

SECTION 3 – NATURAL ENVIRONMENT

3.1 Climate

The climate in Līhu‘e is characterized as semi-tropical and is influenced by Hawai‘i’s geographic location within the tropics, southwest of the Pacific High or anticyclone region. The outstanding features of the climate are the equable temperatures from day to day and season to season, the persistent northeasterly trade winds and the marked variation in rainfall from the wet to the dry season, and place to place. The average annual temperature recorded at the Līhu‘e International Airport ranges between 79.1 degrees Fahrenheit during the warmest month and 71.3 degrees Fahrenheit during the coolest month. Normal annual rainfall is over 40 inches. Three-fourths of this total, on the average, falls during the seven month wet season which extends from October through April. The dry season includes the months of May through September. Winds at the Līhu‘e Airport are predominantly from the northeast at speeds of 10 to 13 knots. Relative humidity, moderate to high in all seasons, is slightly higher in the wet season than in the dry. The average relative humidity recorded at Līhu‘e Airport is 67 percent in mid-afternoon and 83 percent in the early morning hours. Completely cloudless skies are quite rare. On the average, clouds cover six tenths to seven tenths of the sky during the daylight hours.

Impacts and Mitigation

The proposed project will not affect the climate of the region. The favorable trade wind and temperature conditions of the site, however, are anticipated to enhance and contribute to the general use of the proposed project.

3.2 Geography, Topography and Soils

The majority of the project is located on a plateau area within the ahupua‘a of Kalapakī and Hanamā‘ulu. The plateau area slopes gently downward west to east towards the ocean at an average 8 percent slope. The project area is bounded on the north by Hanamā‘ulu Stream Gulch and on the south by Nāwiliwili Stream Gulch. The elevation of the project area ranges from ocean level to 207 feet near the State and County buildings. The coastline from Ahukini to Ninini consists of steep cliffs that drop twenty to thirty feet to a cobble shoreline in most areas.

The general Līhu‘e area is located in the Līhu‘e basin which is a large (approximately 40 square miles) semicircular depression bound by steep cliffs and filled by the Koloa Volcanic series which resulted from flows that began two million years after the island was formed. The Koloa Volcanic series include lava flows of olivine, basalt, melilitite-nepheline basalt, and basanite,

related cinder and tuff cones and ash beds, and closely associated and intercalated sedimentary breccias and conglomerates. Portions of Nāwiliwili are also located on alluvium beach and dune sand, lagoonal clays and marls created by erosional forces and sedimentation over the millennium.

Soils information for the project site was obtained from the *Soil Survey of Islands of Kauaʻi, Oʻahu, Maui, Molokaʻi and Lanaʻi, State of Hawaiʻi*, as prepared by the U.S. Department of Agriculture, 1972. The soil in the project area belongs primarily to the Līhuʻe-Puhi soil association. These soils are characterized by a surface layer which ranges from firm silty clay (LhB0) to gravelly silty clay (LIB, LIC). The subsoil is firm silty clay and the sub-stratum is soft, weathered basic igneous rock. The slope ranges from 0 to 8 percent (LhB, LIB) and 8 to 15 percent (LIC). Soil along the coast generally belongs to the Waikomo-Kalihi-Koloa association which is characterized by a surface layer of firm stony silty clay, a subsoil of firm silty clay and substratum of hard rock. The slope in these coastal regions ranges from 3 to 8 percent (KvB) and 15 to 25 (KvD) percent. Rocky outcrops are also found along the coastline. Soil types found in and around the project area are illustrated in **Figure 3-1**.

Impacts and Mitigation

No significant impacts to soils, topography or geology are expected to result from this project. Grading and excavations required for construction of the path and related amenities will be designed to minimize the amount of cut and fill required. The path alignment was selected to take advantage of natural grades in order to meet ADA accessibility standards for slopes with a minimal amount of ground disturbance and related costs. Erosion control measures will be employed during construction. Following project complete, permanent soil stabilization will be achieved through landscaping with various plant materials and ground covers.

