Unalaska Multi-Jurisdictional Hazard Mitigation Plan

QAWALANGIN Tribe of Unalaska

CITY OF UNALASKA INTERNATIONAL PORT OF DUTCH HARBOR 53° 54' N 166° 32' W

February 2025

Prepared for:
City of Unalaska and
Qawalangin Tribe of Unalaska

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Chapter 1 - Introduction

1.1 Background

The City of Unalaska is vulnerable to a wide range of natural, technological, and human hazards. These hazards can affect the safety of residents, damage or destroy public and private property, disrupt the local economy, and negatively impact the quality of life.

Typically, hazards cannot be eliminated, but theses hazards can lessen their impact by participating in hazard mitigation. Hazard mitigation is any action taken to reduce or eliminate the long-term risk to property and human life from hazards.

There is a wide variety of hazard mitigation activities available. They can be structural in nature, such as reinforcing a building's foundation. Mitigation activities can focus on preventing the damage from occurring in the first place (by limiting development in hazard-prone areas), or by protecting against damage (strengthening existing or future development so that it is not damaged by a hazard event). More information about hazard mitigation activities can be found in Chapter 5.

One of the most effective tools to reduce vulnerability to hazards is a local hazard mitigation plan. A hazard mitigation plan identifies what hazards exist in the community and establishes goals and specific mitigation activities to be undertaken.

To encourage communities to develop hazard mitigation plans, the United States Congress passed the Disaster Mitigation Act of 2000 (DMA 2000). This Act requires local governments to have a Federal Emergency Management Agency (FEMA)-approved mitigation plan by November 2004 to remain eligible for FEMA Hazard Mitigation Grant Program (HMGP) funding and Pre-Disaster Mitigation (PDM) grants. This plan for the City of Unalaska has been prepared in coordination with the State of Alaska (SOA) Division of Homeland Security and Emergency Management (DHS&EM) to ensure it meets all applicable DMA 2000 requirements. FEMA's Local Mitigation Plan Crosswalk, found in Appendix A, provides a summary of federal and state minimum standards and documents where each requirement is met within the plan.

1.2 Purpose

The purpose of the HMGP (Program) is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. Projects must provide a long-term solution to a problem, for example, elevation of a home to reduce the risk of flood damages as opposed to buying sandbags and pumps to fight the flood. In addition, a project's potential savings must be more than the cost of implementing the project. Funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage. The amount of funding available for the Program under a particular disaster declaration is limited. FEMA may provide a State or Tribe with up to 20% of the total aggregate disaster damage costs to fund the Program Projects or Planning Grants. The cost-share for these grants is 75% Federal/25% non-Federal. Communities

that fulfill "Impoverished Community" criteria and receive FEMA Regional Administrator approval may be funded at 90% Federal/10% non- Federal.

The mitigation grant program provides funds to State, Tribes, and Local entities, for hazard mitigation planning and mitigation project implementation prior to a disaster event. These grants are awarded on a nationally competitive basis. The Program project's potential savings must be more than the cost of implementing the project. In addition, funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage. The total amount of pre-disaster mitigation funding available is appropriated by Congress on an annual basis. In FY 2019, pre-disaster mitigation program funding totaled approximately $250 million. Federal funding was available for up to 75 percent of the eligible activity costs. Small, impoverished communities may be eligible for up to a 90 percent federal cost share in accordance with the Section 203(h) of the Stafford Act. The remaining eligible activity costs must be derived from non-federal sources.

The goal of the FMA grant program is to reduce or eliminate flood insurance claims under the NFIP. Emphasis for this program is placed on mitigating repetitive loss (RL) properties. The primary source of funding for this program is the National Flood Insurance Fund with funding available for planning and project grants. Project grants typically use most of the program's total funding. States, Tribes, and Local entities apply to implement mitigation measures that potentially reduce flood losses to NFIP insured properties. It should be noted the City of Unalaska does not currently participate in the NFIP, and is therefore, ineligible for National Flood Insurance Act Grant Programs.

1.3 Plan Organization

The City of Unalaska's Hazard Mitigation Plan is organized into seven chapters and its appendices:

Chapter 1 - Introduction

Chapter 1 will introduce the plan and includes the purpose, scope, and organization of the plan, as well as a description of the planning process.

Chapter 2 – Community Profile

Chapter 2 is a general history and background of the City of Unalaska (City) and the Qawalangin Tribe of Unalaska (Tribe), including historical trends for population, and the demographic and economic conditions that have shaped the area.

Chapter 3 – Asset Inventory

Chapter 3 is an asset inventory identifying what development could be vulnerable to a hazard event.

Chapter 4 – Hazards in the City of Unalaska

Chapter 4 provides details about the hazards that can occur in Unalaska. For each hazard, there is a description of the hazard's characteristics, the location where the hazard can occur, previous occurrences of the hazard, and what is vulnerable to the hazard. Where possible, the location of the hazard area has been mapped.

Chapter 5 – Mitigation Strategy

Chapter 5 contains the City of Unalaska's mitigation strategy, including mitigation goals, objectives, and action items. This chapter also contains information about how the mitigation measures will be implemented.

Chapter 6 – Plan Maintenance

This chapter is devoted to the maintenance, evaluation, and updating of the plan.

Appendices

The appendices contain the plan's supporting documentation.

1.4 Planning

The initial Planning Process which began in 2021 was led by the Unalaska Fire Chief Patrick Shipp. Facilitation and guidance were provided by The Response Group for development. Planning Team Members included:

Table 1: 2021 Planning Team

2021 Hazard Mitigation Planning Team			
Name	**Title**	**Organization**	**Key Input**
Scott Brown	Port Deputy Director	City of Unalaska	Planning Team Member
Bob Cummings	City Engineering	City of Unalaska	Planning Team Member
Mark Descoteaux	Wastewater Supervisor	City of Unalaska	Planning Team Member
Bil Homka	Planning Director	City of Unalaska	Planning Team Member
Jay King	Police Chief	City of Unalaska	Planning Team Member
Ben Knowles	Fire Captain	City of Unalaska	Planning Team Member
Jeremiah Kirchofer	Water Supervisor	City of Unalaska	Planning Team Member
Ferdinand Lopez	Safety Security Director	Unisea	Planning Team Member
Peggy McLaughlin	Port Director	City of Unalaska	Planning Team Member
Elena Ramirez	Operations Director/Lands & Infrastructure Director	Qawalangin Tribe of Unalaska	Planning Team Member
Chris Salt	CEO	Ounalashka Corporation	Planning Team Member
Patrick Shipp	Fire Chief	City of Unalaska	Planning Team Member
Steve Tompkins	Public Utilities Deputy Director	City of Unalaska	Planning Team Member
Dan Winters	Public Works Director	City of Unalaska	Planning Team Member

Chief Shipp left Unalaska in August of 2022 prior to finalization of the project. Chief Ben Knowles picked up the project after his appointment to the Fire Chief position in June 2023 and discovered that Tribal Stakeholders were significantly under-represented during the 2021 update process.

After speaking with AK DHS&EM and FEMA representatives it was decided to review and revise the 2021 draft update with additional effort to capture the input and needs of Tribal stakeholders. In February of 2024 Chief Knowles engaged the services of Katmai Preparedness Solutions to assist with revision, finalization and adoption of the work that was started in 2021. The 2024 Planning Team Members include:

Table 2: 2024 Planning Team

2024 Hazard Mitigation Planning Team

Name	Title	Organization	Key Input
Ben Knowles	Fire Chief	City of Unalaska	Planning Team Member
Chris Price	CEO	Qawalangin Tribe of Unalaska	Planning Team Member
Tanaya Horne	COO	Qawalangin Tribe of Unalaska	Planning Team Member
Natasha Swint	Finance and Administration Manager	Qawalangin Tribe of Unalaska	Planning Team Member
Payola Kennedy		Qawalangin Tribe of Unalaska	Planning Team Member
Laresa Syverson	Technical Lands Manager	Ounalashka Corporatioin	Planning Team Member
Karen Pletnikoff	Environment & Safety Administrator	Aleutian Pribilof Islands Association (APIA)	Planning Team Member
Christy Fassbender	DNP	IFHS	Planning Team Member

2021 Efforts:

Per 44 CFR Part 201 et seq., public involvement is encouraged. Public meetings were arranged, and publications were distributed. Public involvement on the 2021 update was conducted via public meetings and surveys. Two public meetings on the HMP were held on August 17, 2021 at 2:00 PM and 6:00 PM.

The planning team – the consultant, staff core team, and other interested city staff - met May 18, June 22, and August 18, 2021 to develop the mitigation strategy. Public notice for the meetings were advertised in accordance with Unalaska General Code requirements. Meeting agendas and minutes are in the Appendix, as is a comprehensive matrix detailing all public comments received, their disposition, and how they were resolved or considered. All meetings were advertised and open to the public, using normal public notice procedures.

2024 Efforts:

The 2021 public input survey was recreated in 2024 and was distributed to capture additional public/stakeholder input from those that did not have the opportunity to participate in the 2021 survey.

The 2024 planning team met Bi-Weekly from August 1, 2024 through October 10, 2024 to review and revise the 2021 draft plan. After the completed revisions to the plan and mitigation strategy an additional public meeting was held on (insert date), public notice for the meeting was advertised in accordance with City and Tribal public notice requirements.

The MJHMP Planning Process is surmised in the following illustration:

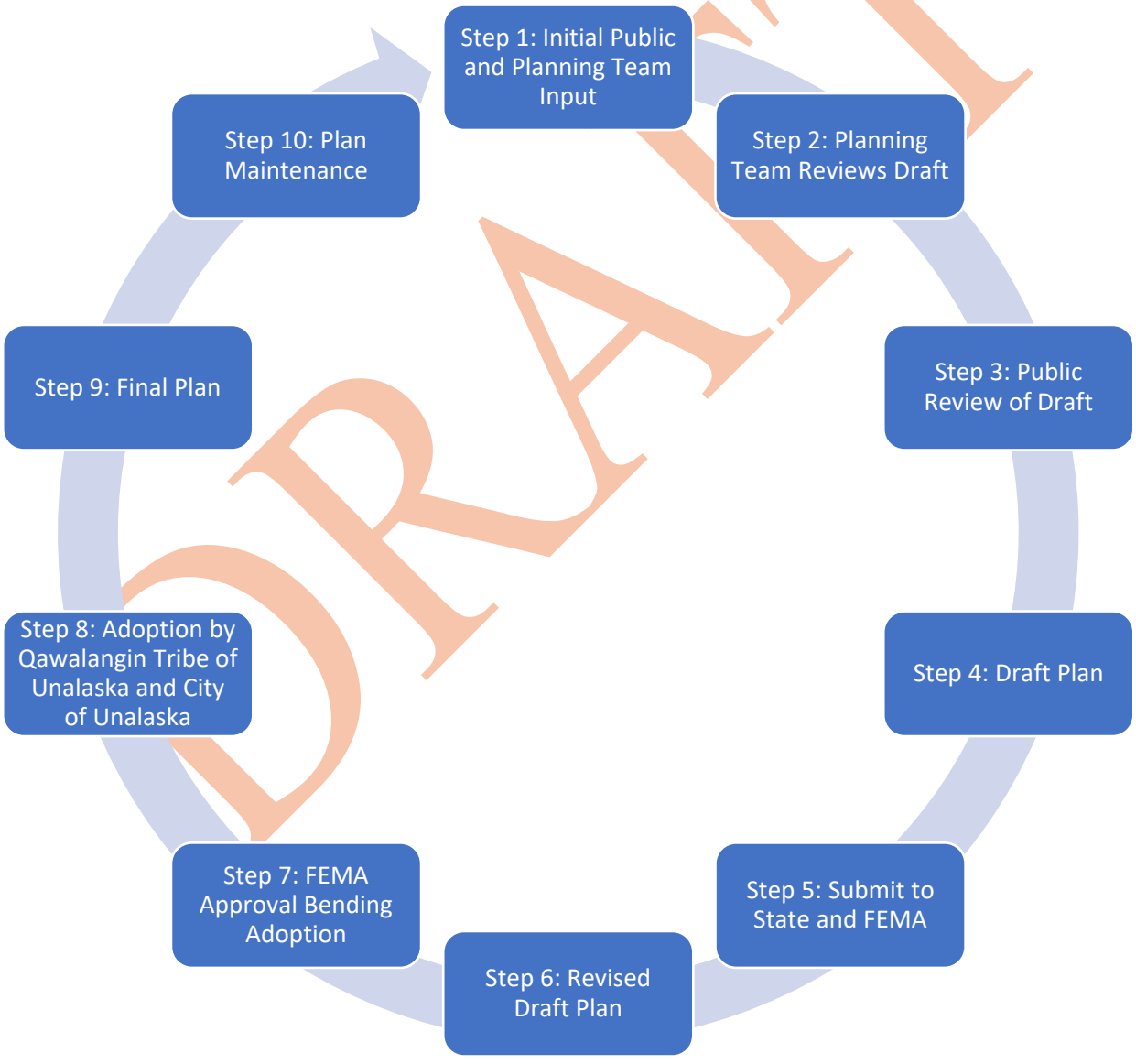

Figure 1: MJHMP Planning Process

Chapter 2 – Community Profile

2.1 Location and Geography

Unalaska overlooks Iliuliuk Bay and Dutch Harbor on Unalaska Island in the Aleutian Chain. It lies 800 air miles from Anchorage and 1,700 miles northwest of Seattle. The name Dutch Harbor is often applied to the portion of the city on Amaknak Island, which is connected to Unalaska Island by bridge. Dutch Harbor is within the boundaries of the City of Unalaska. Unalaska lies at approximately 53.873610 North Latitude and 166.536670 West Longitude.

The Qawalangin Tribal website provides a brief history of present-day Unalaska:

“The word Aleutian and the name "Aleut" was given to the native people by the first Russian explorers to visit the Aleutian Islands. Its meaning is unclear, so the present-day Natives of Unalaska and most of the Aleutian Islands prefer to call themselves Unangan, or the people of the passes. In the dialect of the eastern Aleutian Islands, the self-given term for this group of

Native peoples is Unangan; in the western dialect, Unangas. Collectively, Unangax̂ is the proper term for the Native people of the Aleutian region. This group of hunters, whalers, and fishers are the original inhabitants of the Aleutian Island Chain, predating the Russian settlement of the region by thousands of years.

Resources from the sea provided a livelihood for the Unangan people and still does today, for not only the Unangan, but also many residents of Unalaska. The harsh climate and unforgiving topography of the islands created a Unangan culture both rich in art and oral tradition that lives today and continues to grow and flourish in the present generation of Unangan People.

Language, Unangan dance, and medicinal plants are being brought back and used as they always were over thousands of years. The Unangan People are mostly widely known for their ultra-fine grass basketry, sleek and efficient wood-frame iqyan (skin boats made of wood frames and marine mammal skin) and mastery in handling these skin boats at sea. The Unangan People are also well-known for their excellence as marine mammal hunters, superior skin sewing and embroidery techniques, and beautiful, streamlined bentwood hats and visors. Historically, the Aleutian Island of Unalaska has been home to the Unangan People, who through oral history have documented an estimated 8,000 years of trade and travel.

Archaeological investigation in the Unalaska area gives evidence that the Unangan people have inhabited the Aleutian Islands for at least 9,000 years. Artifacts found in the archaeological site at Margaret Bay on the Island of Unalaska were ancient at the time the Egyptians were building the first step pyramids. By 1745, the Unangan People had meet Russian explorers, fur traders and hunters who came across the Bering Straits to the Aleutian Islands such as Unalaska. There were inevitable clashes between the Russians and the native islanders, as the Russian’s treatment of the Unangan was less than favorable. At this time, the explorers branded the Unangan/Unangas people with the name, "Aleut", a word of uncertain meaning and origin that has become a catchall name for various Alaska Native groups.

International commerce began in 1759 when Stephan Glotov and accompanying fur hunters spent two years on Unalaska and nearby Umnak Island. Soon under Russian control, the Unangan People were consolidated into fewer and fewer communities to accelerate the efficiency in which the Russians could take advantage of their hunting skills. The decline of the Unangan population was rapid and occurred for varied reasons, from genocide to contact diseases brought by the Russian newcomers. According to Unalaska resident Moses Dirks, a linguist specialist and teacher of the Unangan Language at the high school in Unalaska, the word Unangan means people of the passes. The Aleutian Islands are home to the earliest known continually inhabited coastal site in North America" (Qawalangin 2012).

The City of Unalaska's Comprehensive Plan 2020 (2020 Plan) provides some historical background for their community as: "Unalaska (Iluulux) in Aleut; (Уналашка) in Russian) is a city in the Aleutians West Census Area of the Unorganized Borough of the State of Alaska and is located on Unalaska Island and neighboring Amaknak Island in the Aleutian Islands off of mainland Alaska. The Unangan people, who were the first to inhabit the island of Unalaska, named it "Ounalashka" meaning "Near the Peninsula". The name Unalaska is probably an English variation of this name. The regional native corporation has adopted this moniker and is known as the Ounalashka Corporation. Dutch Harbor was so named by the Russians because they believed that a Dutch vessel was the first European ship to enter the harbor" (UCP 2011).

Figure 2: Unalaska Location within Alaska

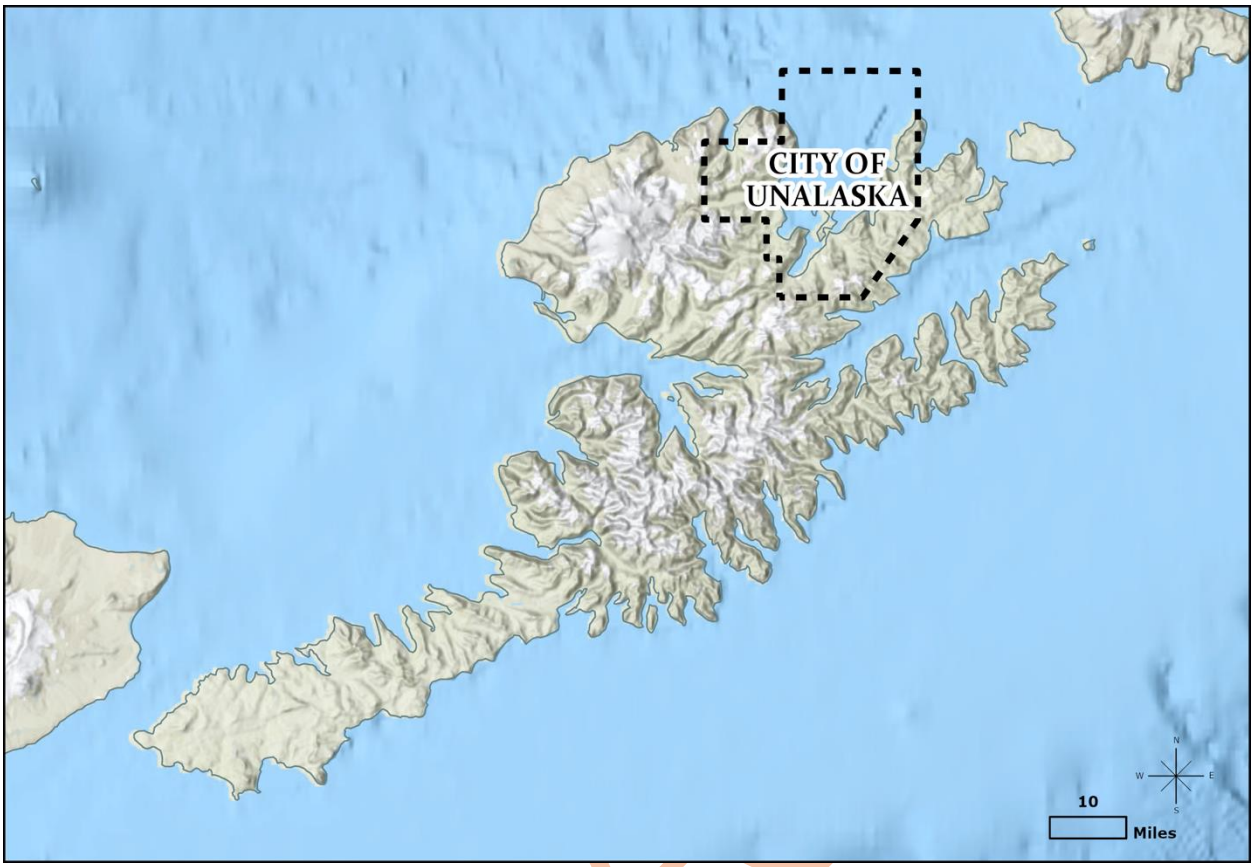

Figure 3: Unalaska Location on Unalaska Island

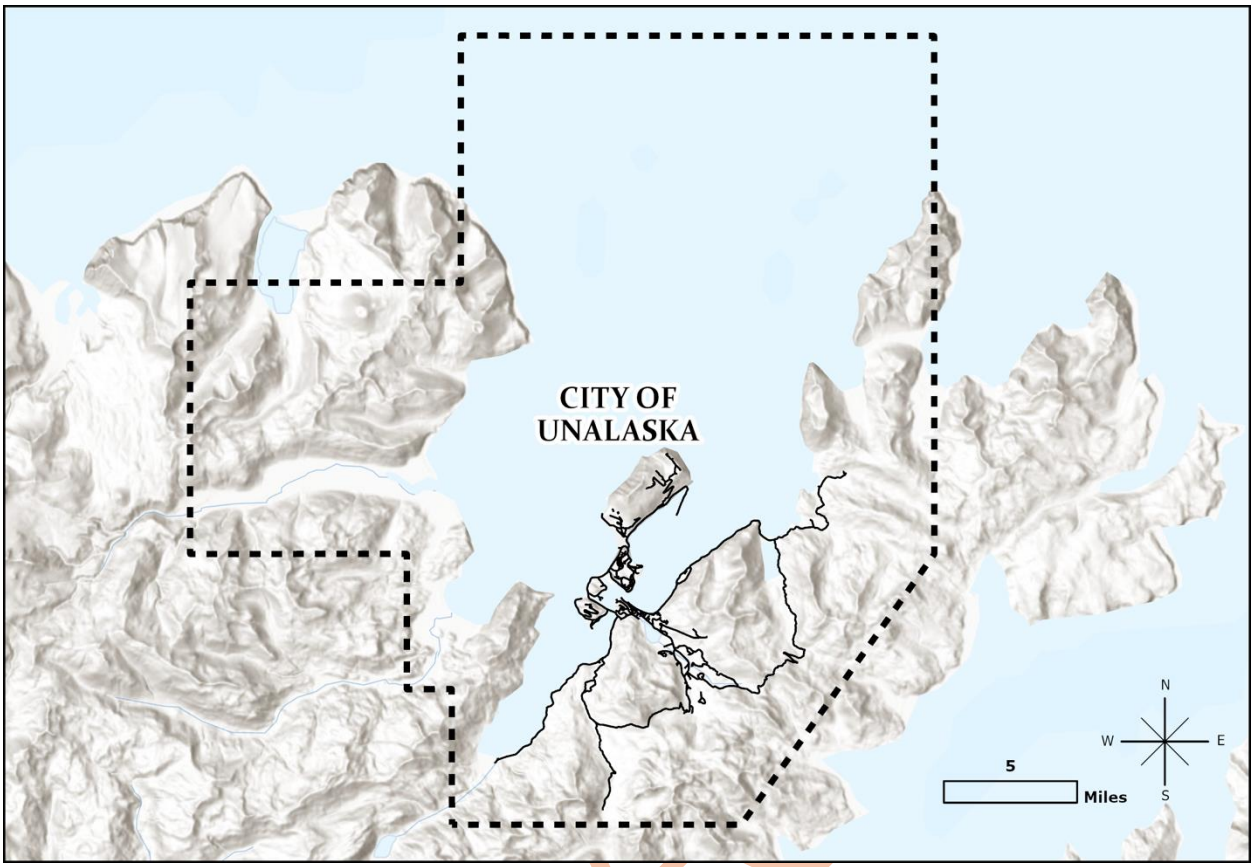

Figure 4: Unalaska City Limits

2.2 History

The history of the Unalaska region is rich and multifaceted, marked by significant events and developments over thousands of years.

15-20,000 Years Ago:

The first people to inhabit the Unalaska region are believed to have crossed into Alaska from Siberia via the Bering Land Bridge. These early settlers, known as the Unangan people (today's Aleuts), established a deep connection with the land and the sea, developing a rich culture and lifestyle centered around fishing, hunting, and gathering.

1741:

Russian ships first reached the Aleutian Islands. Fur hunters exploited the region's abundant resources, and Russians enslaved many Unangan inhabitants, disrupting their traditional way of life and introducing foreign diseases that significantly reduced the population.

1759:

Approximately 3,000 Unangan people utilized 24 locations on Unalaska and Amaknak Islands. During this period, international commerce began as Unangan people worked with Russian explorer Stephan Glotov and accompanying fur hunters.

1867:

The United States purchased Alaska from Russia, ending Russian control. This transfer of power brought new governance and economic opportunities to the region, although it also led to further exploitation of the Unangan people and their resources.

1880:

The Methodist Church opened a school, clinic, and the Jesse Lee Home for Orphans in Unalaska. These institutions provided much-needed services to the local population, including education and healthcare.

1880s:

Dutch Harbor flourished as a hub for coal and commercial trade, attracting settlers and businesses to the region.

1890s:

The Klondike Gold Rush brought many through the Unimak Pass, using it as a gateway to the northwest Alaska gold fields. This influx of prospectors and adventurers significantly impacted the local economy and infrastructure.

1900s:

Seafood processing plants were established to process herring, salmon, and whale meat, laying the foundation for Unalaska's future as a major seafood processing center.

1910:

Fox farming provided economic benefits to the area as the coal trade diminished due to the rise of oil use. This period saw diversification in the local economy.

