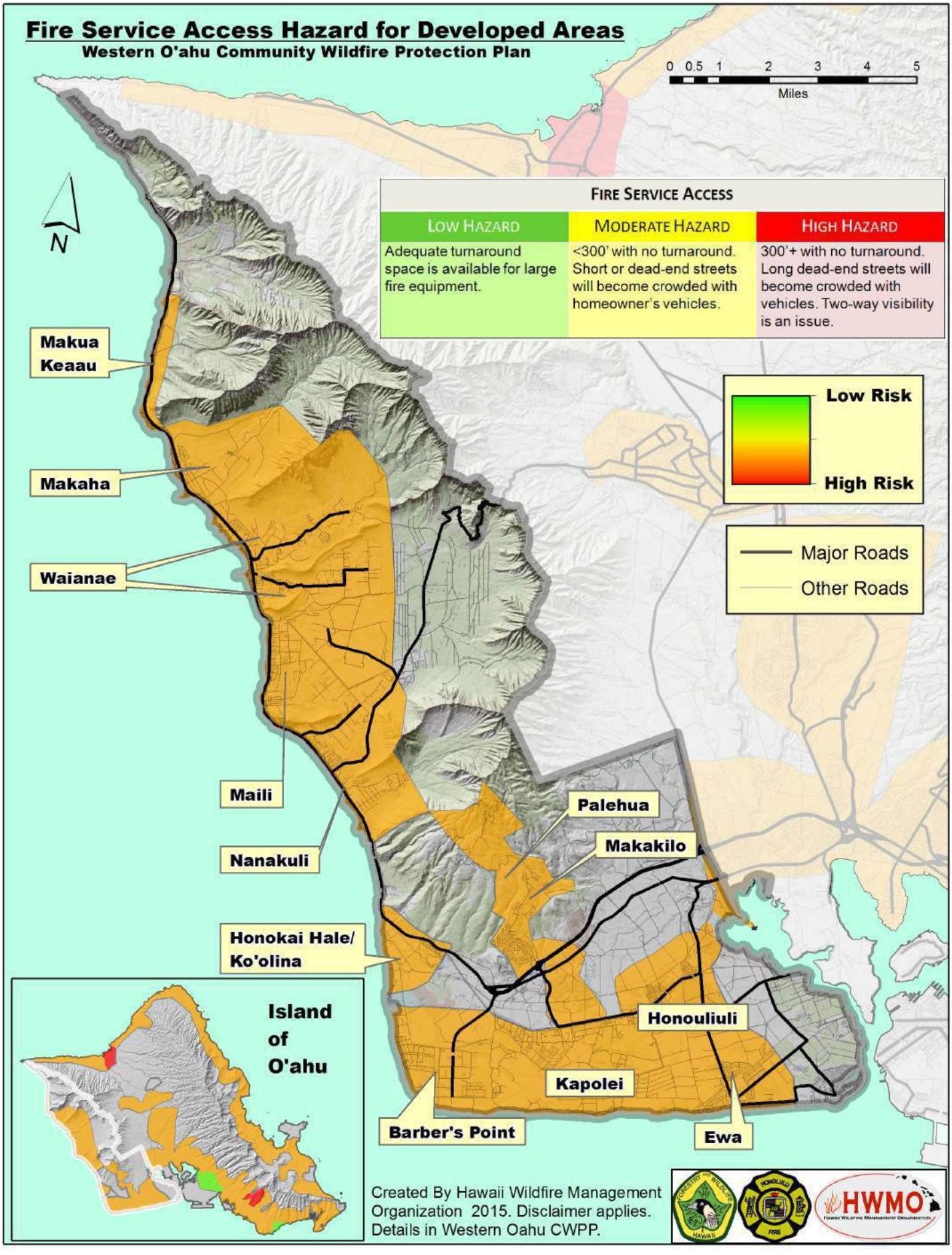
Wildfire Hazard Assessment Maps for Western O'ahu

Hazard Category (Maps provided in CWPP main document)	Individual Hazard Maps (Maps provided below in the following order)
Subdivision Hazard Total	• Fire Service Access • Home Setbacks • Ingress/Egress • Private Landowner Firewise Landscaping & Defensible Space • Proximity of Subdivision to Wildland Areas • All Season Road Condition • Road Maintenance • Road Width • Street Signs • Structure Density • Unmanaged, Untended, Undeveloped Lands
Vegetation Hazard Total	• Defensible Space: Fuels Reduction Around Homes & Structures • Fuel Loading • Fuel Structure & Arrangement • Proximity of Flammable Fuels Around Subdivision • Vegetation Within 300' Of Homes
Building Hazard Total	• Siding/Soffits • Roofing Assembly • Structural Ignitability • Under Skirting Around Decks, Lanais, Post & Pier Structures • Utilities Placement; Gas & Electric
Fire Environment Hazard Total	• Average Rainfall • Prevailing Wind Speeds & Direction • Slope • Topographic Features That Adversely Affect Wildland Fire Behavior • Seasonal or Periodic High Hazard Conditions • Ignition Risk
Fire Protection Hazard Total (high capacity and capability= low hazard)	• Response Time • Community Planning Practices & Ordinances • Community Fire Safe Efforts & Programs Already In Place • Fire Department Structural Training & Expertise • Local Emergency Operations Group or Citizen Group • Proximity to Fire Stations • Water Source Availability • Wildland Firefighting Capacity of Initial Response Agency • Interagency Cooperation

SUBDIVISION HAZARD FOR DEVELOPED AREAS

Fire Service Access Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan

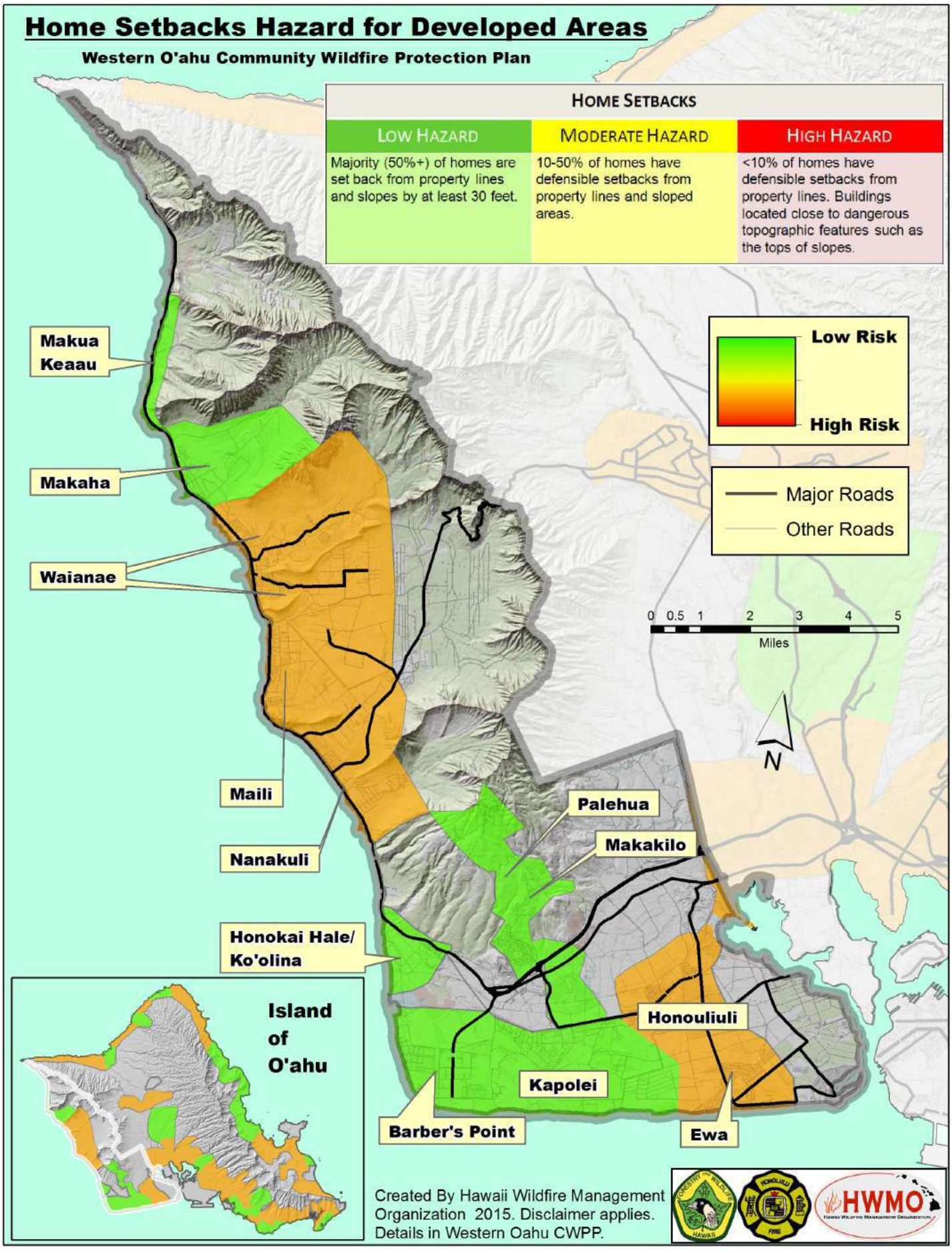


Created By Hawaii Wildfire Management Organization 2015. Disclaimer applies. Details in Western Oahu CWPP.

Home Setbacks Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan

Home Setbacks		
Low Hazard	Moderate Hazard	High Hazard
Majority (50%+) of homes are set back from property lines and slopes by at least 30 feet.	10-50% of homes have defensible setbacks from property lines and sloped areas.	<10% of homes have defensible setbacks from property lines. Buildings located close to dangerous topographic features such as the tops of slopes.



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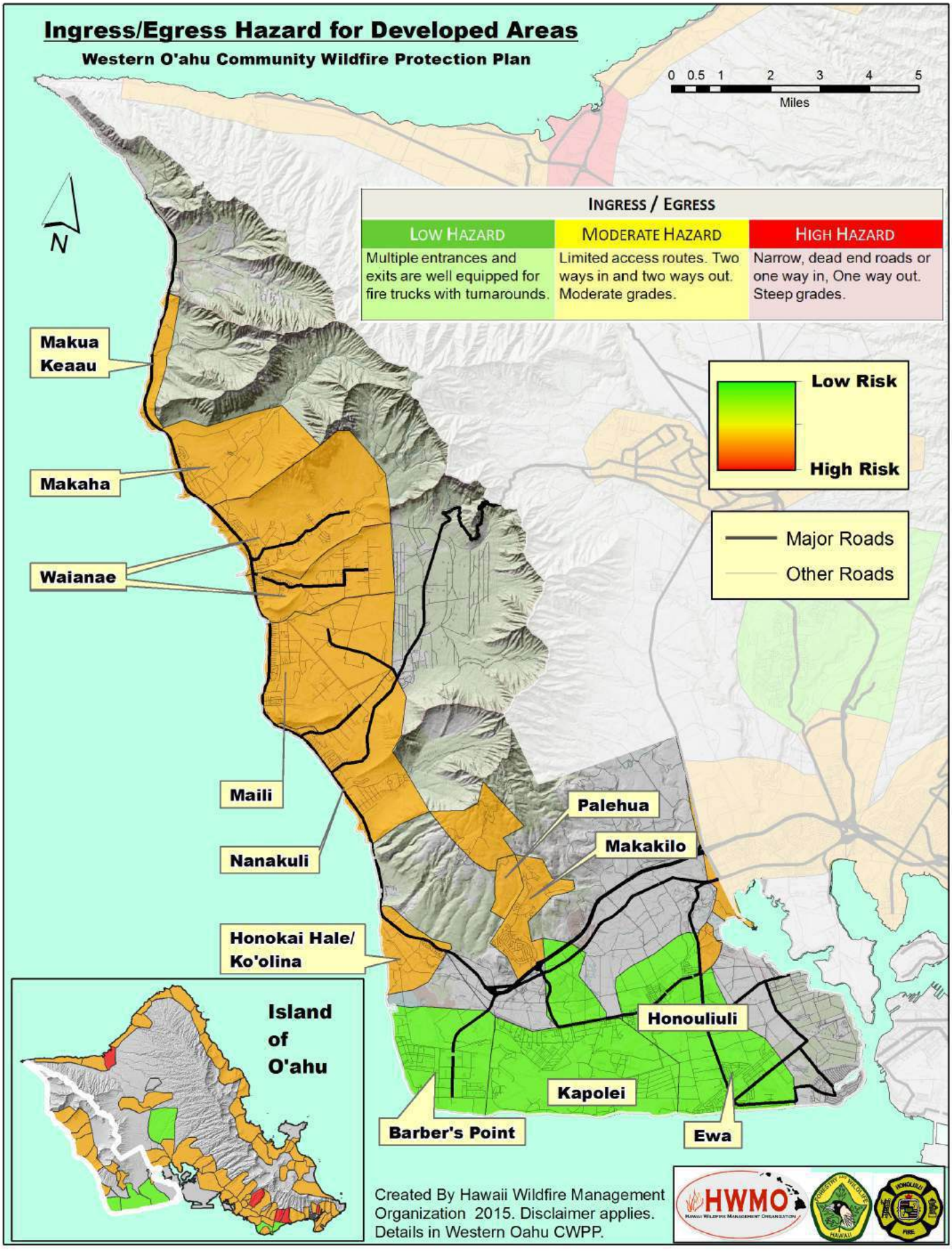
Ingress/Egress Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan



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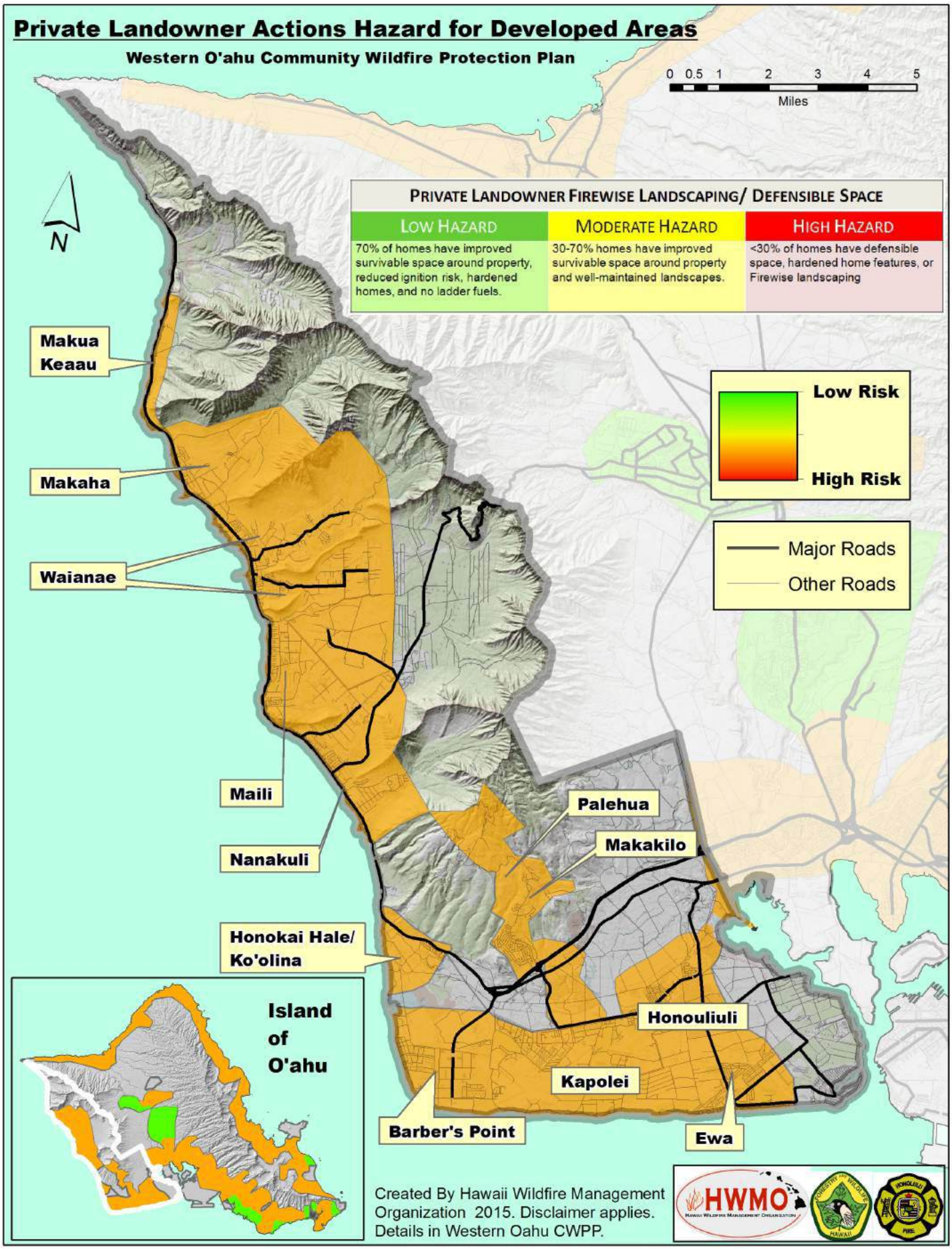
Private Landowner Actions Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan



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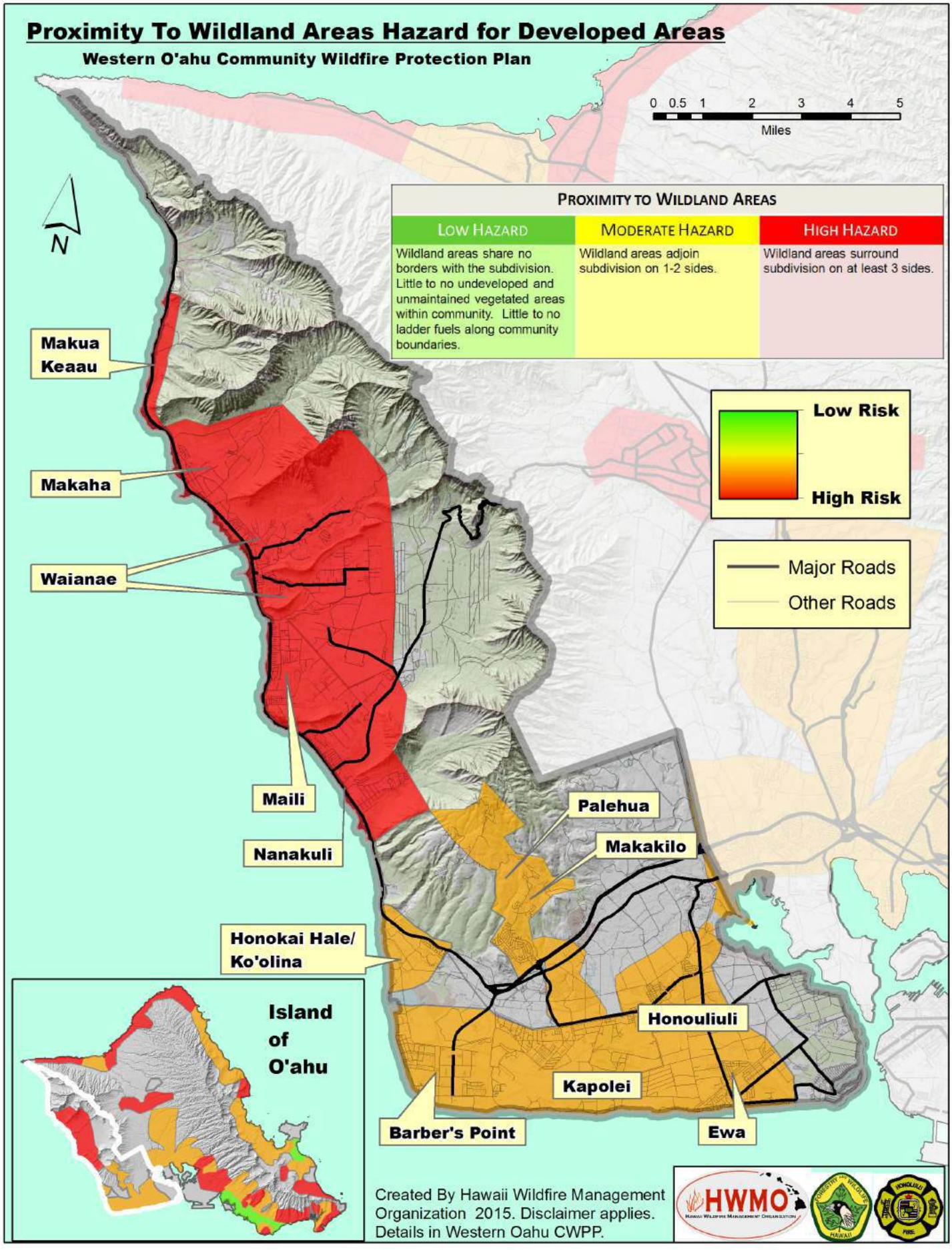
Proximity To Wildland Areas Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan



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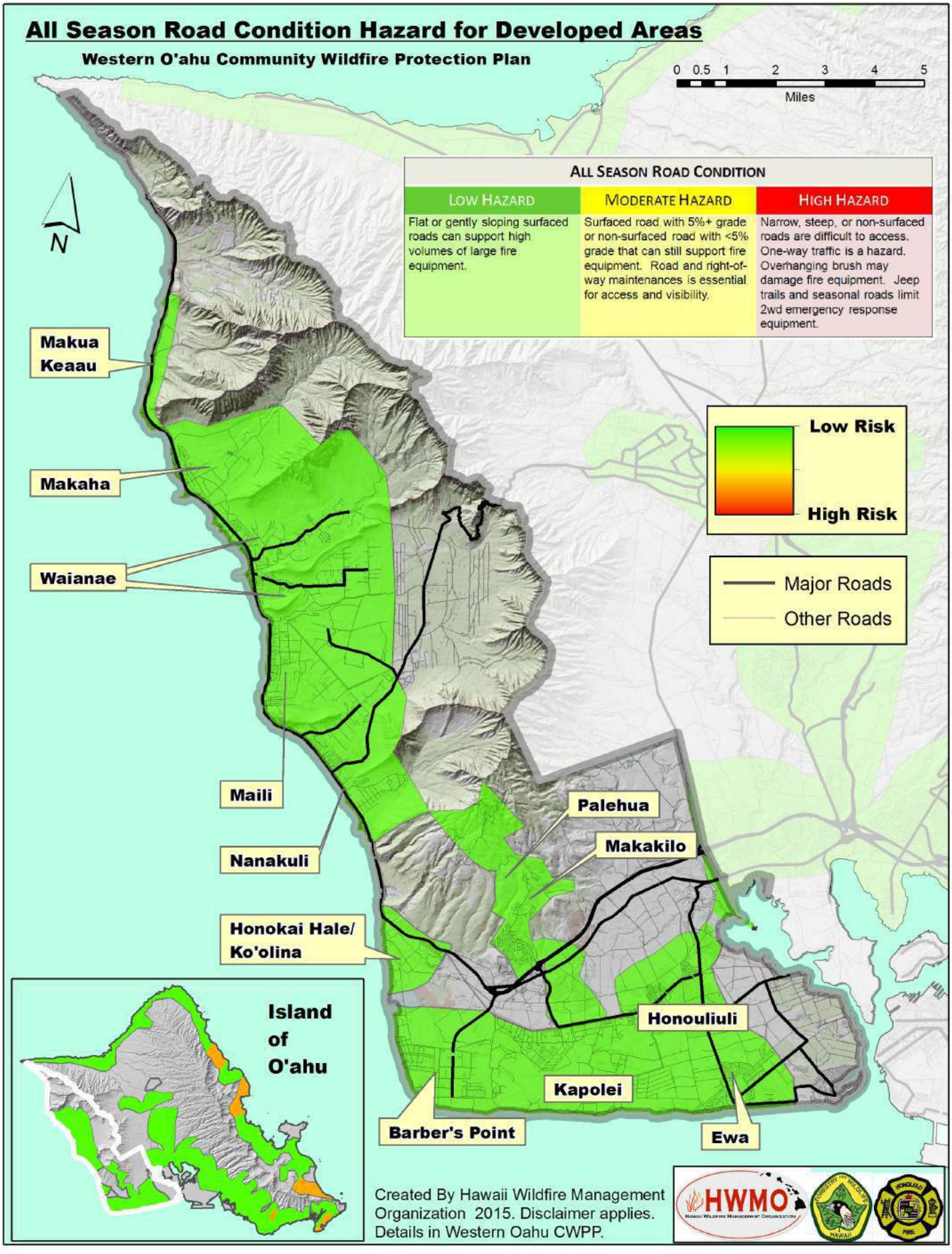
All Season Road Condition Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan



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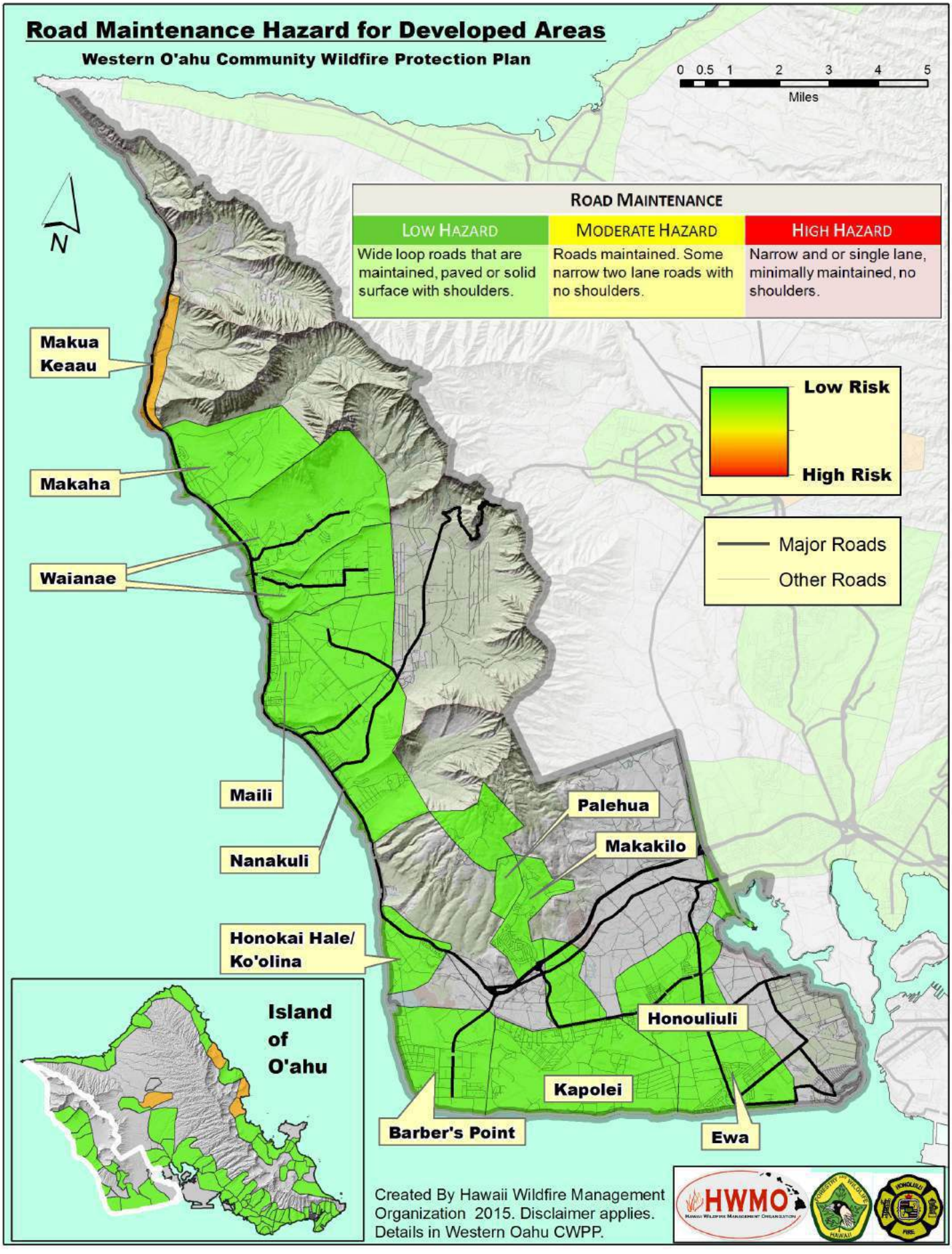
Road Maintenance Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan



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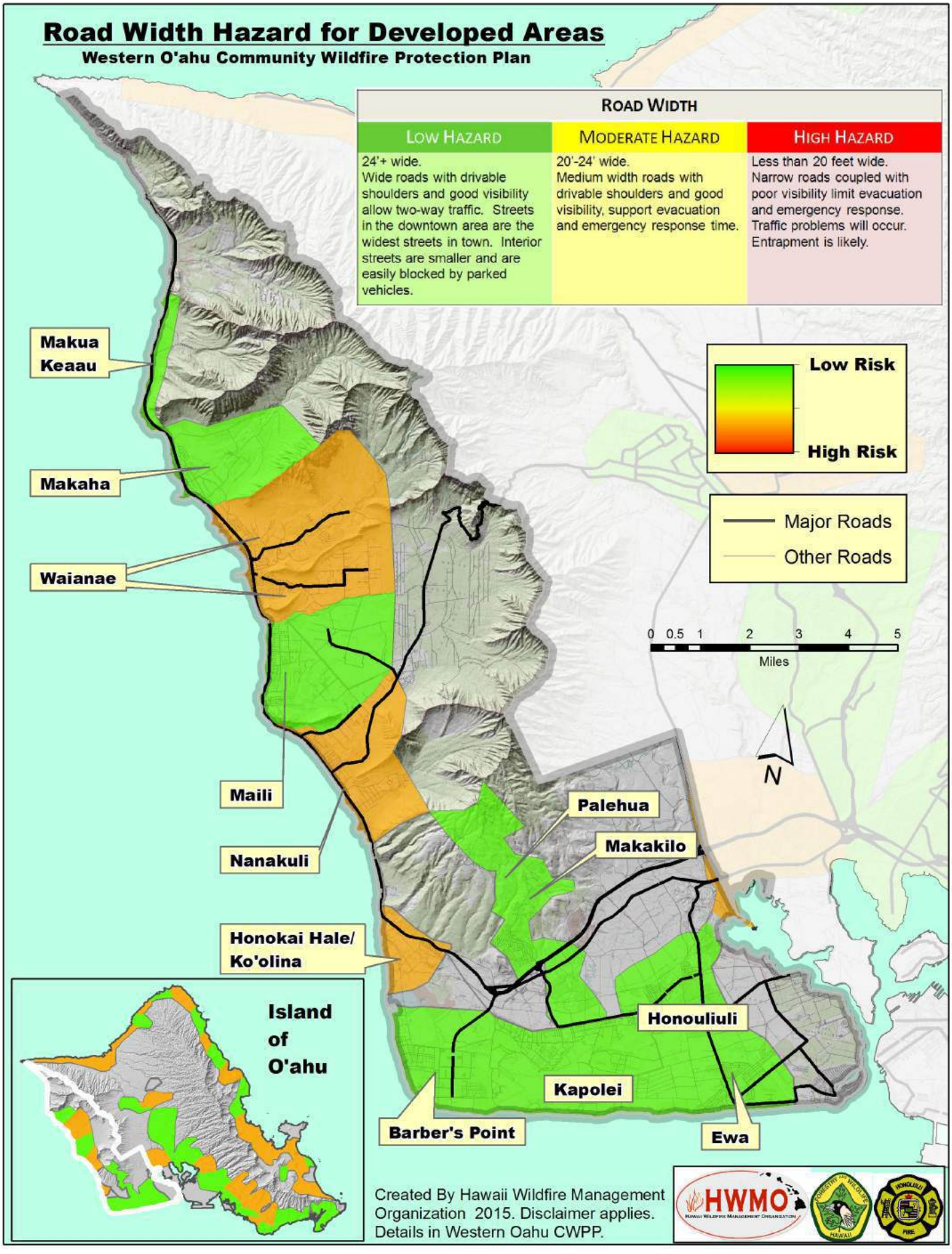
Road Width Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan

ROAD WIDTH		
LOW HAZARD	MODERATE HAZARD	HIGH HAZARD
24'+ wide. Wide roads with drivable shoulders and good visibility allow two-way traffic. Streets in the downtown area are the widest streets in town. Interior streets are smaller and are easily blocked by parked vehicles.	20'-24' wide. Medium width roads with drivable shoulders and good visibility, support evacuation and emergency response time.	Less than 20 feet wide. Narrow roads coupled with poor visibility limit evacuation and emergency response. Traffic problems will occur. Entrapment is likely.



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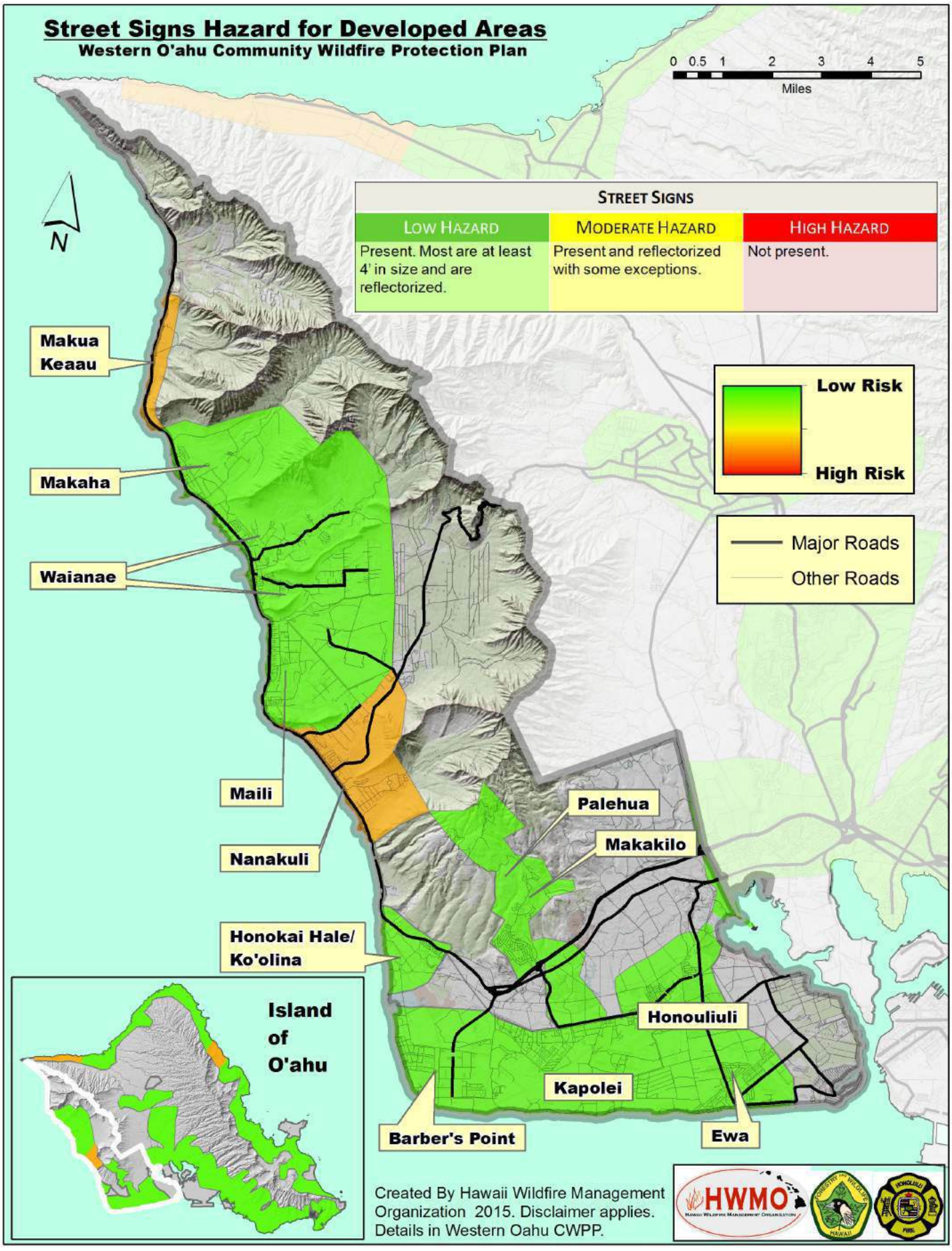
Street Signs Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan



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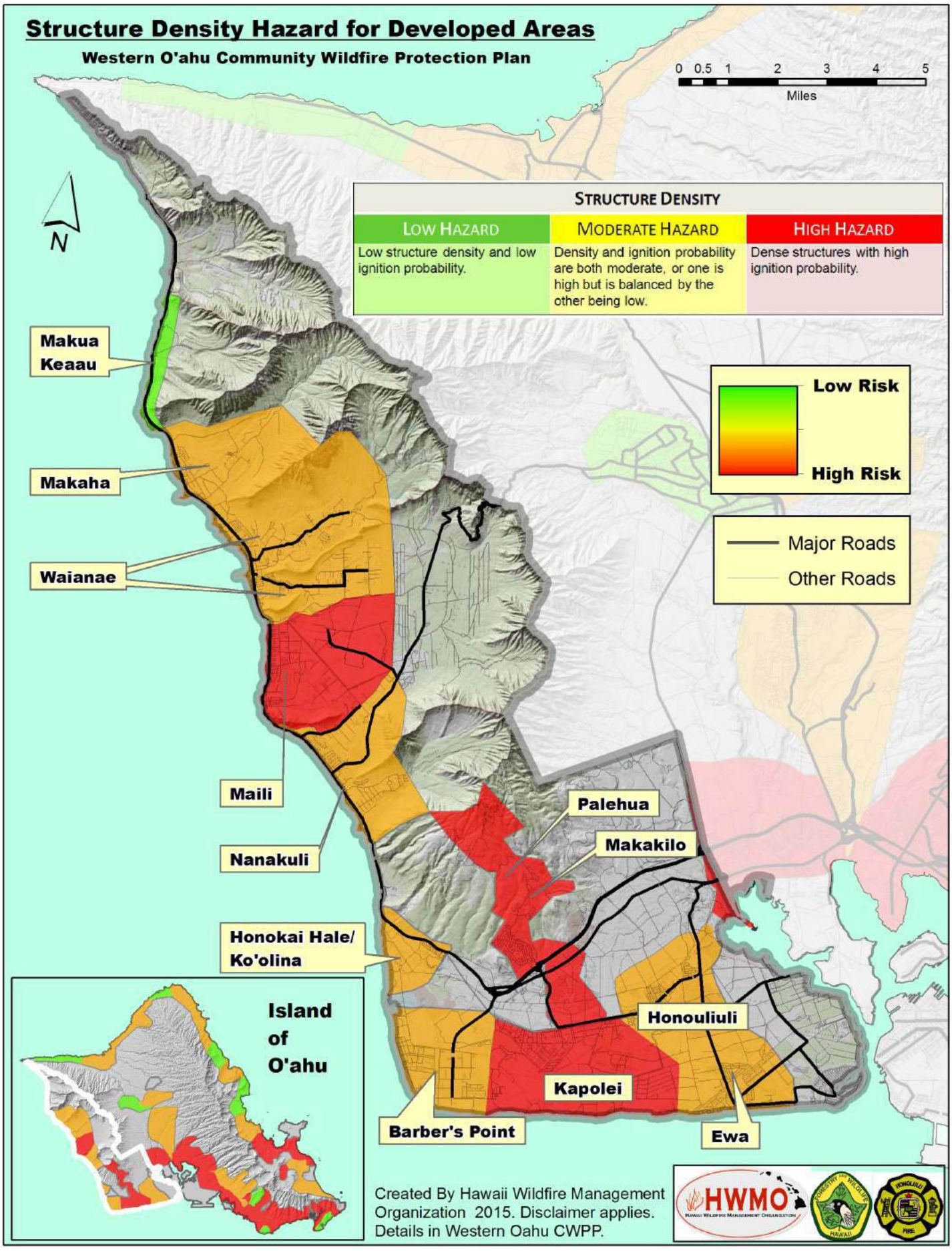
Structure Density Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan



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Untended Lands Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan

0 0.5 1 2 3 4 5
Miles

N

Untended Lands		
Low Hazard	**Moderate Hazard**	**High Hazard**
Few to no weedy vacant lots. Few to no undeveloped unmaintained vegetated areas or corridors between homes. Less than 10% of lots remain undeveloped and pose an additional wildfire hazard due to lack of maintenance and/or restricted access.	Some isolated unmaintained lots or undeveloped vegetated areas within subdivision. 10-50% of lots have not been developed and pose an additional wildfire hazard due to lack of maintenance and/or restricted access. Hazard ranking is dependent on ignition risk, size of area, and fuel type.	Abundant unmanaged, vegetated corridors and vacant lots throughout community. Agricultural lands irregularly maintained leaving dry weedy species causing increased ignition risk. Numerous ladder fuels and high risk fuels. Greater than 75% of lots have not been developed or Separation of adjacent structures that can contribute to fire spread