3.3 Water Quality

3.3.1 Surface Water and Wetlands

Surface water in the project area consists of perennial streams, man-made and natural freshwater and brackish ponds, and ocean water. The stream system begins in the upper mountain areas where rain either runs off the land into the streams or percolates through the soil into the groundwater. In the dry seasons this groundwater discharge is the main source of

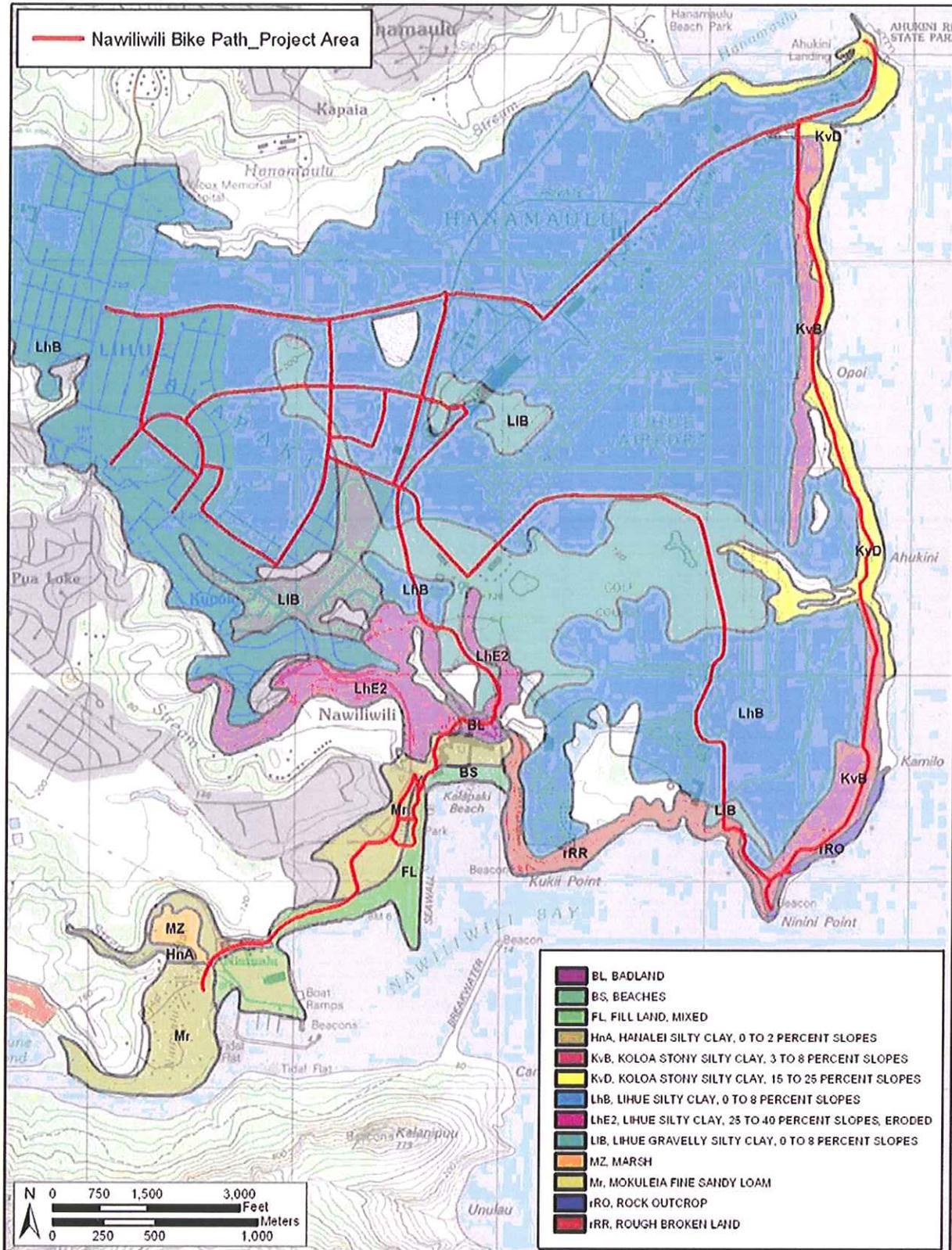


FIGURE 3-1: Soils Map

project area. Nāwiliwili Stream enters Kalapakī Beach after flowing through Nāwiliwili. Koena'awanui Stream once flowed through the ahupua'a of Kalapakī, where the project site is located, and entered the ocean in the middle of Kalapakī Beach. It now flows underground through concrete channels below the Marriot hotel. Other streams in the Nāwiliwili area include Hulē'ia to the south. Hanamā'ulu Stream defines the northern boundary of the project area and discharges into Hanamā'ulu Bay north of Ahukini point.