1930s:

The Great Depression caused the collapse of the fur industry, leading to economic hardship for many in the region.

1942:

Military defense installations proved wise when Japanese aircraft attacked Dutch Harbor during World War II. This event marked Unalaska's significant role in the Aleutian Campaign and led to further militarization of the region.

1950:

The Aleutians renewed interest in fish processing with a focus on halibut, salmon, and king crab, revitalizing the local economy and establishing Unalaska as a key player in the seafood industry.

1960:

The king crab industry improved significantly, bringing prosperity to the region and attracting workers and businesses from around the world.

1989:

The Qawalangin Tribe of Unalaska was federally recognized as a sovereign nation of the United States. This recognition affirmed the Tribe's rights and sovereignty, allowing it to pursue self-governance and development initiatives to benefit its members.

1989 to Today:

For the Qawalangin Tribe:

Since gaining federal recognition in 1989, the Qawalangin Tribe of Unalaska has made significant strides in various areas to enhance the well-being of its members and the community. The Tribe has focused on cultural preservation, economic development, and social services, working to sustain and revitalize Unangan traditions and practices.

In the 1990s, the Tribe began to develop its administrative capacity, securing grants and funding to support health, education, and housing programs. The Tribe has been instrumental in advocating for the rights and needs of the Unangan people, ensuring that their voice is heard in local, state, and federal matters.

The early 2000s saw continued growth and development, with the Tribe expanding its services and infrastructure. This period included the establishment of community health initiatives, cultural programs, and environmental stewardship efforts. The Tribe also strengthened its partnerships with local, state, and federal agencies to enhance its capacity to serve its members.

In recent years, the Qawalangin Tribe has continued to advance its strategic goals. The Tribe has focused on economic development projects, including exploring opportunities in tourism, fisheries, and renewable energy. These initiatives aim to create sustainable economic growth and provide employment opportunities for Tribal members.

The Tribe has also prioritized education and youth programs, recognizing the importance of nurturing the next generation of leaders. By providing scholarships, educational support, and cultural programs, the Tribe ensures that young Unangans have the resources and opportunities to succeed.

The Tribe’s efforts in healthcare have also been notable, with the establishment of the Aleutian Pribilof Island Association (APIA) clinic, which provides comprehensive healthcare services to Tribal members. This facility ensures that the community has access to quality healthcare, addressing both physical and mental health needs.

Overall, the Qawalangin Tribe of Unalaska has made significant progress in asserting its sovereignty and improving the quality of life for its members. By focusing on cultural preservation, economic development, and social services, the Tribe continues to build a strong and resilient community.

For the City of Unalaska:

Since 1989, the City of Unalaska has experienced substantial growth and development, becoming a crucial hub for the fishing industry and other economic activities.

1990s:

The City continued to expand its infrastructure to support the growing seafood industry, which remains a vital part of the local economy. Investments were made in port facilities, roads, and public services to accommodate the increasing demands of commercial fishing and processing.

2000s:

The early 2000s saw significant improvements in public services and infrastructure. The City invested in modernizing its utilities, including water and wastewater systems, to support the growing population and industrial activities. Educational institutions also saw enhancements, with local schools receiving upgrades to better serve the community's youth.

2010s:

The City of Unalaska focused on sustainability and resilience. Environmental initiatives were launched to protect the local ecosystem, which is critical to the fishing industry. The City also worked on improving its emergency preparedness and response capabilities, recognizing the unique challenges posed by its remote location and harsh weather conditions.

2020s:

In the 2020s, the City has continued to prioritize infrastructure and economic development. The completion of the Aleutian Fiber Project by GCI in 2022 brought high-speed internet to the island, significantly enhancing connectivity for residents and businesses. This development has opened new opportunities for education, healthcare, and commerce.

The City also remains a leader in the seafood industry. Dutch Harbor consistently ranks as one of the top fishing ports in the United States, contributing significantly to the national seafood supply. The City's harbor and port facilities have been continually upgraded to support this thriving industry.

In recent years, the City has focused on diversifying its economy to reduce reliance on seafood processing. Efforts have been made to explore tourism and renewable energy as potential growth sectors. Additionally, the City has worked closely with the Qawalangin Tribe to ensure that development initiatives respect and integrate the cultural and historical significance of the area.

The partnership between the City of Unalaska and the Qawalangin Tribe has strengthened over the years, with both entities working together to enhance the well-being of all residents. This collaborative approach has ensured that Unalaska remains a vibrant and resilient community, capable of adapting to changing economic and environmental conditions.

(UCP 2011, Qawalangin 2012, DCRA 2012)

2.3 Government

The Qawalangin Tribe of Unalaska and the City of Unalaska collaborate closely to enhance the well-being and prosperity of the local community. This partnership includes joint efforts in areas such as cultural preservation, environmental stewardship, and economic development. Both entities prioritize maintaining the rich heritage and traditions of the region while fostering growth and resilience. Regular meetings and open communication channels ensure that both the City and the Tribe can address shared challenges and opportunities effectively, working together to create a vibrant and sustainable future for all residents.

The City of Unalaska was organized as a First Class City in 1942. Unalaska consists of a mayor and six council members, elected by the citizens. The vice mayor is selected to serve a one year term from among the council members shortly after the elections. Municipal elections are held the first Tuesday of October and each council member elected serves a three-year term. The Council meets for regularly scheduled meetings the second and fourth Tuesdays of each month.

The Qawalangin Tribe of Unalaska was federally recognized in 1971. The Tribe operates under a constitution and bylaws, governed by a Tribal Council consisting of seven members elected by the Tribe's citizens. Each council member serves a staggered three-year term, ensuring continuity within the governing body. Elections are held annually on the second Tuesday of October. The Tribal Council meets regularly on the first and third Wednesdays of each month to discuss and decide on matters important to the community and its members.

2.4 Demographics

Every June, the Commissioner of the Department of Commerce Community Economic Development certifies the community population figures. The 2010 population was 4,376 residents with a median age of 40.2.

The 2010 U.S. Census revealed that there are 927 households with the average household having approximately two individuals.2

Table 3: Demographics

Demographics	
Population by Race	
American Indian or AK Native	4.3%
Asian	43.27%
Black or African American	5.97%
Native Hawaiian or Pacific Islander	2.25%
White	31.59%
Other	6.65%
Two or More Races	5.9%
Population by Age	
Under 5	3.06%
5 to 9	5.84%
10 to 14	4.18%
15 to 19	4.97%
20 to 24	8.85%
25 to 34	19/24%
35 to 44	16.86%
45 to 54	19.36%
55 to 59	6.28%
60 to 64	6.11%
65 to 74	4.46%
75 to 84	0.55%
Over 85	0.0%
Sex	
Male	37.56%
Female	62.44%

According to the 2020 U.S. Census, the median household income in Unalaska was $94,750 with a per capita income of $35,461. Approximately 5.7% were reported to be living below the poverty level. The potential work force (those aged 16 years or older) in the City was estimated to be 3,850, of which 3,938 were actively employed. In 2010, the unemployment rate was 2.1%. However, this included part-time and seasonal jobs, and practical unemployment or underemployment is likely to be significantly higher.

It is important to recognize the distinction between the City of Unalaska's economic demographics and those of the Qawalangin Tribe of Unalaska. The City's economic data, heavily influenced by the fishing industry and city employees, shows a median household income of $94,750. In contrast, the Tribe's community economic demographics are considerably lower, estimated to be between $14,000 and $50,000. This significant disparity highlights the economic challenges faced by the Tribal community and underscores the importance of recognizing these differences for grant opportunities and the support of economically disadvantaged communities, thereby preserving Tribal Sovereignty.

2.5 Economy

Unalaska's economy is robust and multifaceted, with a strong foundation in the commercial fishing industry, supported by a diverse range of other economic activities.

Commercial Fishing and Seafood Processing

The commercial fishing industry is the cornerstone of Unalaska's economy. Dutch Harbor, a part of Unalaska, has consistently ranked as one of the top fishing ports in the United States by volume of seafood landed. The rich fishing grounds surrounding the Aleutian Islands provide abundant stocks of pollock, cod, halibut, crab, and other species.

Unalaska's seafood processing plants, including Westward Seafoods, Alyeska Seafoods, and UniSea, are major employers in the region, providing jobs for thousands of workers both year-round and seasonally. These facilities process millions of pounds of seafood annually, which are then distributed to markets worldwide. The industry not only supports local employment but also contributes significantly to the national seafood supply.

Port and Marine Services

Unalaska's strategic location and well-developed port facilities make it a critical hub for marine services. The Port of Dutch Harbor provides essential services to the commercial fishing fleet, including docking, refueling, maintenance, and repair. The port also serves as a transshipment point for goods and supplies destined for other parts of Alaska and the North Pacific.

The Department of Ports and Harbors manages and operates six city-owned marine facilities, including the United States Coast Guard (USCG) Dock, the Unalaska Marine Center (UMC) Dock, the Spit Dock, the Light Cargo Dock (LCD), the Robert Storrs International Small Boat Harbor (SBH), and Carl E. Moses Boat Harbor (CEM). These facilities are crucial for supporting the commercial fishing industry and other maritime activities.

Transportation and Logistics

Given its remote location, Unalaska relies heavily on air and sea transportation for the movement of people and goods. The Unalaska/Dutch Harbor Airport provides critical air links to the mainland, facilitating passenger travel and the shipment of high-value goods, including seafood. The airport's strategic importance is underscored by ongoing efforts to enhance its infrastructure and service capabilities.

The marine transportation sector is also vital, with regular cargo shipments arriving from the mainland United States and other regions. Companies like Horizon Lines and American President Lines (APL) play a key role in maintaining the flow of goods necessary for daily life and industrial operations in Unalaska.

Tourism

Tourism is a growing sector in Unalaska's economy, attracting visitors with its stunning natural landscapes, rich cultural heritage, and opportunities for outdoor recreation. Activities such as

wildlife viewing, birdwatching, hiking, and exploring historical sites related to World War II draw tourists from around the world. The Qawalangin Tribe of Unalaska and other local organizations are working to develop sustainable tourism initiatives that benefit the community while preserving the natural environment and cultural sites.

Renewable Energy

Unalaska is exploring renewable energy opportunities to diversify its economy and enhance sustainability. Wind and tidal energy projects are under consideration, leveraging the region's natural resources to reduce reliance on imported fuels and lower energy costs. These initiatives align with broader efforts to address climate change and promote environmental stewardship.

Collaboration with the Qawalangin Tribe

The Qawalangin Tribe of Unalaska plays a significant role in the local economy, particularly through initiatives aimed at economic development, cultural preservation, and social services. The Tribe's efforts in securing grants and funding for various projects contribute to the overall economic health and resilience of the community. Collaboration between the City of Unalaska and the Tribe ensures that economic development strategies are inclusive and beneficial to all residents.

Economic Challenges and Opportunities

Despite its strengths, Unalaska's economy faces challenges such as fluctuations in fish populations, the impacts of climate change, and the logistical complexities of its remote location. However, the community's resilience, strategic initiatives, and diversification efforts position it well to adapt to these challenges and seize new opportunities for growth.

Unalaska's economy remains dynamic and vital, driven by its natural resources, strategic location, and the ingenuity of its residents. The continued development of diverse economic sectors ensures a sustainable and prosperous future for the community.

2.6 Climate

Unalaska, located in the Aleutian Islands, experiences a maritime climate characterized by relatively moderate temperatures, high humidity, wind storms, and significant precipitation throughout the year. The climate is heavily influenced by the surrounding North Pacific Ocean and Bering Sea, which contribute to the area's unique weather patterns.

2.6.1 Temperature

The temperature in Unalaska tends to be mild, with small variations between summer and winter. Average high temperatures in the summer months (June through August) range from 50°F to 60°F (10°C to 16°C), while winter temperatures (December through February) typically range from 30°F to 40°F (-1°C to 4°C). Extreme temperatures are rare, and the maritime influence prevents both severe cold and intense heat.

Table 4: Unalaska Mean Temperature by Month

Month	Mean Max Temperature Normal (°F)	Mean Min Temperature Normal (°F)	Mean Avg Temperature Normal (°F)
January	37.3	28.7	33.0
February	38.6	29.4	34.0
March	38.9	29.2	34.1
April	41.8	32.5	37.1
May	46.7	37.4	42.0
June	52.3	42.4	47.3
July	57.4	46.6	52.0
August	59.3	48.1	53.7
September	54.6	44.2	49.4
October	48.1	38.4	43.2
November	43.3	33.2	38.2
December	39.3	30.6	35.0
Annual	46.5	36.7	41.6

2.6.2 Precipitation

Unalaska receives a substantial amount of precipitation, averaging around 60 inches (1524 mm) annually. This precipitation is relatively evenly distributed throughout the year, though the fall months tend to be the wettest (with 5 to 8 inches averaged a month) and summer months the driest (with 2-3 inches averaged a month). Rain is the most common form of precipitation, but snow can occur in the winter months (mainly falling between December and March), with about 80 inches (2032 mm) of annual snowfall received. The high levels of precipitation contribute to the lush, green landscapes that characterize the region.

Table 5: Unalaska Precipitation by Month

Month	Total Precipitation Normal (inches)
January	6.79
February	5.18
March	4.65
April	3.47
May	4.20
June	2.52
July	2.30
August	2.86
September	5.73
October	7.89
November	6.66
December	7.88
Annual	60.13

2.6.3 Wind

Strong winds are a common feature of Unalaska's climate, particularly during the fall and winter months. The region frequently experiences gale-force winds (35 knots (40mph) or more), and individual storms can bring even stronger gusts. These winds are a result of the area's position along the North Pacific storm track, where low-pressure systems regularly pass through.

2.6.4 Fog

Fog is another frequent occurrence in Unalaska, especially in the summer months. The interaction between the cool ocean waters and the relatively warmer air masses often leads to the formation of dense fog, which reduces visibility and impacts transportation and daily activities.

2.6.5 Climate Change Impact

Climate change poses potential challenges for Unalaska, as rising global temperatures and changing weather patterns may affect the region's natural environment and the livelihoods of its residents. Potential impacts include changes in fish populations, shifts in weather patterns, and increased frequency of extreme weather events. Both the City of Unalaska and the Qawalangin Tribe are actively monitoring these changes and developing strategies to mitigate their effects and enhance community resilience.

Overall, Unalaska's climate is a defining feature of the region, shaping its natural environment, lifestyle, and economic activities. The community's ability to adapt to and thrive in these conditions is a testament to the resilience and resourcefulness of its residents.

Chapter 3 – Asset Inventory

Before a community can develop its mitigation strategy, it needs to know what should be protected. The purpose of this chapter is to identify what needs to be protected, including Unalaska critical facilities. Unalaska has many other assets that should be protected, including its infrastructure and existing development.

3.1 Infrastructure

Infrastructure is the basic facilities and services needed for a community. Unalaska's infrastructure includes roads, water supplies, wastewater treatment plants, water and wastewater pipes, power plants, electrical lines, bridges, ports, airports, telecommunications equipment, schools, etc.

3.1.1 Education

Due to the size of Unalaska, there are three primary schools that serve the educational needs of the community's younger residents. In addition to these, there is also a higher education institution that provides opportunities for adult and continuing education.

3.1.1.1 Unalaska Schools

Table 6: Educational Facilities

Unalaska Schools	
School	Grades
Unalaska High School	5th – 12th
Eagles View Elementary	K – 4th
Unalaska Preschool	Pre-K/Pre-School

3.1.1.2 Higher Education

University of Alaska Fairbanks - Unalaska Learning Center: This learning center is part of the University of Alaska Fairbanks Bristol Bay Campus. It offers a variety of courses and programs tailored to the needs of the local community, providing opportunities for higher education and professional development. The center supports students in achieving their educational and career goals through access to university resources and personalized instruction.

These educational institutions collectively support the diverse learning needs of Unalaska's residents, from early childhood through adulthood, fostering a culture of lifelong learning and community development.

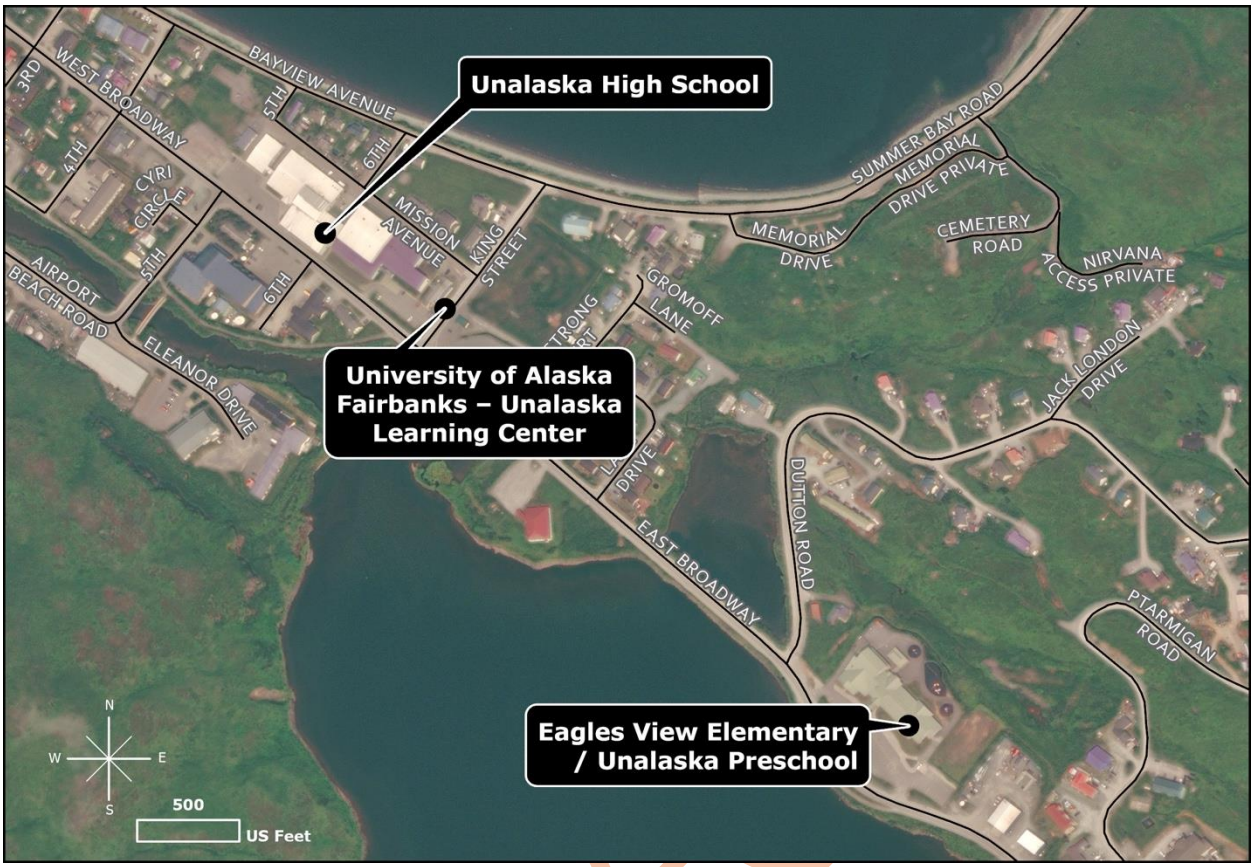

Figure 5: Map of Educational Facilities

3.1.2 Medical Care

The community's health care services are primarily provided by two key organizations: Iliuliuk Family & Health Services, Inc. (IFHS) and Aleutian Pribilof Island Association (APIA).

3.1.2.1 Iliuliuk Family & Health Services, Inc. (IFHS)

IFHS operates the local clinic for residents of Unalaska and the fishing fleet of the Bering Sea. They provide comprehensive primary medical care and behavioral health care. IFHS offers a full range of primary care services which include a diagnostic laboratory, preventive health care, urgent care and emergency services, alternative medicine options, mental health services, x-ray, ultrasound, prenatal care, postnatal home visits, domestic violence counseling, and health education and outreach. The clinic is staffed by family practice physicians, physician assistants, and family nurse practitioners. The medical support staff includes registered nurses, a case management team, medical assistants, emergency medical technicians/paramedics, and x-ray/lab technicians. Oral health care is provided through referrals to local dental providers. IFHS collaborates with local behavioral health counseling services to address community behavioral health needs. Primary care services provided by IFHS are on a sliding fee scale based on family size and household income.

3.1.2.2 Aleutian Pribilof Island Association (APIA)

APIA is the Indian Health Services (IHS) designated healthcare provider for the Qawalangin Tribe of Unalaska and serves as the HUB for the Aleutian Islands. Tribal members are required to seek medical care through APIA rather than IFHS. APIA is also the only Veteran Administration authorized contracted primary care facility on the island, addressing the unique healthcare needs of veterans within the community. APIA's inclusion in the Multijurisdictional Hazard Mitigation Plan is crucial as both IFHS and APIA are affected by hazard mitigation risk factors. Recognizing APIA's role ensures a comprehensive understanding of the healthcare landscape and supports the Tribe's ability to secure funding for risk mitigation improvements to its healthcare facility.

APIA operates the Oonalaska Wellness Center at

3.1.2.3 Additional Healthcare Services

In addition to the services provided by IFHS and APIA, two dentists visit the community on a regular basis throughout the year. Two chiropractic clinics also provide services to the people of the community, and an optometrist comes to Unalaska on a regular basis to address the vision needs of the community.

3.1.2.4 Medical Evacuation Services

LifeMed Alaska, a for profit private air medical transportation company, is the primary provider of air medical transport for patients from Unalaska to definitive care in Anchorage. LifeMed Alaska has a dedicated "Dutch Med Team" that resides in Unalaska 365 days a year.

Other agencies such as Guardian, Medevac Alaska, and the United States Coast Guard can be called in should LifeMed Alaska be unavailable on a different mission.

Table 7: Medical Facilities

Unalaska Medical Facilities	
Facility Name	**Address**
IFHS Clinic	34 Lavelle Ct.
APIA Oonalaska Wellness Center	34 Lavelle Ct. #A
APIA Behaviorial Health Clinic	205 W Broadway Ave.
Dutch Harbor Dental Clinic	179 Gilman Way #201
Aleutian Family Dentistry	159 Riverside Dr.
Arctic Chiropractic Unalaska	372 Bayview Ave
Arctic Chiropractic Dutch Harbor	125 Raven Way

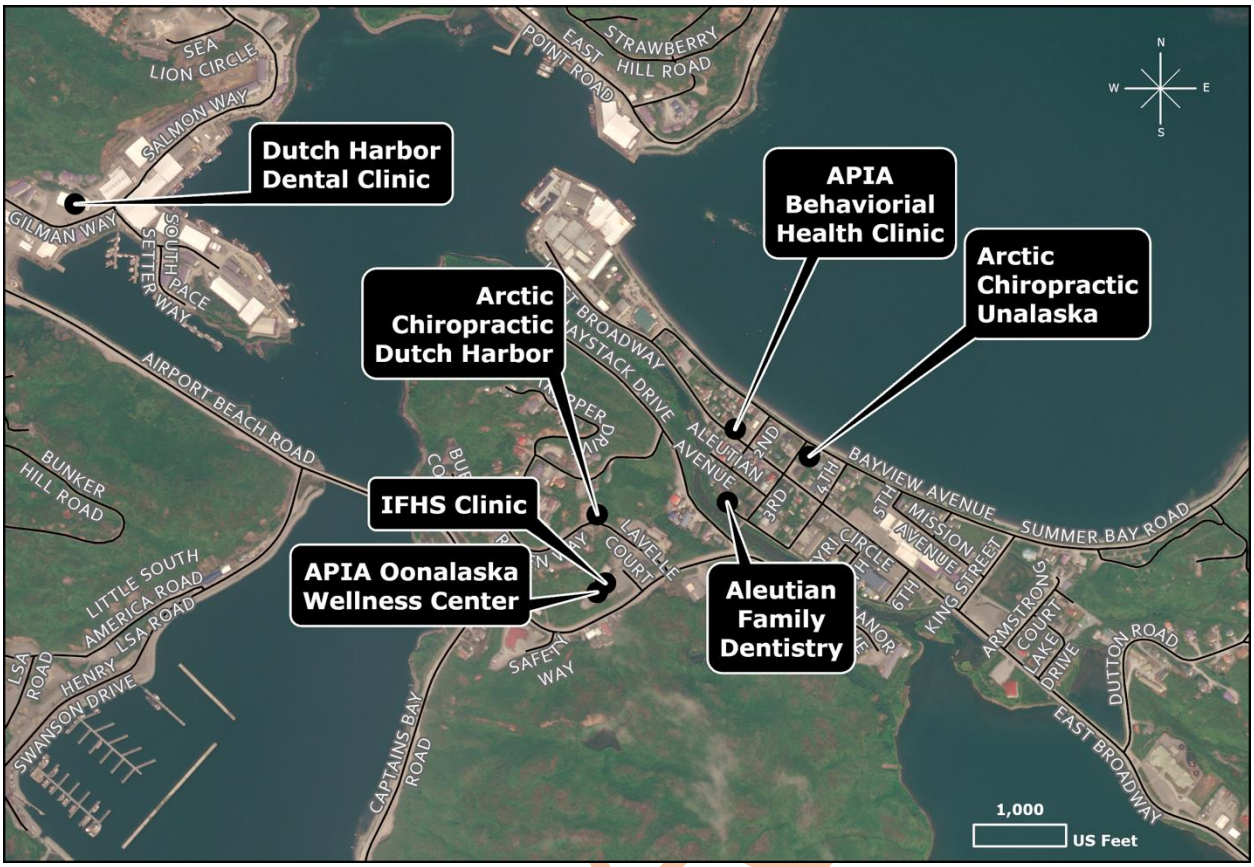

Figure 6: Map of Medical Facilities

3.1.3 Public Safety

3.1.3.1 Fire Department

Fire and Emergency Medical Services are provided by the City of Unalaska Fire Department, currently employing six career firefighters, an administrative assistant and a fire chief. Station 1 is staffed seven days a week from 0800 – 1800, with on-call response from the respective shift on duty from home. The fire department also have a volunteer roster of up to 40 members. The City of Unalaska Fire Department is a licensed advanced life support ground ambulance service and registered fire department.