Low Risk
High Risk

Major Roads
Other Roads

Makua
Keaau

Makaha

Waianae

Maili

Nanakuli

Palehua

Makakilo

Honokai Hale/
Ko'olina

Honouliuli

Kapolei

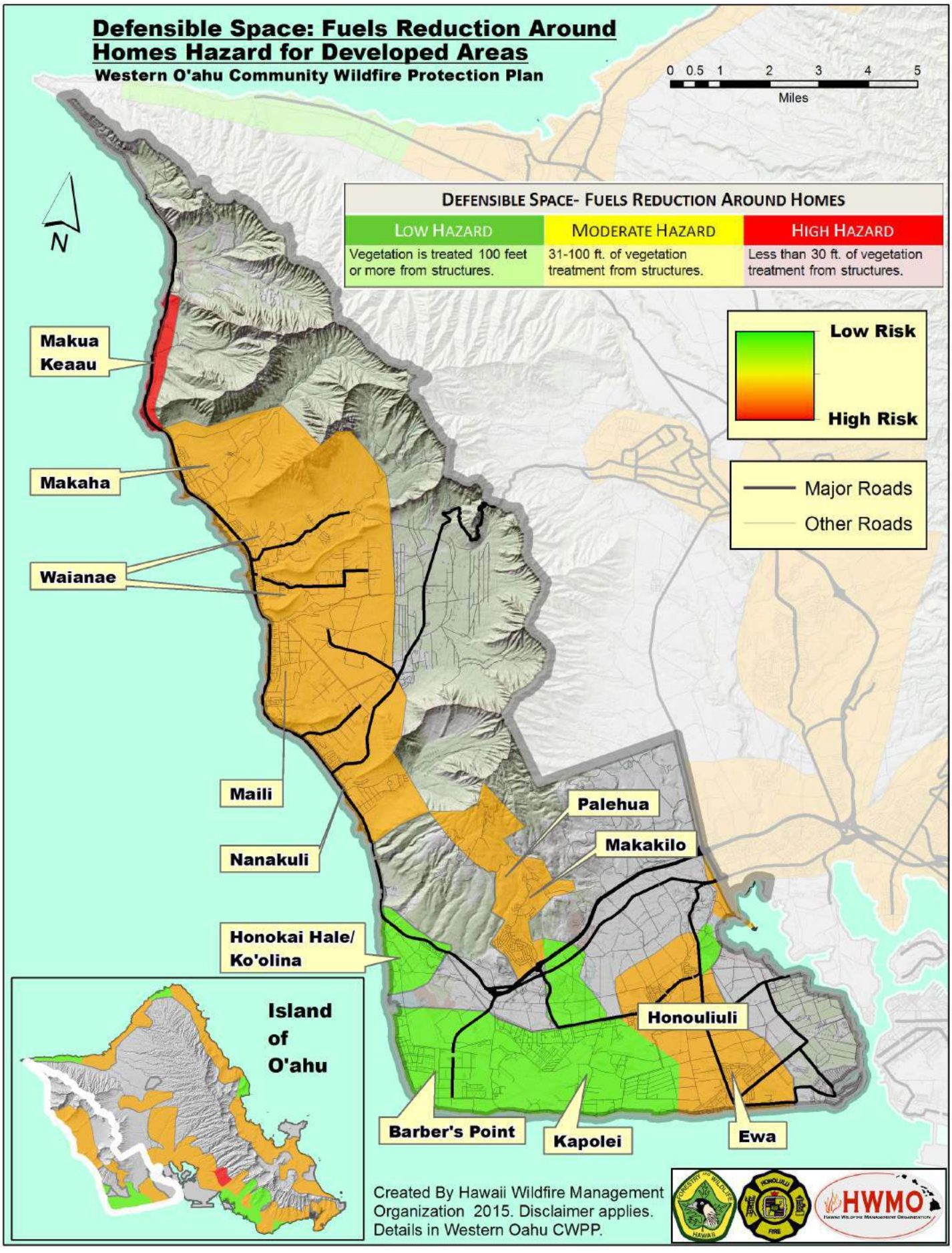
Barber's Point

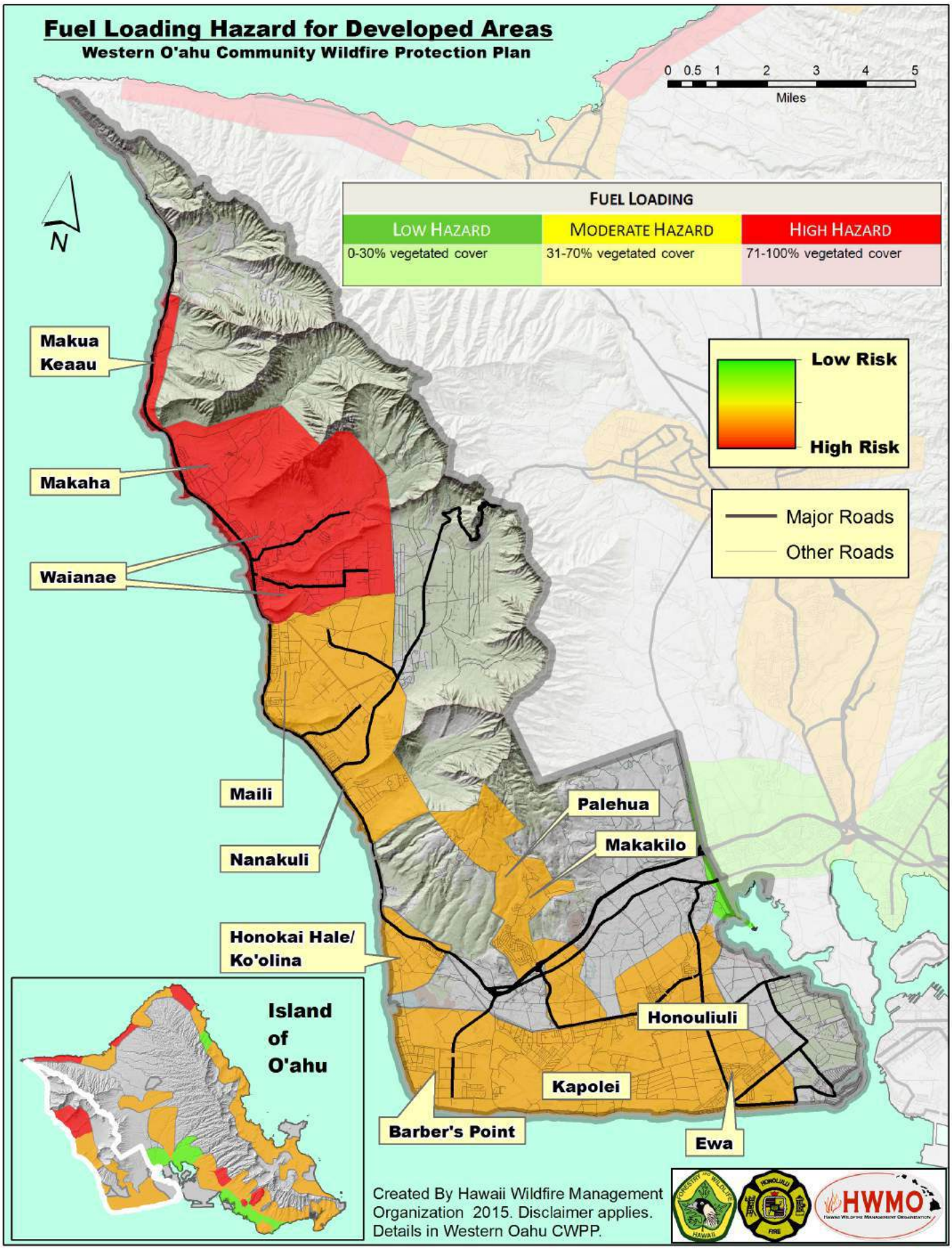
Ewa

Island
of
O'ahu

Created By Hawaii Wildfire Management Organization 2015. Disclaimer applies. Details in Western Oahu CWPP.

VEGETATION HAZARD FOR DEVELOPED AREAS


Defensible Space: Fuels Reduction Around Homes Hazard for Developed Areas
Western O'ahu Community Wildfire Protection Plan
0 0.5 1 2 3 4 5
Miles
N
DEFENSIBLE SPACE- FUELS REDUCTION AROUND HOMES
LOW HAZARD
Vegetation is treated 100 feet or more from structures.
MODERATE HAZARD
31-100 ft. of vegetation treatment from structures.
HIGH HAZARD
Less than 30 ft. of vegetation treatment from structures.
Low Risk
High Risk
Major Roads
Other Roads
Makua
Keaau
Makaha
Waianae
Maili
Nanakuli
Palehua
Makakilo
Honokai Hale/
Ko'olina
Honouliuli
Barber's Point
Kapolei
Ewa
Island
of
O'ahu
Created By Hawaii Wildfire Management Organization 2015. Disclaimer applies. Details in Western Oahu CWPP.
HWMO


Fuel Loading Hazard for Developed Areas
Western O'ahu Community Wildfire Protection Plan
0 0.5 1 2 3 4 5
Miles
N
FUEL LOADING
LOW HAZARD
0-30% vegetated cover
MODERATE HAZARD
31-70% vegetated cover
HIGH HAZARD
71-100% vegetated cover
Low Risk
High Risk
Major Roads
Other Roads
Makua
Keaau
Makaha
Waianae
Maili
Nanakuli
Palehua
Makakilo
Honokai Hale/
Ko'olina
Honouliuli
Kapolei
Barber's Point
Ewa
Island
of
O'ahu
Created By Hawaii Wildfire Management Organization 2015. Disclaimer applies. Details in Western Oahu CWPP.
HWMO

Fuel Structure and Arrangement Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan

0 0.5 1 2 3 4 5
Miles

N

Fuel Structure and Arrangement		
Low Hazard	Moderate Hazard	High Hazard
Non-contiguous or patchwork arrangement. Little to no ladder fuels.	Some areas of contiguous vegetation. Few ladder fuels.	Uninterrupted vegetation, pervasive ladder fuels.

Low Risk
High Risk

Major Roads
Other Roads

Makua
Keaau

Makaha

Waianae

Maili

Nanakuli

Palehua

Makakilo

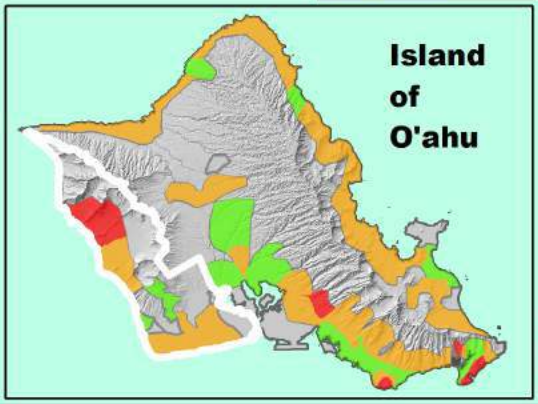
Honokai Hale/
Ko'olina

Honouliuli

Kapolei

Barber's Point

Ewa

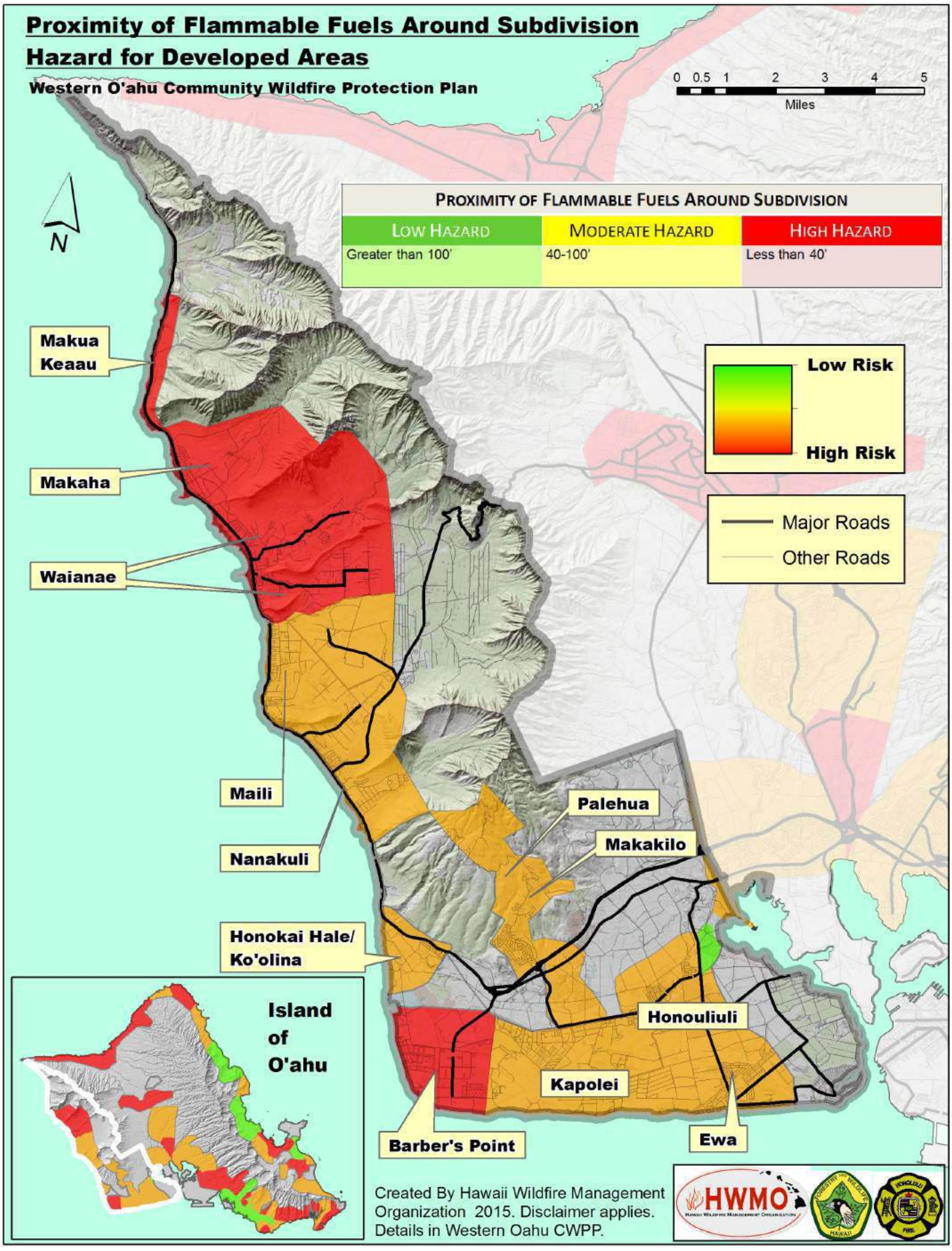


Created By Hawaii Wildfire Management Organization 2015. Disclaimer applies. Details in Western Oahu CWPP.

HWMO

Proximity of Flammable Fuels Around Subdivision Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan



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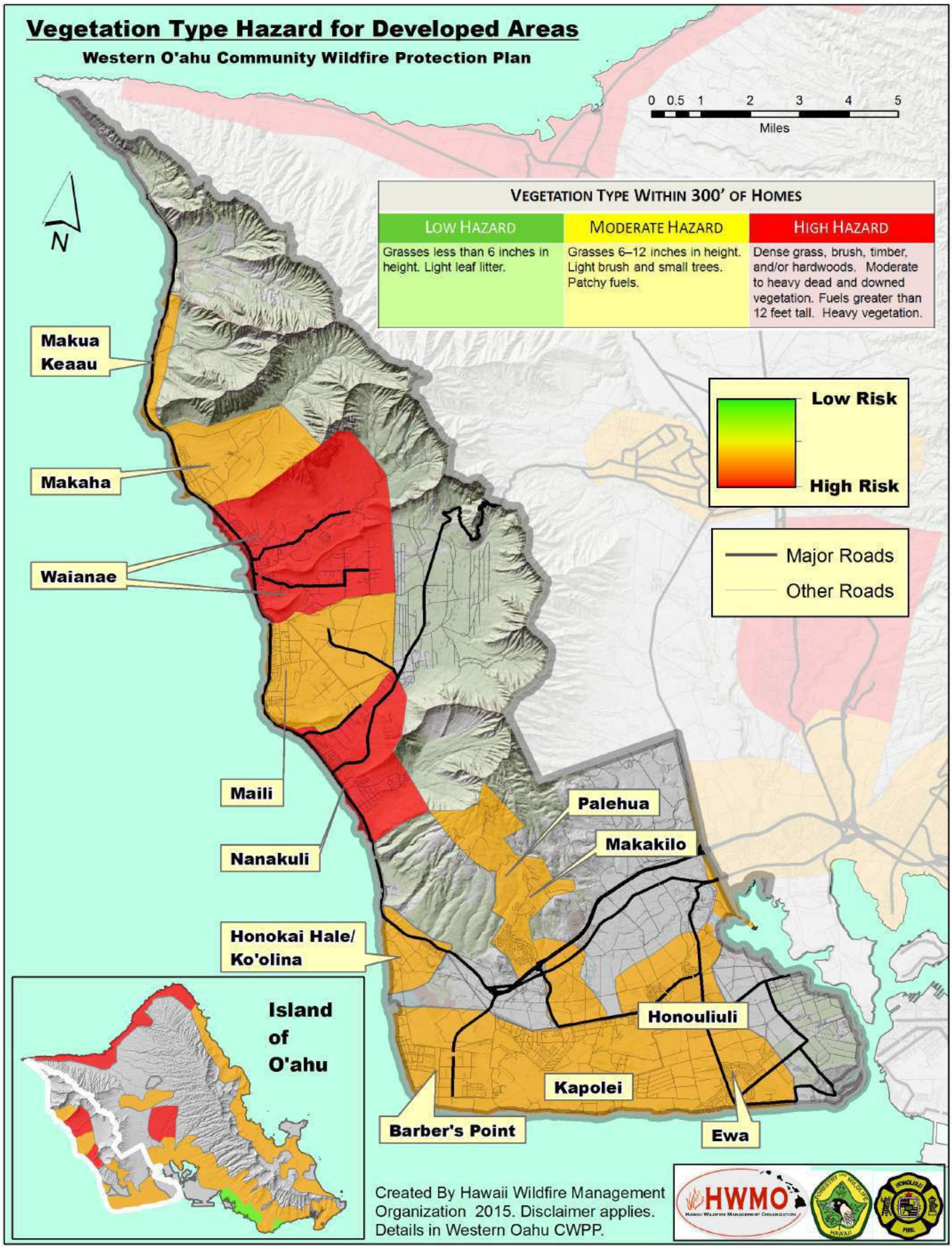
Vegetation Type Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan



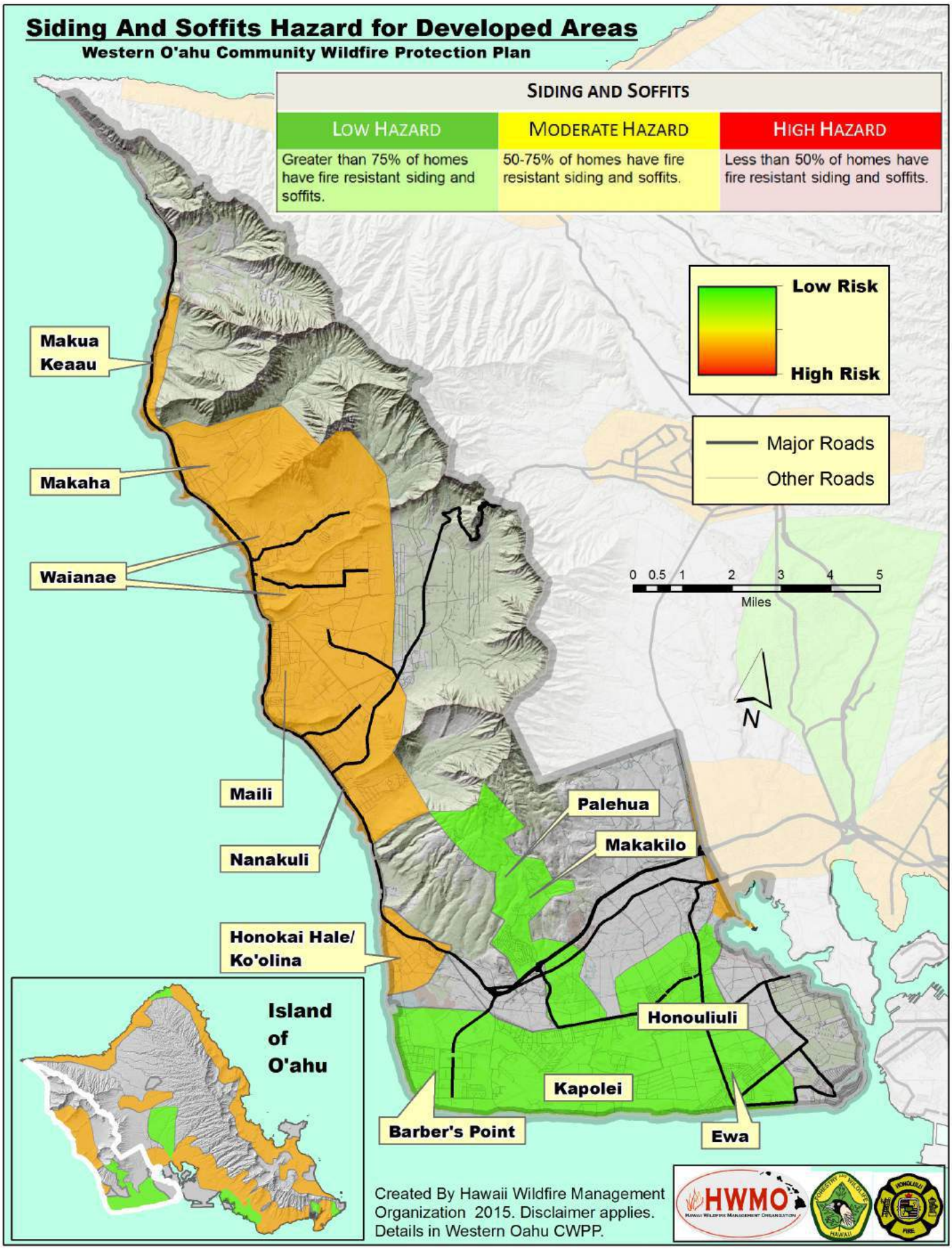
Created By Hawaii Wildfire Management Organization 2015. Disclaimer applies. Details in Western Oahu CWPP.

BUILDING HAZARD FOR DEVELOPED AREAS

Siding And Soffits Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan

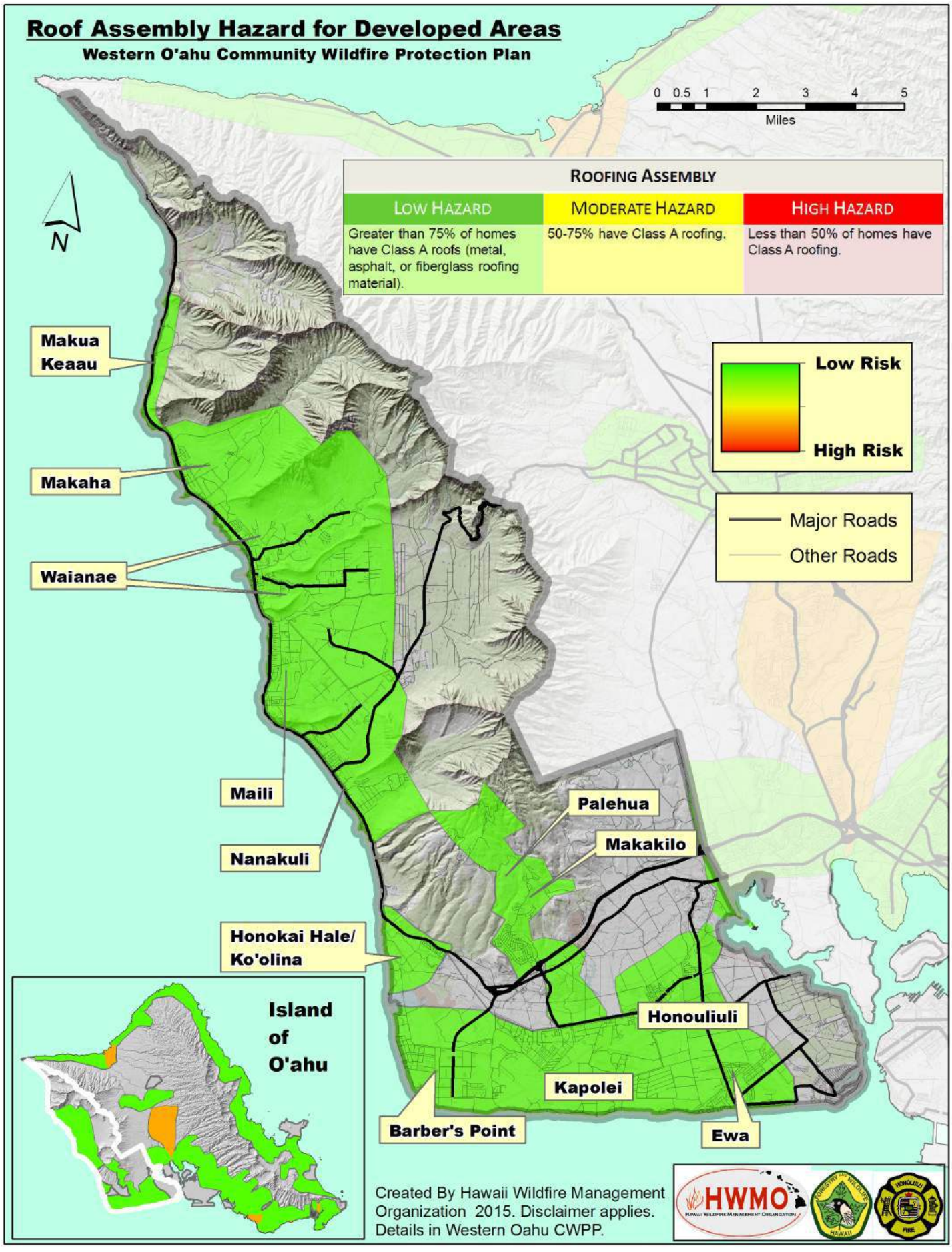
SIDING AND SOFFITS		
LOW HAZARD	MODERATE HAZARD	HIGH HAZARD
Greater than 75% of homes have fire resistant siding and soffits.	50-75% of homes have fire resistant siding and soffits.	Less than 50% of homes have fire resistant siding and soffits.