The United States Fish and Wildlife Service (USFWS) have identified several man-made and natural wetlands in the project area. USFWS classifies wetland areas according to identifying features such as general appearance, dominant form of vegetation, composition of bottom, and permanency. A large reservoir basin is located near the junction of Ahukini and Kapule Highway. The reservoir is an intermittently flooded impoundment, codified L1UBHh. Several smaller surface water detention areas have been identified on the Kaua'i Marriot and the Kaua'i Lagoons properties. One of these ponds has been coded PUBHh which indicates that it is has either been created or modified by a man-made barrier or dam. An intermittently flooded pond, codified PUBF, is located along the coast, north of Ninini Point. A permanent fresh water pond located north of Kalapakī beach has been classified PUBH. This pond is bordered on the south by a freshwater, seasonally emergent wetland, code PEM1C. Northwest of this point lies a forested wetland, PFO3A, that has a surface water level which lies below the soil surface most times of the year. Further west surrounding the Nāwiliwili Stream are areas of seasonally flooded wetlands (PEM1C) characterized by perennial aquatic vegetation present for most times of the year. Also found in close proximity to the stream are freshwater forested/shrub wetlands, that have a surface water level present for extended periods of time throughout the year. Several other unidentified ponds are also located in the project area but are not coded by USFWS.

The marine waters adjacent to the Ahukini to Nāwiliwili portion of the path have been classified as Class A waters by the State of Hawai'i, Department of Health (DOH) Administrative Rules, Chapter 54, Water Quality Standards. Class A waters are protected for recreational purposes and aesthetic enjoyment. Discharges covered by a National Pollutant Discharge Elimination System general permit, approved by the U.S. Environmental Protection Agency and issued by the DOH are allowed in this class of waters.

Nāwiliwili Harbor has been classified by DOH as a Water Quality Limited Segment, meaning that it cannot reasonably be expected to attain or maintain State Water Quality Standards without additional action to control nonpoint sources of pollution.

Impacts and Mitigation

The bike path corridor will be routed around wetland resources. This will include routing the corridor to avoid the potential for stormwater runoff from adversely affecting any wetlands. No impacts to wetlands are anticipated.

No impacts to surface or other inland waters are expected to result from the project. Construction activities will be conducted in compliance with Hawai'i Administrative Rules (HAR) 11-54 Water Quality Standards; HAR 11-55, Water Pollution Control; County of Kaua'i grading and erosion control standards; and other standards as prescribed by law.

3.3.2 Groundwater

The Līhu'e area lies in the Hanamā'ulu Aquifer system. Virtually the entire aquifer is layered by the Kōloa Volcanic Series formation which consists of a system of layered basalts of variable density and thickness with generally poor to moderate permeability. The Līhu'e Basin has lower hydraulic conductivities, a thicker freshwater lens, steeper horizontal and vertical head gradients, higher inland water levels, and a greater proportion of groundwater discharge to streams than other parts of Hawai'i. Ground water sources for the Līhu'e area come from the Kālepa Ridge well, Kilohana Well A, Kilohana Well B, Kilohana Well I, Hanamā'ulu Well No. 3, Surface Water Treatment Plant, Garlinghouse Tunnel, Līhu'e Grammar School Well, and Pukaki Well.

Groundwater quality is generally good and requires no treatment except disinfection. However, 2005 State of Hawai'i Department of Health Groundwater Contamination Maps indicates that contaminants have been found in the following wells: Grammar School Well (Isophorone 0.6), Garlingtonhouse Tunnel (Atrazine 0.06), Desethyl Altrazine NQ< 0.05) Kilohana B (Isophorone 1.6) and C (Atrazine 0.08, Bromacil .2) and Kālepa (Isophorone 1.6). None of the contaminant levels exceed State or Federal Standards. In 2006 drinking water was tested for regulated microbiological, radioactive, inorganic, organic, and volatile organic contaminants as well as other unregulated contaminants. The study found no contaminants that exceeded State or Federal Standards.

Impacts and Mitigation

Development of the bike path is not expected to result in adverse impacts to groundwater. Project activities will be conducted in compliance with regulatory standards including the National Pollutant Discharge Elimination System (NPDES) requirements as regulated by the State Department of Health (DOH). Wastewater from new comfort stations will be collected and treated in accordance with DOH wastewater

regulations as prescribed in HAR, Chapter 11-62, Wastewater Systems. Due to the long distance from the nearest waste water collection system connection, the proposed comfort station will utilize a septic aerobic or leach field system for wastewater treatment.