3.1.3.2 Law Enforcement

Police protection is provided by the Unalaska Police Department and the Alaska State Troopers.

Patrol

The Patrol Division is the primary law enforcement entity for the City of Unalaska and the International Port of Dutch Harbor.

Corrections

The Unalaska City Jail is a temporary holding facility, owned and operated by the City of Unalaska. The jail has nine beds and is operated 24 hours a day, 365 days per year.

3.1.3.3 Tribal Authority

The Qawalangin Tribe of Unalaska holds the authority to own and operate its own justice programs exclusive of the City of Unalaska. Currently, the Tribe is investigating Department of Justice opportunities to create its own justice programs. Although the Tribe has not yet implemented these services, it retains the sovereign right to develop and manage public safety and justice services independently. The current operation of fire and law enforcement services by city entities is conducted under implied permission from the Tribe. Recognizing this authority is essential to maintaining the integrity of Tribal Sovereignty and supporting the Tribe's future initiatives in public safety and justice.

Table 8: Public Safety Facilities

Public Safety Locations	
Facility Name	Address
Fire Station 1	29 Safety Way
Fire Station 2	2713 Airport Beach Road
Police Department	29 Safety Way
Jail	29 Safety Way
Court Magistrate	204 W Broadway
Alaska Wildlife Troopers	2315 Airport Beach Rd. #101

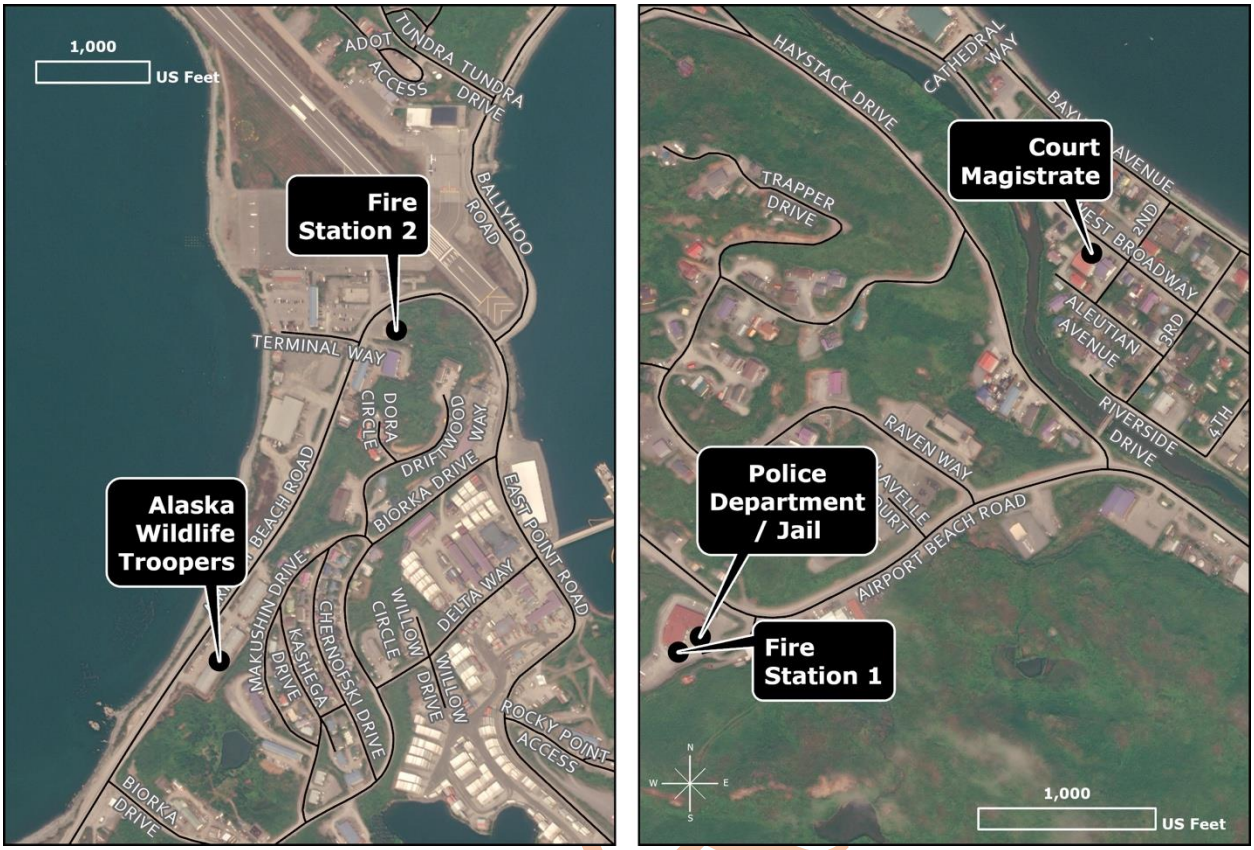

Figure 7: Map of Public Safety Facilities

3.1.4 Utilities

3.1.4.1 Water

The City of Unalaska water system provides drinking water to approximately 4,592 permanent residents within the City, as well as numerous fish processing facilities and industries. The water system currently has over 20 miles of water distribution main and approximately 572 metered water systems. Potable water is produced at the 6 million gallons per day (MGD) Pyramid Water Treatment Plant (WTP), which treats local surface water. Water for the treatment is collected from impoundments along the Icy Creek, known as Icy Lake and Icy Reservoir, and have a capacity of 57 and 9.62 million gallons (MG) respectively. In addition to surface water, the City also has four active well sites with a combined production capacity of 2,800 gallons per Page 34 of 70 minute (GPM). The City also has a fully operational Supervisory Control and Data Acquisition (SCADA) system that enables both remote monitoring and control over assets.

The City's historical water demands present a unique operational challenge owing to seasonal influx of transient population and fish processor water demands throughout the year. Between 5,000 to 6,000 transient people come to Unalaska during peak fishing season and processing times. This significant influx coupled with the increased water demand by industry causes large peaks and valleys in water demands. Demands can peak at nearly 7.25 MGD and drop as low as 1.5

MGD during off-peak seasons. For this reason, it is necessary for the City to have large untreated raw water storage capacity available to offset the peak demands throughout the year.

3.1.4.2 Wastewater

The City of Unalaska wastewater collection system consists of 18 miles of gravity sewer and force mains with 12 lift stations that transport wastewater to a chemically enhanced primary treatment facility before discharging into South Unalaska Bay. The City's wastewater treatment plant (WWTP) serves both the City of Unalaska and Amaknak Island. It is a primary treatment facility that removes solids from domestic and industrial wastewater with a rotary sheer screen, followed by disinfection using ultraviolet radiation. Screened solids are disposed of at the City's municipal landfill. The City's landfill contributes leachate to the collection system and is a source of biochemical oxygen demand (BOD) loading to the facility.

Based on historical data wastewater average day flow is 0.41 million gallons per day (MGD) with a maximum daily flow of 0.90 MGD, resulting in a peaking factor of approximately 2.17. The peaks and lows in wastewater production are less dramatic than observed in the water production as can be seen in figure on the following page, which is likely due to a number of the fish processing facilities having their own discharge permits. The wastewater influent to the WWTP is projected to have a minor increase over the next 20 years to approximately 0.49 MGD average day flow and a peak flow of 1.06 MGD.

3.1.4.3 Electricity

The City of Unalaska operates two co-located power plants and one remote mobile power module. The primary facility, NPH, was built in 2011 and contains four diesel 4.16 kV generators. These units comprise the only power generation the City operates to meet its current demand. The four generating units consist of two Wartsila 12V32 units rated at 5.2 megawatts (MW) each and two Caterpillar C280-16 units rated at 4.4 MW each, for a total nominal output of 19.2 MW.

The City of Unalaska is home to many large industrial customers including Westward Seafoods, Alyeska Seafoods, UniSea, Horizon Lines, American President Lines (APL). Historically, these customers have provided their own power as the City did not have the generation and distribution capacity to support them. However, the City has built up its electrical infrastructure and is now supporting a large portion of the fishing industry. It is the City's goal to increase its infrastructure to provide on-Island support to all consumers.

3.1.4.4 Tribal Authority

The Qawalangin Tribe of Unalaska and the Ounalashka Corporation (OC) retain the authority to provide utilities to Tribal Members separate and apart from the City of Unalaska. As the entire Island of Unalaska is considered Tribal lands, this acknowledgment is crucial for preserving Tribal Sovereignty. The Tribe and OC are actively pursuing opportunities to develop and enhance their own utility infrastructure to better serve their communities. Recognizing the goals of the Tribe and OC alongside the City's infrastructure plans ensures a comprehensive approach to utility services on the island, supporting the Tribe's ability to secure funding for utility infrastructure improvements and maintaining the integrity of Tribal Sovereignty.

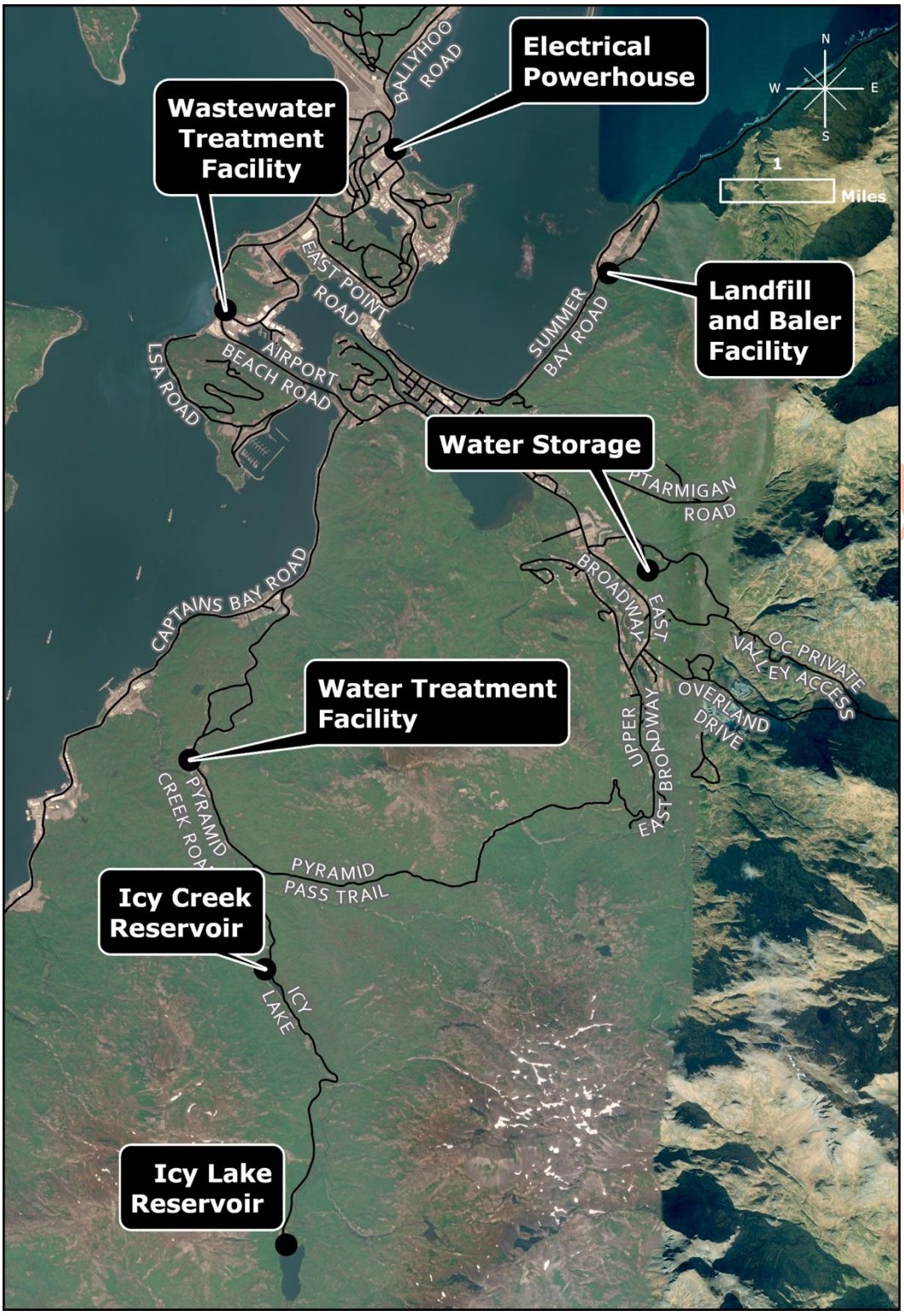

Figure 8: Map of Utilities Facilities

3.1.5 Transporation

3.1.5.1 Roads

The City of Unalaska has 42 miles of road in the existing roadway network. The Roads Public Works Department (PWD) identifies 6.6 miles of road as paved, with the remaining 35.4 miles of road consisting of unpaved or having a class 2 gravel surface. However, high costs for construction and weather conditions relevant to the island's remote location demands a more realistic approach for the PWD to gradually increase the paved roads inventory while effectively maintaining the level of service for existing facilities.

In addition to the City's efforts, the Qawalangin Tribe of Unalaska operates a Bureau of Indian Affairs (BIA) Roads program, which assists with the maintenance of both city and Tribal lands. This collaborative effort is essential for the comprehensive maintenance and development of the island's road infrastructure.

3.1.5.2 Airport

The Unalaska/Dutch Harbor Airport, also commonly known as "Tom Madsen Airport," began as part of the Naval Air station commissioned in September of 1941 during WWII. In June of 1942, work started with a gravel runway, 500 feet wide by 4,358 feet long, along Mount Ballyhoo's southern foot. The first record of a plane landing occurred on July 3, 1942. This runway continues to support peninsula air travel to this day for the community. The City wants to improve direct service by allowing for larger aircraft with daily scheduled service.

The Ounalashka Corporation (OC) directly owns the airport lands and all the surrounding lands, playing a critical role in the management and future development of the airport. Recognizing OC's ownership and involvement is crucial for supporting the overall transportation infrastructure on the island.

3.1.5.3 Harbor and Ports

For more than 30 years, Unalaska's economy has been primarily driven by commercial fishing, seafood processing, and providing marine services. According to a 2018 study conducted by the National Oceanic and Atmospheric Administration (NOAA), Unalaska's Port of Dutch Harbor has been a significant contributor to the U.S. Commercial Fisheries and Seafood Industry for 22 consecutive years. Unalaska's Port of Dutch Harbor led the nation, producing 763 million pounds of seafood, constituting 14.5% of the national totals valued at more than USD 180M. The goals for Harbor & Port Operations moving forward are to continue leading the nation in production, continuing to find opportunities to build and expand operations, and diversify port support services.

Currently, the Department of Ports and Harbors manages, maintains, and operates six City owned marine facilities: The United States Coast Guard (USCG) Dock, the Unalaska Marine Center (UMC) Dock, the Spit Dock, the Light Cargo Dock (LC D), the Robert Storrs International Small Boat Harbor (SBH), and Carl E. Moses Boat Harbor (CEM).

Additionally, the Ounalashka Corporation (OC) maintains and operates a port facility, contributing significantly to the island's marine infrastructure. Acknowledging OC's role in port operations is essential for a comprehensive understanding of the island's transportation and economic landscape. This recognition also supports the Tribe and OC's efforts to obtain future funding for their programs, maintaining the integrity of Tribal Sovereignty.

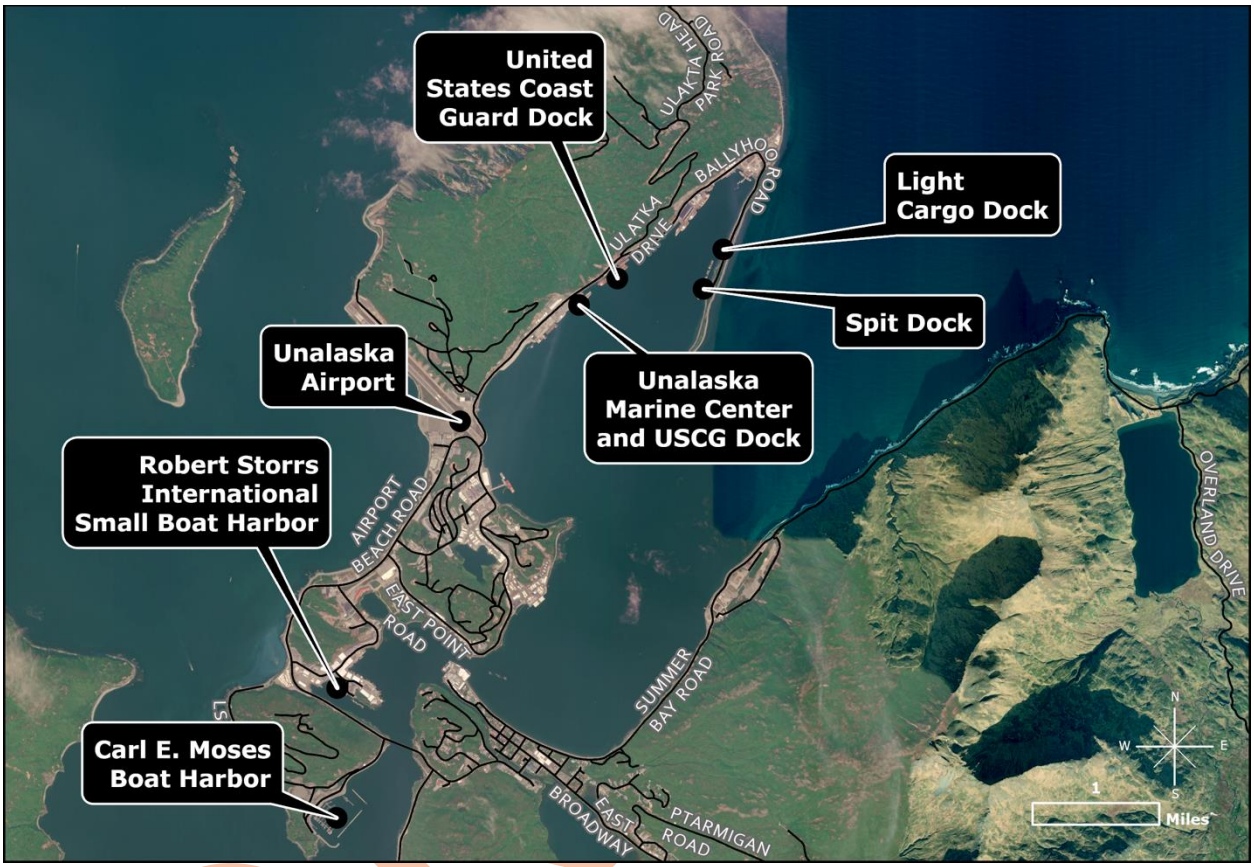

Figure 9: Map of Transportation Facilities

3.1.6 Communications

The City of Unalaska has recently made significant strides in improving its communications infrastructure. In late 2022, GCI completed the Aleutian Fiber Project, turning on 2.5GB internet service, which has dramatically enhanced broadband internet access on the island. This new fiber optic connection has brought reliable and high-speed internet to Unalaska, addressing the previous limitations and helping the community keep pace with global digital transformation.

In addition to GCI, other telecom and internet service providers play vital roles in ensuring comprehensive communications services for the residents of Unalaska and Dutch Harbor:

TelAlaska provides a range of telecommunications services, including local and long-distance telephone service, as well as internet access.

Starlink, the satellite internet service from SpaceX, offers high-speed satellite internet options, providing an alternative solution for areas that might still experience connectivity challenges.

OptimERA is another key provider, offering broadband internet services and working to improve the overall connectivity on the island. OptimERA has been instrumental in deploying wireless internet solutions and continues to expand its service coverage to meet the growing demands of the community.

These advancements in communications infrastructure are crucial for supporting the economic, educational, and social needs of the community. The combined efforts of GCI, TelAlaska, Starlink, and OptimERA ensure that Unalaska's residents and businesses have access to the modern telecommunications services necessary for a connected and resilient future.

3.1.7 Historical Sites

According to the National Register Information System, the City of Unalaska has the following sites listed on the National Register of Historic Places. The State Historic Preservation Office's (SHPO) Alaska Heritage Resources Survey (AHRS) has many more sites considered historically significant within Unalaska. Because the AHRS has numerous entries and is not available to the public, information about these sites is not listed here.

Table 9: Historic Sites

National Register of Historic Places		
Name	Address	National Register Information System ID
Holy Ascension Orthodox Church	265 West Broadway Avenue	70000112
Sitka Spruce Plantation	N/A	78000513
Dutch Harbor Naval Operating Base and Fort Mears, U.S. Army	Amaknak Island	85002733

Figure 10: Map of Historic Site Locations

Chapter 4 – Hazards in the City of Unalaska

One of the requirements of a hazard mitigation plan is that it describes the hazards that affect a jurisdiction. This chapter profiles the hazards that occur in the within the area by identifying each hazard's location, extent, previous occurrences, and the likelihood of future events. The City and Tribe are collocated within the City of Unalaska. The Tribe does not own land within the City but provides operational funding to Tribal facilities within the City. Additionally, the population of the Tribe lives within the City.

It is important to remember that the information listed in this chapter is meant to provide an overview of each hazard. While based on the best available information, the information is for planning purposes and should not be used for purposes which it was not intended such as securing permits, or for construction.

As part of this update, the City of Unalaska Departments, along with several state and federal agencies, were contacted to find out if new information was available. When available, the additional information was incorporated into the plan. Each hazard is assigned a rating based on the following criteria for probability.

Table 10: Hazard Probability

Hazard Probability	
Probability	**Criteria**
Highly Likely	• Event is probably within the calendar year • Event has up to 1 in 1 year's chance of occurring (1/1=100%) • History of events is greater than 33% likely per year • Event is "Highly Likely" to occur.
Likely	• Event is probable within the next three years • Event has up to 1 in 3 year's chance of occurring (1/3=33%) likely per year. • History of events is greater than 20% but less than or equal to 33% likely per year. • Event is "Likely" to occur
Possible	• Event is probable within the next five years. • Event has up to 1 in 5 years' chance of occurring (1/5=20%). • History of events is greater than 10% but less than or equal to 25% likely per year. • Event could "Possibly" occur.
Unlikely	• Event is possible within the next 10 years. • Event has up to 1 in 10 year's chance of occurring (1/10=10%). • History of events is less than or equal to 10% likely per year. • Event is "Unlikely" but is possible to occur.

Table 11: Hazard Magnitude

Hazard Magnitude	
Magnitude	**Criteria**
Catastrophic	• Multiple deaths. • Complete shutdown of critical facilities for 30 or more days. • More than 50% of property is severely damaged.
Critical	• Injuries and/or illnesses result in permanent disability. • Complete shutdown of critical facilities for at least two weeks. • More than 25% of property is severely damaged.
Limited	• Injuries and/or illnesses do not result in permanent disability. • Complete shutdown of critical facilities for more than one week. • More than 10% of property is severely damaged.
Negligible	• Injuries and/or illnesses are treatable with first aid. • Minor quality of life lost. • Shutdown of critical facilities and services for 24 hours or less. • Less than 10%of property is severely damaged.

4.1 Natural Hazards

Natural hazards are unexpected or uncontrollable events caused by nature, such as earthquakes, floods, or volcanic eruptions. In some cases, although rare, they can be human triggered, such as a human-triggered avalanche. The impacts of a natural hazard can also be worse based on human development and changes to the landscape.

4.1.1 Earthquakes

An earthquake is the shaking of the Earth's surface caused by the sudden release of energy in the Earth's crust. Most large earthquakes result from the release of accumulated stresses as tectonic plates move against each other. Additionally, earthquakes can occur along faults within these plates. The primary dangers associated with earthquakes include ground shaking, ground failure, surface faulting, and secondary hazards such as landslides and tsunamis.

Ground Shaking

Ground shaking is the primary cause of damage during an earthquake. It results from seismic waves generated by the earthquake. There are three main types of seismic waves:

- **Primary waves (P waves):** These are the fastest seismic waves, often felt as a sharp jolt.
- **Secondary waves (S waves):** These waves travel slower than P waves and produce a side-to-side motion. They can be particularly damaging because structures are generally more vulnerable to horizontal than vertical motion.

- **Surface waves:** Although the slowest, these waves often carry the bulk of the energy in a large earthquake and can cause significant damage.

The intensity of ground shaking depends on various factors, including the earthquake's magnitude, the geology of the area, distance from the epicenter, building design, and local construction practices. The extent of damage to buildings depends on how the characteristics of each incoming wave interact with the building's height, shape, and construction materials.

Surface Faulting

Surface faulting occurs when the Earth's surface experiences differential movement along a fault line. There are three primary types of faults:

- **Strike-slip faults:** Horizontal movement occurs on either side of the fault.
- **Normal faults:** One side of the fault drops down relative to the other.
- **Thrust (reverse) faults:** One side of the fault is pushed up and over the other.

Secondary Hazards

Secondary hazards from an earthquake can include seismically induced ground failure, snow avalanches, tsunamis, landslides, and infrastructure failure. These will be discussed in greater detail in other sections of the plan.

Magnitude and Intensity

Earthquakes are measured by their magnitude and intensity:

- **Magnitude** refers to the amount of energy released during an event. It is usually reported using the Richter scale (ML) for small to moderate earthquakes and the moment-magnitude scale (MW) for larger events.
- **Intensity** refers to the effects on people and structures at a particular location. It is usually reported using the Modified Mercalli Intensity (MMI) scale, which has 12 categories ranging from not felt to destruction. Different MMI values can be recorded at different locations for the same event, depending on local factors such as distance from the epicenter and building practices.