Created By Hawaii Wildfire Management Organization 2015. Disclaimer applies. Details in Western Oahu CWPP.

Roof Assembly Hazard for Developed Areas

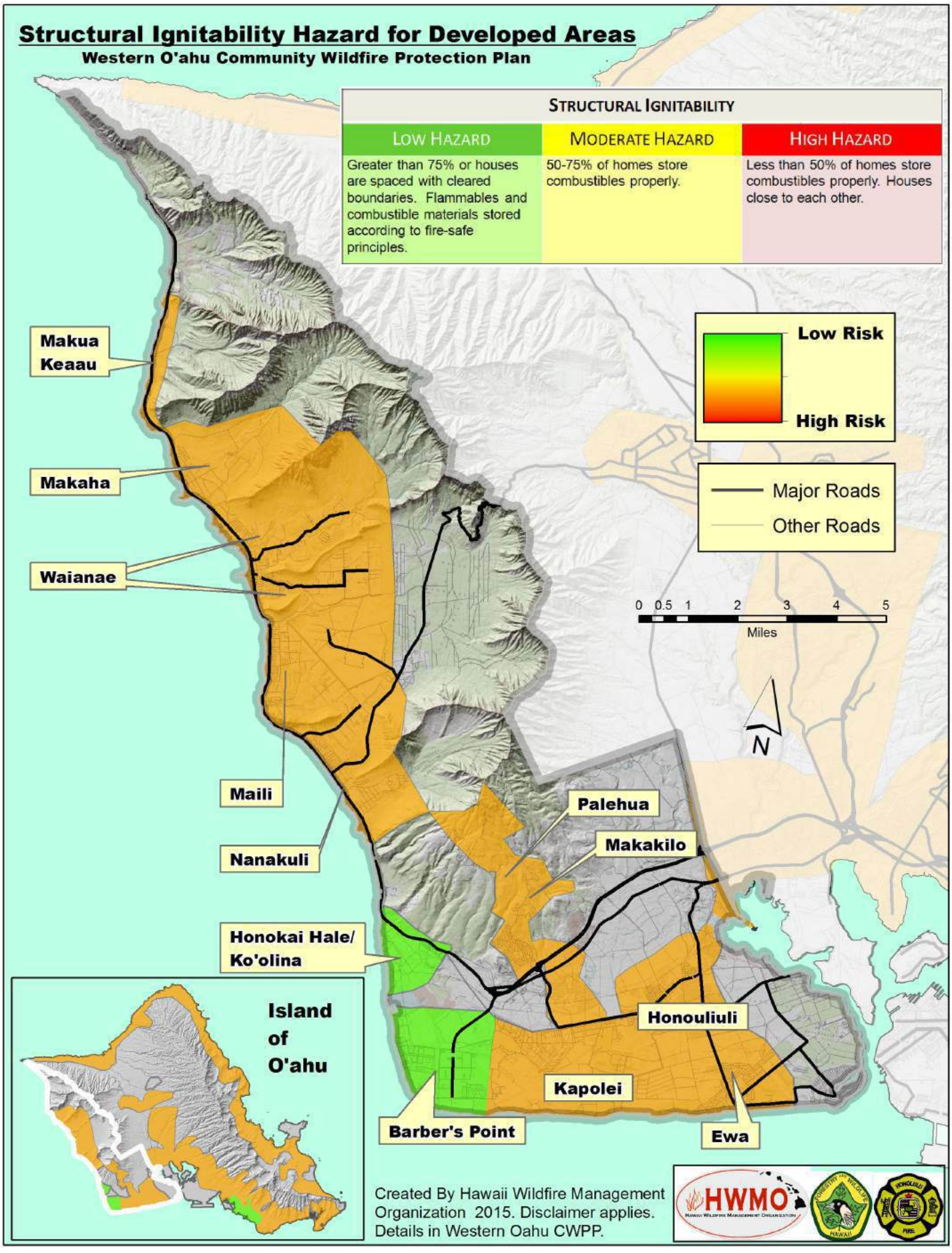
Western O'ahu Community Wildfire Protection Plan



Created By Hawaii Wildfire Management Organization 2015. Disclaimer applies. Details in Western Oahu CWPP.

Structural Ignitability Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan



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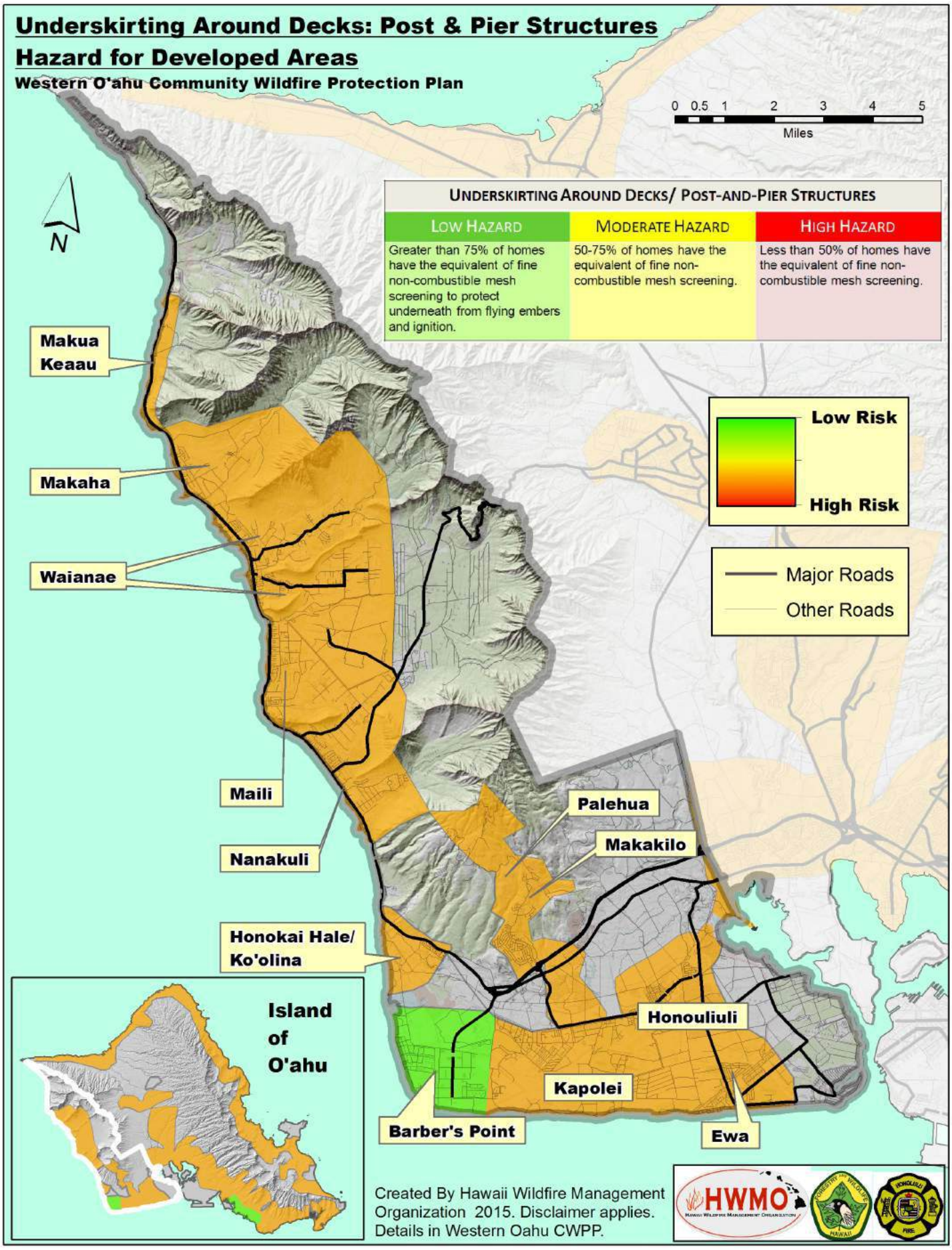
Underskirting Around Decks: Post & Pier Structures Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan



Created By Hawaii Wildfire Management Organization 2015. Disclaimer applies. Details in Western Oahu CWPP.

Utilities Placement: Gas & Electric Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan

0 0.5 1 2 3 4 5
Miles

N

Utilities Placement- Gas and Electric		
Low Hazard	Moderate Hazard	High Hazard
All underground or none.	One underground, one above ground.	Both above ground.

Low Risk

High Risk

Major Roads

Other Roads

Makua Keaau

Makaha

Waianae

Maili

Nanakuli

Honokai Hale/ Ko'olina

Palehua

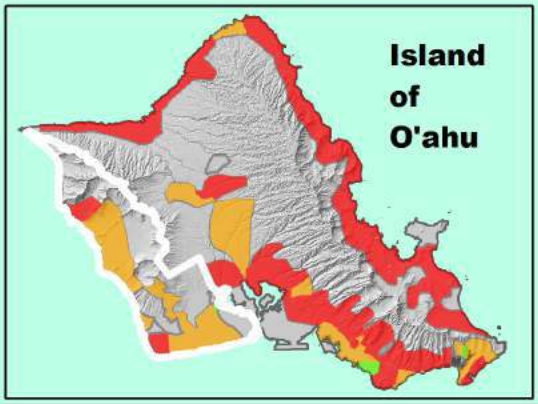
Makakilo

Honouliuli

Kapolei

Barber's Point

Ewa



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HWMO

FIRE ENVIRONMENT HAZARD FOR DEVELOPED AREAS

Average Rainfall Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan

0 0.5 1 2 3 4 5
Miles

N

Average Rainfall		
Low Hazard	Moderate Hazard	High Hazard
High Precipitation	Moderate Precipitation	Low Precipitation

Low Risk

High Risk

Major Roads

Other Roads

Makua
Keaau

Makaha

Waianae

Maili

Nanakuli

Honokai Hale/
Ko'olina

Palehua

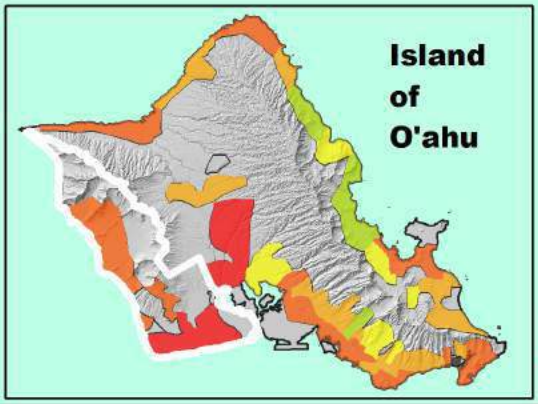
Makakilo

Honouliuli

Barber's Point

Kapolei

Ewa



Created By Hawaii Wildfire Management Organization 2015. Disclaimer applies. Details in Western Oahu CWPP.

Prevailing Wind: Speed and Direction Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan

0 0.5 1 2 3 4 5
Miles

N

Prevailing Wind Speeds and Direction		
Low Hazard	Moderate Hazard	High Hazard
Wind rarely (less than 10% of time) exceeds 15 mph. Protection from predominant winds.	Wind rarely (less than 10% of time) exceeds 15 mph.	Wind frequently (50% or more of time) exceeds 15 mph or frequent exposure to predominant winds or transitional/converging wind directions.

Low Risk

High Risk

Major Roads

Other Roads

Makua
Keaau

Makaha

Waianae

Maili

Nanakuli

Honokai Hale/
Ko'olina

Palehua

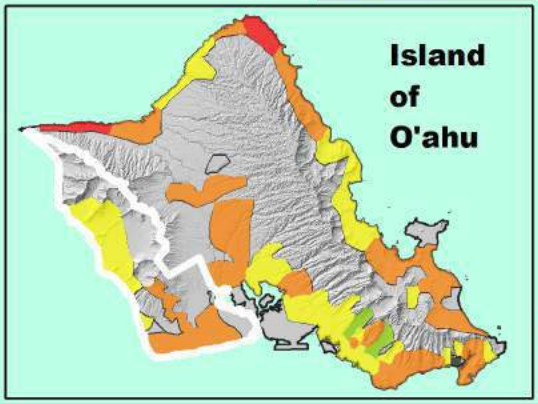
Makakilo

Honouliuli

Kapolei

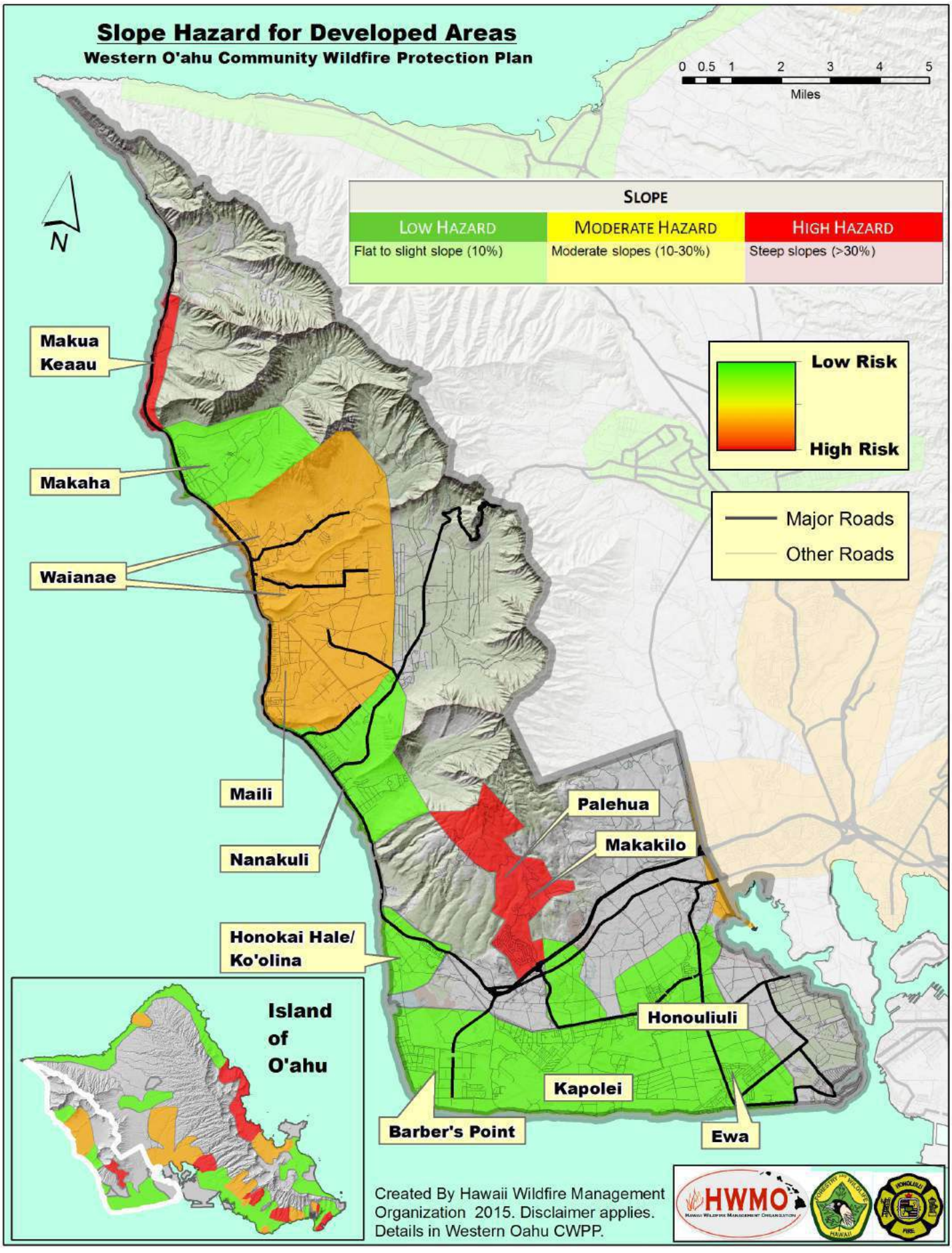
Barber's Point

Ewa



Created By Hawaii Wildfire Management Organization 2015. Disclaimer applies. Details in Western Oahu CWPP.

HWMO


Slope Hazard for Developed Areas
Western O'ahu Community Wildfire Protection Plan
0 0.5 1 2 3 4 5
Miles
N
SLOPE
LOW HAZARD
Flat to slight slope (10%)
MODERATE HAZARD
Moderate slopes (10-30%)
HIGH HAZARD
Steep slopes (>30%)
Low Risk
High Risk
Major Roads
Other Roads
Makua
Keaau
Makaha
Waianae
Maili
Nanakuli
Palehua
Makakilo
Honokai Hale/
Ko'olina
Honouliuli
Kapolei
Barber's Point
Ewa
Island
of
O'ahu
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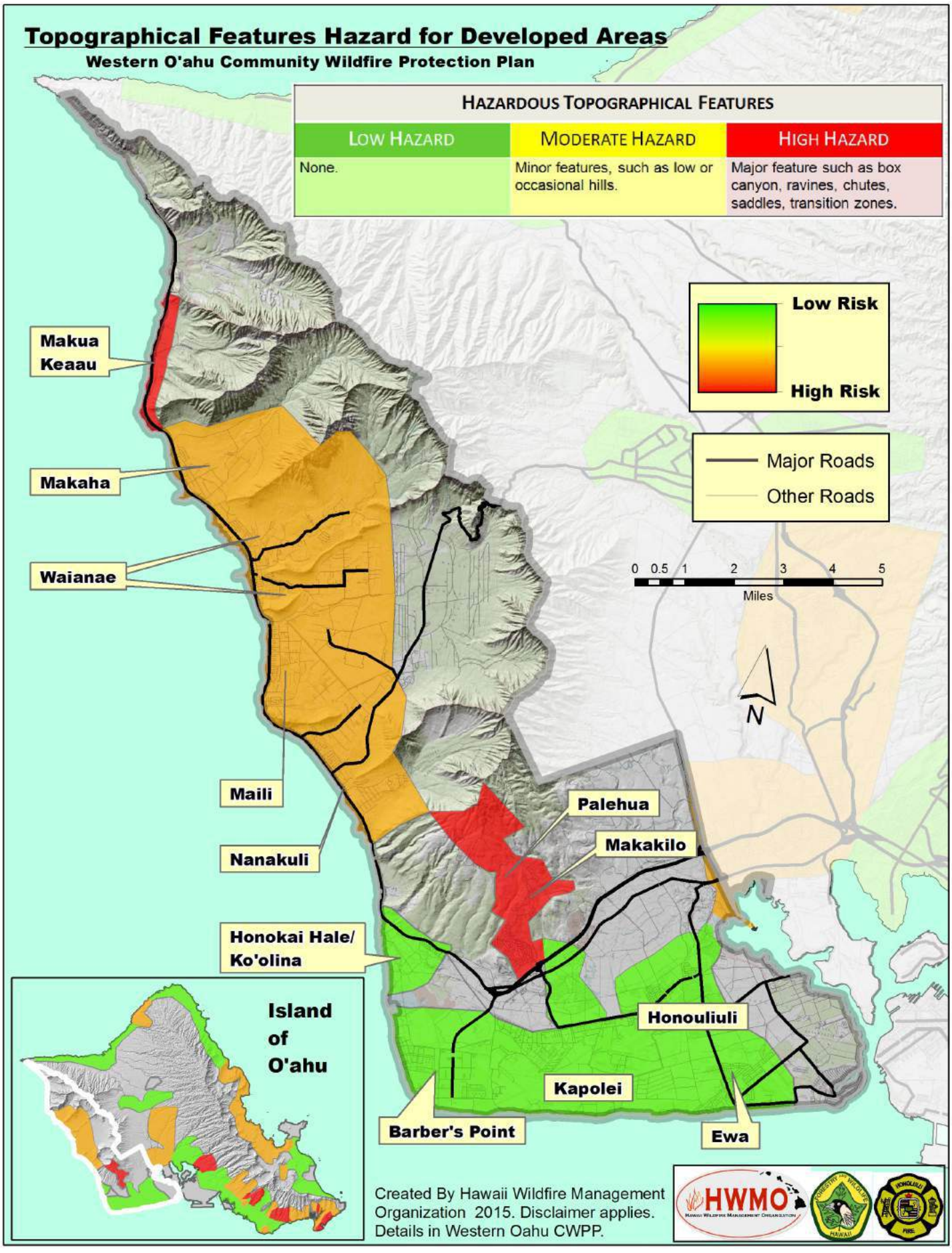
HWMO

Topographical Features Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan

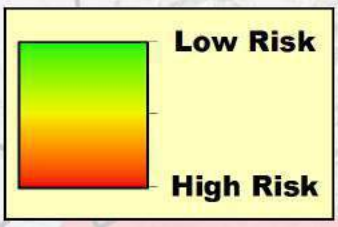


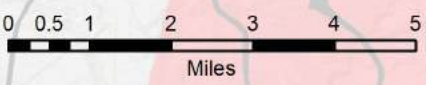
Created By Hawaii Wildfire Management Organization 2015. Disclaimer applies. Details in Western Oahu CWPP.

Seasonal Or Periodic High Risk Conditions Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan

Seasonal Or Periodic High Hazard Conditions		
Low Hazard	**Moderate Hazard**	**High Hazard**
Area has no major seasonal increase of fire hazard.	Area is occasionally (e.g., once per decade) exposed to fire prone conditions: drought, lightning storms, desiccated vegetation, and/or strong dry winds.	Area is seasonally exposed to unusually severe fire weather, drought conditions, lightning storms, desiccated vegetation, and/or strong dry winds.