3.4 Drainage

Storm water runoff throughout the project area is conveyed in both natural drainage channels and improved drainage systems comprised of concrete pipes, culverts, drain inlets, and lined and unlined ditches. Within the primary project corridor between Ahukini and Ninini Point (Path Segment A), runoff flows through four major natural drainage channels that discharge to the ocean. Pipes and culverts are installed under the airport perimeter road and the public access dirt road at these locations. Runoff also follows smaller natural channels and/or sheet flows into the ocean along this segment. These channels also convey storm drainage originating from the airport and the Ahukini Road Corridor makai of Kapule Highway (Path Segments G and H).

West of Ninini Point (Path Segments B and C) drainage is directed via an unlined swale along Ninini Point Road and directed into a large natural drainage gully that discharges into Nāwiliwili Harbor in the vicinity of Ninini Beach. As Ninini Point Road approaches the south-west end of Runway 3-21 (Path Segments C and D), runoff is directed through the Kaua'i Lagoons golf course via a system of swales, inlets and pipes and is concentrated into two natural drainage channels located east and west of Limo Road. Two large culvert inlets convey the concentrated runoff through the resort's subsurface drainage system to discharge at a drainage outfall at the mouth of Nāwiliwili Stream adjacent to Duke's Restaurant. This system also receives storm water flows that originate at the Molokoa Civic Center Facilities (Kaua'i Police Headquarters, State Judiciary Building, Vidinha Memorial Stadium and Soccer Complex) and the Lihu'e Industrial Park on Kapule Highway (Path Segments J, K, L).

Runoff on Ahukini Road makai of Kapule Highway (Path Segment I) flows through ditches, trenches, swales and pipe crossings that were part of the former cane field drainage system and discharges into the ocean. Storm water in Lihu'e town (Path Segments L and M) is conveyed via an improved, subsurface drainage system into a large, lined drainage channel located perpendicular to Rice Street south-west of the intersection with Ho'olako Street. The Lihu'e town drainage channel discharges into Nāwiliwili Stream within the Nāwiliwili Stream Valley (Path Segment N). Runoff on Kānoa Street, Wilcox Road, Wa'apā Road and Niumalu Road (Path Segment O and P) is collected in swales, drain inlets and pipes and is conveyed to various points of discharge into Nāwiliwili Harbor.

Within developed projects areas, pathway improvements will include installation of drain pipes, inlets, lined and unlined swales, and other improvements as necessary to tie into the existing drainage systems.

Planned improvements in the undeveloped areas between Ahukini and Ninini Point include installation of drainage culverts and/or bridge spans at the four major drainage ways to provide safe crossing for the shared-use path. In addition, smaller drain pipes will be installed as needed along the pathway to convey smaller, localized flows. Runoff from the path will surface flow to adjacent, grassed shoulders. The existing drainage pattern will remain as is: runoff will discharge to the ocean within the drainage channels or via surface flow. Sizes of pipes and culverts will be determined during the design phase.

On Ninini Point Road and Limo Road, the path will rely on the existing system of drainage swales, inlets and pipes to collect and convey runoff. Path construction will include pipe and culvert crossings as necessary to preserve existing drainage patterns and tie into the existing drainage system within the resort property.

Impacts and Mitigation

Planned improvements will require excavation and grading work to achieve proper elevations and grades for path construction, installation of at-grade drainage crossings, and construction of proposed comfort stations at Ninini Point and Nāwiliwili Park. Potential impacts include discharge of sediments or other pollutants in construction-related storm water runoff. Because planned improvements will result in more than one acre of ground disturbance during construction, project activities will be subject to a National Pollutant Discharge Elimination System (NPDES) Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity permit from the State Department of Health, Clean Water Branch. The permit requires implementation of Best Management Practices (BMPs), including site management measures and physical controls (e.g. diversion berms, silt fences, detention ponds) to reduce pollutants in construction storm water runoff and ensure that the project complies with State water quality standards. Impacts related to construction activities will be of short duration and will cease upon completion of the project.

In the long-term, construction of the concrete path, Ninini Point comfort station and improvements at Nāwiliwili Beach Park will result in an increase in impervious area and related surface runoff. Due to the narrow, linear nature of the path, the increase in runoff from project improvements is expected to be slight in relation to the size of the project corridor. Nevertheless, drainage improvements will be designed to accommodate runoff increases. In addition to the improvements described above, additional measures may include use of vegetated detention strips and basins as part of path landscaping, use

pervious pavements, and use of underground storm water detention chambers. No significant impacts to existing drainage patterns are anticipated to result from the planned path improvements.