Location

According to the Alaska Earthquake Center, Unalaska faces a significant threat from earthquakes, particularly from the subduction of the Pacific Plate beneath the North American Plate.

History

The U.S. Geological Survey (USGS) database lists 32,342 earthquakes that have occurred within 100 miles (160 km) of Unalaska in the past 100 years, since 1924. Unalaska also experiences shaking from more distant earthquakes, but this analysis focuses on events within 100 miles of the city.

The three most significant earthquakes during this period were:

- A magnitude 7.8 earthquake located 76 km east of Nikolski in 1965,
- A magnitude 7.1 earthquake located 39 km south of Akutan in 1957,
- A magnitude 6.9 earthquake located 67 km southwest of Unalaska in 1987.

The U.S. Geological Survey (USGS) database lists 171 earthquakes of magnitude 5.0 or greater that have occurred within 100 miles (160 km) of Unalaska since 1924. The following table highlights the 20 largest of these events, ordered by magnitude.

Table 12: Top 20 Largest Earthquakes Within 100 Miles of Unalaska

Top 20 Largest Earthquakes (Magnitude 5.0 and Above) Within 100 Miles of Unalaska (1924–Present)

Date Time (UTC)	Latitude	Longitude	Depth	Magnitude
1965-07-02T20:58:40.260Z	52.99	-167.739	45	7.8
1957-03-22T14:21:15.060Z	53.778	-165.771	46.6	7.07
1980-03-24T03:59:51.300Z	52.969	-167.67	33	6.9
1987-02-27T08:31:54.400Z	53.47	-167.291	10	6.9
1957-03-29T05:10:33.600Z	53.312	-166.949	25	6.84
1955-01-13T02:03:48.850Z	53.141	-167.701	17.6	6.82
2003-02-19T03:32:36.360Z	53.645	-164.643	19	6.6
1946-10-30T07:47:37.440Z	53.714	-164.714	30	6.55
2009-10-13T05:37:23.690Z	52.754	-166.997	24	6.5
1974-02-06T04:04:07.200Z	53.799	-164.672	2	6.5
1955-01-13T02:35:51.810Z	53.031	-167.613	40	6.45
1944-07-27T00:04:28.470Z	54.487	-165.08	65	6.43
1957-03-17T22:44:53.780Z	53.823	-165.218	45	6.42
1957-03-15T02:52:14.680Z	52.762	-167.129	25	6.41
2009-10-13T20:21:53.200Z	52.604	-167.118	14	6.4
1957-11-20T12:40:31.150Z	53.756	-164.648	25	6.4
1952-01-12T20:11:43.690Z	52.64	-166.906	25	6.31
1958-06-12T20:53:05.930Z	52.658	-166.983	35	6.31
1975-11-30T20:30:17.000Z	52.599	-167.184	24	6.3
1989-05-19T02:21:56.380Z	54.305	-165.574	104	6.3

Vulnerability

An earthquake has the potential to significantly impact the City of Unalaska. The extent of damage to structures and infrastructure will depend on several factors, including the earthquake's magnitude, location, and frequency. Building type also plays a crucial role in determining vulnerability; for example, unreinforced masonry buildings are generally more susceptible to

earthquake damage compared to wood-framed structures. Additionally, critical infrastructure such as roads, bridges, and utilities are at risk, with disruptions potentially hindering emergency response efforts.

The entire population of Unalaska, including existing residents, transient populations, and future inhabitants, as well as residential structures and critical facilities, is exposed to the effects of a catastrophic earthquake. For this vulnerability assessment, it is estimated that 50% of the population, residences, and facilities would be affected in the event of a significant earthquake. The following table quantifies the potential impacts on Unalaska's population, facilities, and infrastructure in the event of a significant earthquake.

Table 13: Earthquake Community Affects

Community Affects from an Earthquake		
Affected	Facilities	Approximate Value
2,171 persons	553 Residences	$104,959,400
125 persons	6 Government Facilities	$9,098,690
25 persons	4 Emergency Facilities	$14,568,669
504 persons	6 Educational Facilities	$29,466,700
>560 persons	20 Community Facilities	$>99,987,330
41 miles	Asphalt and Gravel Roads	$3,813,330
Bridges	4 Bridges	$41,846,933
450 persons	10 Transportation Facilities	$160,907,231
26 persons	13 Utilities	$185,060,000

Future impacts on populations, residential structures, critical facilities, and infrastructure are anticipated to mirror historical levels of impact. Details on existing infrastructure are provided in Chapter 3.

Probability of Future Events

Unalaska experiences an average of three earthquakes exceeding magnitude 5.0 each year. Additionally, earthquakes of magnitude 6.0 or greater have historically occurred within a 24-month period. This represents a significant threat, as damage to aircraft and marine infrastructure could isolate the community from emergency response efforts and critically needed assistance.

While it is impossible to predict the exact timing of an earthquake, the USGS Earthquake Hazard Mapping model indicates that Unalaska has a 2% probability of experiencing ground acceleration between 0.80 and 1.20 g within the next 50 years. This level of ground shaking could result in severe damage, emphasizing the need for ongoing preparedness and mitigation efforts.

4.1.2 Tsunami

Location

The UAF/GI indicates there is a minimal threat from distant source tsunamis; however, they indicated an Aleutian Trench generated tsunami could generate a two-meter-high tsunami that could come into Unalaska Bay. (UAF/GI 2012).

The State of Alaska, the University of Alaska Fairbanks, Geophysical Institute (UAF/GI), and the National Oceanic and Atmospheric Administration's (NOAA) Pacific Marine Environmental Laboratory indicate that Unalaska has a minor tsunami impact threat. Many believe their relatively-protected location on the northern side of the island – away from Aleutian Trench created tsunami sources would protect them from severe impacts. However, the UAF/GI conducted tsunami models that demonstrates the harbor and airport areas may receive significant water current impacts with whirlpools as depicted in Figure 5-9, the UAF/GI's "specific scenario" model sequence - 65 minutes to 105 minutes series.

Table 14: Tsunami Wave Heights at Dutch Harbor

Aleutian Tsunamis – Waves at Dutch Harbor					
Date	Location	Earthquake Magnitude	Wave Height in Meters	Source Latitude	Source Longitude
November 10, 1938	Alaska Peninsula	8.2	0.1	54.48	-158.37
April 1, 1946	Near Unimak Island, Eastern Aleutian Islands, AK	8.6	Unknown	25.8	-163.50
March 9, 1957	South of Andreanof Islands, Central Aleutian Islands, AK	8.3	Unknown	51.5	-175.70
March 27, 1964	Prince William Sound	9.2	0.35	61.05	
February 4, 1965	Rat Islands, Western Aleutian Islands, AK	8.7	0.1	51.29	-178.49
May 7, 1986	Central Aleutian Islands, AK	8.0	0.15	51.52	-166.54
February 21, 1991	Bering Sea	6.7	0.15	58.43	-175.54
June 10, 1996	Central Aleutian Islands, AK	7.9	0.6	51.56	-177.63

On January 23, 2018, a 7.9 magnitude earthquake occurred near Kodiak, and a tsunami warning was issued. A buoy in Unalaska predicted a 30-foot tsunami wave, but the wave was a few inches in reality.

Vulnerability

Potentially, threatened facilities located below the 30 ft elevation.

Table 15: Tsunami Community Affects

Community Affects from a Tsunami		
Affected	Facilities	Approximate Value
70 persons	5 Government Facilities	$194,935
10 persons	2 Emergency Facilities	$33,434
482 persons	6 Educational Facilities	$1,473,335
380 persons	14 Community Facilities	$3,521,579
Bridges	2 Bridges	$1,501,426
410 persons	9 Transportation Facilities	$7,186,866
12 persons	3 Utilities	$398,991
40 persons	1 Medical Facility	$85,470

Probability of Future Events

Unalaska has a minor tsunami impact history. While it is not possible to predict when a tsunami will occur, Dr. Elena Sulemani, University of Alaska Fairbanks' tsunami threat assessment supports NOAA's SIFT model. Therefore, a distant source tsunami is "Possible" to occur, but the recurrence interval is unknown. Too many factors determine when the next event will occur, as supported by known bathymetric conditions surrounding Unalaska Island.

Based on historic earthquake events, UAF/GI, the University of Washington, and the Pacific Marine Environmental Laboratory information, the magnitude and severity of earthquake impacts to Unalaska are considered "Limited" with injuries and/or illnesses that do not result in permanent disability; complete critical facility shutdown for more than one week, and more than 10% of property could be severely damaged.

Impacts to future populations, residential structures, critical facilities, and infrastructure are unpredictable due to several complex factors, such as tsunami generating source, distance from community and originating direction of source wave.

4.1.3 Wildfires

A wildfire is an uncontrolled fire spreading through wildland vegetative fuels and/or urban interface areas where fuels may include structures. They often begin unnoticed, spread quickly, and are often generating smoke that may fill the area for miles around. Wildfires can be human caused through acts such as arson or campfires or can be caused by natural events such as lightning. If not promptly controlled, wildfires may develop into an emergency. Even small fires can threaten lives, resources, and destroy improved properties.

The indirect effects of wildfires can also be catastrophic. In addition to stripping the land of vegetation and destroying forest resources and personal property, large, intense fires can harm the soil and waterways. Soil exposed to intense heat may temporarily lose its capability to absorb

moisture and support life. Exposed soils in denuded watersheds erode quickly and are easily transported to rivers and streams thereby enhancing flood potential, harming aquatic life, and degrading water quality. Lands stripped of vegetation are also subject to increased landslide hazards.

History

The City faced unprecedented back-to-back wildfires in April 2020- Spilt Top Mountain on April 17th and Mt. Ballyhoo on April 29th.

Figure 11: Split Top Mountain brush fire – April 17, 2020

Figure 12: Mt. Ballyhoo brush fire – April 29, 2020

Vulnerability

The precise location of structures affected by wildfires will vary based on their size and proximity. Unalaska, a sparsely populated island with limited forests, primarily consists of a tundra ecosystem characterized by mosses, grasses, and low shrubs and bushes, such as blueberries. Consequently, large, fast-moving wildfires are unlikely to occur due to the prevailing winds. However, large, slow-moving tundra fires are possible and pose significant challenges in extinguishing.

The direct vulnerability of most structures is limited. Typically, extensive lot clearing required for construction eliminates tundra vegetation, exposing structures to a combination of bedrock, gravel, or crushed rock. Only a few critical facilities are directly exposed to wildfire, as outlined in Appendix C.

The primary vulnerability of Unalaska lies in the potential for large, uncontrolled tundra fires. Such fires could generate smoke that reduces visibility, potentially disrupting the airport's operations for an extended period. The airport relies on air deliveries for essential supplies and perishable food, making it susceptible to disruptions caused by wildfire smoke.

Probability of Future Events

The probability of wildfire incidents for Unalaska are influenced by numerous factors including vegetation densities, climatic conditions such as temperature, humidity, and wind, ignition source (human or natural), topographic aspect and slope, and remoteness of area. Although Unalaska has had 2 wildfires in 2019, not to mention within days of each other, the probability is "Possible" for future events.

Table 16: Wildfire Community Affects

Community Affects from a Wildfire		
Affected	Facilities	Approximate Value
2,171 persons	553 Residences	$104,959,400
125 persons	6 Government Facilities	$9,098,690
25 persons	4 Emergency Facilities	$14,568,669
504 persons	6 Educational Facilities	$29,466,700
>560 persons	20 Community Facilities	$>99,987,330
450 persons	10 Transportation Facilities	$160,907,231
26 persons	13 Utilities	$185,060,000

4.1.4 Extreme Weather

Extreme weather is a broad category that includes snow, heavy rain, extreme cold, ice storms, high winds, flood, avalanche, and landslides. High winds, ice storms, and heavy snow are the most likely types of extreme weather in the Unalaska.

4.1.4.1 Snow

The National Weather Service defines heavy snow as snowfall accumulating to four inched or more in depth in twelve hours or less or snowfall accumulating to six inches or more in depth in twenty-four hours or less.4

Until the snow can be removed, airports and roadways experience delay, or are closed completely, stopping the flow of traffic, supplies and disrupting emergency and medical services. Heavy snow loads can damage light aircraft and sink small boats. It can also cause roofs to collapse and knock down trees and power lines.

Heavy snowfalls can cause secondary hazards. In the mountains, heavy snow can lead to avalanches. A quick thaw can cause flooding, especially along small streams and in urban areas. The cost of snow removal, repairing damages, and the loss of business can have severe economic impacts.

Location

Impacts to Unalaska are considered “Limited” with injuries and/or illnesses that do not result in permanent disability; complete critical facility shutdown for more than one week, and more than 10% of property could be severely damaged.

History

Average snow fall for the area is 92.3 inches per year.

Table 17: Heavy Snow Events

Heavy Snow Events			
Time	Date	Inches	Location
1333	March 7, 2018	10	Alaska Peninsula
0500	March 9, 2018	14	Alaska Peninsula

4.1.4.2 Heavy Rain

Heavy rain is defined as rainfall of three inches or greater in a twelve-hour period or six inches at two or more selected stations or six inches or more in a twelve-hour period or less at a single station.

Location

The occurrence of heavy rain depends on various weather conditions. Low pressure over the Bearing Sea, El Nino or La Nina conditions or the direction the storm is coming from. A warm weather rain event during the winter can cause flooding due to the snow melt, the inability of the water to infiltrate into the ground and decreased ability of the stream channels and storm drains to pass the runoff.

History

Average rainfall for the area is 5.05 inches per year.

There were no heavy rain events since 2018.

Vulnerability/Probability of Future Events

Impacts to Unalaska are considered “Limited” with injuries and/or illnesses that do not result in permanent disability; complete critical facility shutdown for more than one week, and more than 10% of property could be severely damaged.

4.1.4.3 Extreme Cold

Extreme Cold varies according to the normal climate of a region. In areas unaccustomed to winter weather, near freezing temperatures are considered “extreme”. What is considered an excessively cold temperature varies according to the normal climate of a region. In areas unaccustomed to winter weather, near freezing temperatures are considered "extreme cold." In Alaska, extreme cold usually involves temperatures below –40º Fahrenheit (F). Excessive cold may accompany winter storms, be left in their wake, or can occur without storm activity.

Extreme cold can also bring transportation to a halt for days or weeks at a time. Aircraft may be grounded due to extreme cold and ice fog conditions. Long cold spells can cause rivers to freeze which increases the likelihood of ice jams and ice jam related flooding. If extreme cold conditions

are combined with low or no snow cover, the ground's frost depth can increase, and disturb buried utility pipes.

The greatest danger from extreme cold is to people. Prolonged exposure to the cold can cause frostbite or hypothermia and become life threatening, especially for infants and the elderly. Carbon monoxide (CO) poisonings also increase as people use supplemental heating devices.

History

Low cold temperatures average 35.9°F.

There were no extreme cold events since 2018.

Vulnerability/Probability of Future Events

Impacts to Unalaska are considered "Limited" with injuries and/or illnesses that do not result in permanent disability; complete critical facility shutdown for more than one week, and more than 10% of property could be severely damaged.

4.1.4.4 Ice Storms

Ice storm is the term used to describe occasions when damaging accumulations of ice are expected during freezing rain situations. Ice storms result from the accumulation of freezing rain (rain that becomes super cooled and freezes upon impact with cold surfaces). Freezing rain most commonly occurs in a narrow band within a winter storm that is also producing heavy amounts of snow and sleet in other locations. Ice storms can be devastating and are often the cause of automobile accidents, power outages and personal injuries.

History

There were no ice storm events since 2018.

Vulnerability/Probability of Future Events

Based on past severe weather events, the extent of severe weather is considered "Limited" where injuries do not result in permanent disability, complete shutdown of critical facilities occurs for more than one week, and more than 10% of property is severely damaged.

4.1.4.5 High Winds

High Winds occur in Alaska when there are winter low-pressure systems in the North Pacific Ocean and the Gulf of Alaska. Alaska's high winds can equal hurricane force but fall under a different classification because they are not cyclonic nor possess other hurricane characteristics. In Alaska, high winds (winds more than 60 MPH) occur rather frequently over the coastal areas along the Bering Sea and the Gulf of Alaska. High winds are a severe threat to Unalaska.

Location

Strong winds occasionally occur over the interior due to strong pressure differences, especially where influenced by mountainous terrain, but the windiest places in Alaska are generally along the coastlines. Should time permit, the National Weather Service may issue a Wind Advisory which is defined as sustained winds of 31 to 39 mph for better than one hour and/or wind gusts 46 to 57 mph for any duration.6

History

The following table depicts sustained gusts of 46 mph or greater observed at the Unalaska Airport.

Table 18: High Wind Events

High Wind Events			
Time	Date	Windspeed in mph	Location
1345	May 10, 2018	125	East
0220	October 15, 2019	55	West
1456	December 22, 2019	53	Southwest
0121	December 25, 2019	52	North
2256	January 16, 2020	56	Southeast
0025	March 1, 2020	62	Southwest
0756	August 30, 2020	73	Southwest
0856	October 22, 2020	61	East
1451	November 10, 2020	50	Southwest
0556	November 11, 2020	55	West
2056	November 22, 2020	62	Northwest
2210	November 30, 2020	64	Northeast
0834	December 10, 2020	63	Southeast
0756	December 26, 2020	52	Southeast
1113	January 9, 2021	67	East
0856	February 6, 2021	63	East
1256	April 7, 2021	51	Southwest
0207	June 30, 2021	59	Southeast

Vulnerability

Based on past severe weather events, the extent of severe weather is considered “Limited” where injuries do not result in permanent disability, complete shutdown of critical facilities occurs for more than one week, and more than 10% of property is severely damaged.

Probability of Future Events

Based on previous occurrences and the criteria identified, it is highly likely severe storm events of snow, heavy rain, extreme cold, ice storms and high winds will occur in the next year (event has up to 1 in 1 year’s chance of occurring) as the history of events is greater than 33% likely per year

4.1.5.6 Flood

Flooding occurs when weather, geology, and hydrology combine to create conditions where river and stream waters flow outside of their usual course and "spill" beyond their banks. Primary factors in the amount of precipitation and area will receive are elevation and slope aspect, or direction. There are several types of flooding.

Table 19: Types of Flooding

Types of Flooding	
River Flood	occurs when water levels rise over the top of riverbanks due to excessive rain, persistent thunderstorms over the same area for extended periods of time, combined rainfall and snowmelt, or an ice jam.
Coastal Flood	caused by higher-than-average high tide and worsened by heavy rainfall and onshore winds, i.e., wind blowing landward from the ocean.
Storm Surge	abnormal rise in water level in coastal areas, over and above the regular astronomical tide, caused by forces generated from a severe storm's wind, waves, and low atmospheric pressure. Storm surge is extremely dangerous because it is capable of flooding large coastal areas. Extreme flooding can occur in coastal areas particularly when storm surge coincides with normal high tide, resulting in storm tides reaching up to 20 feet or more in some cases.
Inland Flooding	moderate precipitation accumulates over several days, intense precipitation falls over a short period, or a river overflow because of an ice or debris jam or dam or levee failure.
Flash Flood	is caused by heavy or excessive rainfall in a short period of time, generally less than six hours. Flash floods are usually characterized by raging torrents after heavy rains that rip through riverbeds, urban streets, or mountain canyons. They can occur within minutes or a few hours of excessive rainfall. They can also occur even if no rain has fallen, for instance after a levee or dam has failed, or after a sudden release of water by a debris or ice jam.

Typical flood impacts associated with flooding is water damage to structures and contents, roadbed erosion and damage, boat stranding, areas of standing water in roadways, and damage or displacement of fuel tanks, power lines, or other infrastructure. Buildings on slab foundations, not located on raised foundations, and/or not constructed with materials designed to withstand flooding events (e.g., cross vents to allow water to pass through an open area under the main floor of a building) are more vulnerable to the impacts of flooding.

Location

The Planning Team indicated that Unalaska has minor flooding impacts; most of which occur from rainfall and snowmelt run-off. Water collects in low terrain depressions and may rise to just below

a structures first step with no water intrusion on the first floor. The typical minor flood locations are:

- Iliuliuk River;
- Iliuliuk Lake;
- Lake Ilulaq;
- Summers Bay;
- Captain's Bay;
- Broad Bay; and
- Nateekin Bay.

History

Table 20: Flood Events

Flood Events			
Location	Year	Event Type	Extent
Unalaska	1985	Flood	11' of rain in 24-hours
Unalaska	1991	Heavy Rainfall Flood	Iliuliuk River flooded Public Works Area
Unalaska	2007	Winter Storm Flood	Impacted neighborhoods

Vulnerability

Floods also result in economic losses through business and government facility closure, communications, utility (such as water and sewer), and transportation services disruptions. Floods result in excessive expenditures for emergency response, and generally disrupt the normal function of a community.

Deposition is the accumulation of soil, silt, and other particles on a river bottom or delta. Deposition leads to the destruction of fish habitat, presents a challenge for navigational purposes, and prevents access to historical boat and barge landing areas. Deposition also reduces channel capacity, resulting in increased flooding or bank erosion. Stream bank erosion involves the removal of material from the stream bank. When bank erosion is excessive, it becomes a concern because it results in loss of streamside vegetation, loss of fish habitat, and loss of land and property.

Nationwide, floods result in more deaths than any other natural hazard. Physical damage from floods include:

- Structure flood inundation, causing water damage to structural elements and contents.
- Erosion or scouring of stream banks, roadway embankments, foundations, footings for bridge piers, and other features
- Damage to structures, roads, bridges, culverts, and other features from high- velocity flow and debris carried by floodwaters. Such debris may also accumulate on bridge piers and in culverts, increasing loads on these features or causing overtopping or backwater damages.

- Sewage and hazardous or toxic materials released as wastewater treatment plants or sewage lagoons are inundated, storage tanks are damaged, and pipelines are severed.

Table 21: Flooding Community Affects

Community Affects from Flooding		
Affected	Facilities	Approximate Value
112 persons	56 Residences	$10,495,940
55 persons	3 Government Facilities	$454,935

Unalaska does not participate in the NFIP; neither do they have a repetitive flood property inventory that meets NFIP criteria as the loss thresholds are substantially below FEMA values.8

Based on past flood events, the extent of severe weather is considered "Limited" where injuries do not result in permanent disability, complete shutdown of critical facilities occurs for more than one week, and more than 10% of property is severely damaged.

Probability of Future Events

Future events, based on previous occurrences, there is a 1 in 1 year's chance of occurring (1/1=100%) in the valley. History of events is greater than 33%. There is no data identifying a 500-year (0.2% chance of occurring in a given year) flood threat in Unalaska.

4.1.5.7 Avalanche

An avalanche is a rapid flow of snow down a hill or mountainside. Although avalanches can occur on any steep slope given the right conditions, certain times of the year and types of locations are naturally more dangerous. While avalanches are sudden there are typically several warning signs you can look for or feel before one occurs. In ninety percent of avalanches, the snow slides are triggered by the victim or someone in the victim's party. Avalanches kill more than one-hundred fifty people worldwide each year. The National Weather Service provides current weather conditions and forecast information to regional avalanche forecast centers that in-turn issue avalanche forecast. Loose Snow Avalanches and Slab Avalanches are the two main types.

Table 22: Types of Avalanches

Types of Avalanches	
Loose-snow	Also called sluffs, are made up of surface and/or near-surface snow that is not well-bonded. They begin at a single point, gathering more loosely bonded snow crystals from the surface of the snowpack as they descend, gradually fanning out. After the fact, you can recognize them by their inverted "V" pattern, starting from a point and spreading out downhill.
Slab	Occurs when a layer somewhere beneath the surface layer fails, and the cohesive layer(s) above it fracture into a block (or blocks) and slide downhill

History

In March of 2020, a snowmobiler was killed due to a loose snow avalanche.

Vulnerability

Based on past avalanche events, the extent of severe weather is considered “Limited” where injuries do not result in permanent disability, complete shutdown of critical facilities occurs for more than one week, and more than 10% of property is severely damaged.

Probability of Future Events

Even though there are few written records defining ground failure impacts for Unalaska, the Planning Committee has anecdotal evidence of their recurring landslide, rockfall, avalanche, and ground failure damages throughout the community – to structures, roads, harbor areas, and the airport. The Planning Team believes the future damage probability resulting from ground failure is likely in the next three years (event has up to 1 in 3 year’s chance of occurring) as the history of events is greater than 20% but less than 33% likely per year.

4.1.5.8 Landslide

A landslide is the movement of a mass of rock, debris, or earth down a slope. Landslides are a form of “mass wasting,” which refers to any downward movement of soil and rock under the direct influence of gravity. The term “landslide” encompasses five modes of slope movement: falls, topples, slides, spreads, and flows, which can be further classified by the type of geologic material involved (bedrock, debris, or earth). Common types of landslides include debris flows (often referred to as mudflows or mudslides) and rock falls.

Most landslides have multiple contributing factors. Slope movement occurs when the forces acting downslope (primarily due to gravity) exceed the strength of the earth materials that compose the slope. Contributing factors include conditions that increase the effects of downslope forces and those that reduce the slope’s material strength. Landslides can be triggered by rainfall, snowmelt,

changes in water levels, stream erosion, changes in groundwater, earthquakes, volcanic activity, and human activities, often in combination. Earthquakes and other factors can also trigger underwater landslides, known as submarine landslides, which can sometimes generate tsunamis that threaten coastal areas.

Location

Landslides can occur in various locations on Unalaska Island. Contributing factors include volcanic activity from Makushin Volcano, glacial impacts, and human development. Steep, nearly vertical terrain is particularly susceptible to landslides and snow avalanches, especially in areas adjacent to the road system that encircles Unalaska's bays and coves.

History

While written records of ground failure impacts are limited, the 2016 DHS&EM Disaster Cost Index documents one historical ground failure event affecting Unalaska: On December 13, 1985, a severe windstorm caused mudslides, road and port damage, and damage to public buildings. Public disaster assistance supplemented insurance settlements to aid in recovery.