Makua
Keaau

Makaha

Waianae

Maili

Nanakuli

Palehua

Makakilo

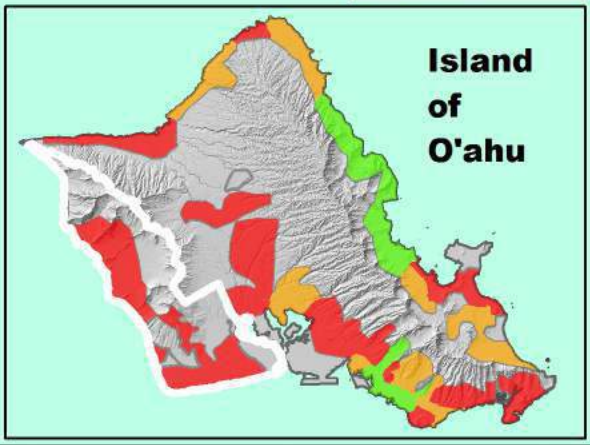
Honokai Hale/
Ko'olina

Honouliuli

Kapolei

Barber's Point

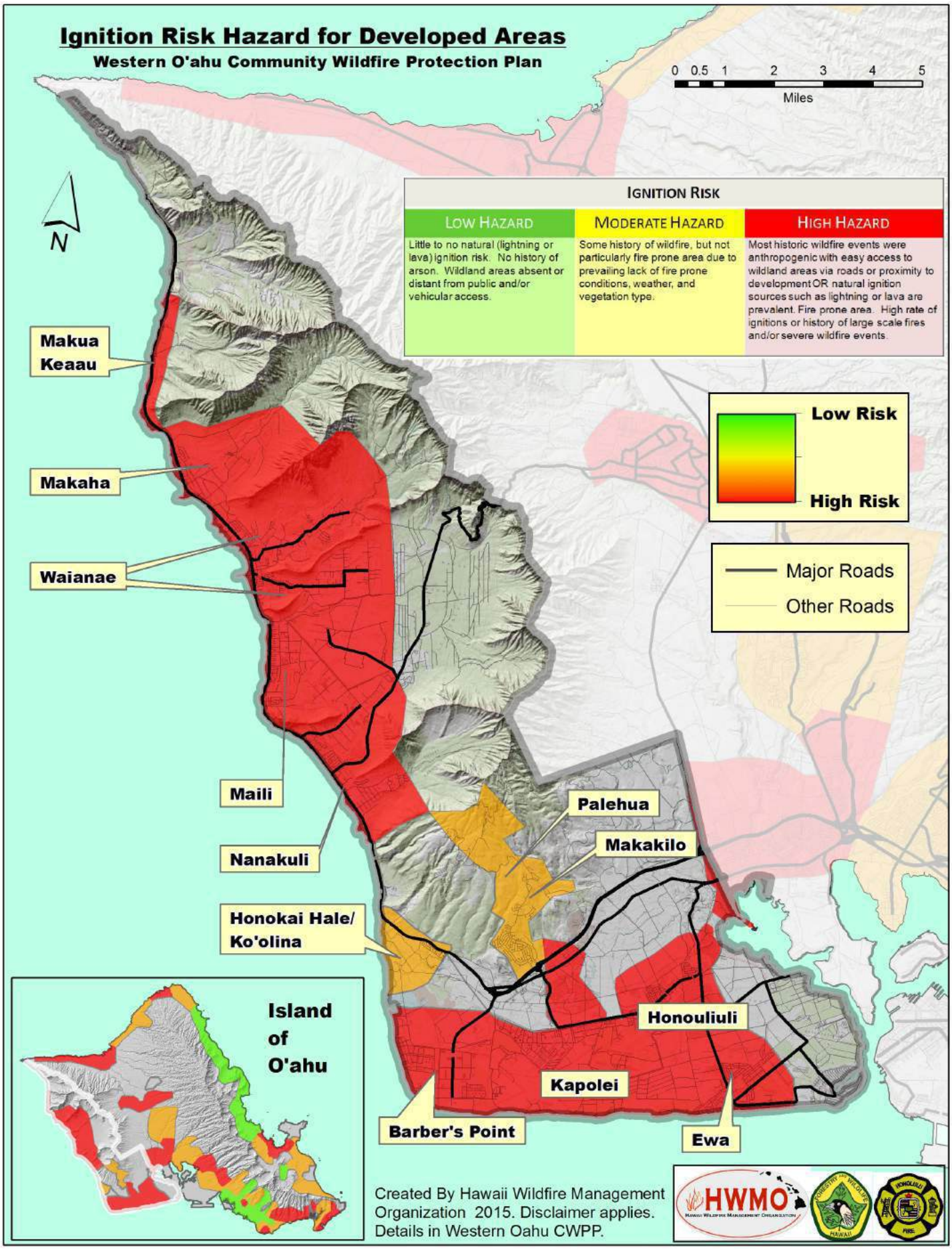
Ewa



Created By Hawaii Wildfire Management Organization 2015. Disclaimer applies. Details in Western Oahu CWPP.

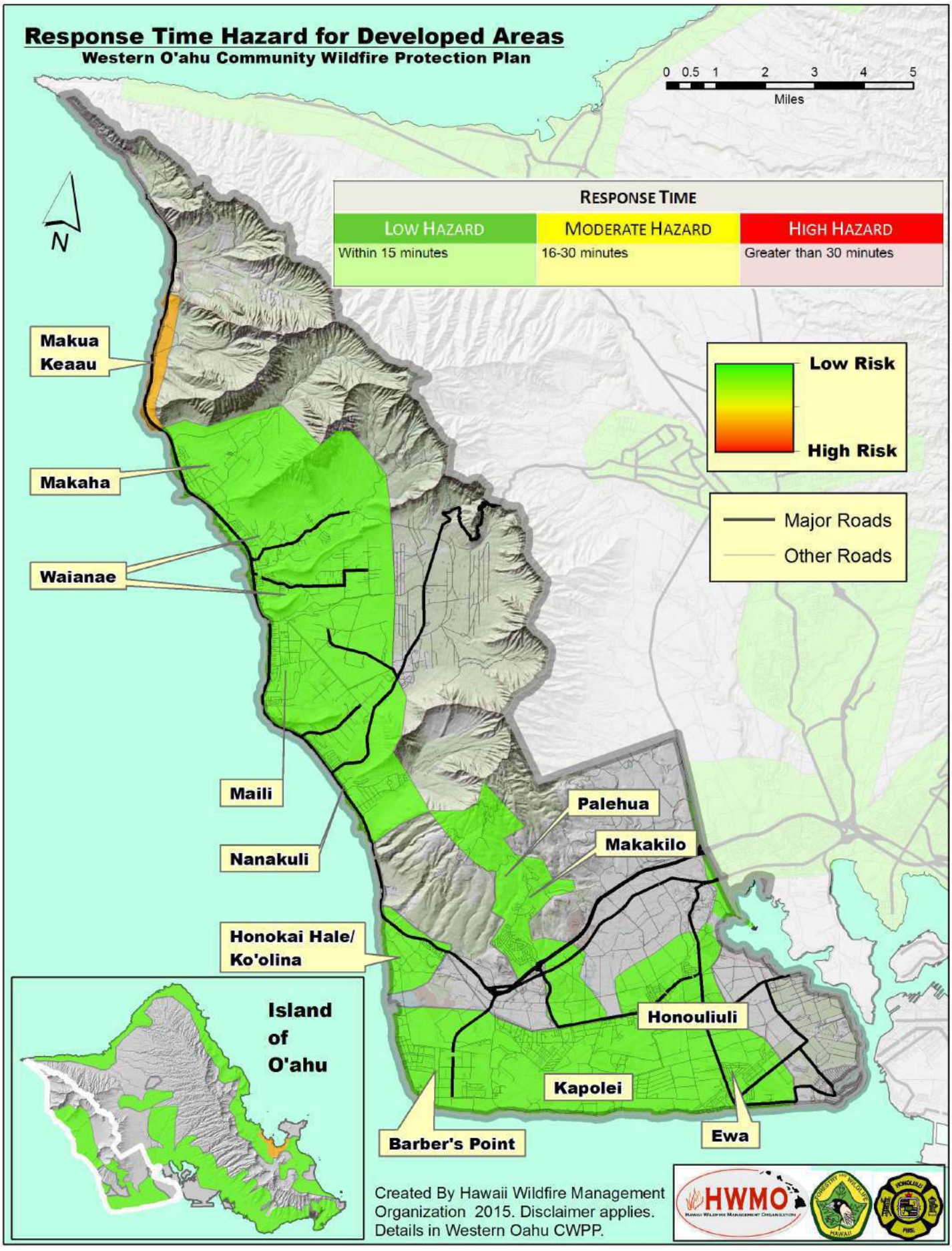
Ignition Risk Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan



Created By Hawaii Wildfire Management Organization 2015. Disclaimer applies. Details in Western Oahu CWPP.

FIRE PROTECTION HAZARD FOR DEVELOPED AREAS


Response Time Hazard for Developed Areas
Western O'ahu Community Wildfire Protection Plan
0 0.5 1 2 3 4 5
Miles
N
Response Time
Low Hazard
Within 15 minutes
Moderate Hazard
16-30 minutes
High Hazard
Greater than 30 minutes
Low Risk
High Risk
Major Roads
Other Roads
Makua
Keaau
Makaha
Waianae
Maili
Nanakuli
Palehua
Makakilo
Honokai Hale/
Ko'olina
Honouliuli
Kapolei
Barber's Point
Ewa
Island
of
O'ahu
Created By Hawaii Wildfire Management Organization 2015. Disclaimer applies. Details in Western Oahu CWPP.
HWMO

Community Planning Practices & Ordinances

Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan

Community Planning Practices and Ordinances		
Low Hazard	**Moderate Hazard**	**High Hazard**
County/local laws, zoning ordinances, and codes require use of fire safe residential and subdivision designs. Fire department actively participates in planning process and enforces ordinances. Residents are compliant.	Have voluntary ordinances for fire safe practices. Local officials have an understanding of appropriate wildfire mitigation strategies. Fire department has limited input to fire safe planning and development efforts and limited enforcement. Residents are mostly compliant.	No local codes, laws, or ordinances requiring fire safe building or practices. Community standards for fire safe development and protection are marginal or non-existent. Little to no effort has been made in assessing and applying measures to reduce wildfire impact. Ordinances are not enforced and/or residents are not compliant.

Makua Keaau

Makaha

Waianae

Maili

Nanakuli

Palehua

Makakilo

Honokai Hale/ Ko'olina

Honouliuli

Kapolei

Ewa

Barber's Point

0 0.5 1 2 3 4 5

Miles

N

Low Risk

High Risk

Major Roads

Other Roads

Island of O'ahu

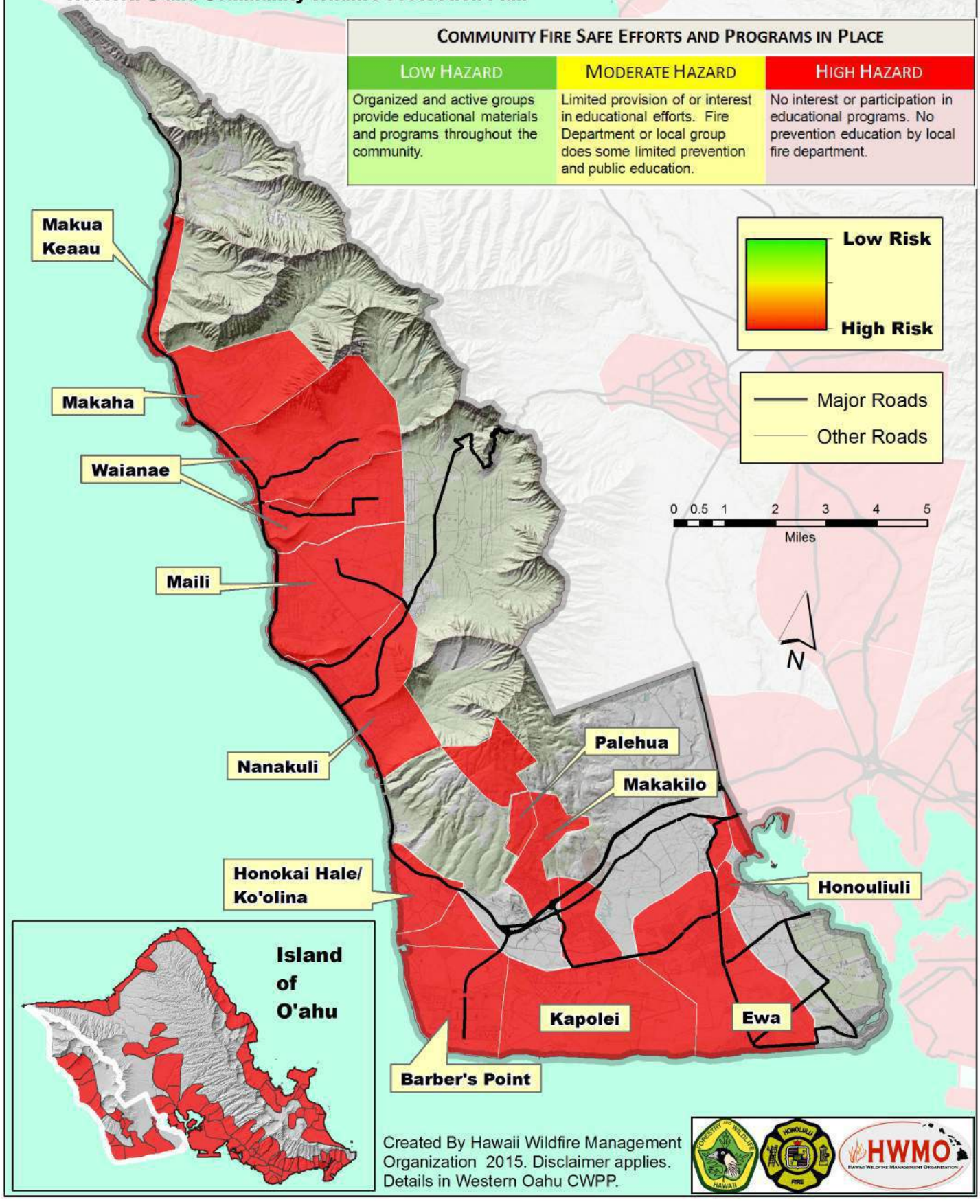
Created By Hawaii Wildfire Management Organization 2015. Disclaimer applies. Details in Western Oahu CWPP.

HWMO

Community Fire Safe Efforts & Programs Already In Place Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan

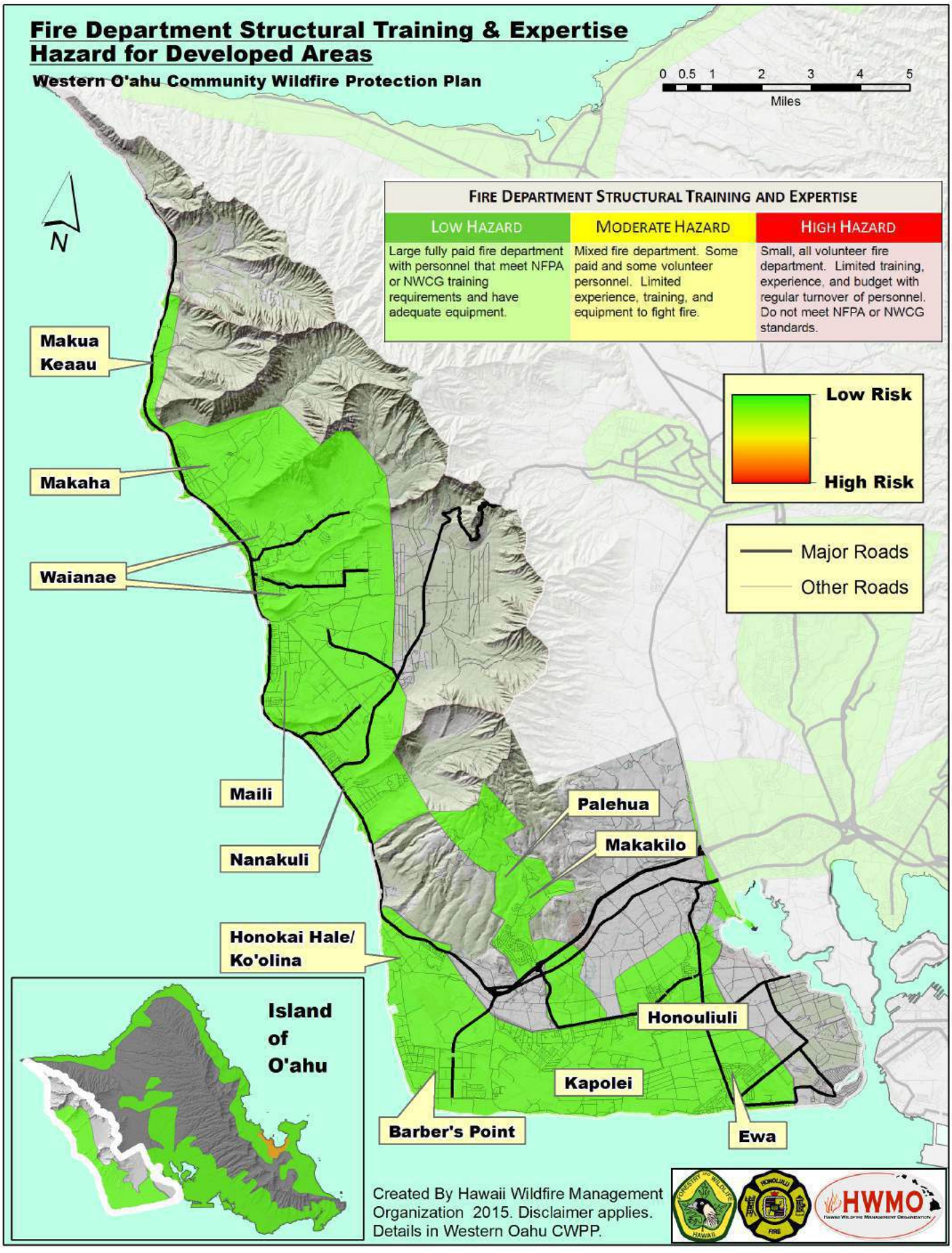
Community Fire Safe Efforts and Programs in Place		
Low Hazard	**Moderate Hazard**	**High Hazard**
Organized and active groups provide educational materials and programs throughout the community.	Limited provision of or interest in educational efforts. Fire Department or local group does some limited prevention and public education.	No interest or participation in educational programs. No prevention education by local fire department.



Created By Hawaii Wildfire Management Organization 2015. Disclaimer applies. Details in Western Oahu CWPP.

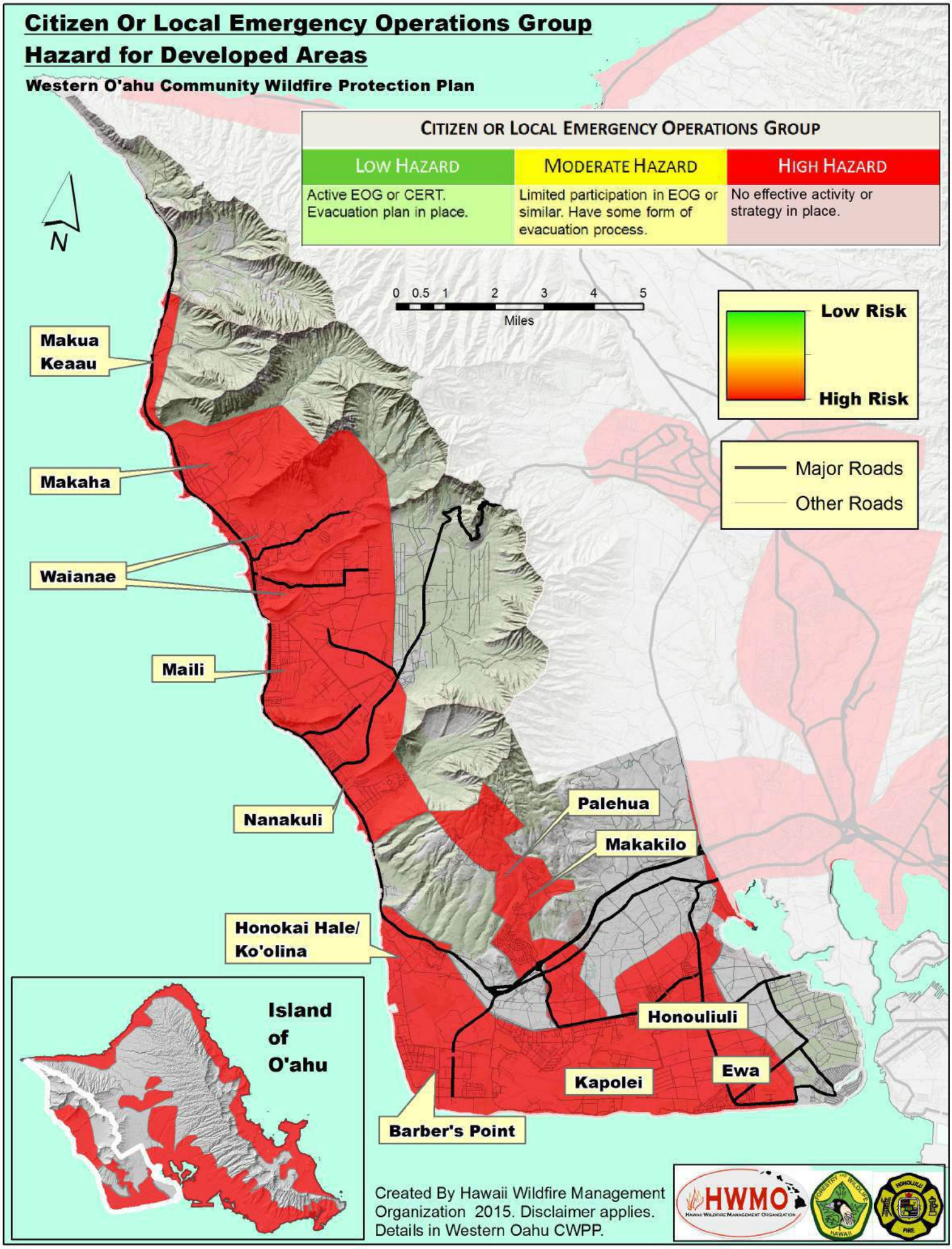
Fire Department Structural Training & Expertise Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan

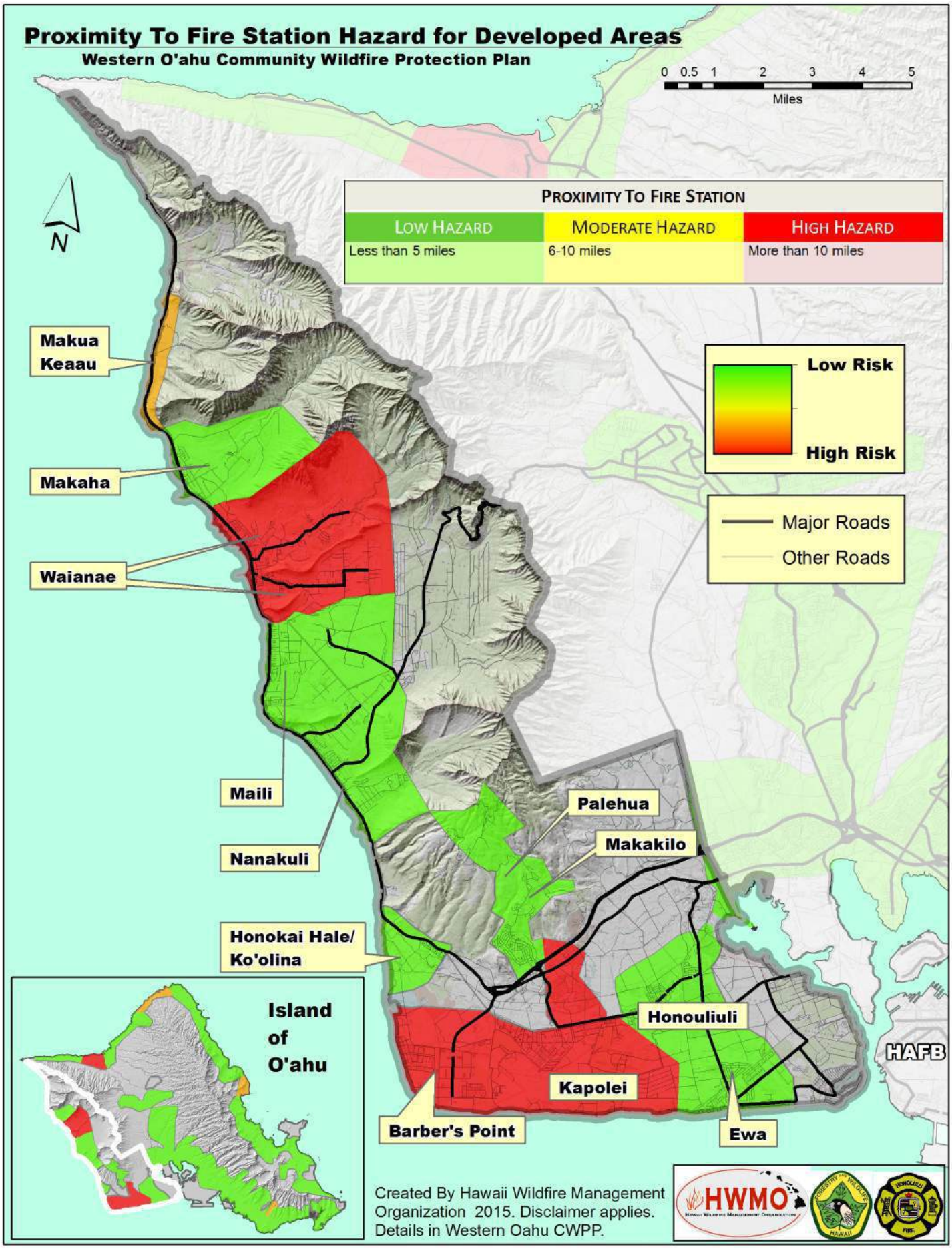


Citizen Or Local Emergency Operations Group Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan



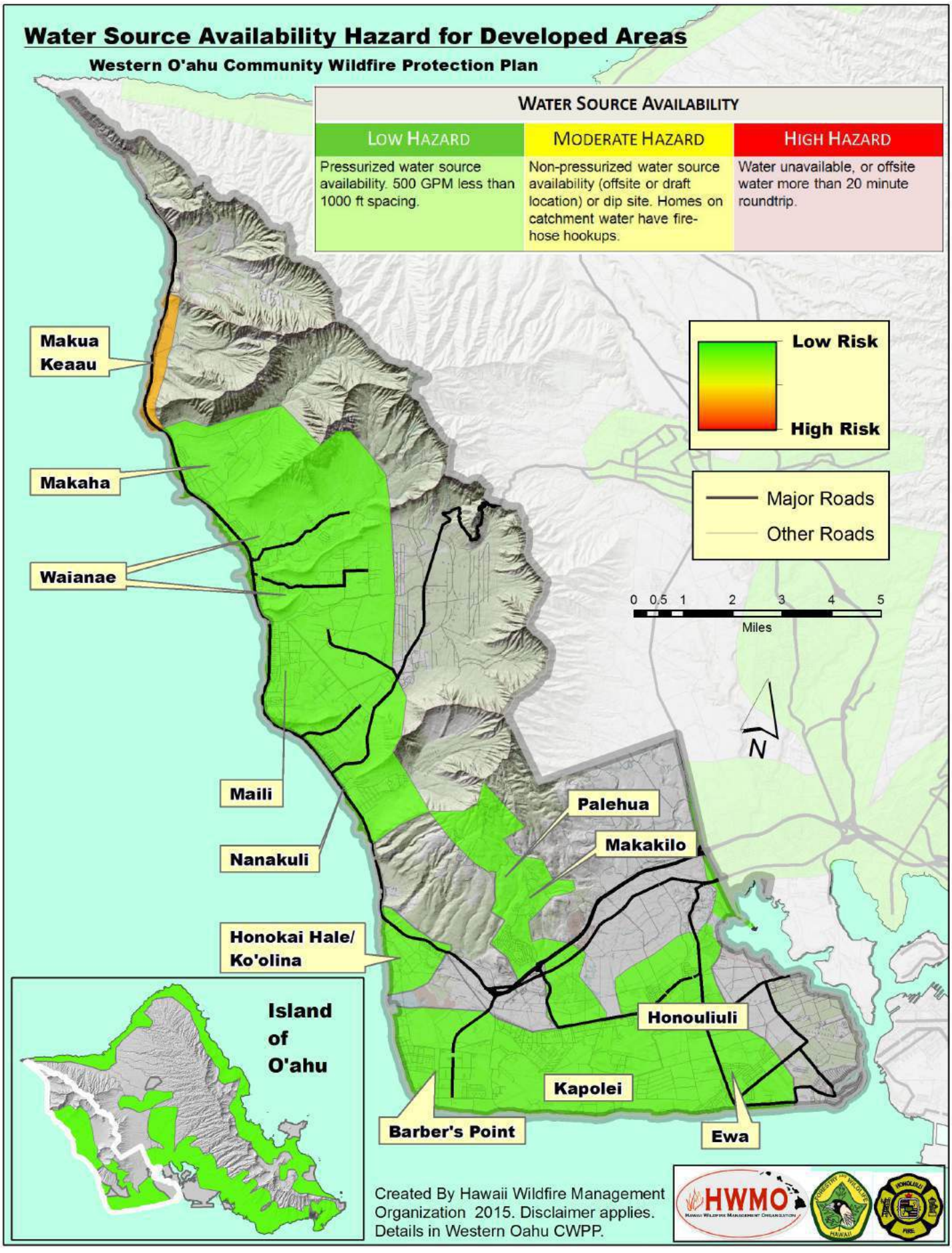
Created By Hawaii Wildfire Management Organization 2015. Disclaimer applies. Details in Western Oahu CWPP.


Proximity To Fire Station Hazard for Developed Areas
Western O'ahu Community Wildfire Protection Plan
0 0.5 1 2 3 4 5
Miles
N
Proximity To Fire Station
Low Hazard
Less than 5 miles
Moderate Hazard
6-10 miles
High Hazard
More than 10 miles
Low Risk
High Risk
Major Roads
Other Roads
Makua
Keaau
Makaha
Waianae
Maili
Nanakuli
Palehua
Makakilo
Honokai Hale/
Ko'olina
Honouliuli
HAFB
Kapolei
Barber's Point
Ewa
Island
of
O'ahu
Created By Hawaii Wildfire Management Organization 2015. Disclaimer applies. Details in Western Oahu CWPP.
HWMO

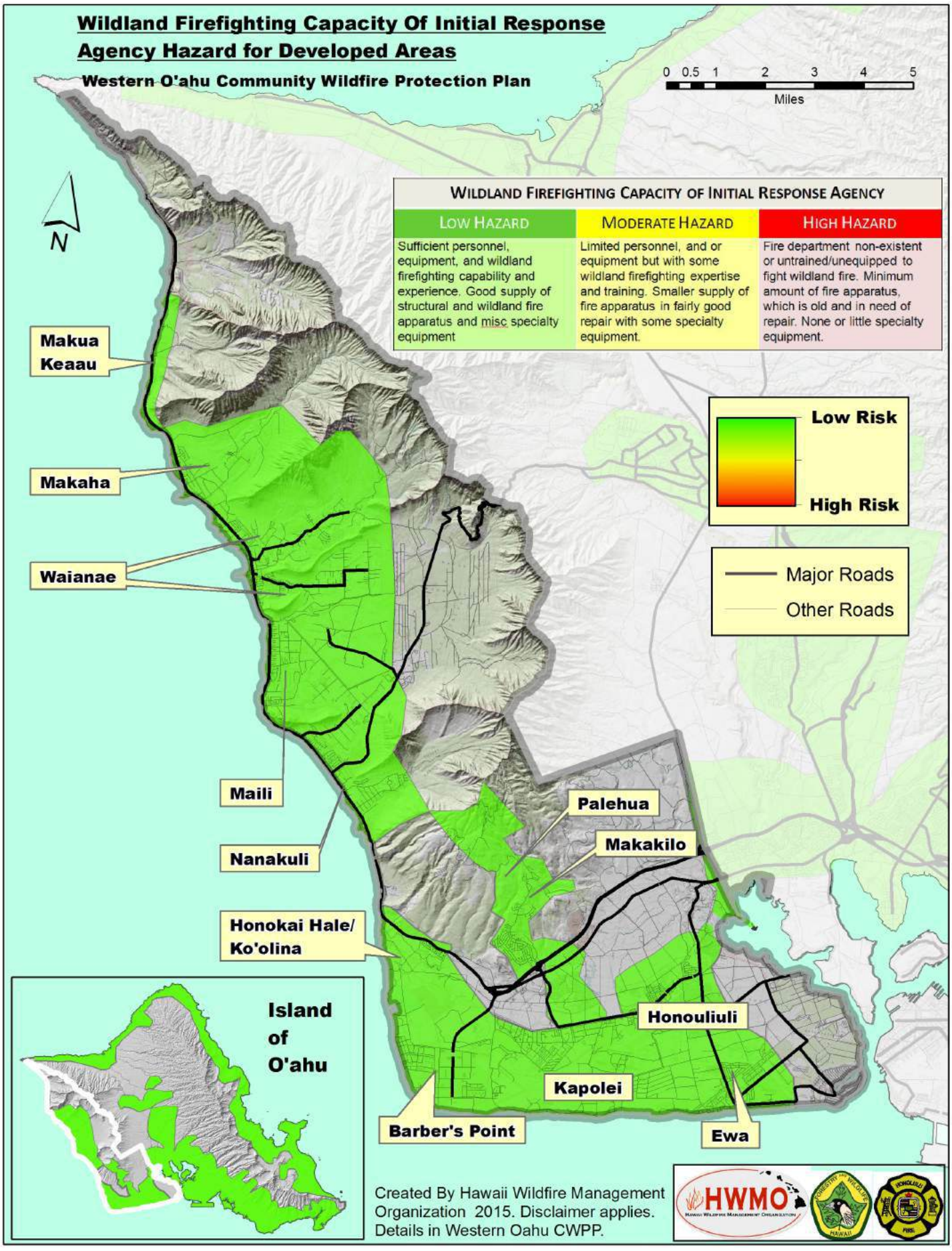
Water Source Availability Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan

Water Source Availability		
Low Hazard	**Moderate Hazard**	**High Hazard**
Pressurized water source availability. 500 GPM less than 1000 ft spacing.	Non-pressurized water source availability (offsite or draft location) or dip site. Homes on catchment water have fire-hose hookups.	Water unavailable, or offsite water more than 20 minute roundtrip.



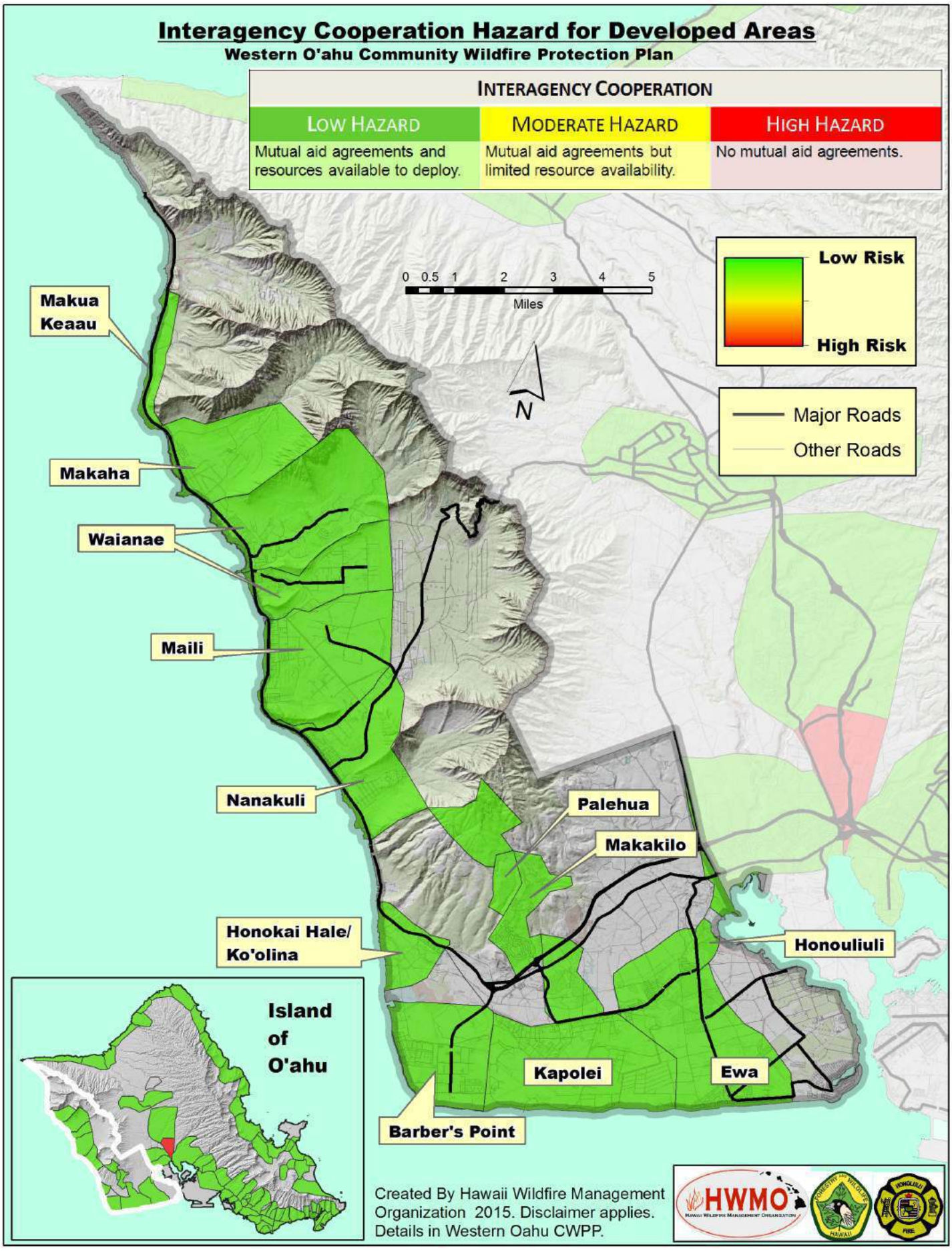
Created By Hawaii Wildfire Management Organization 2015. Disclaimer applies. Details in Western Oahu CWPP.


Wildland Firefighting Capacity Of Initial Response Agency Hazard for Developed Areas
Western O'ahu Community Wildfire Protection Plan
0 0.5 1 2 3 4 5
Miles
N
WILDLAND FIREFIGHTING CAPACITY OF INITIAL RESPONSE AGENCY
LOW HAZARD
Sufficient personnel, equipment, and wildland firefighting capability and experience. Good supply of structural and wildland fire apparatus and misc specialty equipment
MODERATE HAZARD
Limited personnel, and or equipment but with some wildland firefighting expertise and training. Smaller supply of fire apparatus in fairly good repair with some specialty equipment.
HIGH HAZARD
Fire department non-existent or untrained/unequipped to fight wildland fire. Minimum amount of fire apparatus, which is old and in need of repair. None or little specialty equipment.
Low Risk
High Risk
Major Roads
Other Roads
Makua
Keaau
Makaha
Waianae
Maili
Nanakuli
Honokai Hale/
Ko'olina
Palehua
Makakilo
Honouliuli
Kapolei
Barber's Point
Ewa
Island
of
O'ahu
Created By Hawaii Wildfire Management Organization 2015. Disclaimer applies. Details in Western Oahu CWPP.
HWMO

Interagency Cooperation Hazard for Developed Areas

Western O'ahu Community Wildfire Protection Plan

INTERAGENCY COOPERATION		
LOW HAZARD	MODERATE HAZARD	HIGH HAZARD
Mutual aid agreements and resources available to deploy.	Mutual aid agreements but limited resource availability.	No mutual aid agreements.



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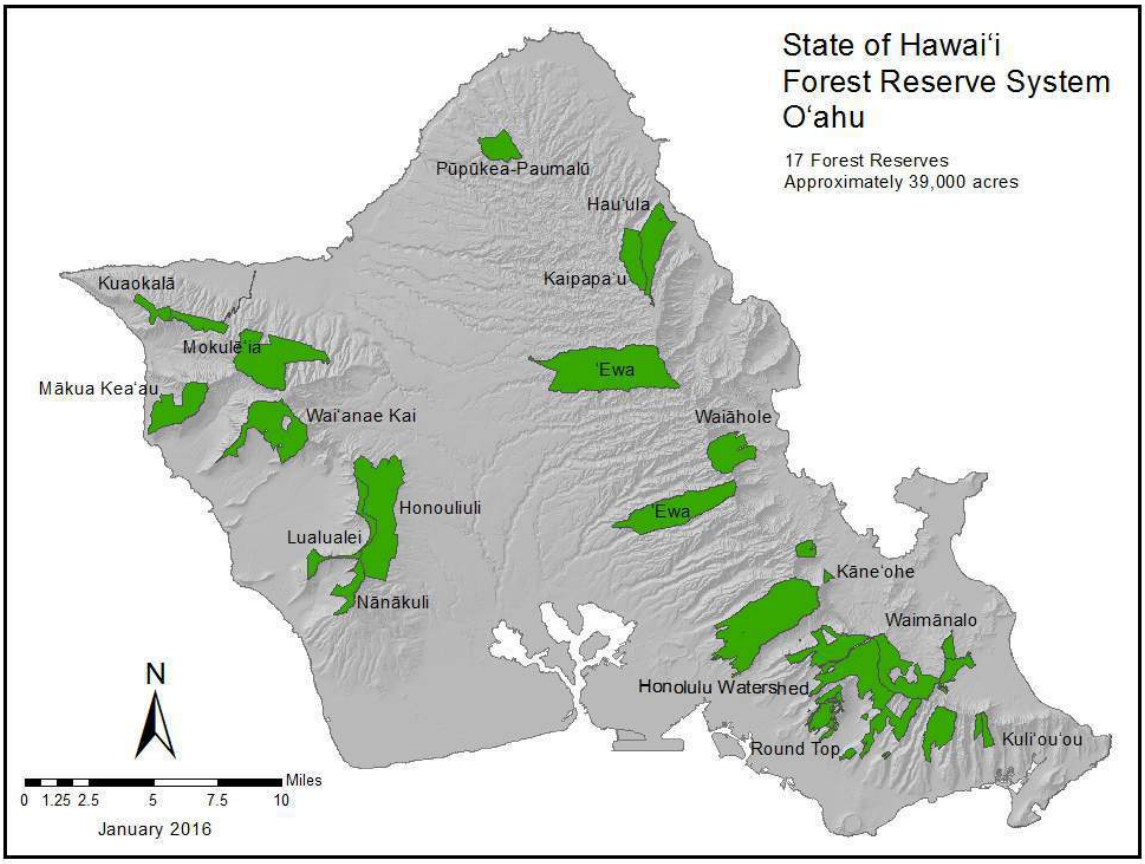
Western O‘ahu Community Wildfire Protection Plan
APPENDIX D
DLNR-DOFAW Forest Reserves on O‘ahu



Source: DLNR-DOFAW

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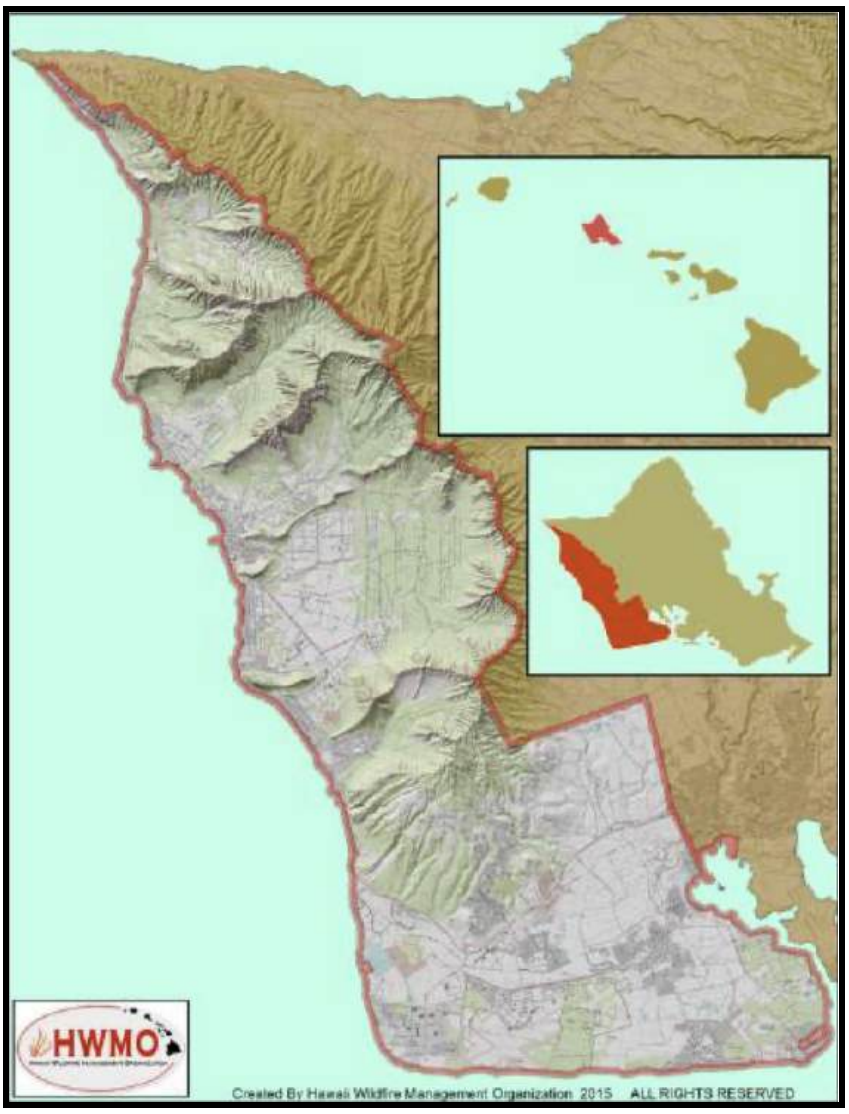
APPENDIX E:

2024 LIST OF PRIORITY PROJECTS AND ACTIONS WESTERN OAHU

2024 LIST OF PRIORITY PROJECTS AND ACTIONS



Western Oahu, State of Hawaii

Drafted by Hawaii Wildfire Management Organization, in cooperation with the Department of Land and Natural Resources - Division of Forestry and Wildlife, Honolulu Fire Department, and City and County of Honolulu - Department of Emergency Management.