3.5 Flora

Vegetation along the proposed bike/pedestrian corridor is dominated by introduced, alien, and exotic species. None of the plants observed along the proposed segments of the corridor are listed as endangered or threatened, or currently proposed for listing under either federal or State of Hawai'i endangered species statutes.

No adverse effects are anticipated. Landscaping is planned along portions of the corridor to improve soil retention and promote filtration of any stormwater runoff from the path. The landscaping will be designed to be consistent with the character and physical environment of the area, incorporating native species whenever feasible.

Impacts and Mitigation

The construction of the proposed path is not anticipated to result in deleterious impacts to protected plants species. No negative impact on plant habitats or specific plant communities along the corridor is expected. However certain measures will be taken to promote native vegetation in the project area. The plant material used for landscaping (i.e. at comfort stations) will be selected to fit the character and physical environment of the area incorporating the use of native species whenever feasible.

3.6 Fauna

Birds

Field surveys documented the presence of native avian species (water birds) within and adjacent to the project area. Four of the species found are listed as endangered under both federal and state of Hawai'i endangered species statutes. The four listed species within the project area were the Hawaiian Goose, or Nēnē (*Branta sandvicensis*), Hawaiian Duck, or Koloa (*Anas wyvilliana*), the Hawaiian endemic sub-species of the Common Moorhen, or 'Alae 'ula (*Gallinula chloropus sandvicensis*), and the Hawaiian Coot, or 'Alae ke'oke'o (*Fulica alai*). All four species were seen in and around the Kaua'i Lagoons property, located immediately to the west of the Līhu'e International Airport main runway. The three other waterbird species detected during the biological surveys, Hawaiian Duck, Common Moorhen and Hawaiian Coot

were all recorded on Kaua‘i Lagoons property or immediately adjacent to it on lands abutting the western side of the Līhu‘e International Airport.

In addition to the water birds detected within the project area, a number of other resident native avian species including both resident and migratory species were recorded. These native and indigenous species include the Hawaiian endemic sub-species of the Short-eared Owl, or Pueo (*Asio flammeus sandwichensis*), and the resident Black-crowned Night-Heron, ‘Auku‘u (*Nycticorax nycticorax hoactli*), as well as the migratory Pacific Golden-Plover, or Kōlea (*Pluvialis fulva*), and Ruddy Turnstone, or ‘Akekeke (*Arenaria interpres*). A significant nesting colony of Wedge-tailed Shearwater, or ‘Ua‘u kani, (*Puffinus pacificus*) is present adjacent to a portion of the path, between Ninini Point Lighthouse, and Ninini Beach. The colony extends from just above the high water mark, inland, onto the flats above the cliff face. Wedge-tailed Shearwaters are not protected under either federal or State of Hawai‘i endangered species statutes, they are protected under the federal Migratory Bird Treaty Act. Additionally, both the endangered Hawaiian Petrel, or ‘Ua‘u (*Pterodroma sandwichensis*), and the threatened Newell’s Shearwater, or ‘A‘o (*Puffinus auricularis newelli*) overfly the project area on an annual basis on their way back and forth to their colonies located inland.

Currently a relatively large flock of Nēnē is present on the Kaua‘i Lagoons property. Over the past several years as many as 50 pairs have nested on the grounds of the golf course and surrounding property. No known nests or nesting territories are known from within the various alignments under consideration. The U.S. Fish & Wildlife Service and the State of Hawaii Department of Land and Natural Resource, Division of Forestry and Wildlife are actively working to translocate a large portion of this Nēnē flock. Currently young birds are being translocated to private property located in the Kōloa area, it is expected that by 2009 young birds from this flock will start to be translocated to other islands. The main reason that the wildlife agencies are undertaking this management action is due to concerns over the potential Bird Air Strike Hazards posed by the geese to aircraft using the Līhu‘e International Airport.

Mammals

One endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) was recorded foraging above a small ephemeral storm water run-off pond on land owned by the Kaua‘i Lagoons Golf Course which fronts one of the proposed path alignments. This species though endangered is generally considered to be fairly common on Kaua‘i. It is regularly seen during crepuscular hours in many lowland areas on the island. Hawaiian hoary bats use a wide array of tree species and habitats in which to roost, and are opportunistic feeders, preying on a wide variety of native and alien flying insects. Their presence within the general project area was expected, as there are few if any lowland areas on the island of Kaua‘i in which this species is not present at least on a seasonal basis.