Additionally, the National Weather Service (NWS) recorded a ground failure event that caused property damage in the Dutch Harbor area (Alaska Zone 185) on February 13, 2006. During this event, an intense storm moved rapidly from the North Pacific into the Bering Sea, creating an extreme pressure gradient that produced high winds across the central Aleutians. Wind speeds peaked at 123 knots in Akutan and 120 knots in Dutch Harbor. Along with the high winds, heavy rain occurred following a prolonged period of cold weather and above-average snowfall. Several landslides occurred, with one completely destroying a building and its contents, and another pushing a building off its foundation.

Vulnerability

The exact impact of a landslide on Unalaska will depend on the size and location of the event. The entire population of Unalaska—residents, transient populations, and future inhabitants—as well as residential structures and critical facilities, is exposed to the potential effects of a severe landslide. For this vulnerability assessment, it is estimated that 50% of the population, residences, and facilities could be affected by a significant landslide. The following table summarizes the potential impacts on the community.

Table 23: Landslide Community Affects

Community Affects from a Landslide		
Affected	Facilities	Approximate Value
2,171 persons	553 Residences	$104,959,400
125 persons	6 Government Facilities	$9,098,690
25 persons	4 Emergency Facilities	$14,568,669
504 persons	6 Educational Facilities	$29,466,700
>560 persons	20 Community Facilities	$>99,987,330
41 miles	Asphalt and Gravel Roads	$3,813,330
Bridges	4 Bridges	$41,846,933
450 persons	10 Transportation Facilities	$160,907,231
26 persons	13 Utilities	$185,060,000

Based on past landslide events, the extent of damage from severe weather is considered "Limited." This means that injuries are unlikely to result in permanent disability, critical facilities may be completely shut down for more than a week, and more than 10% of property could be severely damaged.

Probability of Future Events

The Planning Committee has anecdotal evidence of recurring landslides, rockfalls, avalanches, and ground failures affecting structures, roads, harbor areas, and the airport throughout the community. The Planning Team believes that future damage from ground failures is likely within the next three years, with an estimated probability of 1 in 3 years (33%) based on historical events. The likelihood of such events occurring annually is greater than 20% but less than 33%.

Table 24: Unalaska Climate Summary by Month

Unalaska Climate Summary					
Month	Average Min Temperature	Average Max Temperature	Average Precipitation	Average Snowfall	Average Snow Depth
January	28.0	36.7	7.13	23.8	4
February	27.8	37.4	6.20	19.6	4
March	28.2	38.5	5.25	16.8	3
April	31.4	40.8	3.42	6.8	1
May	36.7	46.0	3.98	0.2	0
June	41.8	51.5	2.50	0.0	0
July	45.9	56.8	2.21	0.0	0
August	47.6	58.8	2.76	0.0	0
September	43.5	53.9	5.54	0.0	0
October	37.3	47.3	7.09	0.5	0
November	32.1	42.5	6.66	7.1	0
December	30.3	39.0	7.90	17.4	3

4.1.5 Volcanic Activity

A volcano is defined as a vent in the surface of the Earth through which magma associated gases and ash erupt; also, the form or structure (usually conical) that is produced by the ejected material.13

Alaska contains over 130 volcanoes and volcanic fields which have been active within the last two million years. Of these volcanoes, about 90 have been active within the last 10,000 years (and might be expected to erupt again), and more than 50 have been active within historical time (since about 1760, for Alaska).

Although the historical record in Alaska goes back to around 1760, the task of counting known eruptions and calculating an eruption frequency is complicated inaccurate older accounts. Many times, a volcano is reported as "smoking" without further clarification of what that smoke may have been - a real eruption, normal fumarolic activity, or even atypically tall clouds rising above a summit because of unstable weather conditions. The term "eruption" as used here includes vigorous explosions which may not contain fresh (juvenile) magma, as well as magmatic explosions and the effusion of lava as flows and domes.

Since 1760, 30 Alaskan volcanoes have had more than 240 confirmed eruptions averaging one volcanic eruption per year.14

History

Table 25: Volcanic Activity History

Volcano Activity History	
Volcano	Date
Mt. Redoubt	December 20, 1989
Mt. Redoubt	January 11, 1990
Mt. Spurr	September 21, 1992
Mt. Redoubt	March 31, 2009

The nearest volcano to Unalaska is Makushin. Located sixteen miles from Unalaska, its most recent activity was January 30, 1995. From McGimsey and Neal (1996): "On 12:46 pm AST on Monday, January 30, 1995, USCG C-130 pilots reported a small steam and ash cloud from Makushin Volcano. The cloud rose to 8000 ft., and was carried northeast from the volcano, prompting NWS to issue a SIGMET (Significant Meteorological Information) that ran until 5 pm AST. Over the next hour, several pilots reported seeing a dispersing light brown ash plume at Makushin. All activity subsided shortly thereafter as confirmed by a satellite image recorded at 1:45 pm AST, which showed no sign of the eruption."15

Vulnerability

There are a variety of hazards associated with a volcanic eruption, but the primary hazard is volcanic ash fall. Volcanic ash consists of small, jagged pieces (less than 1/12 inch in diameter) of rocks, minerals, and volcanic glass sent into the air by a volcano. Volcanic ash is created during an explosive volcanic eruption. Alaska's volcanic activity is dominated by explosive volcanism.

Volcanic ash can accumulate on roof tops, or on other structures causing them to collapse. Wet ash can conduct electricity and may cause short circuits or the failure of electrical components. Ash fall may interfere with telephone and radio communications. Ash can also interfere with the operation of mechanical equipment, including aircraft. In Alaska, this is a major problem, as many major flight routes are near historically active volcanoes.

Table 26: Volcano Community Affects

Community Affects from Volcano		
Affected	Facilities	Approximate Value
2,171 persons	553 Residences	$104,959,400
125 persons	6 Government Facilities	$9,098,690
25 persons	4 Emergency Facilities	$14,568,669
504 persons	6 Educational Facilities	$29,466,700
>560 persons	20 Community Facilities	$>99,987,330
41 miles	Asphalt and Gravel Roads	$3,813,330
Bridges	4 Bridges	$41,846,933
450 persons	10 Transportation Facilities	$160,907,231
26 persons	13 Utilities	$185,060,000

Probability of Future Events

It is "Likely" for a volcanic eruption to occur within the next three years. The event has up to 1 in 3 year's chance of occurring (1/3=33%). History of events is greater than 20% but less than or equal to 33% likely per year. Vulnerability depends on the type of activity and current weather, especially wind patterns.

Geologists can make general forecasts of long-term activity associated with individual volcanoes by carefully analyzing past activity, but these are on the order of trends and likelihood, rather than specific events or timelines. Short-range forecasts are often possible with greater accuracy. Several signs of increasing activity can indicate that an eruption will follow within weeks or months. Magma moving upward into a volcano often causes a significant increase in small, localized earthquakes, and measurable carbon dioxide and compounds of sulfur and chlorine emissions increases. Shifts in magma depth and location can cause ground level elevation changes that can be detected through ground instrumentation or remote sensing.

4.1.6 Erosion

Erosion rates can vary significantly because erosion can occur quite quickly as the result of a flash flood, coastal storm, or other event. It can also occur slowly, as the result of long-term environmental changes. Erosion is a natural process, but its effects can be exacerbated by human activity.

Location

Erosion rarely causes death or injury. However, erosion causes the destruction of property, development, and infrastructure. In Alaska, coastal erosion is the most destructive. Coastal and riverine erosion are problems for communities where disappearing land threatens development and infrastructure.

History

Although erosion evolves over time, there are no historic records to depict this. Rather, areas that have sloughed are listed below.

Areas of the Upper Iliuliuk River has eroded over time. This is an important anadromous fish system in the Unalaska Bay area, and due to its location within the village of Unalaska is of high value for recreational and subsistence users.

The single-most commonly identified issue for the community of Unalaska is the lack of storm water run-off control and associated problems with erosion and sedimentation. In areas of unstable soils or steep slopes, heavy accumulations of snow or intense rainfall contribute to erosion, mudslides, landslides, debris flow, and avalanches. There are currently storm drains along Unalaska Lake, Summer Bay Road and Ballyhoo Road. Although progress has been made to pave roads and install catch basins to manage storm water run-off and sedimentation, the majority of the road system remains un-paved and surface water run-off flows directly into the rivers, lakes, and nearshore marine waters.

Most of the roads in the Unalaska area (Airport Road, Captains Bay Road, Front Street, Summer Bay Road, etc.) follow the coastline often impinging on the back-beach zone. The compacted roadbed material does not provide a good substrate for natural colonization of vegetation, and therefore remains mostly unvegetated and is an area of active erosion. Also, the absence of vegetation allows the storm water sediment to be transported and discharged into receiving waters.

Broad Bay is located on the west side of Unalaska Bay at the mouth of the Makushin River. The area is zoned “subsistence tidelands” with adjacent “marine dependent industrial.” Furthermore, the AWCRSA Coastal Management Plan has designated a portion of this area for recreational and subsistence use as follows: Broad Bay - The area within 1000 feet of either side of the ordinary high-water mark of the Makushin River. The designated area extends 300 feet offshore and 250 feet inland as measured from mean high water.

Nateekin Bay is located on the west side of Unalaska Bay at the mouth of the Nateekin River. The area is zoned “developable tidelands” with adjacent “marine dependent industrial”. Furthermore,

the AWCRSA Coastal Management Plan has designated a portion of this area for recreational subsistence use as follows: Nateekin Bay - The area within 1000 feet of either side of the ordinary high-water mark of the Nateekin River. The designated area extends 300 feet offshore and 250 feet inland as measured from mean high water.

Coastal erosion is a major erosion threat to Unalaska as it threatens the embankment, structures, and utilities of its residents. Sometimes referred to as tidal, bluff, or beach erosion, may other times encompass different categories altogether. For this profile, tidal, bluff and beach erosion are nested within the term erosion.

Table 27: Coastal Erosion Characteristics

Coastal Erosion Characteristics
The attrition of land resulting in loss of beach, shoreline, or dune material from natural activity or human influences.
Occurs over the area roughly from the top of the bluff out into the near-shore region to about the 30-foot water depth.
Recession is the most visible aspect of coastal erosion because of the dramatic change it causes to the landscape.
Forces of erosion are embodied in waves, currents, and winds on the coast.
Surface and ground water flow, and freeze-thaw cycles may also play a role.
Can occur from rapid, short-term daily, seasonal, or annual natural events such as waves, storm surge, wind, coastal storms, and flooding, or from human activities including boat wakes and dredging.
The most dramatic erosion often occurs during storms, particularly because the highest energy waves are generated under storm conditions.

Riverine erosion results from the force of flowing water and ice formations in and adjacent to river channels. This erosion affects the bed and banks of the channel and can alter or preclude any channel navigation or riverbank development. In less-stable braided channel reaches, erosion and material deposition are constant issues. In more-stable meandering channels, erosion episodes may only occasionally occur.

History

Table 28: Erosion Community Affects

Community Affects from Erosion		
Affected	Facilities	Approximate Value
112 persons	56 Residences	$10,495,940
55 persons	3 Government Facilities	$454,935

Vulnerability

Based on past erosion events, the magnitude and severity of erosion impacts in Unalaska are considered "limited" with potential for critical facilities to be shut down for more than a week, and more than 10% of property or critical infrastructure being severely damaged.

Probability of Future Events

Based on historical impacts, it is likely that erosion will occur in the next three years (event has up to 1 in 3 year's chance of occurring) as the history of events is greater than 20% but less than or equal to 33% likely per year.

4.2 Technology Hazards

Technological hazards are hazards originating from technological or industrial accidents, dangerous procedures, infrastructure failures, or human error or omission.

4.2.1 Dam Failure

Alaska Statute 46.17.900(3) defines a dam as, "artificial barrier and its appurtenant works, which may impound or divert water." Dam safety is regulated by Alaska Statute 46.17 and 11 Alaska Administrative Code 93 Article 3, Dam Safety, which became effective in May 1987. Dam failures involve the unintended release of impounded water. A dam failure does not always involve a total collapse of the dam. Dams may fail due to structural deficiencies, poor initial design or construction, lack of maintenance or repair, weakening of the dam through aging, debris blocking the spillway, other disasters such as earthquakes, improper operation, or vandalism.

There is one reservoir dam which serves the City of Unalaska, Icy Creek Reservoir Dam (AK00265). Classified as a Hazard Class II dam, it was constructed in 1976 with a 12-foot and satisfies regulations covered under Title 11, Chapter 93, Article 3 of Alaska Administrative Code (11 AAC 93), which addresses the safety of all non-federally regulated dams in Alaska. The dam is a maximum 25 feet high on the downstream side with a crest elevation of 521.0 feet. The sheet pile dam, which is about 281 feet long, is supported by a combination of steel I-beam whalers and braces with concrete footings. Concrete retaining walls provide additional support at each abutment. Outside of the abutment, the sheet pile is covered by shot rock riprap. The dam is founded and keyed into bedrock. The sheet piles and concrete footings are also anchored into bedrock.

The principal spillway, which is located on the left side of the dam, has two weir elevations: the right side is 26 feet wide at an elevation of 517.0 feet and the left side is 32 feet wide at an elevation of 517.3 feet. A secondary spillway, which is 30 feet wide at an elevation of 520.0 feet, is located on the right side of the dam.

4.2.2 Energy Management

An energy emergency refers to the inability to produce and transmit enough energy to the public, businesses, and industry. It can involve one or more energy resources such as heating oil, natural gas, gasoline, coal, or electricity.

An energy emergency can develop quickly. For example, a storm could cause a power line to break. It could also develop over days or weeks. For example, during the 1973 OPEC (Oil Producing and Exporting Countries) embargo, gasoline, fuel oil, and other petroleum derivatives were in short supply. An energy emergency could even develop over years or decades. For example, increased development puts pressure on the amount of energy needed; if a utility company expands to meet that need but the revenue is not sufficient, the utility company could potentially close.

4.2.3 Urban Fire

An urban fire is one involving a structure or property within an urban or developed area. For the purposes of this plan, urban fires are defined as major fires affecting (or with the potential to affect) multiple properties. These types of fires are rare in modern, developed cities but could happen if associated with another disaster such as an earthquake, secondary to an aircraft crash, during civil unrest, where multiple ignitions could occur simultaneously, overwhelming the fire department's ability to respond.

4.2.4 Hazardous Materials Release

In general, a hazardous material is any substance or a material that has the potential to harm humans, animals, or the environment. A hazardous materials incident is the intentional or accidental release of toxic, combustible, illegal, or dangerous nuclear, biological, or chemical agents into the environment. The types of material that can cause a hazardous materials incident are wide ranging. Examples include materials such as chlorine, sulfuric acid, gasoline, medical/biological waste, etc. Many accidents happen at fixed sites, but incidents may also occur during transportation. Incidents are more likely to be at fixed facility at a processing facility.

Hazardous materials incidents are more likely to occur where hazardous materials are located. Facilities that meet certain requirements are required to report information regarding the type and volume of hazardous materials to the State of Alaska and to the Unalaska Fire and EMS.

4.2.5 Transportation Incidents

The transportation system in the City of Unalaska consists of air, road, and marine systems. All these modes have the potential for accidents that could lead to a disaster. For this plan, a transportation accident is any aircraft, vehicular, or marine accident, i.e., one that is not handled on a day-to-day basis by emergency responders.

Unalaska has one airport, The Unalaska/Dutch Harbor Airport, also commonly known as "Tom Madsen Airport,". Named in honor of Charles Thomas Madsen Sr. in 2002, Madsen was a Bush pilot who was known as the "Aleutian Aviator", and spent many years delivering cargo and

passengers to Kodiak, Cordova, the North Slope, Juneau and the Aleutian and Pribilof Islands. Scheduled taxi planes from Cold Bay and Anchorage traverse passengers. Peninsula Airways, a code share partner of Alaska Airlines, had daily flights from Dutch Harbor/Unalaska to Anchorage, Alaska year-round until the COVID-19 Pandemic; at which time they were forced to stop operations. Grant Aviation offers service between Unalaska/Dutch Harbor and Atka, Akun and Nikolski. Services available at the Tom Madsen Airport include a restaurant, travel agencies, vehicle rentals and air cargo.

The City of Unalaska is vulnerable to air transportation accidents such as a crash involving a passenger aircraft, a crash involving cargo aircraft and a crash causing casualties on the ground. Mid-air collisions between two aircrafts are also possible.

The City of Unalaska has a strong fishing presence due to its location and has the potential for marine accidents. The International Port of Dutch Harbor is considered an Artic Port; however, its strong suit is serving as the most southern port that is non-ice and deep-water. Additionally, the Port of Dutch Harbor may act as a port of refuge as the North Pacific Great Circle Route connects the west coast of the United States with major ports in Asia transits directly through the Aleutians. Each year, several thousand large, deep-draft vessels make this voyage, sailing through Unimak Pass on the eastern end of the Aleutians, and using one of several different passes to the west.

4.2.6 Communications

A communications failure is the interruption or loss of communications systems including transmission lines, communications satellites, and associated hardware and software necessary for the communications system to function. A communications failure may be the result of an equipment failure, human acts- deliberate or accidental- or the result of another hazard event.

When a communications failure occurs, it can have a wide range of affects. A failure that results in a small delay in response times by emergency service providers might have a minimal impact on the community in general even though it may be problematic to individuals who require those services.

Based on previous occurrences and the criteria identified in Table 5-2, it is possible a technological and manmade hazard will occur in the next five years (event has up to 1 in 5 year's chance of occurring) as the history of events is greater than 10% likely per year but less than or equal to 20% likely per year.

4.3 Vulnerability Exposure Analysis

The City of Unalaska provided extensive area wide GIS data which formed the basis for the City's critical facilities and critical infrastructure hazard exposure analysis. The following tabulates potential loss estimation data. Section 6.7.1 Exposure Analysis – Hazard Narrative Summaries provides an explanatory description of the tabulated exposure analysis.

Probability of Future Events

Inclement weather, topography, and human influence are the usual causes for transportation and utility system failure events. Increased usage (portrayed by heavy traffic periods or increased utility needs such as winter heating) can exacerbate or accelerate these systems' failure rates. Consequently, Unalaska may periodically experience episodic utility failure.

Based on previous occurrences and the criteria identified, it is possible a technological and manmade hazard will occur in the next five years (event has up to 1 in 5 year's chance of occurring) as the history of events is greater than 10% likely per year but less than or equal to 20% likely per year.

Table 29: Vulnerability Exposure Analysis

Vulnerability Exposure Analysis

Hazard Type	Earthquake	Erosion	Flood	Ground Failure	Ground Failure	Tsunami	Tsunami	Tsunami	Volcano	Severe Weather
Methodology	>40-60% (g)	Within 300' of erosion	--	>14-32 degrees	>32-56 degrees	100' Elevation	50' Elevation	30' Elevation	--	--
Hazard Severity	Severe	--	--	Moderate	High	Low	Medium	High	--	--
Government Buildings/Occupants	6/125	3/55	3/55	--	2/45	6/120	6/120	5/70	6/125	6/125
Government Value ($)	9,098,690	4,954,935	4,954,935	--	4,954,935	9,098,690	9,098,690	3,898,690	9,398	9,398,090
Public Safety Buildings/Occupants	4/25	--	--	--	--	3/25	2/10	2/10	4/25	4/25
Public Safety Value ($)	14,568,669	--	--	--	--	4,822,599	668,669	668,669	14,568,669	14,568,669
Education Buildings/Occupants	6/504	--	--	--	--	6/482	6/482	6/482	6/482	6/482
Education Value ($)	29,466,700	--	--	--	--	29,466,700	29,466,700	29,466,700	29,466,700	29,466,700
Medical Buildings/Occupants	3/880	--	--	--	--	3/80	1/40	1/40	3/80	3/80
Medical Value ($)	701,600	--	--	--	--	7,016,000	1,709,400	1,709,400	7,016,000	7,016,000
Community Buildings/Occupants	20/>560	--	--	--	6/Unknown	14/380	14/380	14/380	19/>560	19/>560
Community Value ($)	>99,987,330	--	--	--	>1,547,100	70,431,575	70,431,575	70,431,575	>99,987,330	>99,987,330
Transportation Buildings/Occupants	10/450	--	--	--	--	9/410	9/411	10/450	10/450	10/450
Transporation Value ($)	160,907,321	--	--	--	--	143,737,321	143,737,321	160,907,321	160,907,321	160,907,321
Utilities Buildings/Occupants	13/26	--	--	--	--	3/12	3/12	--	11/26	11/26
Utilities Value ($)	185,060,000	--	--	--	--	7,979,807	7,979,807	--	100,085,000	100,085,000
Miles of Roads	41	--	--	--	0.5	Unknown	Unknown	Unknown	41	41
Roads Value ($)	3,813,330	--	--	--	Unknown	Unknown	Unknown	Unknown	3,813,330	3,813,330
Number of Bridges	4	--	--	--	--	2	2	4	4	4
Bridges Value ($)	41,846,933	--	--	--	--	30,024,907	30,024,907	41,846,933	41,846,933	41,846,933

Chapter 5 – Mitigation Strategy

The purpose of this chapter is to document the Unalaska's mitigation strategy, which is based on the findings presented in the preceding chapters. This chapter is divided into the following sections:

- 5.1.1 Hazard Mitigation Goals and Objectives
- 5.1.2 Hazard Mitigation Strategies
- 5.1.3 Action Plan

The goals, objectives, and action items in this chapter are intended to guide everyday activities and provide a long-term hazard mitigation approach for the City and Tribe to follow. The intent is that these goals, objectives, and action items will be incorporated into future plans, policies, and projects. The goals are broad statements to achieve in terms of hazard mitigation. Objectives identify how to achieve those goals. The Action Plan items are specific actions that will be taken or projects that will be built to implement this mitigation plan.

A review of the goals, objectives and action items was conducted as part of this plan the planning group has twice to discuss the goals, objectives and action items and has provided written and verbal input.

Table 30: Hazard Mitigation Goals and Objectives

Hazard Mitigation Goals and Objectives	
Goal 1 - Implement and maintain the All Hazards Mitigation Plan.	
Objective #	Description
Objective 1.1	Ensure City and Tribe involvement by appointed personnel in this plan.
Objective 1.2	Require periodic meetings with City personnel, Tribe and the public.
Goal 2 - Inform the community on the local hazards and ways to be prepapred if a hazardoud event occurs.	
Objective #	Description
Objective 2.1	Educate individuals and businesses about hazards, disaster preparedness, and mitigation.
Objective 2.2	Increase coordination between hazard mitigation goals and existing and future, including the incorporation of effective hazard mitigation strategies into the Capital Improvement Program.
Objective 2.3	Educate public officials, developers, realtors, contractors, building owners, and the public about hazard risks and building requirements.
Objective 2.4	Partner with Municipal Departments and other agencies serving vulnerable populations to minimize harm in the event of an emergency.
Objective 2.5	Ensure hazard information/maps are easy to access and up to date in the municipal GIS database.
Objective 2.6	Partner with private sector to promote employee education about disaster preparedness while on the job and at home.
Goal 3 - Increase the survivability and resilience of municipal structures and functions for local hazards.	
Objective #	Description
Objective 3.1	Conduct surveys of essential municipal building and infrastructure to determine if seismic and life safety retrofits are required.
Objective 3.2	As surveys are completed prioritize the municipal facilities to receive upgrades.
Objective 3.3	Implement the facility upgrades as funding becomes available.
Objective 3.4	Incorporate non-structural mitigation into existing buildings.
Objective 3.5	Create redundancies for critical networks such as water, sewer, digital data, power, and communications.
Goal 4 - Improve the resiliency of essential private sector functions.	
Objective #	Description
Objective 4.1	Create a planning document to determine which private sector facilities should be prioritized for assistance in disaster recovery.
Objective 4.2	Develop a recovery plan for essential private sector functions such as health care or food distribution facilities.
Objective 4.3	Minimize economic loss.

Goal 5 - Create and maintain a community where people and property are safe.	
Objective #	Description
Objective 5.1	Develop mechanisms in advance of a major emergency to cope with subsequent rebuilding and recovery phases.
Objective 5.2	Plan for and respond to the secondary effects of disasters, such as hazardous waste and hazardous materials spills, when planning and developing mitigation projects.
Objective 5.3	Promote disaster contingency planning and facility safety among institutions that provide essential services.
Objective 5.4	Improve disaster warning systems.

5.1 Hazard Mitigation Strategies

The City and Tribe will implement the mitigation measures identified in this plan by using the comprehensive plan, Capital Improvement Plan, and other hazard mitigation tools they have at their disposal.

While there are many ways to mitigate hazards, not all are appropriate for all situations. Each situation must be evaluated to decide what activities are the most appropriate. General strategies that can be used to mitigate hazards, several options are discussed.

5.1.1 Structural Features

Structural features are designed to control the hazard and restrict the exposed area. The construction of a structure such as a dam, levee, or avalanche deflection wall can lessen the impact of a hazard event. Structures can be incorporated into new development, but this should be discouraged in hazard-prone areas.

5.1.2 Land Use Planning

Land use planning can guide development away from hazard-prone areas.3 Planning is more effective at protecting future development.

5.1.3 Zoning

Zoning ordinances regulate development by dividing a community into areas and by establishing development criteria for each area. They may restrict certain uses in hazard- prone areas or add restrictions such as minimum elevations. Zoning is more effective with future development.

5.1.4 Capital Improvement Plan

A Capital Improvement Plan is used to guide major public expenditures for physical improvements over a given period. These expenditures can be used to mitigate existing and future development. Examples include funding to retrofit an existing structure, build a new levee, or purchase property. The lack of investment in infrastructure in hazard-prone areas may also act to restrict development, as it is too costly for a private developer to build the necessary improvements.