Table of Contents

I. INTRODUCTION

Community Wildfire Protection Plans (CWPP) are a great community planning tool and have become a prerequisite for receiving federal funding for wildfire protection projects. A CWPP assists a community in identifying and prioritizing areas for hazardous fuel reduction treatments and supports communities in taking action. The plans assess values at risk, such as safety, natural resource protection, recreation, scenic values, and economic assets. Through a collaborative process involving input from community members, resource management and firefighting agencies, and various other interested parties, CWPPs help bring wildfire hazard information and planning and action opportunities to all parties. These plans are increasingly important in Hawaii, which faces unique wildfire threats that are becoming more challenging due to increasing ignitions, drought episodes, and land use changes.

In order to keep the CWPPs current and relevant, this Appendix to the CWPP serves as a repository for annual updates to the list of priority projects and actions. These project and action updates are designed to keep the CWPP actionable and aligned with the community's current needs and opportunities for wildfire mitigation. In this appendix, you will find a list of projects and actions that help at-risk communities to protect their citizens, homes, and resources from the destruction of catastrophic wildfires in the wildland-urban interface (WUI).

This approach was mutually agreed upon and affirmed through the signatures at the front of this document, ensuring collective commitment to maintaining the CWPP as a living and evolving tool. By focusing on shovel-ready priority projects, we enable more effective planning, resource allocation, and funding efforts. Each update reflects the collaborative efforts of stakeholders and represents the best available information for advancing wildfire risk reduction.

Readers are encouraged to refer to these updates in conjunction with the foundational elements of the CWPP. Together, they provide a comprehensive framework for understanding wildfire risks and implementing effective mitigation strategies.

II. TABLE OF PROJECTS AND ACTIONS

Project Name: Fire Adapted Oahu	
Communities and Neighborhoods that will benefit from this project: Waianae, Nanakuli, Makaha, Makaha Valley, Mokuleia, Waialua, Helemano	
Affiliation: Hawaii Wildfire Management Organization (HWMO)	**Project Lead:** HWMO **Partners:** DLNR-DOFAW, Honolulu Fire Department
CWPP Area: Western Oahu	**Cost:** $1,395,296

Project Description: The proposed project is for HWMO to lead the following two programs for Oahu's CWPP-covered areas (Western Oahu and North Shore, combined population approx. 98,600).

1- The Firewise Communities (FC) program, which leads resident education, aids communities through the Firewise hazard assessment and recognition process. It also supports defensible space and risk-reduction efforts for at-risk, underserved communities via vegetation removal/transport assistance; and

2- The Wildfire Resilient Landscapes (WRL) program, which provides education and technical support for land managers, policymakers, emergency responders, and others. The WRL program provides education via in-person and virtual workshops,
facilitates collaboration by facilitating ongoing working groups toward sustained multi-partner planning and cross-boundary mitigation, and provides area-specific and onsite technical mitigation and planning guidance.

This work will be implemented by HWMO, in close communication and partnership with Hawaii Dept. of Land and Natural Resources, State Division of Forestry and Wildlife (DLNR-DOFAW), Honolulu Fire Department (HFD), and others.

Hawaii's August 2023 fires were spread by heavy winds and through unmanaged lands heavily invaded by fire-prone grasses that entered the built environment, causing substantial damage to life and property. These wildfires were the most devastating and publicized fires in Hawaii's history in terms of the number of lives and structures lost. However, wildfire size and frequency has been growing over the past few decades with broad and long-lasting impacts, especially in Oahu's western (leeward) region and northern shore area, where infrastructure is not designed or built with wildfire safety in mind, and ecosystems are not adapted to fire.

The CWPPs for these areas prioritize community, land manager, and decisionmaker education, and vegetation management in and around at-risk communities and WUI boundaries. This project supports both and will be implemented in the areas covered by CWPPs.

CWPP priorities met by this project: Specifically, 38% of Western Oahu CWPP participant input was related to the need to work toward fire awareness, readiness, prevention, and general fire-adaptation by communities and residents (page 50). There was an urgency and

emphasis of participant concerns regarding the general lack of awareness of the threats and impacts of wildfire among all community members from residents to decision makers. (page 53). This project addresses the #1 and #3 priorities from the Western Oahu CWPP: Increase community awareness; and Improve planning efforts (of many types and scales) and to include community wildfire prevention and risk reduction (page 51).

Many North Shore CWPP participant input priorities are concurrently being addressed by this project:

Resilient Landscapes Education (p. 48, 50-51): Reach out to community members, those who lease agricultural lots, and elected officials about the critical need to address vegetative fuel hazards. Engage community members more intentionally and regularly about preventing fire ignitions in wildland areas; Formalize local wildfire coordinating groups in each area; Plan and implement the reduction of fire prone vegetation across ownership areas to increase capacity and engagement of a broader set of land managers and residents, and make whole areas safer

Community Education and Action: (p. 51-52):Increase homeowner awareness and preparedness: Offer programs that build community awareness, group mentality/culture, and attitudes toward wildfire prevention and preparedness; Provide best practices education and assistance for homeowners to establish defensible space around homes; Provide information, and pursue outreach and education programs for residents and area managers to treat structural ignitability of homes and buildings; Grow engagement and action of those who own and manage larger lots and agricultural lands; Provide education toward the need and responsibility to address fire risk on fallow lands; Support/engage large landowners in taking action,establishing and maintaining firebreaks; Create a way to coordinate and communicate among landowners and land managers in each area.

The project also supports the updated goals of the Cohesive Wildland Fire Management Strategy (CWFMS, 2023). By providing the opportunity for people to work together to reduce fire risk the project will support the goal of creating fire-adapted communities. By engaging practitioners to inform, learn and work toward climate-smart land and fire management, the project will support the goal of creating resilient landscapes by prioritizing management actions to safeguard and restore landscapes.

The project also supports the new wildland fire critical emphasis areas of:

(1) community resilience, and (2) diversity, equity, inclusion and environmental justice in creating fire-adapted communities. There is a strong emphasis in the project for prioritizing low income communities for assistance with vegetation removal projects in the Firewise Communities program.

This need for community risk reduction education and fuels management is also highlighted in the Hawaii Forest Action Plan (https://dlnr.hawaii.gov/forestry/files/2013/09/Hawaii-Forest-Action-Plan-2016-FINAL.pdf) as Issue # 3: Wildfires: Priority 1.a. Prevention education: Reduce the threat from wildfires to native ecosystems, forests, watersheds, and threatened and endangered species as well as communities within WUI areas through established fire prevention programs; and Priority 2.c Pre-suppression fuels management: Mitigate the impacts of wildfires on natural and built environments.

By bringing together a diverse group of agencies, organizations, and the public, the two proposed programs also support the State of Hawaii Forest Action Plan (FAP) by providing an opportunity to address wildfire issues in Hawaii by strengthening collaborative partnerships through the partner-heavy implementation of the FC program, and by facilitating collaborative learning and project planning across jurisdictional and land ownership boundaries through the WRL program.

The full set of programs will operate throughout Oahu's CWPP covered areas, focusing on the communities with the highest fire threat, all of which are identified as Communities at Risk by the State Division of Forestry and Wildlife and Hawaii Wildfire Management Organization. Wildfire on Oahu poses threats to many communities on the island, however many of our communities at highest risk of wildfire are also socioeconomically vulnerable, underserved, and/or low-income, particularly Hawaiian Homestead Lands, which are designated as underserved Tribal areas in the CWDG tool.

Importance: These two programs have been key to Hawaii's progress toward wildfire preparedness and risk reduction thus far, but support is needed to carry forward the programs at the county level for all CWPP-covered areas. The request for participation in these two programs has increased 1,500% since our recent devastating fires. People have become both scared and motivated. This proposal will meet those emotions and motivations with meaningful programming, sound information, and sustained technical support and risk reduction project assistance, carried out at the county level instead of at the existing, albeit limited, statewide level. Supporting implementation of the two programs will provide higher quality education and technical support for individuals and communities (via FC program) and for others who influence fire outcomes (land stewards, large landowners, policymakers, and more, via the WRL program) in this new era when capacity, not complacency, has become our biggest obstacle.

Project Name: Dedicated Risk-Reduction Support for Native Hawaiians

Communities and Neighborhoods that will benefit from this project:
All DHHL Homestead Communities

Affiliation: Department of Hawaiian Home Lands (DHHL)	**Project Lead:** Richard Hoke
CWPP Area: Western Oahu	**Cost:** $150,000 annually per firewise coordinator, plus annual mitigation funds

Project Description: DHHL homesteaders are Native Hawaiians who receive land leases from DHHL to build homes and establish sustainable communities. Many face socioeconomic challenges, including lower income levels and limited access to essential resources. While DHHL will provide financial assistance for community mitigation efforts, grant funds will directly support the hiring of a dedicated Firewise Coordinator for these vulnerable communities, enabling unified efforts in wildfire preparedness and mitigation.

As a central point of contact, the Coordinator will support three groups: those interested in wildfire preparedness (Firewise-interested sites), those needing assistance to meet Firewise requirements (emerging sites), and those already in the Firewise program seeking advanced guidance (existing sites).

Firewise-interested sites will receive resources and participate in workshops aimed at increasing knowledge around wildfire risks and mitigation best practices. Emerging sites will benefit from social and technical support to meet Firewise criteria, including forming a team, completing a hazard assessment, developing an action plan, and executing a risk-reduction project. Emerging and existing sites will receive technical assistance for mitigation planning and implementation, as well as access to the broader community of Firewise sites across the state (HI-Firewise Network).

Mitigation projects to be designated by this Firewise assessment process.

Importance: We are committed to investing millions in fuel breaks & land management activities to enhance the health/safety of the lands & communities we steward. However, achieving this vision requires the cooperation & active participation of our beneficiaries/homesteaders. Our primary aim is to target the enabling factors that will empower them to take proactive risk-reduction actions, while DHHL simultaneously mitigates risks on surrounding lands. This initiative will assess the impact of coordination support for our homestead communities and the availability of funds for their risk-reduction projects. Targeting both residential areas and DHHL-owned lands fosters a cohesive approach to wildfire management. This strategy encourages collaboration among neighboring communities and with DHHL, effectively reducing overall risk across the landscape. Additionally, this initiative aligns with broader wildfire management strategies, contributing to a unified regional response. As communities implement their mitigation plans and achieve Firewise recognition, we will establish a network of prepared landscapes and neighborhoods. This collaborative effort will collectively reduce wildfire hazards and promote sustainable, long-term risk reduction strategies.

Project Name: BWS - Excavator with Mulcher Attachment for Fire Break Maintenance

Communities and Neighborhoods that will benefit from this project:
West Oahu, including Makaha and Waianae

Affiliation: Honolulu Board of Water Supply	**Project Lead:** Raelynn Nakabayashi
CWPP Area: Western Oahu	**Cost:** $275,000

Project Description: Purchase of an excavator with a mulcher attachment for fire break and vegetation maintenance and management on properties owned by Honolulu Board of Water Supply (BWS). BWS has various reservoirs, pumps and watershed properties along the west coast of Oahu. Equipment will be used on BWS

property, but is also intended to protect other public and private properties and lives in the areas surrounding and adjacent to these properties. The goal of the project is to use the equipment to more efficiently and expediently clear vegetation to maintain firebreaks to protect lives and property in the event of a wildfire.

Importance: It is important to clear vegetation around BWS property and equipment to ensure that in the event of a wildfire the water system can continue to provide water needed to fight fires and for drinking, sanitation and hygiene. It is important to maintain firebreaks to prevent wildfires from spreading to urban areas to protect BWS, other public and private property and the lives of people living on the west coast of Oahu.

Project Name: Makaha 875' Dip Pond

Communities and Neighborhoods that will benefit from this project:
Western Oahu and Neighborhoods surrounding the Makaha/Waianae area

Affiliation: Honolulu Board of Water Supply	**Project Lead:** Raelynn Nakabayashi
CWPP Area: Western Oahu	**Cost:** $500,000

Project Description: Construction and installation of a dip pond at the Honolulu Board of Water Supply's Makaha 875' Reservoir to be used by helicopters for wildfire suppression. The goal of the project is to construct a dip pond to make wildfire response/suppression quicker by providing a location that is closer to areas that are prone to wildfires and further away from urban areas than existing viable dip pond areas.

Importance: It is important to install a dip pond closer to the Makaha area that is prone to wildfires that is also away from urban and inhabited areas to protect lives and property. It will allow firefighters to respond quicker to wildfires in the area.

Project Name: Waianae Kai Fire Break

Communities and Neighborhoods that will benefit from this project:
This project immediately affects the Waianae Community in West Oahu. According to the U.S. Census in 2021, 79% of the population in Waianae is native Hawaiian or mixed-race including other Pacific Islanders. 21% of the population was reported in poverty. As described by Hawaii's Workforce Development Council in 2018, Waianae has the highest number of underserved communities on Oahu. With the highest percentage of the population with disabilities, lowest percentage of adults with high school degree or equivalent, highest poverty rates, lowest access to affordable and

quality healthcare. Wildfires in Waianae continually threaten and damage property and life. These fires perpetually degrade the watershed and air quality. The project area exemplifies the wildland urban interface in that it contains undeveloped fire prone wildland areas adjacent to developed subdivisions. There are numerous community resources, assets, and infrastructure at risk of wildfires. This project will benefit the community by implementing watershed restoration efforts that improve and protect drinking water in communities with persistent poverty. Restoration actions will also reduce hazardous fire fuels and reduce the threat of fires spreading to the urban areas. The loss of native forests has a significant negative effect on Native Hawaiian communities through the loss of natural resources that the culture is intimately connected to and reliant upon. KF, as a cultural and educational center, has an integral role as a landowner and project partner because of their location within the historic burn area and directly on the access roads in the valley, (adjacent agricultural lands that this project will target and treat).Fires have historically burned through the KF, where hale (traditional house structures) and other structures were destroyed. A large fire in 2012, encompassed 1,100 ac and prompted over 100 firefighters to work to save homes, came dangerously close to two dense housing areas and burned KFs agricultural lands and structures. This project will benefit underserved communities by: Reducing hazardous fire fuels and reducing the risk of wildfires that threaten property, cultural resources, infrastructure, and lives. Reducing the risk of post-fire erosion and landslides that threaten water resources and marine ecosystems. Improving watershed health by reducing the risk of fires, removing invasive grasses, and planting tree species. Reducing the risk of wildfires that will reduce dust, ash and smoke, improving air quality.

Affiliation: Native Ecosystem Services	**Project Lead:** Taylor Marsh **Partner:** HWMO
CWPP Area: Western Oahu	**Cost:** $185,000

Project Description: This project will restore and maintain fire-prone landscapes by creating fire breaks, reducing fire fuels, and planting drought-tolerant trees as shaded fuel breaks on 1,757 acres of post-burn sites in Waianae Kai, Oahu by the following actions: 1) controlling invasive fire-prone grasses manually, 2) replacing grasses by planting 1,000 trees including Milo, Mango, Kau, and Aalii, and 3) follow-up invasive grass control/maintenance, all benefiting 1,757 acres (ac) of state Forest Reserve (FR) and 1,147 ac of adjacent agricultural lands. The project is in Waianae Kai FR in leeward Oahu and offers a landscape scale approach through planting a shaded fuel break 3,200 feet (ft.) (.6 miles) long that crosses through 1,147 acres of highly flammable grassland. Restoration efforts will reduce the risk of wildfire and bring diversity, resilience, and protection to these degraded lands. Since 1999, total burnt acreage in Waianae Kai FR has increased and fires are consistently encroaching into upland forests due to increased fire frequency and ignitions, a drying climate, and an increase in fuels from invasive grasses, resulting in a year-round fire season. Fires destroy watershed function and forest diversity and increase the likelihood of future fires. This project stops the loss of forest by effectively managing invasive wildfire

fuels and utilizing shaded fuel breaks in a strategic forest restoration area within 1,147 acres of historic burn area.

Importance: Increased wildfire ignitions and invasive fire-prone grasses that dominate fallow agricultural lands and maintain a grass-fire-cycle, increasingly threaten residential areas, forested watersheds, and agricultural lands. These non-native ecosystems now cover nearly 1/4 of Hawaii's land area, increasing the incidence of larger fires, especially in dry leeward areas. A key strategy to break this cycle and reduce the risk and extent of future fires is to create effective shaded fuel breaks by replacing invasive fuels, like grasses, with drought-tolerant and shade-producing tree species that are less prone to burning and strategically increase the probability of wildfire control and containment. The project benefits 1,147 acres of rural forest land impacted by wildfire (21 acres of Forest Reserve and 1,126 acres of Kaala Farm's adjacent agricultural land). The project scale is meaningful because through strategically treating and planting 64,000 sq. ft., 1,147 ac of fire prone area and 1,757 ac of forest reserve will be benefited by reducing the risk of fire in the larger area as well as improving water quality and watershed functions, benefiting endangered species habitat, and improving forest ecosystems by removing invasive species. The project area was selected because 1) it has a high assigned fire threat with the highest wildland fire frequency on the Waianae coast, 2) the strong existing partnership effort and momentum on forest restoration, fire breaks and fuels management already taking place in the area, 3) the strong cross-boundary, collaborative, community, and multi-agency coalition working to reduce fires in the area, and 4) planting drought-tolerant shade trees has been proven successful as a large scale tool for reforestation and fuel breaks. The project area is also adjacent to and provides habitats that support existing rare and endangered Hawaiian flora and fauna in the Waianae Mountains. This project builds on the past lower elevation fire breaks and native plantings by implementing restoration in remote and strategic upper areas by conducting significant restoration where fires continually threaten forested areas and adjacent valleys, as well as providing grass control and reforestation on a landscape scale. This project supports the long term vision of a coalition of community members, managers, agencies, and partners in reducing wildfires and promoting reforestation in the area.

Project Name: Honolulu Fire Department Wildfire Community Program

Communities and Neighborhoods that will benefit from this project:
Western Oahu - ex: Waianae, Nanakuli

Affiliation: Honolulu Fire Department (HFD)	**Project Lead:** Michele Haruno **Partners:** Hawaiian Electric, Hawaii Wildfire Management Organization, Malama Learning Center, Waianae Mountains Watershed Partnership

CWPP Area: Western Oahu	**Cost:** $1,200,000
Project Description: The HFD hopes to include 3 components in the request. Through the collaboration with organizations, the HFD's goal is to increase community awareness to improve wildfire prevention and risk reduction. For the first component, the HFD plans to conduct a tabletop or functional exercise to test the effectiveness of community wildfire planning and response with organizations such as the Hawaii Wildfire Management, Hawaiian Electric, Malama Learning Center, and Waianae Mountains Watershed Partnership. This would include a third party contractor to conduct and evaluate the exercise to assess the roles and responsibilities of all parties to ensure that communities are prepared to endure, respond to, and recover from wildfires. The goal of this collaboration is to be proactive to align with the framework and objectives for Fire-Adapted Communities. The second component is to procure a third party contractor to evaluate and assess three areas of the HFD to review current standard operation guidelines (SOG) and identify gaps in the program to develop an improvement plan to address the gaps identified. The three areas of the HFD are the HFD WUI program, code enforcement, and Community Relations Office (CRO). The goal of this evaluation is to ensure the programs are aligned with the most recent industry standards. The last component includes the collaboration with organizations such as HWMO, MLC, and WMWP for wildfire prevention and mitigation education outreach. These projects are intended to coordinate, develop and distribute educational programs to the community to reduce the wildfire risk.	
Importance: This project is important to the HFD because we serve as the fire protection agency for the City and County of Honolulu, as designated by the Revised Charter of Honolulu. With the recent wildland fires across the country and more recently the Maui wildfire incident, wildfires are recognized as a rapidly increasing threat to the community and its infrastructure, which brings the need to address this issue to the forefront. As the threat of wildfire incidents increases, the HFD identified the value of coordinating with other City departments and organizations to educate the community to mitigate the risk against wildfires.	