All other mammalian species recorded during the course of the biological surveys are considered to be alien to the Hawaiian Islands, and are by in large deleterious to native species and the habitats that they depend on for their survival. Non-native mammalian species recorded included, cats, dogs, pig, European house mice and at least one species of rat. The U.S. Fish and Wildlife Service notes that the federally protected Hawaiian Monk Seal (*Monachus schauinisi*) has used the coastal regions of the project as a birthing and pup-rearing site.

Impacts and Mitigation

Waterbirds:

With the exception of the Nēnē all other listed waterbird species detected within the proposed path alignments were restricted to the Kaua'i Lagoons property. It is not expected that the development of the proposed path will result in deleterious impacts to Hawaiian Ducks, Hawaiian Coots or the Hawaiian endemic sub-species of the Common Moorhen. Construction activities and use of the completed path potential could result in deleterious impacts to Nēnē, especially during and immediately after the nesting season. Nēnē are very susceptible to disturbance at the nest, and have been recorded abandoning active nests when overly disturbed. Additionally, goslings are flightless for up to two weeks following fledging from the nest, and are thus very susceptible to predators and physical injury from construction activity. Following the build-out of the path, users of the path may also disturb individual birds, though this is probably not a serious threat as many of these birds are used to humans as they encounter them on the Kaua'i Lagoons property on a daily basis. Path users who may have unleashed dogs with them while using the path pose the greater threat. Dogs naturally chase birds, and have repeatedly been documented killing birds, especially in and around nesting areas, and colonies.

Seabirds:

Potential threats posed by the development and operation of the path to the resident Wedge-tailed Shearwater colony present along the shoreline between Ninini Point and Ninini Beach are similar to those posed to Nēnē. Wedge-tailed Shearwaters nest in a dense colony, that is very susceptible to trampling and burrow collapse if humans enter the colonies. The birds are also at extreme risk from alien mammalian predators such as cats, dogs and rats, and possibly the introduced Barn Owl (*Tyto alba*), since they are extremely naïve of the threats posed by these alien predators, since they did not co-evolve with each other.

Potential threats posed by the development and operation of the path to the endangered Hawaiian Petrel and the threatened Newell's Shearwater revolve around exterior lighting. Exterior lighting can disorient nocturnally flying seabirds, especially fledglings

on their way to sea in the summer and fall. When disoriented, seabirds often collide with man-made structures, and if they are not killed outright, the dazed or injured birds are easy targets of opportunity for feral mammals. Once on the ground neither of these birds is normally able to take off again. Both Hawaiian Petrels and Newell's Shearwaters have been grounded immediately adjacent to the project site on an annual basis over the past 29-years. There are neither nesting colonies, nor suitable nesting habitat for either seabird species within or close to the project site.

Monk Seals

The planned shared-use path will be setback from the shoreline and located away from sandy beaches favored by monk seals. However, upon project completion, path use is expected to result in an increased number of people accessing the shoreline along the path route, including areas used by monk seals such as Running Waters Beach and Ninini Beach. Increased contact with monk seals and use of their habitat by recreational beach goers could disrupt the seals' normal behavior.

Recommendations

- Conduct a Nēnē nesting survey before the onset of the nesting season to determine if any active nests are close to the construction area.
- If nesting is encountered the area around the nest needs to be screened from the construction site.
- Limit nighttime construction activity between September 15 and December 15 each year to avoid attracting either Hawaiian Petrels or Newell's Shearwaters by construction lighting.
- Maintain a pet carrier at the construction site at all times to be used to hold any downed seabirds that may be encountered by construction personnel.
- Immediately call the Save our Shearwater Program (SOS Program) if a downed seabird is encountered.
- Lighting should be kept to a minimum along the pathway all lights should be shielded.
- The boundary and a buffer zone should be fenced around the existing Wedge-tailed Shearwater colony to restrict both human and dog traffic in the colony.
- The exact locations and types of fencing should be further detailed in a protection plan developed by a biologist or other professional knowledgeable in conservation of threatened and endangered species and habitats.

- A series of Education and Information signs should be located at areas along the path that may be near trust resources such as Nēnē, Wedge-tailed Shearwater, and other protected species. These signs should contain information on the species in question and why they are important, along with the rules covering leashing dogs, not harassing or disturbing the birds, observing and staying within the designated pathway.
- Signage will be installed along shoreline areas frequented by monk seals to educate the public about the species status, behavior, and what to do if a monk seal is observed in the area. Additional mitigation measures will be developed in consultation with the National Marine Fisheries Service. Measures may include cordoning off areas of the beach and posting special warning signs when monk seals are present.