5.1.5 Open Space Preservation

Open space preservation is a tool to keep existing open spaces in hazard-prone areas from being developed. This prevents putting more people and facilities at risk. A municipal government may acquire the property from a private property owner, excluding Tribal lands held by the Qawalangin Tribe and the Ounalashka Corporation. The property then becomes zoned as open space, which limits the future development of the property.

5.1.6 Acquisition

Acquisition involves purchasing property in high-risk areas and demolishing any structures on it to prevent the structure from being damaged during a hazard event. The structure is demolished to ensure that it is not re-used in the future. This technique is appropriate for mitigation of existing structures. It can also be used to buy vacant land in high-risk areas to prevent development. This excludes Tribal lands held by the Qawalangin Tribe and the Ounalashka Corporation.

5.1.7Relocation

Relocation is like acquisition, except that any structures on the property are relocated out of a hazard-prone area. Most appropriate for existing structures, the structure may be relocated to a different parcel or within the same parcel. This excludes Tribal lands held by the Qawalangin Tribe and the Ounalashka Corporation.

5.1.8 Building Codes

Building codes are a compilation of laws, regulations, ordinances, or other statutory requirements adopted by a government legislative authority relating to the physical structure of buildings. They establish minimum requirements regarding the construction of a structure to protect public health, safety, and welfare. They apply to new buildings as well as those existing development. Enforcement is essential for building codes to be an effective hazard mitigation tool. It is also less expensive and easier to incorporate mitigation measures into new structures than it is to retrofit existing ones.

5.1.9 Insurance

Insurance provides funding to rebuild a structure and replace its contents after a hazard event. Insurance is appropriate for mitigating existing structures. The problem with insurance is that it can make it easier to rebuild in a hazard-prone area, thus creating a repetitive loss situation.

5.1.10 Education

Education involves teaching the public about potential natural hazards, the importance of mitigation, and how to prepare for emergency situations. It is used to inform residents, business owners, visitors, etc. about the hazards in the area and what they can do to protect themselves and

their property. Examples include real estate disclosure, homeowner wildfire reduction publications, and training.

5.2 Action Plan

The action plan consists of specific activities or projects that will be used to implement the goals and objectives of this hazard mitigation plan. The action items are categorized by the hazard being addressed with action items addressing more than one hazard being grouped in a multi-hazard category. The action plan contains many items that have no funding sources identified. The timelines are dependent upon obtaining funding. When funding becomes available, more specific timelines will be established. This list is in the early stages of development and will be updated as needed. For each item, several characteristics are listed.

Table 31: Action Plan Hazard Abbreviations

Hazard Abbreviations			
Abbreviation	Hazard	Abbreviation	Hazard
MH	Multi-Hazard	UTD	Utility Disruption
EQ	Earthquake	LS	Landslide
FL	Flood	WF	Wildfire
GF	Ground Failure	HM	Hazardous Materials
TS	Tsunami	AV	Avalanche
VOL	Volcano	CL	Coastal/Littoral Erosion
SW	Severe Weather	SWI	Storm Water Inundation
SLR	Sea Level Rise	DF	Dam Failure
SC	Subsidence/Collapse (ground)	WE	Winter Event
CM	Cybersecurity	FZ	Freezing-infrastructure impact

Table 32: Mitigation Action Plan

Action Item Number	Description	Priority	Responsible Party	Potential Funding Source(s)	Timeframe	Benefit Costs (BC)/Technical Feasibility	Update
MH 1.1	Identify and pursue funding opportunities to implement mitigation actions.	High	City of Unalaska (City) Qawalangin Tribal Council (Tribe)	City, Tribe	1-3 Years	BC: This ongoing activity is essential for the City and Tribe as there are limited funds available to accomplish effective mitigation actions. TF: This is an ongoing activity demonstrating its feasibility.	The City and Tribe are continually seeking funding to implement mitigation actions. The City funded projects to implement riverbank protection and storm drain improvements since the last plan updates.
MH 1.2	Develop, produce, and distribute information materials concerning mitigation, preparedness, and safety procedures for all identified natural hazards.	Low	City LEPC, City Fire Chief and Police Chief, Tribal Operations Director/Lands & Infrastructure Director	City, Tribe	Ongoing	BC: FEMA provides free publications for community education purposes. TF: This activity is an ongoing	The LEPC has produced and distributes a disaster preparedness guide and Tsunami inundation and evacuation map. Low to no cost outreach efforts makes this a very feasible project to successfully educate large populations.
MH 1.3	Based on known high-risk hazard areas, identify hazardspecific signage needs, and purchase and install hazard warning signs near these areas to notify and educate the public of potential hazards	Medium	City Fire Chief and Police Chief, Tribal Operations Director/Lands & Infrastructure Director	City, Tribe, Denali Commission, DCRA, DOF, DHS&EM Mitigation & Preparedness Sections	Completed	B/C: This project will ensure the community looks closely at their identified hazard areas to ensure they can safely evacuate their residents and visitors during a natural hazard event. TF: This is an ongoing technically feasible activity using existing city resources.	The City has posted signs about the Tsunami hazard and evacuation route, which is part of their certification as a Tsunami Ready community. Additionally, the outdoor warning system is being replaced at the time of this plan.
MH 2.2	The City and Tribe will aggressively manage their existing plans to ensure they incorporate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, and land use plans, etc. to demonstrate multi- benefit considerations and facilitate using multiple funding sources.	Medium	City Planning Department, Tribal Operations Director/Lands & Infrastructure Director	City, Tribe	3-5 Years	BC: Coordinated planning ensures effective damage abatement and ensures proper attention is assigned to reduce losses and damage to structures and residents. TF: This is feasible to accomplish as cost can be associated with plan reviews and updates. The action relies on staff and planning committee availability a	The City has a consolidated Planning Department which works to incorporate mitigation planning into the community planning process.
MH 2.3	Construct a reception center above fifty-foot (50') MSL for safe haven for residents during tsunami and/or flooding events. One reception center would be needed on each island. Center could also act as multipurpose for point of distribution, point of dispensing (medical events), and secondary town hall.	Medium	Public Safety, City Planning, Tribal Operations Director/Lands & Infrastructure Director	City, Tribe, EMPG, USDA	1-3 Years	BC: Ensuring the residents have a safe haven during a tsunami and/or flooding events. Additionally, would serve as secondary town hall. TF: The City and Tribe could support some funding. However, additional funding would have to sought.	New project from the planning committee after discussion of where residents should report to in the event of a tsunami warning.
MH 2.4	Install flood and erosion mitigation actions to reduce storm water related erosion, mudslides, landslides, debris flows, and avalanches by extending pavement and ditching along gravel roads and installing catchment basins, sediment traps, and retention ponds to control sediment entry into community waterways.	Low	City Public Works Department, USACE, NRCS	City, Tribe, FHWA, DOT/PF, USACE, NRCS	3-5 Years	B/C: Improving water flow capability will greatly reduce potential infrastructure and residential losses. Project costs would outweigh replacement costs of lost facilities. TF: The Community has the skill to implement this action. Specialized skills may need to be contracted-out with materials and equipment barged in depending on the method selected.	Completed

Action Item Number	Description	Priority	Responsible Party	Potential Funding Source(s)	Timeframe	Benefit Costs (BC)/Technical Feasibility	Update
MH 3.3	Purchase and install generators with main power distribution disconnect switches for identified and prioritized critical facilities susceptible to short-term power disruption (i.e. first responder and medical facilities, schools, correctional facilities, and water and sewage treatment plants, etc.).	Medium	City Public Utilities Department	City, Tribe, Lindbergh, HMGP, FP&S, SAFER, ANA, CCP, EMPG, EOC	Completed	BC: Emergency power generation is a minor cost to ensure their availability for use after a hazard strike. TF: Installing emergency generators is technically feasible for this Community as they already have staff to maintain existing community power generation facilities. *This project typically needs to be associated with essential facility upgrades for FEMA funding.	The generators were purchased and installed in 2021.
MH 3.5	Perform hydrologic and hydraulic engineering, and drainage studies and analyses. Use information obtained for feasibility determination and project design. This information should be a key component, directly related to implementing a proposed project identified from the study.	Low	City Public Works Department, Tribal Operations Director/Lands & Infrastructure Director, USACE	City, Tribe, NRCS, USACE, USDA/EWP, USDA/ECP, DCRA/ ACCIMP	1-3 Years	BC: Flood hazard mitigation is among FEMA's highest national priorities. FEMA desires communities focus on repetitive flood loss properties. This activity will ensure the City and Tribal Councils focus on priority flood locations and projects. TF: The City has the technical capability to manage and conduct this project. Hiring contractors to accomplish specialized studies is expected in rural/remote Alaska.	The City commissioned a study in 2016 to look for alternative water supplies outside of Pyramid Valley or raise the dam because of the high demand of water by fish processors.
EQ 4.1	Evaluate critical public facility seismic performance for fire stations, public works buildings, potable water systems, wastewater systems, electric power systems, and bridges within the jurisdiction.	Medium	City Public Works Department, Tribal Operations Director/Lands & Infrastructure Director	City, Tribe, ANA, EFSP, DOT/PF	3-5 Years	BC: Retrofit projects can be very cost-effective methods for bush communities as materials and shipping costs are very high. Project viability is dependent on the cost and extent of modifications. A comprehensive BCA will need to be conducted for each facility to validate this activity. TF: The Community has the skill to implement this action. Specialized skills may need to be contracted-out with materials and equipment barged in depending on the method selected.	The Summer Bay bridge was recently replaced with seismic considerations in the construction, including steel piles socketed into bedrock to prevent damage in the event of soil liquefication.
ER 5.6	Install bank protection such as rip-rap (large rocks), sheet pilings, gabion baskets, articulated matting, concrete, asphalt, vegetation, or other armoring or protective materials to provide river bank protection.	Medium	City Public Works Department, Tribal Operations Director/Lands & Infrastructure Director	City, Tribe, ANA, NRCS, USACE, USDA/EWP, USDA/ECP, DCRA/ACCIM P	1-3 Years	BC: Improving embankment and slope stability will greatly reduce potential infrastructure and residential losses. Project costs would outweigh replacement costs of lost facilities. TF: The Community has the skill and resources to implement this action.	The City is working to install riverbank protection. Since the last Plan update, the Public Works Department planted vegetation along the Lower Iliuliuk River to prevent erosion. The community is working on installing more riverbank protection.
ER 5.7	Install embankment protection along Icy Dam reservoir.	High	City Public Works Department, Tribal Operations Director/Lands & Infrastructure Director	City, Tribe, NRCS, USACE, USDA/EWP, USDA/ECP, DCRA/ ACCIMP	3-5 Years	BC: Improving embankment and slope stability will greatly reduce potential infrastructure and residential losses. Project costs would outweigh replacement costs of lost facilities. TF: The community has the skill and resources to implement this action.	This action has been delayed by technical problems with sediment related to the Dam and Reservoir that the Community is working to solve.

Action Item Number	Description	Priority	Responsible Party	Potential Funding Source(s)	Timeframe	Benefit Costs (BC)/Technical Feasibility	Update
FL 6.1	Develop, revise, adopt, and enforce storm water ordinances and regulations to manage run-off from new development, including buffers and retention ponds.	Medium	City Mayor, City Council, Tribal Operations Director/Lands & Infrastructure Director	City, Tribe, ANA, DEC/WSRF	3-5 Years	BC: Storm water management plans are an essential disaster management tool. Focused and coordinated planning enables effective damage abatement and ensures proper attention is assigned to reduce losses, damage, and materials management. TF: This action is feasible with limited fund expenditures.	The Community has focused on higher priority actions and has not yet developed storm water ordinances.
FL 6.2	Create detention storage basins, ponds, reservoirs etc. to allow water to temporarily accumulate to reduce pressure on culverts and low water crossings allowing water to ultimately return to its watercourse at a reduced flow rate.	Medium	City Public Works, Tribal Operations Director/Lands & Infrastructure Director	City, Tribe, ANA, Denali Commission, NRCS, USACE, USDA/EWP, USDA/ECP, DCRA/ ACCIMP	3-5 Years	BC: Improving water flow capability will greatly reduce potential infrastructure and residential losses. Project costs would outweigh replacement costs of lost facilities. TF: The community has the skills and resources to implement this action.	The community is working to improve storm water drainage. A drainage pond was installed, and more work is planned to reduce sediment entry into lakes.
TS 8.2	Develop a public education effort to reduce the public health and safety risks for this hazard.	High	City LEPC, City Fire Chief and Police Chief, Tribal Operations Director/Lands & Infrastructure Director	City, Tribe	Ongoing	BC: Sustained mitigation outreach programs have minimal cost and will help build and support community capacity enabling the public to appropriately prepare for, respond to, and recover from disasters. TF: This project is technically feasible using existing City and Tribal staff.	The LEPC promotes public education efforts through distributing Tsunami information. The High school also hosts the annual Tsunami Bowl, which encourages high schoolers to learn about ocean science and Tsunami hazards.
VOL 9.1	Update public emergency notification procedures and develop an outreach program for ash fall events.	High	City LEPC, City Fire Chief and Police Chief, Tribal Operations Director/La	City, Tribe, DHS&EM, USGS, AVO, DOC/NOAA, RCASP, NWS, Denali Commission	In-Process	BC: Sustained emergency warning, response planning, and mitigation outreach programs enable communities to plan for, warn, and protect their hazard threatened populations. Each project type is cost dependent, but for the most part is cost effective and will help build and support community capacity enabling the public to prepare for, respond to, and recover from disasters. TF: This project is technically feasible using existing City staff.	The LEPC has completed this action and has a set of established procedures for ashfall events. The LEPC would like to purchase 5,000 emergency kits for distribution in the community to help residents prepare for disasters and is looking for funding to complete this.
VOL 9.2	Evaluate capability of water treatment plants to deal with high turbidity from ash fall events	High	City Public Utilities Department, Tribal Operations Director/Lands & Infrastructure Director	City, Tribe, ANA, EPA, DEC/CWSRF	1-3 Years	BC: Water Plant Protection plans are an essential disaster management tool. Focused and coordinated planning enables effective damage abatement and ensures proper attention is assigned to reduce losses, damage, and materials management. TF: This action is feasible with limited fund expenditures	The City has determined that ash fall events will shut down the open reservoirs at the Pyramid Water plant and the City will have to rely on enclosed reservoirs and wells until the ash issue is resolved. The City believes a sand filter may mitigate the risk of ash clogging the system.

Action Item Number	Description	Priority	Responsible Party	Potential Funding Source(s)	Timeframe	Benefit Costs (BC)/Technical Feasibility	Update
VOL 9.7	Install sand filter at Pyramid Valley water treatment plant to filter ash from water reservoir in the event of ashfall event.	Medium	City Public Utilities Department, City Public Works Department	City, Tribe, USDA	3-5 Years	BC: Adding additional filtration for water coming from the reservoir will reduce the likelihood of shutdown in the event of an ashfall event and help the City maintain a clean water supply. TF: This project is technically feasible, but may require outside funding	
UTD 11.1	Develop redundant communications capability for the City and the Tribe to the outside world as well as all critical facilities	Medium	City Fire Chief and Police Chief	City, Tribe, Lindbergh Grants Program, FP&S, SAFER, ANA, EMPG, EOC	1-3 Years	BC: Sustained emergency warning, communication, and response activity capabilities enable communities to warn and protect their hazard threatened populations. This project is dependent on emerging technology. The City is researching options to replace satellite communications (such as fiber optic undersea cabling) and their viability for development and implementation. This project will help build and support community capacity enabling the public to prepare for, respond to, and recover from disasters. TF: This project is technically feasible using existing City staff.	In addition to regular phone and internet access, the City has access to Satellite phones, HAM radios, and single band radios on marine vessels.

After the adoption of the MJHMP, each Planning Team Member will ensure that the MJHMP, in particular each Mitigation Action Project, is incorporated into existing planning mechanisms. Each member of the Planning Team will achieve this incorporation by undertaking the following activities.

- Review the community-specific regulatory tools to determine where to integrate the mitigation philosophy and implementable initiatives.
- Work with pertinent community departments to increase awareness for implementing the philosophies and identified initiatives. Aid with integrating the mitigation strategy (including the Mitigation Action Plan) into relevant planning mechanisms (i.e., Comprehensive Plan, Capital Improvement Project List, Transportation Improvement Plan, etc.).
- Implementing this philosophy and activities may require updating or amending specific planning mechanisms.

The City's and Tribe's capability assessment reviews the technical and fiscal resources available to the community. The following tables clarifies the resources available to Unalaska for mitigation and mitigation-related funding and training.

Table 33: Unalaska Regulatory Tools

Unalaska Regulatory Tools		
Regulatory Tool	Existing	Comments
Comprehensive Plan	Yes	2020 Comprehensive Plan. Explains the City's land use initiatives and natural hazard impacts.
Land Use Plan	Yes	The City's Land Use Plan explains the City's community development goals and initiatives.
Tribal Corporation Land Use Plan	Yes	The Qawalangin Tribe of Unalaska Land Use Plan, 1999. Describes the Tribe's development goals and initiatives.
Emergency Response Plan	No	In Production.
Building Codes	Yes	Title 17 Unalaska Municipal Code of Ordinances. IBC.
Zoning Ordinances	Yes	Title 8.12 UCO. City Council Ordinance 2012-07.
Subdivision Ordinances or Regulations	Yes	Title 8.08 UCO. City Council Ordinance 2012-07.
Special Purpose Ordinances	Yes	The City can exercise this authority

Chapter 6 – Plan Maintenance

This Plan is intended to be a "living" document that will help inform all interested parties about the community's hazard mitigation policies and projects. It will be reviewed and updated on a regular basis. The mitigation strategy identified will act as a guide for City departments in determining projects for which to seek FEMA assistance and other mitigation funds from outside sources.

6.1 Plan Adoption

The City and Tribe of Unalaska are represented in this MJHMP and meet the requirements of Section 409 of the Stafford Act and Section 322 of DMA 2000, and 44 CFR §201.6(c)(5). The Unalaska City Council and Qawalangin Tribe of Unalaska adopted the MJHMP on **(insert date)** and submitted the final MJHMP Update to FEMA for formal approval.

The Qawalangin Tribe of Unalaska, a federally recognized sovereign nation, will pattern its Tribal regulations to be in accordance with 44 CFR 13.11(c) and 44 CFR 13.11(d), and will amend Tribal laws as needed to be in compliance with funding sources. At no time shall the Tribe relinquish its Sovereign Authority through utilization of the words "comply," but rather will adopt similar language to federal laws and regulations as necessary.

6.2 Plan Implementation

Once the Plan is community-adopted and receives FEMA's final approval, each Planning Team Member ensures the Plan, in particular each Mitigation Action Project, is incorporated into existing planning mechanisms whenever possible. Each member of the Planning Team has the responsibility of undertaking the following activities.

• Conduct a review of the community-specific regulatory tools to assess the integration of the mitigation strategy. These regulatory tools are identified in the following capability assessment section.

• Work with the community to increase awareness of the Plan and aid in integrating the mitigation strategy into relevant planning mechanisms. Implementation of these requirements may require updating or amending specific planning mechanisms.

6.3 Plan Monitoring and Evaluation

This Plan was prepared as a collaborative effort. To maintain momentum and build upon previous hazard mitigation planning efforts and successes, the City and Tribe will continue to use the Planning Team to monitor, evaluate, and update the Plan. Each authority identified in the Mitigation Action Plan will be responsible for implementing the Mitigation Action Plan and determining whether their respective actions were effectively implemented. The Director of Planning and Tribal Operations Director/Lands & Infrastructure Director will serve as the primary points of contact and will coordinate local efforts to monitor, evaluate, revise, and tabulate Plan actions' status.

The Annual Review Questionnaire provides the basis for future Plan evaluations by guiding the Planning Team with identifying new or more threatening hazards, adjusting to changes to, or increases in, resource allocations, and garnering additional support for Plan implementation.

The Planning Team Leader will initiate the annual review two months prior to the scheduled planning meeting date to ensure that all data is assembled for discussion with the Planning Team. The findings from these reviews will be presented at the annual Planning Team Meeting. Each review, as shown on the Annual Review Worksheet, will include an evaluation of the following:

- Determine authorities, outside agencies, stakeholders, and residents' participation in MJHMP implementation success.
- Identify notable risk changes for each identified and newly considered natural or human caused hazards.
- Consider land development activities and related programs' impacts on hazard mitigation.
- Mitigation Action Plan implementation progress (identify problems and suggest improvements as necessary).
- Evaluate the Plan's local resource implementation for Plan identified activities. For FEMA supported projects, progress reports are required on a quarterly basis throughout the project duration. The degree of quarterly reporting will be dependent upon the type of project, its funding source, and the associated requirements. At a minimum, the quarterly report shall address:
- Project Completion Status
- Project Challenges/Issues (If any)
- Budgetary Considerations (Cost Overruns or Underruns)
- Detailed Documentation of Expenditures

Upon completion of projects, the Fire Chief and the Police Chief will visit the project location to view the final results. A closed project will also change status to "Completed" and will then be monitored for effectiveness in the intended area of mitigation. FEMA supported project closeouts will include an audit of the project financials as well as other guidelines/requirements set forth under the funding or grant rules, and any attendant administrative plans developed by the Tribe.

6.4 Continued Public Involvement

The City and Tribe are dedicated to involving the public directly in the continual reshaping and updating the Plan. A paper copy of the Plan and any proposed changes will be available at the City and Tribal Offices. The contact information of the Planning Team Leaders, to whom people can direct their comments or concerns, will also be available at the City and Tribal Offices.

The Planning Team will survey the community for natural hazard survey to the community in the first quarter of every year. Survey results will be kept in the annual Plan files and evaluated during each five-year review.

Table 34: MJHMP Review Schedule

Plan Review Schedule	
Year 1	
X	This is the beginning of the 5 Year Cycle. The Plan has been approved and was adopted by all participating jurisdictions.
Year 2	
X	Annual Review of the Plan
X	Report any changes to the Planning Team
Year 3	
X	1st Quarter – Contact Alaska DHS&EM regarding Plan update funding availability.
X	3rd Quarter – Contract for Profession Update Services if they will be used.
X	4th Quarter – Annual Review of the Plan by the Planning Committee
Year 4	
X	Annual Review of the Plan
X	Develop a detailed update timeline
X	Begin working on updates
Year 5	
X	Complete updates started in Yr 4
X	State and FEMA Review
X	Make any revisions required by State or FEMA
X	Participating jurisdictions adopt the updated plan

Annual

The City and Tribe will annually review the HMP and update the Plan every five years (or when significant changes are made) by having the Planning Team review the considerations below, to determine the success of implementing the HMP's Mitigation Action Plan. The Annual Review Questionnaire will enable the Team to identify possible changes in the Plan by refocusing on new or more threatening hazards, resource availability, and acquiring stakeholder support for the Plan project implementation.

Table 35: Annual Review Considerations

Considerations for Annual Review	
X	Progress made on plan recommendations during the previous 12 months.
X	Mitigation accomplishments in projects, programs, and policies.
X	Actual losses avoided by implementation of mitigation actions.
X	Emergency disaster damage trends and repetitive losses.
X	Identification of new mitigation needs
X	Cancellation of planned initiatives, and the justification for doing so.
X	Changes in membership to the planning team.

No later than the beginning of the fourth year following the Plan's adoption, the Planning Team will undertake the following activities:

- Request grant assistance from DHS&EM to update the Plan.
- Ensure that each authority administering a mitigation project will submit a Progress Report to the Planning Team.
- Develop a chart to identify those Plan sections that need improvement, the section and page number of their location within the Plan and describe the proposed changes
- Thoroughly update the natural hazard risks.
- Determine the current status of the mitigation projects.
- Identify the proposed Mitigation Plan Actions (projects) that were completed, deleted, or delayed. Each action should include a description of whether the project should remain on the list, be deleted because the action is no longer feasible, or reasons for the delay.
- Describe how each action's priority status has changed since the Plan was originally developed and subsequently approved by FEMA.
- Determine whether or not the project has helped achieve the appropriate goals identified in the Plan.
- Describe whether the community has experienced any barriers preventing them from implementing their mitigation actions (projects) such as financial, legal, and/or political restrictions and stating appropriate strategies to overcome them.
- Update ongoing processes, and to change the proposed implementation date/duration timeline if delayed actions the City of Unalaska still desires to implement.
- Prepare a new Draft Plan Update.
- Submit the Draft Plan Update to DHS&EM and FEMA for review and approval

Following a Major Disaster

After a major disaster, the City Manager, or his/her designee, will convene the planning team to conduct a review like the annual update. The planning team will consider the implications of long-term recovery and may opt to establish regular meetings while the recovery process is taking place.

Table 36: Post Disaster Considerations

Considerations After a Major Disaster	
X	Document "Lessons Learned" from the disaster and what new initiatives should be added to the plan to help reduce the likelihood of similar damage in the future.
X	Follow up required on any relevant mitigation items.
X	Action items from after-action reports.
X	Integration of mitigation into the recovery process and coordination with recovery efforts conducted by other agencies and jurisdictions.

Formal Plan Update

Every five years, the plan will be re-submitted for adoption to the City Council. Prior to this, the City Manager, or his/her designee, may use the following table to assist in that all relevant parties are involved.

Table 37: Formal Plan Update Considerations

Considerations for Formal Plan Updates	
X	Conduct regular reviews of the plan as described above and incorporate feedback from those reviews into the planning document.
X	Conduct public engagement activities and initiate meetings with identified groups of interested parties and outside organizations to gain input and feedback.
X	Integrate relevant feedback and circulate revised plan to planning team for approval.
X	Submit Plan to each jurisdiction elected or appointed body for adoption by resolution.

It is anticipated that the next full update of this plan will take place in 2023 for the planning period of 2022 through 2028.