Project Name: Western Oahu Water Tanks	
Communities and Neighborhoods that will benefit from this project: Waianae, Nanakuli, Makaha, Makaha Valley, Ewa Villages, Ewa Beach, Ewa Gentry, Makaha Valley Hawaiian Home Land, Waianae Kai Hawaiian Home Land, Waianae Hawaiian Home Land, Nanakuli Hawaiian Home Land	
Affiliation: DLNR - DOFAW	**Project Lead:** Mike Walker **Partners:** HFD, Honolulu Board of Water Supply, and Department of Hawaiian Homelands
CWPP Area: Western Oahu	**Cost:** $1,500,000 (subject to market costs)

Project Description: The West Oahu Cisterns and Fuel Breaks project was developed to meet a single goal: Provide high risk areas with limited water infrastructure for aerial and ground fire suppression with five cisterns across the landscape.

The installation of cisterns in strategic locations can greatly reduce the time required to locate a fresh water supply for helicopter buckets and return to the incident scene with the much-needed critical resource. The cisterns will support the suppression of wildland and wildland urban interface fires in rural areas of West Oahu County covered by the 2016 West Oahu CWPP. Four cisterns will be installed near water sources across state and private lands providing protection for the communities of Department of Hawaiian Homelands (DHHL) Nanakuli, Waianae, and the communities of Makakilo and Makaha. Each cistern will hold a total of 30,000 gallons and will have dry stand pipes that can be utilized for filling ground suppression resources if needed. The useful life of the cisterns will extend past 20 years and ensure the sustainability of the project well beyond the grant period.

Honolulu Board of Water Supply and DHHL have committed locations for the dip tanks along with DLNR-DOFAW. Honolulu Board of Water Supply has committed water resources to fill the tanks located on its land.

Importance: In many areas of Hawaiian islands fresh water is not often available and helicopters must dip their buckets in the ocean. Ocean dipping increases the risk to communities and firefighters due to having to cross roads and developed areas, increases turn around time between water drops, and is detrimental to equipment, aircraft, plant cover, and soil structure and viability.

Project Name: Cross-boundary fuels management technical assistance and education to reduce wildfire risk in Hawaii's underserved communities

Communities and Neighborhoods that will benefit from this project:
Waianae, Makaha, Anahola, Waimea, Kailapa, Kohala, Kula, Waiohuli, Haliimalie

Affiliation: University of Hawaii at Manoa	**Project Lead:** University of Hawaii at Manoa **Partners:** HWMO and others
CWPP Area: Western Oahu	**Cost:** $6,744,187

Project Description:
This project will establish Fireshed Partnerships in each CWPP region to bring together landowners and agencies within and adjacent to underserved and vulnerable communities to specify areas for contiguous, cross-boundary fuels mitigation and shared resources and establish agreements whereby partners implement and/or build

capacity to implement these actions. The Fireshed Partnerships will target highly fire-prone, largely unmanaged lands that lie between Hawaii's communities and watershed forests and comprise the vast majority of area burned in the islands. This will fill gaps in fuels management by bridging existing community level Firewise projects and programs coordinated by HWMO and the upper elevation terrestrial management by the Hawaii Division of Forestry and Wildlife (DOFAW) and Hawaii Watershed Partnerships. The Fireshed Partnerships will work on three objectives: 1) map available fire-related suppression resources, hazardous fuels, vulnerable assets, resource needs, and potential mitigation strategies; 2) develop cross-boundary agreements/MOUs by determining costs and resource sharing opportunities for long-term, spatially contiguous fuels mitigation projects at landscape scales; and 3) expand and develop multi-use, multi-partner fuels management demonstrations, including grazing, conventional fuel breaks and reforestation/restoration green strips, that will reduce risk and be used to educate local leadership and other communities. In terms of geographic scope, the project will aim to accomplish Objectives 1, 2 and 3 for to establish one Fireshed Partnership per county in Years 1-3 and initiate Objectives 1 and 2 for an expansion of or establishment of new Fireshed Partnerships in each county in Years 4 and 5.

This project's goals support two of the Cohesive Strategy's challenges: Managing vegetation and fuels, and Protecting homes, communities, and other values at risk. The Fireshed Partnership addresses the most fire-prone and least fire-resilient landscapes in Hawaii which pose the greatest threats to communities, watershed forests, and near-shore areas, namely former agricultural lands dominated by nonnative grasses and shrubs. This project will identify and integrate proven and locally relevant strategies (conventional fuel and green breaks, grazing, fuels conversion/restoration) into planning and implementation efforts to deal with the unique fuel types of Hawaii. By mapping resources and fuels projects, the project will also create opportunities for safer fire response, addressing the third Cohesive Strategy challenge. This project addresses objectives of the 2016 Hawaii Forest Action Plan. Chapter 3 (pages 109-110) points to the need for fuel assessment, modeling, reduction, and management and improved fire data management systems to support fire management projects. Pages 121 and 122 also include Address wildland fire landowner management plans, and develop maps that identify the resources and incorporate risk assessment.

Long-term strategies for wildland fire (Page 125) call to improve cross-sector collaboration among agencies with responsibilities in the areas of planning, wildfire mitigation, and public safety.

This effort will leverage existing partnerships among the Hawaii Department of Land and Natural Resources, the Hawaii Association of Watershed Partnerships and HWMO to expand landowner participation and fill fuels mitigation gaps across the landscape. Within Year 1 for each Partnership area, the Project Lead and Project Manager will work with the GIS Analyst and County-level Extension Agents to review existing projects, fire risk and fuels maps developed by UH Fire, and conduct site

assessments. We will identify key allies among our state and/or private landowner partners with whom we will develop a variety of engagement strategies (from one-on-one meetings to working groups). Within Year 1 the GIS Analyst will also contract University of Hawaii Information and Technology Services to develop and maintain a database for storing and sharing spatial information. Over Years 1 and 2, the Agents will develop and implement engagement strategies to establish Partnership MOUs.

This process will involve collaborative mapping of resources and site specific planning spatial extents, timelines, and material needs (labor, supplies, equipment) for new fuels reduction actions. In Years 1-2, the Economic Analyst will project costs for the purposes of fundraising by partners beginning in Years 2 and 3. Large-scale (e.g.,10-50 acre), cross-boundary demonstration projects (Objective 3) will be established over Years 2 to 3 and Agents will document best practices and project costs with the Economic Analyst for dissemination (Years 4 and 5) via the Pacific Fire Exchange. Demonstrations will provide models for future actions elsewhere, and build from prior successes of small-scale (1-3 acre) fuels reduction/conversion demonstrations of green breaks, grazed fuel breaks, and agroforestry restoration. In Years 4 and 5, the Project Lead and Project Manager will assess the outcomes of the initial Fireshed Partnerships and develop proposals for continued funding. In Years 4-5, the Agents will work with the GIS and Economic Analysts to expand or develop new Fireshed Partnerships and conduct mapping and MOU development (Objectives 1 and 2) with an additional community in each County.

Planning for diverse types of fuels mitigation in lands surrounding communities was identified in each of the CWPPs referenced by this project. For the West Oahu CWPP, fuels management was the highest ranked with Improved Planning ranked third as priorities (Figure 3, page 48). Table 9 (page 55) of the West Oahu CWPP states the need for grazing corridors, reforestation and restoration, and fuel breaks for fuels reduction. Proposed projects (Table 11; Page 63) include working with large land owners to encourage fuels management, the need to consult with land use planners, and to re-establish agriculture as a form of fuels conversion. Table 11 also explicitly pointed to the need for fencing and water troughs to facilitate grazing around the community.

In the Upcountry Maui CWPP general fuels management and using agricultural and/or grazing methods to reduce fuels were the most frequently recommended strategies for fire risk reduction (page 53). Fuels management planning was second alongside ecosystem protection and improved access (page 53). Planning for large landowners and pre-fire actions, was the second most recommended action for increasing firefighter safety (Page 55). Fuels reduction recommendations included grazing, mowing and herbicide, and fuels conversion through reforestation/restoration and shaded fuel breaks (Table 9, page 56). Table 9 also pointed to converting fuels to drought-tolerant, fire-resistant plants (preferably native) as well as re-establishing agriculture. Longer-term plans (Table 11, page 64) identify fencing and water storage to increase grazing feasibility, multi-use water storage, and working with large

landowners to encourage access for fire management. Finally, page 65 of the CWPP recommends forming action teams, funding fire risk reduction projects and documenting successes from those projects.

The Kauai CWPP (2016) ranks vegetative fuels management the highest need, followed by planning (page 35). The top four fuels management priorities (Page 36) included using agriculture and grazing, increasing capacity among landowners for fuels mitigation, reducing fuels on vacant, fallow lands, and planning. Among the CWPP priorities were coordinated fuels management and improved planning (Page 37). Table 7 (page 38) further specified grazing, mowing and herbicide, and reforestation/restoration in shaded fuelbreaks as well as converting fuels to less fire-prone, preferably native plants. Longer-term actions (Table 9, page 46) identified working with large landowners to encourage fuels management, multi-use water storage and installing water and fencing for grazing.

Recommended actions in the NW Hawaii Island CWPP (Updated in 2016) identifies the need to reduce and/or convert fuels to less fire-prone vegetation, especially native plants, community planning at the regional and community/subdivision scale(Page 28). Reduction of fuel load and invasive species were ranked as high priorities across multiple communities in the CWPP (page 29) and also specified that wherever possible incorporate native plants as well as the use of vegetated fuel break corridors with an emphasis on native plants (page 32). Additional input from the 2016 CWPP update included an Action Plan for increased fencing and water for grazing corridors, resource maps, and developing community-specific plans.

Importance: In working towards these place-based objectives, the project will achieve outcomes that have region-wide impacts. Through the process of onboarding and orienting project funded, county-level Extension Agents, the Project Lead will offer training in fire mitigation and best practices to the entire University of Hawaii's Cooperative Extension Program (29 employees statewide), whos relationships with stakeholders will increase program impact and create future opportunities for community engagement and on-the-ground projects. Specific to the objectives described above, the development of infrastructure for data management, visualization, and access will be useable by future and concurrent projects and available to fire response agencies through their dispatch systems (i.e. CODES) meeting a need identified in the State Forest Action Plan. Developing Fireshed Partnerships and MOUs with long-term plans will not only provide a template for future and concurrent statewide action, it will facilitate additional partnerships since many of the agencies, utilities, and large landowners involved in this project manage lands and resources around other communities in the state. For example, the coordinators for Hawaiian Association of Watershed Partnerships have established agreements with both the state and many private landowners, but focus on higher elevation, intact ecosystem conservation. The project will therefore leverage these relationships to forge new agreements through the Fireshed Partnerships to expand land management efforts into lower elevation, high fire risk areas. Finally, using Extension Agents to implement and document place-based fuels reduction

projects as demonstrations will create opportunities for dissemination of best practices for multiple strategies and multiple audiences by coordinating with the Pacific Fire Exchange project (www.PacificFireExchange.org) and concurrent outreach efforts by HWMO via FireWise and others such as the Watershed Partnerships.

Project Name: West Oahu Wildfire Fuel Break and Community Outreach	
Communities and Neighborhoods that will benefit from this project: Makaha and Waianae	
Affiliation: Waianae Mountains Watershed Partnership through PCSU/RCUH/University of Hawaii	**Project Lead:** Waianae Mountains Watershed Partnership through PCSU/RCUH/University of Hawaii **Partners:** DLNR-DOFAW, Board of Water Supply, HWMO, USFS
CWPP Area: Western Oahu	**Cost:** $1,437,569

Project Description: He alii ka ina; he kauw ke kanaka - The land is chief; man is its servant. Land has no need for man, but man needs the land and works it for a livelihood.

On August 4, 2018, a large fire swept through Makaha Valley and Waianae Valley at the same time, threatening homes, farms, and businesses in the wildland urban interface (WUI); DLNR and HBWS facilities; endangered species; and forested watershed areas important for water recharge. Over 8,800 acres of Makaha and Waianae were burned, including current WMWP management areas (restoration sites and vegetative fuel breaks). This large landscape level fire resulted in native ecosystem habitat loss and invasive grassland conversion (promoting and perpetuating the grass-fire cycle). Sadly, this is not a rare occurrence for West Oahu.

The Cohesive Wildland Fire Management Strategy aims for landscapes that can resist, survive, and recover from wildfire, disease, and disturbance. This project is specifically aimed at accomplishing those goals for the Waianae/Makaha area. Our proposal is seeking funding to expand vegetative fuel breaks in the WUI areas of Makaha and Waianae (West Oahu) and provide education and outreach to surrounding at-risk communities about the threat of wildfire.

The Makaha and Waianae proposed project areas are located on the arid leeward (west) side of Oahu. Densely populated communities and dry/drought conditions make wildfires a major threat. Nearly 70% of all wildfires on Oahu occur in this region.
Native ecosystems are not adapted to fire, resulting in the loss and conversion of much of the native dryland and mesic forests to fire-prone invasive vegetation such as Guinea grass (Megathyrsus maximus) and koa haole (Leucaena leucocephala). These hazardous fuels have increased fire threat, intensity, and frequency leading to a vicious grass-fire cycle that is difficult to break.

The largest most recent fires in 2012, 2016, 2018 and 2020 started in the wildland urban interface and quickly spread across the open landscape burning over 2,000 acres (including

but not limited to two home structures, dozens of farming support structures, acres of farmland, farming equipment, irrigation, a traditional Hawaiian hale (house) at a cultural learning center and hundreds of cars in a tow yard) in less than 48 hours.

Waianae and Makaha are adjacent HBWS and DLNR priority watersheds in the Waianae Mountains. Both valleys are home to diverse native forests; ecosystems with threatened, endangered and rare native species; and important for groundwater recharge. There are extensive cultural sites and was once the most productive Hawaiian agricultural complex on the Waianae Coast. WMWP began restoration and fire mitigation work in WKFR in 2010 and it is the longest running project for the partnership. WMWP began fire mitigation work in Makaha in 2016 after observing successful project results from the WKFR project mentioned above. Fire prone invasive species control and fuel break installation mitigate the threat of wildfire to at risk communities in the WUI, climate change impacts, reduce erosion/sedimentation during flood events, and improve groundwater recharge in both areas.

The existing WKFR vegetative fuel break was strategically installed parallel to 0.75 miles of both sides of the WKFR service road and continues towards the south facing ridge of the valley. It spans roughly 10 acres of outplanted native plants grown and planted by WMWP and WMWP/DOFAW volunteers. In Makaha, three areas bordering the WUI on the south facing slope of the valley are currently being managed as vegetative firebreaks along an asphalt BWS access road in Makaha Valley. The "Kili Drive roadside fuel break" is a 1,200 ft. strip parallel to the Kili Drive service road on the south side of the road (utilizing the road as part of a bare ground fuel break) at a width between 30-40 feet (depending on the vertical slope of the area). The "lower fuel break site" (Reservoir Site) is located above an HBWS reservoir facility perpendicular to Kili Drive access road and is approximately 4 acres. The "upper fuel break site" (Well site) is located above a BWS well facility at the end of the same access road and is approximately 4.5 acres. Both lower and upper vegetative fuel breaks have also been cleared of invasive fuels and planted with native plants grown by WMWP and WMWP/DOFAW volunteers.

A holistic management approach is used to implement wildfire mitigation and fuels management. During the dry season, WMWP staff and hundreds of clear large amounts of guinea grass and haole koa from the fuel breaks and cover the cleared areas with weed cloth to suppress new growth during the wetter months of the year. Throughout the year, WMWP staff and volunteers collect native seeds, and propagate thousands of plants to prepare for outplanting during the wet season. In addition to WMWPs two large base yard shade houses, WMWP also constructed and manage shade houses at three schools where students manage the nurseries, prep seeds for propagation and storage (for post fire seed scattering and propagation), and plant propagation for WMWPs vegetative fuel breaks. Once the wet season begins and the soils are no longer hydrophobic, thousands of plants from the WMWP nursery and WMWPs school nurseries are outplanted in the cleared fuel break areas.

Outreach and education are important components that add to the longevity and success of these wildfire mitigation projects. Creating awareness of wildfire threats to our watersheds and fostering a sense of kuleana (responsibility) over Hawaiis natural and cultural resources in our future generations of leaders is an important and necessary component of conservation management. Public school students, teachers, private companies, extracurricular clubs and conservation minded individuals participate in a variety

of volunteer activities such as nursery work, native plant propagation, seed collection, weed control, and outplanting. On average, 2,000+ volunteers annually assist WMWP with collecting over 50,000 seeds, controlling 10+ acres of weeds, propagating 10,000+ native plants and outplanting 5,000+ plants. WMWP does over 50 presentations per year (related to watersheds and watershed threats such as wildfire) to 1,500+ students from schools in surrounding communities,
extracurricular clubs, and at the university level. WMWP also participates in over 12 outreach events (fairs, workshops, conservation conference) to educate the public about the threat of wildfire. These activities not only connect our keiki (children)
and their ohana (family) to their ahupuaa (watershed) and their island home, but teaches them the importance of conservation; how to be fire-wise with their homes and communities, the meaning of the words mlama ina (to care and protect the land); and shows them the potential and opportunity to pursue college degrees and careers in natural resource management, administration, and policy making. Through our volunteer stewardship program, we have recruited KUPU interns and current
employees and gained additional support for some of our largest and longest running conservation management projects.

1. Work proposed in the Makaha Lower and Upper Fuel Breaks and Waianae Kai Fuel Break will continue ongoing wildfire mitigation efforts: fuels management (control and removal of invasive grasses and fire prone species), expansion of vegetative
fuel breaks (utilizing native plants produced by WMWP and schools), propagation of native plants (includes presentations, weekly nursery/propagation activities with students and maintenance of nurseries), collection of native seeds for storage and
propagation, participation at outreach events, and volunteer service trips.

2. Weed control methods include mechanical control of invasive grass species via hand pulling, sickling, and/or weed whacking, and removal of woody shrub and tree species via chainsaw and/or chemically control woody species with cut stump or basal
methods of herbicide application using Garlon 4 (50%), milestone (1%), and biodiesel (49%).

3. Collection of native seeds across the Waianae Mountains for storage and future propagation of plants for restoration. Seed collection of common native plants will be from genetically appropriate sources across the Waianae Mountains, with a collection
threshold of 20% of seeds/fruits present.

4. The planted native species in the fuel breaks are an additional seed source for increased future post fire seed banking and propagation needs.

5. Propagate seeds collected at WMWP nurseries. Maintain stock of plants for planned fuel break expansion and post fire mitigation restoration.

6. This project includes a year-round holistic management cycle of fire mitigation/fuels management activities and education and outreach to protect and enhance the forested watersheds of Western Oahu.

Importance: WMWPs education and outreach program reaches thousands of people on the leeward side. Those that have engaged with WMWP learned about the threat of wildfire, mitigation efforts, fire-wise communities, wildfire prevention and volunteered in vegetative fuel break expansion activities. Schools from central Oahu, where the risk of wildfire is also high,

also participate in fuel load reduction and growing thousands of native plants for the vegetative fuel breaks. These efforts are far reaching - children play a special role in communicating the importance of wildfire prevention to family members and friends. These activities have also inspired several students to seek STEM and conservation related education and career paths. The outreach and education activities proposed in this narrative will support the continuation of landscape level wildfire outreach to West Oahu communities.

Project Name: Project Proposal for DHHL Wildfire Mitigation Community Master Plan for Waiʻanae

Communities and Neighborhoods that will benefit from this project:
Waiʻanae

Affiliation: DHHL	**Project Lead:** DHHL **Partners:** Hawaii Wildfire Management Organization, DLNR-Division of Forestry and Wildlife, adjacent watershed partnerships, and county fire department
CWPP Area: Western Oahu	**Cost:** $100,000

Project Description:

Introduction

In response to the escalating threat of wildfires in Hawaii, this proposal aims to foster a robust partnership between the Department of Hawaiian Home Lands (DHHL), residents of the Wai'anae homestead community, and expert organizations including the Hawaii Wildfire Management Organization, DLNR-Division of Forestry and Wildlife, adjacent watershed partnerships, and county fire departments. Our objective is to collaboratively develop a comprehensive wildfire mitigation master plan tailored to the unique landscape and community needs of these areas.

Project Purpose

The primary goal of this initiative is to enhance wildfire resilience through a community-informed and expert-supported master plan. This plan will identify risk reduction strategies, integrate traditional knowledge with contemporary fire management techniques, and prioritize actionable steps to safeguard lives, properties, and natural resources.

Objectives

1. **Risk Assessment:** Conduct detailed evaluations of wildfire risks in the Wai'anae homestead area to establish a baseline for mitigation strategies.

2. **Community Engagement:** Foster deep and ongoing engagement with DHHL residents to ensure their insights and traditional land management practices are central to the mitigation strategies.
3. **Expert Collaboration:** Utilize the expertise of fire professionals and forest managers to infuse the plan with the latest in fire prevention and suppression methodologies.
4. **Resource Mapping:** Identify and map critical resources needed for effective wildfire response, including water sources, access routes, and emergency shelters.
5. **Education and Training:** Develop and implement community training programs focused on wildfire prevention, emergency preparedness, and response techniques.

Methodology

- **Workshops and Meetings:** Regularly scheduled gatherings will be held to facilitate knowledge exchange between residents, DHHL leadership, and experts.
- **Surveys and Field Studies:** Empirical data collection to assess vegetation, climate conditions, and current land use to inform risk reduction strategies.
- **Drafting the Master Plan:** Collaborative development of the master plan with iterative feedback loops from all stakeholders to ensure comprehensive coverage of all concerns and strategies.

Expected Outcomes

- A detailed wildfire risk assessment report for Wai'anae.
- A sustainable and actionable wildfire mitigation master plan.
- Increased community capacity in wildfire prevention and emergency responsiveness.
- Strengthened partnerships between DHHL residents, the department, and fire management experts.

Funding Request

Funds are sought to cover:

- Costs of conducting workshops, training sessions, and community engagement activities.
- Expenses related to field assessments, data collection, and analysis.
- Development, printing, and dissemination of the master plan.
- Support for ongoing monitoring and evaluation of plan implementation.

Importance: This proposal represents a proactive approach to wildfire mitigation that respects and integrates the knowledge and needs of DHHL homestead communities with expert guidance. By building a comprehensive, collaborative plan, we aim to enhance the resilience of Wai'anae against the increasing threat of wildfires, ensuring the safety and sustainability of this vibrant community.