3.7 Scenic and Visual Resources

The 1976 Līhu‘e Development Plan identifies many scenic and visual resources located throughout the project site. Scenic resources of the Līhu‘e area are located in the framework of five “major geographic features”. One of these major geographic features is the coastline on the eastern edge of the project area, including the proposed pathway segment from Ahukini to Ninini Point Light House. “Major scenic areas” in the project area include the area surrounding Hanamā‘ulu Bay, Nāwiliwili Bay and Kalapakī Beach, and the Nāwiliwili Stream area up to the section from Halekō Shops to the Līhu‘e United Church and the First Hawaiian Church. “Major scenic places” are places and features of less visual impact than “major scenic areas,” but are still of relatively high visual quality. The area from Halekō Shops to the First Hawaiian Bank is classified as a “scenic place.” Visual structures refer to major features that give an area its own distinct character. These include major paths, minor paths, and visual districts. Major Paths in the project area include Rice Street, and Ahukini Road. Minor paths include Hardy Street and ‘Umi Street. “Visual Districts” in the project area are the Līhu‘e Airport/cane fields, the former Kaua‘i Surf, (now the Marriot), cane fields at Grove Farm, Nāwiliwili, and Līhu‘e Town.

The Kaua‘i General Plan, 2000, identifies the portion of Kapule Highway between Ahukini Road and the end of Vidinha Stadium as a scenic roadway corridor. It is the policy of the County to preserve scenic qualities of lowlands/open space features, such as the shoreline and coastal bluffs. Structures should not impede or intrude upon public views of the feature and should not alter the character of the immediate area around the land feature.

Impacts and Mitigation:

The project is not expected to negatively impact scenic areas in urban Līhu‘e or the developed areas within Nāwiliwili Park, Kaua‘i Marriott, Kaua‘i Lagoons Resort, and the airport. Proposed improvements between Ahukini Landing and Ninini Point have been purposefully minimized to preserve the natural setting and open space values. Planned improvements along this segment include construction of a paved pathway and one new comfort station at Ninini Point Lighthouse, and installation of limited pathway signage to provide educational, regulatory, and safety information. Aside from signage, no vertical structures will be constructed between Ninini Point and Ahukini Road.

The comfort station at Ninini Point will be sited and designed to minimize its visual presence in the landscape. Building materials and colors, lighting design, and landscape screening will be selected and designed to blend into the natural surroundings. (See additional discussion about nighttime lighting in Section 3.6 – Fauna.) Similarly, concrete used in the path will be colored to match the surrounding native soil. Based on the planned mitigation measures, no significant impacts to scenic resources are expected to result from the project.

3.8 Coastal Conditions and Processes

The primary shared-use path corridor follows the coast line from Ahukini Landing to Ninini Point, then turns inland towards the airport and through Kaua‘i Lagoons and Kaua‘i Marriott Resort property before reconnecting with the developed shoreline at Nāwiliwili Park. The shoreline segment between Ahukini Landing and Ninini point is characterized by a generally stable, steeply banked, rocky coastal bluff with top-bank elevations ranging from 20 to 60 feet above mean sea level. At the toe of the bluff, the tidal zone along this segment is typically comprised of large cobble and boulders and fixed basaltic rock formations with intermittent pockets of sandy beach. Above the bluff, the landscape is comprised of gradually sloping, vacant, former sugar cane lands characterized by deep red soils and weedy vegetative cover. Along the southern extents of this segment, the natural grades soften and offer easier access to the shoreline. Numerous trails and unimproved 4-WD roads have are established perpendicular to the shoreline to provide access to fishing spots. Lateral shoreline access is difficult due to the rocky terrain and tidal wash which reaches the face of the bluff in some locations.

Where the proposed shared-use path reconnects to the shoreline near Dukes Bridge at the Kaua‘i Marriott Resort, the shoreline is highly developed. An existing concrete path that connects Duke’s Restaurant with the parking area on the opposite side of Nāwiliwili Stream defines the developed edge of the coast line up to the Duke’s Bridge crossing. The mouth of the stream is subject to seasonal sand build-up that often blocks the stream flow and causes impoundment of the water. On the south side of Nāwiliwili Stream, the shoreline is developed

with a parking lot that serves the Anchor Cove shopping center and roadway connection into Nāwiliwili Park. A stone and concrete seawall is constructed along the makai edge of the park forming a hardened shoreline that extends to the end of the Nāwiliwili Pier.