Mitigation Action Status and Tracking Loss Reduction

All City Departments are tasked with tracking the ongoing status of the mitigation projects to which they are assigned the lead. The following table is examples of tracking items.

Table 38: Tracking Ongoing Projects Considerations

Considerations for Tracking Ongoing Projects	
X	Project Progress, including status of project funding and ongoing needs.
X	Actual losses mitigated by project implementation.
X	Project needs that may be addressed in the next mitigation planning cycle.

Incorporation of Existing Planning Mechanisms3

The Planning Department will coordinate with departments that have jurisdiction over mitigation action implementation areas to incorporate the plan into standard policies and procedures as well as long-term planning documents and budgets.

Short term operational changes that address and consider hazard mitigation may include job description updates, work plans, site reviews, and staff training. Long-term changes may include revisions to existing comprehensive plans, capital improvement plans, zoning and building codes, permitting, and other planning tools.

Additional considerations to long term strategy and to enhance cost effectiveness include ensuring that mitigation projects are present in annual departmental budgets rather than relying solely on grant programs and integrating hazard mitigation into future land use and comprehensive and strategic planning.

Continued Public Involvement4

Public involvement is a key component of the plan implementation and update process. As described above, the City will prepare and make available any means possible, to provide an update on the implementation of the current mitigation plan. This report, along with specific reports for each mitigation measure being implemented and all stakeholder comments received, will be assessed to make improvements in the plan update released every five years

In addition to the ongoing input collected and compiled throughout implementation of the previous plan, planning team will review aspects of the draft update plan. Comments received from the public will also be considered and incorporated where appropriate into annual updates of the plan.

Copies of the HMP will be available at:

- Planning Department
- Fire Department
- Public Works Department
- City Clerk's Office
- Library

The Planning Commission will review the plan on an annual basis, which will be advertised to the public using the same method established under the public involvement section of this plan.

Appendix A – Record of Changes

Record of Changes	
Section	Summary of Change

Appendix B – Funding Resources

B.1 Federal Funding Resources

FEMA Hazard Mitigation Assistance (HMA) grant programs provide funding to States, Tribes, and Local entities that have a FEMA-approved State, Tribal, or Local Hazard Mitigation Plan (HMP). The Qawalangin Tribe of Unalaska and the City of Unalaska have their own grant writers and independently manage their respective grant applications and planning capabilities. The Tribe is fully capable and authorized to write, submit, and administer any and all grants as a Sovereign Nation.

Two of the grants are authorized under the Stafford Act and the Disaster Mitigation Act of 2000 (DMA 2000), while the remaining one is authorized under the National Flood Insurance Act and the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act. The Hazard Mitigation Grant Program (HMGP) is a competitive, disaster-funded grant program, whereas the other Unified Mitigation Assistance (UMA) Programs: Pre-Disaster Mitigation (PDM) and Flood Mitigation Assistance (FMA) programs, although competitive, rely on specific pre-disaster grant funding sources, sharing several common elements.

The Tribe has successfully written and been approved for FEMA grants to engage in Hazard Mitigation Planning and has additional grant applications under consideration by FEMA. The City of Unalaska and the Qawalangin Tribe of Unalaska both pursue funding opportunities to benefit their respective communities, ensuring that all necessary resources are secured to enhance resilience and mitigate hazards effectively.

The Federal government requires local governments to have a HMP in place to be eligible for mitigation funding opportunities through FEMA such as the UHMA Programs and the HMGP. The Mitigation Technical Assistance Programs available to local governments are also a valuable resource. FEMA may also provide temporary housing assistance through rental assistance, mobile homes, furniture rental, mortgage assistance, and emergency home repairs. The Disaster Preparedness Improvement Grant also promotes educational opportunities with respect to hazard awareness and mitigation.

- FEMA, through its Emergency Management Institute, offers training in many aspects of emergency management, including hazard mitigation. FEMA has also developed many documents that address implementing hazard mitigation at the local level. Five key resource documents are available from FEMA Publication Warehouse (1-800-480- 2520) and are briefly described here:
    - How-to Guides. FEMA has developed a series of how-to guides to assist states, communities, and tribes in enhancing their hazard mitigation planning capabilities. The first four guides describe the four major phases of hazard mitigation planning. The last five how-to guides address special topics that arise in hazard mitigation planning such as conducting cost-benefit analysis and preparing multi-jurisdictional plans. The use of worksheets, checklists, and tables make these guides a practical source of guidance to address all stages of the hazard mitigation planning process. They also include special tips on meeting DMA 2000 requirements.

  - Post-Disaster Hazard Mitigation Planning Guidance for State and Local Governments. FEMA DAP-12, September 1990. This handbook explains the basic concepts of hazard mitigation and shows state and local governments how they can develop and achieve mitigation goals within the context of FEMA's postdisaster hazard mitigation planning requirements. The handbook focuses on approaches to mitigation, with an emphasis on multi-objective planning.
  - A Guide to Recovery Programs FEMA 229(4), September 2005. The programs described in this guide may all be of assistance during disaster incident recovery. Some are available only after a Presidential declaration of disaster, but others are available without a declaration. Please see the individual program descriptions for details.
  - The Emergency Management Guide for Business and Industry. FEMA 141, October 1993. This guide provides a step-by-step approach to emergency management planning, response, and recovery. It also details a planning process that businesses can follow to better prepare for a wide range of hazards and emergency events. This effort can enhance a business's ability to recover from financial losses, loss of market share, damages to equipment, and product or business interruptions. This guide could be of great assistance to a community's industries and businesses located in hazard prone areas.
  - The FEMA Hazard Mitigation Assistance (HMA Unified Guidance, June 1, 2010. The guidance introduces the five HMA grant programs, funding opportunities, award information, eligibility, application and submission information, application review process, administering the grant, contracts, additional program guidance, additional project guidance, and contains information and resource appendices (FEMA 2009).

- FEMA also administers emergency management grants (http://www.fema.gov/help/site.shtm) and various firefighter grant programs (http://www.firegrantsupport.com/) such as:
  - Emergency Management Performance Grant (EMPG). This is a pass-through grant. The amount is determined by the State. The grant is intended to support critical assistance to sustain and enhance State and local emergency management capabilities at the State and local levels for all-hazard mitigation, preparedness, response, and recovery including coordination of intergovernmental (Federal, State, regional, local, and tribal) resources, joint operations, and mutual aid compacts state-to-state and nationwide. Subrecipients must be compliant with National Incident Management System (NIMS) implementation as a condition for receiving funds. Requires 50% match.
  - Assistance to Fire Fighters Grant (AFG), Fire Prevention and Safety (FP&S), Staffing for Adequate Fire and Emergency Response Grants (SAFER), and Assistance to Firefighters Station Construction Grant programs.
- Department of Homeland Security (DHS) provides the following grants:
  - Homeland Security Grant Program (HSGP), State Homeland Security Program (SHSP) are 80% pass through grants. SHSP supports implementing the State Homeland Security Strategies to address identified planning, organization, equipment, training, and exercise needs for acts of terrorism and other catastrophic events. In addition, SHSP supports implementing the National Preparedness

Guidelines, the NIMS, and the National Response Framework (NRF). Must ensure at least 25% of funds are dedicated towards law enforcement terrorism prevention-oriented activities.

  - Citizen Corps Program (CCP). The Citizen Corps mission is to bring community and government leaders together to coordinate involving community members in emergency preparedness, planning, mitigation, response, and recovery activities.
  - Emergency Operations Center (EOC) This program is intended to improve emergency management and preparedness capabilities by supporting flexible, sustainable, secure, strategically located, and fully interoperable Emergency Operations Centers (EOCs) with a focus on addressing identified deficiencies and needs. Fully capable emergency operations facilities at the State and local levels are an essential element of a comprehensive national emergency management system and are necessary to ensure continuity of operations and continuity of government in major disasters or emergencies caused by any hazard. Requires 25% match.
  - U.S. Department of Commerce's grant programs include: Remote Community Alert Systems (RCASP) grant for outdoor alerting technologies in remote communities effectively underserved by commercial mobile service for the purpose of enabling residents of those communities to receive emergency messages. This program is a contributing element of the Warning, Alert, and Response Network (WARN) Act.
  - National Oceanic and Atmospheric Administration (NOAA), provides funds to the State of Alaska due to Alaska's high threat for tsunami. The allocation supports the promotion of local, regional, and state level tsunami mitigation and preparedness. installation of warning communications systems; installation of warning communications systems; installation of tsunami signage; promotion of the Tsunami Ready Program in Alaska; development of inundation models; and delivery of inundation maps and decision-support tools to communities in Alaska.

- Department of Agriculture (USDA). Disaster assistance provided includes: Emergency Conservation Program, Non-Insured Assistance, Emergency Forest Restoration Program, Emergency Watershed Protection, Rural Housing Service, Rural Utilities Service, and Rural Business and Cooperative Service.
- Department of Energy (DOE), Office of Energy Efficiency and Renewable Energy, Weatherization Assistance Program. This program minimizes the adverse effects of high energy costs on low-income, elderly, and handicapped citizens through client education activities and weatherization services such as an all-around safety check of major energy systems, including heating system modifications and insulation checks.
  - The Tribal Energy Program offers financial and technical assistance to Indian tribes to help them create sustainable renewable energy installations on their lands. This program promotes tribal energy self-sufficiency and fosters employment and economic development on America's tribal lands.
- US Environmental Protection Agency (EPA). Under EPA's CWSRF program, each state maintains a revolving loan fund to provide independent and permanent sources of low cost financing for a wide range of water quality infrastructure projects, including: municipal wastewater treatment projects; non-point source projects; watershed protection or restoration projects; and estuary management projects.

  - Public Works and Development Facilities Program. This program aids help distressed communities attract new industry, encourage business expansion, diversify local economies, and generate long-term, private sector jobs. Among the types of projects funded are water and sewer facilities, primarily serving industry and commerce; access roads to industrial parks or sites; port improvements; business incubator facilities; technology infrastructure; sustainable development activities; export programs; brownfields redevelopment; aquaculture facilities; and other infrastructure projects. Specific activities may include demolition, renovation, and construction of public facilities; provision of water or sewer infrastructure; or the development of stormwater control mechanisms (e.g., a retention pond) as part of an industrial park or other eligible project.
- Department of Health and Human Services, Administration of Children & Families, Administration for Native Americans (ANA). The ANA awards funds through grants to American Indians, Native Americans, Native Alaskans, Native Hawaiians, and Pacific Islanders. These grants are awarded to individual organizations that successfully apply for discretionary funds. ANA publishes in the Federal Register an announcement of funds available, the primary areas of focus, review criteria, and the method of application.
- Department of Housing and Urban Development (HUD) provides a variety of disaster resources. They also partner with Federal and state agencies to help implement disaster recovery assistance. Under the National Response Framework, the FEMA and the Small Business Administration (SBA) offer initial recovery assistance.
  - HUD, Office of Homes and Communities, Section 108 Loan Guarantee Programs. This program provides loan guarantees as security for Federal loans for acquisition, rehabilitation, relocation, clearance, site preparation, special economic development activities, and construction of certain public facilities and housing.
  - HUD, Office of Homes and Communities, Section 184 Indian Home Loan Guarantee Programs (IHLGP). The Section 184 Indian Home Loan Guarantee Program is a home mortgage specifically designed for American Indian and Alaska Native families, Alaska Villages, Tribes, or Tribally Designated Housing Entities. Section 184 loans can be used, both on and off native lands, for new construction, rehabilitation, purchase of an existing home, or refinance.
  - Because of the unique status of Indian lands being held in Trust, Native American homeownership has historically been an underserved market. Working with an expanding network of private sector and tribal partners, the Section 184 Program endeavors to increase access to capital for Native Americans and provide private funding opportunities for tribal housing agencies with the Section 184 Program.
  - HUD/CDBG provides grant assistance and technical assistance to aid communities in planning activities that address issues detrimental to the health and safety of local residents, such as housing rehabilitation, public services, community facilities, and infrastructure improvements that would primarily benefit low-and moderate-income persons.
- Department of Labor (DOL), Employment and Training Administration, Disaster Unemployment Assistance. Provides weekly unemployment subsistence grants for those who become unemployed because of a major disaster or emergency. Applicants must have exhausted all benefits for which they would normally be eligible.

  - The Workforce Investment Act contains provisions aimed at supporting employment and training activities for Indian, Alaska Native, and Native Hawaiian individuals. The Department of Labor's Indian and Native American Programs (INAP) funds grant programs that provide training opportunities at the local level for this target population.
- U.S. Department of Transportation (DOT), Hazardous Materials Emergency Preparedness Grant. DOT increases State, Territorial, Tribal and local effectiveness in safely and efficiently handling hazardous materials accidents and incidents, enhances implementation of the Emergency Planning and Community Right-to-Know Act of 1986, and encourages a comprehensive approach to emergency training and planning by incorporating the unique challenges of responses to transportation situations, through planning and training. Requires a 20% local match.
- Federal Financial Institutions. Member banks of Federal Deposit Insurance Corporation, Financial Reporting Standards or Federal Home Loan Bank Board may be permitted to waive early withdrawal penalties for Certificates of Deposit and Individual Retirement Accounts.
- Internal Revenue Service (IRS), Disaster Tax Relief. Provides extensions to current year's tax return, allows deductions for disaster losses, and allows amendment of previous year's tax returns.
- Natural Resources Conservation Service (NRCS) has several funding sources to fulfill mitigation needs. The Emergency Watershed Protection Program (EWP). This funding source is designed is to undertake emergency measures, including the purchase of flood plain easements, for runoff retardation and soil erosion prevention to safeguard lives and property from floods, drought, and the products of erosion on any watershed whenever fire, flood or any other natural occurrence is causing or has caused a sudden impairment of the watershed.
  - WHIP. This is a voluntary program for conservation-minded landowners who want to develop and improve wildlife habitat on agricultural land, nonindustrial private forest land, and Indian land.
  - Watershed Planning. NRCS watershed activities in Alaska are voluntary efforts requested through conservation districts and units of government and/or tribes. The watershed activities are lead locally by a "watershed management committee" that is comprised of local interest groups, local units of government, local tribal representatives and any organization that has a vested interest in the watershed planning activity. This committee provides direction to the process as well as provides the decision-making necessary to implement the process. Technical assistance is provided to the watershed management committee through a "technical advisory committee" comprised of local, state, and federal technical specialist. These specialists provide information to the watershed management committee as needed to make sound decisions. NRCS also provides training on watershed planning organization and process.
- U.S. Small Business Administration (SBA) Disaster Assistance provides information concerning disaster assistance, preparedness, planning, cleanup, and recovery planning.
  - May provide low-interest disaster loans to individuals and businesses that have suffered a loss due to a disaster. Requests for SBA loan assistance should be submitted to DHS&EM.

- United States Army Corps of Engineers (USACE) Alaska District's Civil Works Branch studies potential water resource projects in Alaska. These studies analyze and solve water resource issues of concern to the local communities. These issues may involve navigational improvements, flood control or ecosystem restoration. The agency also tracks flood hazard data for over 300 Alaskan communities on floodplains or the seacoast. These data help local communities assess the risk of floods to their communities and prepare for potential future floods. The USACE is a member and cochair of the Alaska Climate Change Sub-Cabinet.

B.2 State Funding Resources

- Department of Military and Veterans Affairs (DMVA): Provides damage appraisals and settlements for VA-insured homes and assists with filing of survivor benefits.
    - DHS&EM within DMVA is responsible for improving hazard mitigation technical assistance for local governments for the State of Alaska. Providing hazard mitigation training, current hazard information and communication facilitation with other agencies will enhance local hazard mitigation efforts. DHS&EM administers FEMA mitigation grants to mitigate future disaster damages such as those that may affect infrastructure including elevating, relocating, or acquiring hazard-prone properties.
    - DHS&EM also provides mitigation funding resources for mitigation planning on their Web site at http://www.ready.alaska.gov.
- Division of Senior Services (DSS): Provides special outreach services for seniors, including food, shelter, and clothing.
- Division of Insurance (DOI): Aids in obtaining copies of policies and provides information regarding filing claims.
- DCRA within the DCCED administers the HUD/CDBG, FMA Program, and the Climate Change Sub-Cabinet's Interagency Working Group's program funds and administers various flood and erosion mitigation projects, including the elevation, relocation, or acquisition of flood-prone homes and businesses throughout the State. This division also administers programs for State's" distressed" and "targeted" communities.
    - DCRA Planning and Land Management staff provide Alaska Climate Change Impact Mitigation Program (ACCIMP) funding to Alaskan communities that meet one or more of the following criteria related to flooding, erosion, melting permafrost, or other climate change-related phenomena: Life/safety risk during storm/flood events; loss of critical infrastructure; public health threats; and loss of 10% of residential dwellings.
    - The Hazard Impact Assessment is the first step in the ACCIMP process. The HIA identifies and defines the climate change-related hazards in the community, establishes current and predicted impacts, and provides recommendations to the community on alternatives to mitigate the impact. The community may then pursue these recommendations through an ACCIMP Community Planning Grant.
- Department of Environmental Conservation (DEC). DEC's primary roles and responsibilities concerning hazards mitigation are ensuring safe food and safe water, and pollution prevention and pollution response. DEC ensures water treatment plants, landfills, and bulk fuel storage tank farms are safely constructed and operated in communities.

Agency and facility response plans include hazards identification and pollution prevention and response strategies.

  - The Division of Water's Village Safe Water Program works with rural communities to develop sustainable sanitation facilities. Communities apply each year to VSW for grants for sanitation projects. Federal and state funding for this program is administered and managed by the State of Alaska's Village Safe Water (VSW) program. VSW provides technical and financial support to Alaska's smallest communities to design and construct water and wastewater systems. In some cases, funding is awarded by VSW through the Alaska Native Tribal Health Consortium, who in turn assist communities in design and construct of sanitation projects.
  - Municipal Grants and Loans Program. The Department of Environmental Conservation / Division of Water administer the Alaska Clean Water Fund (ACWF) and the Alaska Drinking Water Fund (ADWF). The division is fiscally responsible to the Environmental Protection Agency (EPA) to administer the loan funds as the EPA provides capitalization grants to the division for each of the loan funds. In addition, it is prudent upon the division to administer the funds in a manner that ensures their continued viability.
  - Under EPA's CWSRF program, each state maintains a revolving loan fund to provide independent and permanent sources of low-cost financing for a wide range of water quality infrastructure projects, including: municipal wastewater treatment projects; non-point source projects; watershed protection or restoration projects; and estuary management, [and stormwater management] projects. Alaska's Revolving Loan Fund Program, prescribed by Title VI of the Clean Water Act as amended by the Water Quality Act of 1987, Public Law 100- 4. DEC will use the ACWF account to administer the loan fund. This Agreement will continue from year-to-year and will be incorporated by reference into the annual capitalization grant agreement between EPA and the DEC. DEC will use a fiscal year of July 1 to June 30 for reporting purposes.

- Department of Transportation and Public Facilities (DOT/PF) personnel provide technical assistance to the various emergency management programs, to include mitigation. This assistance is addressed in the DHS&EM-DOT/PF Memorandum of Agreement and includes but is not limited to, environmental reviews, archaeological surveys, and historic preservation reviews.
  - DOT/PF and DHS&EM coordinate buy-out projects to ensure that there are no potential right-of-way conflicts with future use of land for bridge and highway projects and collaborate on earthquake mitigation. Additionally, DOT/PF provides the safe, efficient, economical, and effective State highway, harbor, and airport operation. DOT/PF uses it's Planning, Design and Engineering, Maintenance and Operations, and Intelligent Transportation Systems resources to identify hazards, plan and initiate mitigation activities to meet the transportation needs of Alaskans, and make Alaska a better place to live and work. DOT/PF budgets for temporary bridge replacements and materials necessary to make the multi-modal transportation system operational following natural disaster events.
- DNR administers various projects designed to reduce stream bank erosion, reduce localized flooding, improve drainage, and improve discharge water quality through the storm water grant program funds.

- The Division of Geological and Geophysical Survey (DGGS) is responsible Alaska's mineral, land, and water resources use, development, and earthquake mitigation collaboration. Their geologists and support staff are leaders in researching Alaska's geology and implementing technological tools to collect, interpret, publish, archive, and disseminate information to the public most efficiently.
- The DNR's Division of Forestry (DOF) participates in a statewide wildfire control program in cooperation with the forest industry, rural fire departments and other agencies. Prescribed burning may increase the risks of fire hazards; however, prescribed burning reduces the availability of fire fuels and therefore the potential for future, more serious fires.
- DOF also manages various wildland fire programs, activities, and grant programs such as the FireWise Program, Community Forestry Program (CFP), Assistance to Fire Fighters Grant (AFG), Fire Prevention and Safety (FP&S), Staffing for Adequate Fire and Emergency Response Grants (SAFER), and Volunteer Fire Assistance and Rural Fire Assistance Grant (VFA-RFA) programs.

B.3 Other Funding Resources

The following provide focused access to valuable planning resources for communities interested in sustainable development activities.

- FEMA, http://www.fema.gov - includes links to information, resources, and grants that communities can use in planning and implementation of sustainable measures.
- American Planning Association (APA), http://www.planning.org - a non-profit professional association that serves as a resource for planners, elected officials, and citizens concerned with planning and growth initiatives.
- Institute for Business and Home Safety (IBHS), http://ibhs.org - an initiative of the insurance industry to reduce deaths, injuries, property damage, economic losses, and human suffering caused by natural disasters.
- American Red Cross (ARC). Provides for the critical needs of individuals such as food, clothing, shelter, and supplemental medical needs. Provides recovery needs such as furniture, home repair, home purchasing, essential tools, and some bill payment may be provided.
- Crisis Counseling Program. Provides grants to State and Borough Mental Health Departments, which in turn provide training for screening, diagnosing, and counseling techniques. Also provides funds for counseling, outreach, and consultation for those affected by disaster.
- Denali Commission – www.denali.gov - Introduced by Congress in 1998, the Denali Commission is an independent federal agency designed to provide critical utilities, infrastructure, and economic support throughout Alaska. With the creation of the Denali Commission, Congress acknowledged the need for increased inter-agency cooperation and focus on Alaska's remote communities. Since its first meeting in April 1999, the Commission is credited with providing numerous cost-shared infrastructure projects across the State that exemplifies effective and efficient partnership between federal and state agencies, and the private sector.

- The Energy Program primarily funds design and construction of replacement bulk fuel storage facilities, upgrades to community power generation and distribution systems, alternative-renewable energy projects, and some energy cost reduction projects. The Commission works with the Alaska Energy Authority (AEA), Alaska Village Electric Cooperative (AVEC), Alaska Power and Telephone and other partners to meet rural communities' fuel storage and power generation needs.
- The goal of the solid waste program at the Denali Commission is to provide funding to address deficiencies in solid waste disposal sites which threaten to contaminate rural drinking water supplies.

Appendix C – Critical Facilities Hazard Exposure

Natural Hazards									
Type - Facility	Ground Failure / Landslide	Earthquake	Extreme Weather	Volcanic Ashfall	Tsunami	Avalanche	Flooding	Erosion	Wildfire
Education - Unalaska High School	X	X	X	X	X				
Education - Eagles View Elementary	X	X	X	X	X				
Education - Unalaska Preschool	X	X	X	X	X				
Education - UAF Unalska Learning Center	X	X	X	X	X				
Medical - IFHS Clinic	X	X	X	X					
Medical - APIA Oonalaska Wellness Center	X	X	X	X					
Medical - APIA Behaviorial Health Clinic	X	X	X	X	X				
Medical - Dutch Harbor Dental Clinic	X	X	X	X	X				
Medical - Aleutian Family Dentistry	X	X	X	X	X				
Medical - Arctic Chiropractic Unalaska	X	X	X	X	X				
Medical - Arctic Chiropractic Dutch Harbor	X	X	X	X					
Public Safety - Fire Station 1	X	X	X	X		X			
Public Safety - Fire Station 2	X	X	X	X		X			
Public Safety - Police Department	X	X	X	X		X			
Public Safety - Jail	X	X	X	X		X			
Public Safety - Alaska Wildlife Troopers	X	X	X	X	X				
Public Safety - Court Magistrate	X	X	X	X	X				
Utility - Electric Powerhouse	X	X	X	X	X	X			
Utility - Wastewater Treatment Facility	X	X	X	X		X	X	X	
Utility - Landfill and Baler Facility	X	X	X	X	X	X			
Utility - Water Storage	X	X	X	X					X
Utility - Water Treatment Facility	X	X	X	X		X			X
Utility - Icy Creek Reservoir	X	X	X	X		X			X
Utility - Icy Lake Reservoir	X	X	X	X		X			X
Transporation - USCG Dock	X	X	X	X	X		X	X	
Transportation - Unalaska Airport	X	X	X	X	X		X	X	
Transporation - Unalaska Marine Center	X	X	X	X	X		X	X	
Transporation - Light Cargo Dock	X	X	X	X	X		X	X	
Transporation - Spit Dock	X	X	X	X	X		X	X	
Transporation - Robert Storrs International Small Boat Harbor	X	X	X	X	X		X	X	
Transportation - Carl E. Moses Boat Harbor	X	X	X	X	X		X	X	
Historic Site - Holy Ascension Orthodox Church	X	X	X	X	X		X		
Historic Site - Sitka Spruce Plantation	X	X	X	X				X	X
Historic Site - Dutch Harbor Naval Operating Base and Fort Mears, US Army	X	X	X	X				X	X
Roads - All	X	X	X	X	X	X	X	X	
Bridges - All	X	X	X	X	X	X	X	X	

Appendix D – Public Involvement

D.1 Public Input Survey

In 2021 residents were sent a survey via Survey Monkey. In 2024 the same survey questions were published a second time to additional stakeholders and anyone who did not participate in the first survey. The questions and combined results are below.

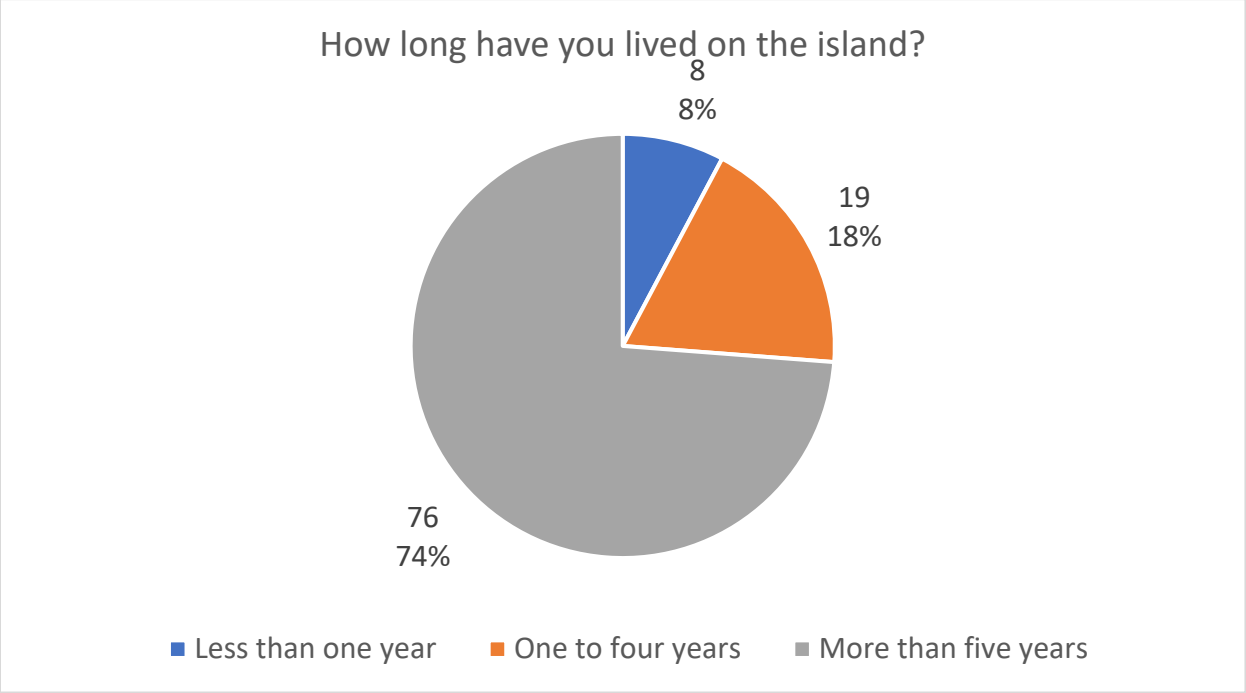

Figure 13: Public Survey Question 1 Results

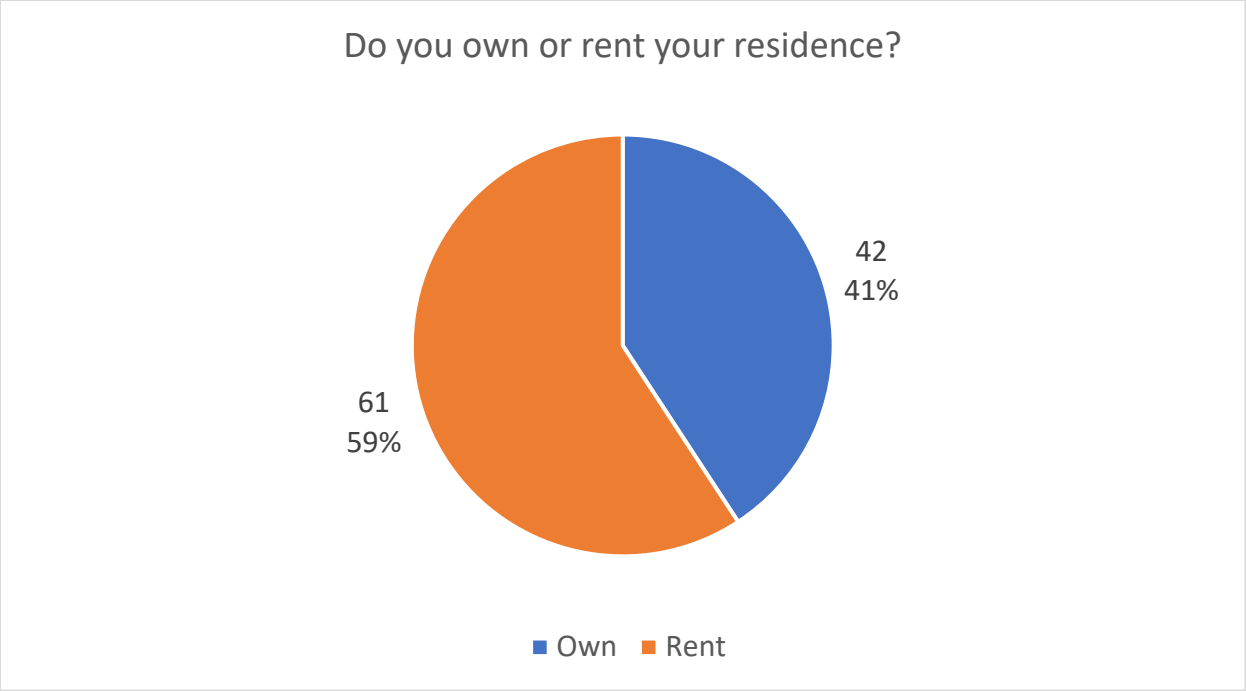

Figure 14: Public Survey Question 2 Results

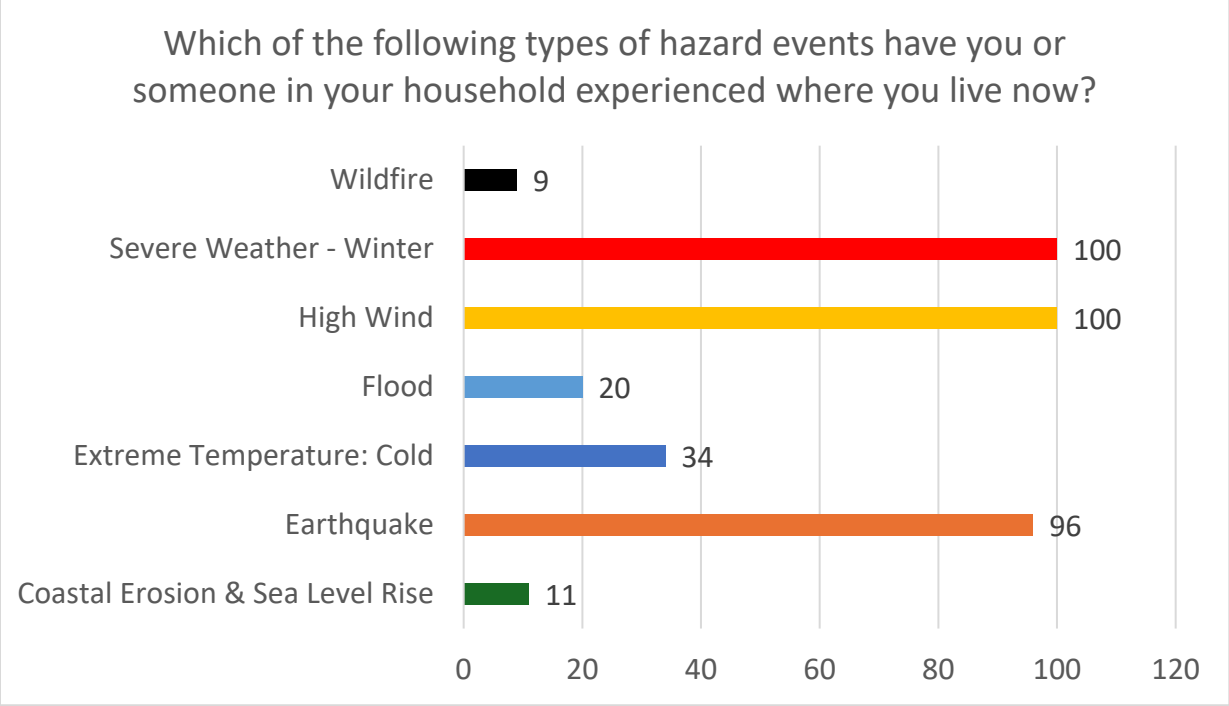

Figure 15: Public Survey Question 3 Results

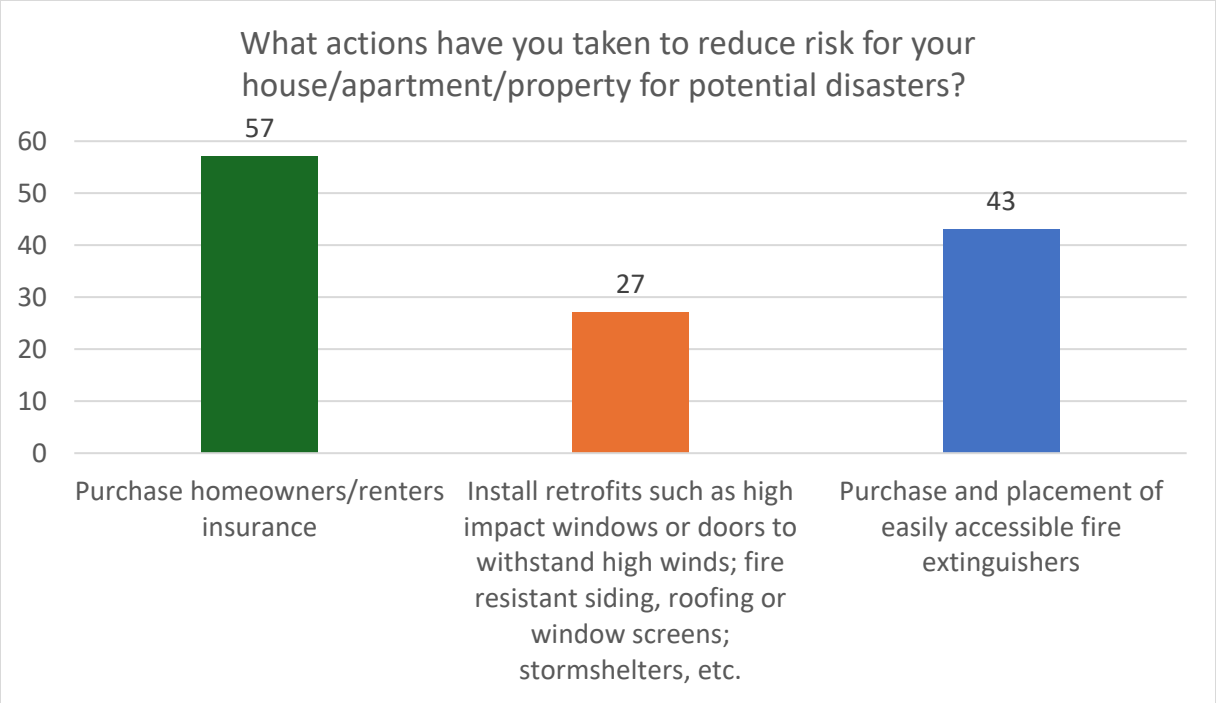

Figure 16: Public Survey Question 4 Results

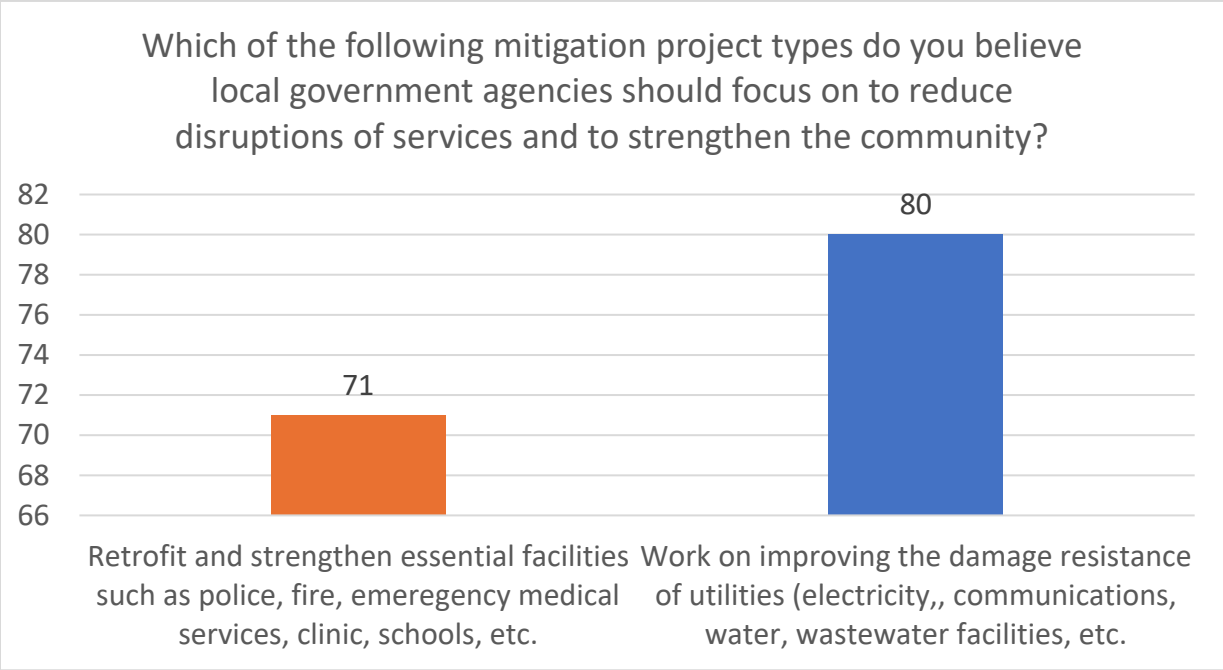

Figure 17: Public Survey Question 5 Results

D.2 Planning Team and Public Input

Section 1.4 of the plan lists the Hazard Mitigation Planning Team that participated in 2021 as well as the additional members that participated in 2024. The public was engaged to participate by completing the Public Input Survey and a total of 103 responses were received.

D.3 Public Meetings

Two meetings were held for public input during 2021 on August 17, 2021 at 2 PM and 6PM. Notices were posted as outlined in the below email from Marjorie Veeder.

From: Marjorie Veeder
Sent: Wednesday, August 4, 2021 9:37 AM
To: Patrick Shipp <pshipp@ci.unalaska.ak.us>
Subject: RE: Unalaska Site Visit

Hey Patrick:

The notice is attached.

- Posted on City Website: https://www.ci.unalaska.ak.us/fire/page/public-meeting-hazard-mitigation-plan-update 8/4/2021
- Posted on City Facebook page and Unalaska Friends & Events FB Group 8/4/2021
- Posted at City Hall 8/4/2021
- Blast Fax 8/4/2021
- Will be posted around town on 8/10/2021

Marjie Veeder
City Clerk
CITY OF UNALASKA
(907) 581-1251 ext. 2104

Despite these notices no members of the public participated in the 2021 public meetings.

Physical copies were made available at the Clerk's office in City Hall and Fire Station 1. Electronic copies were made available online at the City's website. The public was also given the opportunity to make in-person appointments within the public comment period.

One additional meeting was held for public input during 2024 on Tuesday, December 3rd, 2024 from 3:00PM to 6:00PM. This meeting was attended by ## members of the public which is defined as any tribal or community member that is not part of the planning team.

Public notice for the 2024 meeting was posted as outlined below:

- List of ways notice was posted

City of Unalaska and Qawalangin Tribe of Unalaska's Multi-Jurisdictional Hazard Mitigation Plan

PUBLIC COMMENT PERIOD

December 2-6, 2024

Physical Copies Available for Pick-Up at the Following Locations:
City Hall Clerk's Office: 43 Raven Way, Unalaska, AK 99685
Fire Station 1: 29 Safety Way, Unalaska, AK 99685

Digital Viewing is Accessible on the City of Unalaska's Website at:
https://www.ci.unalaska.ak.us/

Tribal and City Contacts:
Qawalangin Tribe Contact:
Katherine McGlashan
katherine@qawalangin.com
City Contact:
Ben Knowles
bknowles@ci.unalaska.ak.us

In-Person Meetings:
The public may schedule an appointment to discuss the plan in person during the comment period from 9:00 AM to 5:00 PM.
To schedule an in person meeting please contact Fire Department Administrative Assistant Angela Mountain at **fireadmin@ci.unalaska.ak.us**

Pre-Scheduled In-Person Meeting:
Will be held on Tuesday, 12/03/2024 at Fire Station 1 from 3:00PM to 6:00PM

D.4 Public Comment

Following the public meeting the public was provided a final opportunity to provide written comment prior to sending the draft plan to the Alaska State Hazard Mitigation Officer. The Draft Plan was available for viewing from December 2-6, 2024.

Appendix E – Prioritization

It is acknowledged that there will be many projects that should be undertaken but there is a limited amount of resources available. Given that, projects must be prioritized to determine how to allocate resources.

The prioritization will be done by the planning committee and will be based on several criteria including:

- Life safety
- Compliance with an existing program/regulation
- Cost Benefit Analysis
- Coordination with existing documents/programs

E.1 Life Safety

Activities that protect human lives will have priority over those that solely protect property.

E.2 Compliance

The failure to comply with existing requirements could have wide ranging consequences such as the ineligibility to participate in funding programs.

E.3 Cost Benefit Analysis

When possible, FEMA's cost-benefit analysis tools will be used to determine a project's cost benefit ratio. Those projects with a higher cost benefit ratio will be given a higher priority. A cost benefit analysis provides a common basis that can be used to compare projects. When calculating a cost benefit ratio, the cost amount includes funds spent by FEMA, state, local, tribal, private, and other dollars. It should include administrative and maintenance costs as well as indirect costs. Examples of costs include:

- Direct expenditures of construction materials
- Costs to develop and administer a new overlay zone
- Increased business operation costs to comply with mitigation requirement

The benefits must be estimated. The calculation includes direct and indirect benefits. Examples of benefits include the losses avoided due to mitigation activities, avoided loss of life, injury, property damage, environmental damage, community disruption and response costs avoided.

E.4 Calculating the Benefit-Cost-Ratio

Cost-effectiveness is determined by comparing the project cost, to the value of damages prevented after the mitigation measure. Because the dollar-value of benefits exceeds the costs of funding the project, the project is cost-effective. This relationship is depicted numerically by dividing the benefits by the costs, resulting in a benefit-cost ratio (BCR). The BCR is simply a way of stating

whether benefits exceed project costs, and by how much. To derive the BCR, divide the benefits by the cost. If the result is 1.0 or greater, then the project is cost-effective. By conducting a benefit-cost analysis, you determine one of two things: either the project is cost-effective (BCR > 1.0) or it is not (BCR < 1.0). If the project is cost-effective, then no further work or analysis needs to be done; there is no third step other than to move the project to the next phase in the approval process. If, however, the project is not cost-effective, then it is not eligible for funding.

FEMA utilizes a computer software program to calculate a project's cost-effectiveness. The following is a technical illustration of how benefit-cost analysis works. There are four key elements to all benefit-cost analyses of hazard mitigation projects:

- an estimate of damages and losses before mitigation
- an estimate of damages and losses after mitigation
- an estimate of the frequency and severity of the hazard causing damages
- the economic factors of the analysis (i.e. discount rate and mitigation project useful lifetime)

If the pre-mitigation damages are frequent and/or severe, then the project is more likely to be cost-effective. Even minor damage that occurs frequently can exceed, over the life of a project, the up-front costs of implementing a mitigation measure. FEMA is trying to maximize its investment in damage reduction by focusing mitigation resources on those projects that have the best chance of making an impact on losses in property and life. Determining cost effectiveness of mitigation projects is of critical importance, therefore, to ensure that FEMA is fulfilling its mission of not just responding to disasters, but also in reducing the economic loss and suffering that they bring.

A project that is integrated into several plans, has gone through the public involvement process will have a higher priority as they reflect the desires of multiple departments and the public. Projects that have been contained within a single plan or has no public involvement may not reflect the wider viewpoint.

The following table shows how the criteria will be considered using a point system to give each project a score. This score will then be used to rank the projects. The department responsible for the project will initially develop the score for the project. The scores will then be evaluated by the Hazard Mitigation Planning Team to ensure that the projects are being consistently scored.

For the purposes of this plan, action items will be given a prioritization of high, medium, or low. A high value represents a score above 72 while a medium is between 37 and 72 and low is 36 or below. For each project, additional factors to be considered can be listed. At their discretion, the Hazard Mitigation Planning Team can evaluate these factors and alter the project's priority. Once the priority has been determined, the action items in order of their priority.

Prioritization of Projects					
Criteria	Weighting	Score			Total Points Weight x Score
		Low 1-3 Possible	Medium 4-6 Possible	High 7-9 Possible	
Life Safety	4	No People at Risk	Fewer than 9 People Affected	More than 10 People Affected	
Compliance with Existing Programs /Regulations	3	Not Needed	Encouraged	Required	
Cost-Benfit	2	No Cost-Benefit Analysis performed or results less than 1	Cost-Benefit between 1 and 2	Cost-Benefit Greater than 2	
Coordination with Existing Plans	1	No Ties to Existing Plans	Mentioned in one or tow plans. Plans without public involvement	Well integrated in Plans. Plans have gone through public input process	

E.5 Potential Funding Sources

Potential funding sources are noted in Appendix B.

Appendix F – Reference

Alaska Disaster Act (AS 26.23.10 to AS 26.23.900)
https://www.touchngo.com/lglcntr/akstats/statutes/title26/chapter23.htm

Alaska Volcano Observatory
https://www.avo.alaska.edu/

City of Unalaska
https://www.ci.unalaska.ak.us/

City of Unalaska and Qawalangin Tribe of Unalaska
Multi-Jurisdiction Hazard Mitigation Plan Update

Unalaska Innovative Readiness Training Report September 2020
https://www.ci.unalaska.ak.us/sites/default/files/fileattachments/mayor_and_city_council/meeting/9570/10a_work_session_-_irt.pdf

Unalaska City School District
https://www.ucsd.net/

Acronyms – Abbreviations

Acronyms/Abbreviations	
°F	Degrees Fahrenheit
ACCIMP	Alaska Climate Change Impact Mitigation Program
ACWF	Alaska Clean Water Fund
ADWF	Alaska Drinking Water Fund
AEA	Alaska Energy Authority
AEEE	Alternative Energy and Energy Efficiency
AFG	Assistance to Firefighters Grant
AHFC	Alaska Housing Finance Corporation
AIDEA	Alaska Industrial Development and Export Authority
AK	Alaska
ANA	Administration for Native Americans
ANCSA	Alaska Native Claims Settlement Act
ARC	American Red Cross
AVEC	Alaska Village Electric Cooperative
AVO	Alaska Volcano Observatory
BIA	Bureau of Indian Affairs
CCP	Citizen Corps Program
CDBG	Community Development Block Grant
CFR	Code of Federal Regulations
CFP	Community Forestry Program
CGP	Comprehensive Grant Program
City	City of Unalaska
CUTOD	Community & Utility Towers Overlay District
CWSRF	Clean Water State Revolving Fund
DCCED	Department of Commerce, Community and Economic Development
DCRA	Division of Community and Regional Affairs
DEC	Department of Environmental Conservation
Denali	Denali Commission
DHS	Department of Homeland Security
DHS&EM	Division of Homeland Security and Emergency Management
DHSS	Department of Health and Social Services
DGGS	Division of Geological and Geophysical Survey
DMA 2000	Disaster Mitigation Act of 2000
DMVA	Department of Military and Veterans Affairs
DNR	Department of Natural Resources
DOE	Department of Energy
DOF	Division of Forestry
DOI	Division of Insurance
DOL	Department of Labor
DOT/PF	Department of Transportation and Public Facilities
DPS	Director of Public Safety
DSS	Division of Senior Services
EOC	Emergency Operations Center
EMPG	Emergency Management Performance Grant
EPA	Environmental Protection Agency

EQ	Earthquake
ER	Erosion
EWP	Emergency Watershed Protection Program
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FL	Flood
FMA	Flood Mitigation Assistance
FP&S	Fire Prevention and Safety
ft	Feet
FY	Fiscal Year
g	Gravity
GF	Ground Failure
GIS	Geospatial Information System
Hazus-MH	Hazard United States – Multi-Hazard Software
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HSGP	Homeland Security Grant Program
HUD	Housing and Urban Development
IHBG	Indian Housing Block Grant
IHLGP	Indian Home Loan Guarantee Program
INAP	Indian And Native American Programs
IRS	Internal Revenue Service
Kts	Knots
LEPC	Local Emergency Planning Committee
M	Magnitude
MAP	Mitigation Action Plan
MPH	Miles Per Hour
msl	Mean Sea Level
NAHASDA	Native American Housing Assistance and Self Determination Act
NFIP	National Flood Insurance Program
NIMS	National Incident Management System
NOAA	National Oceanic and Atmospheric Administration
NRF	National Response Framework
NRCS	Natural Resources Conservation Service
NWS	National Weather Service
OC	Ounalashka Corporation
PCR	Parks Culture & Recreation Center
PDM	Pre-Disaster Mitigation
RL	Repetitive Loss
RFC	Repetitive Flood Claim
SAFER	Staffing for Adequate Fire and Emergency Response
SBA	U.S. Small Business Administration
SHMP	Alaska State Hazard Mitigation Plan
SHSP	State Homeland Security Program
Stafford Act	Robert T. Stafford Disaster Relief and Emergency Assistance Act

Tribe	Qawalangin Tribe of Unalaska
UCP	City of Unalaska's Comprehensive Plan, 2020
UMA	Unified Mitigation Assistance
US	United States
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WARN	Warning, Alert, And Response Network
WX	Weather