Coastal Erosion

Due to the rocky character of the coastal bluff, the Ahukini Landing to Ninini Point segment is generally stable, but experiences episodic and chronic erosion in specific locations associated with semi-improved drainage ways, use of dirt roads by off-road vehicles, and the presence of a closed landfill along approximately one quarter mile of the coastline north of Ahukini Point that is gradually sloughing off debris into the ocean. According to the *Atlas of Natural Hazards in the Hawaiian Coastal Zone*, published by the United States Geological Survey, the erosion hazard assessment is moderately low in the project corridor extending from Ahukini Landing to Nāwiliwili Harbor.

Impacts and Mitigation:

Potential impacts are primarily related to construction activities, such as earth-work near the coastline. In order to prevent erosion the following actions are proposed:

Best Management Practices (BMPs)

There are four types of BMPs that will be applied to the proposed project including general BMPs to address the area of work, and BMPs that would be applied before, during, and after construction.

General

- Limit construction near drainageways to avoid the potential for release of sediments into stormwater.

Before Construction

- Existing ground cover will not be destroyed, removed or disturbed more than 20 calendar days prior to start of construction.
- Erosion and sediment control measures will be in place and functional before earthwork may begin, and will be maintained throughout the construction period. Temporary measures may be removed at the beginning of the work day, but shall be replaced at the end of the work day.

During Construction

- Clearing shall be held to the minimum necessary for grading, equipment operation, and site work.
- Construction shall be sequenced to minimize the exposure time of cleared surface areas. Areas of one phase shall be stabilized before another phase can be initiated. Stabilization shall be accomplished by protecting areas of disturbed soils from rainfall and runoff by use of structural controls such as PVC sheets, geotextile filter fabric, berms or sediment basins, or vegetative controls such as grass seedling or hydromulch.
- Temporary soil stabilization with appropriate vegetation shall be applied on areas that remain unfinished for more than 30 calendar days, and permanent soil stabilization using vegetative controls shall be applied as soon as practicable after final grading.
- All control measures shall be checked and repaired as necessary, e.g., weekly in dry periods and within 24 hours after any heavy rainfall event. During periods of prolonged rainfall, daily checking shall be conducted.

After Construction

- Following construction, all areas of ground disturbance will be stabilized with landscaping consisting of various plant species and ground covers.

Long-term impacts due to coastal erosion will be minimized by the initial design of the path which will include: (1) a concrete or other durable all weather surface; and (2) use of vegetative controls to stabilize areas of disturbed soils. Regular maintenance of the bike/pedestrian path will be provided by the County.

In addition, renovations to the seawall fronting Nāwiliwili Park are proposed as part of the bike path improvements. Proposed improvements are described in further detail in Section 2.2.1.F.

3.9 Air Quality

Air quality in the Līhu'e area is generally good. In 1972 the State DOH, Clean Air Branch established an air quality monitoring station at the District Health Office on 'Umi Street, downtown Līhu'e. It is the only monitoring station on the island of Kaua'i. The area is primarily commercial and residential with surrounding agricultural lands.

In 2005 the measurement of particulate matter (PM-10) detected ranged from an average of 22 to 11 of 30 $\mu\text{g}/\text{m}^3$ which is well below the Hawai'i State Standard and the Federal and Primary and Secondary Standard of 50 $\mu\text{g}/\text{m}^3$ (annual). Although information on other pollution sources was not generally available from the DOH for the proposed project, the DOH in its assessment of statewide air quality noted, "Air quality in the State of Hawai'i continues to be one of the best in the nation, and criteria pollutant levels remain well below state and federal ambient air quality standards." (DOH, 2006).

Impacts and Mitigation:

Some short-term impacts on air quality will occur either directly or indirectly as a consequence of project construction activities. The operation of vehicles, heavy equipment, and generators at the project site will generate some fugitive dust and pollution emissions. Adjacent areas will be temporarily affected during the period of construction by dust and pollution, however, these impacts will be temporary and will cease when construction is completed.

No long term negative consequences related to air quality are expected as a result of the project. The project may result in long-term benefits to air quality through increased use of bicycles by commuters, and corresponding reduction in vehicle exhaust from reduced automobile use.

State air pollution control regulations require that there be no visible fugitive dust emissions at the construction site boundary. Therefore, an effective dust control plan will be implemented by the project contractor to ensure compliance with HAR, Chapter 11-59 and 60. Fugitive dust emissions can be controlled to a large extent by watering of active work areas, using wind screens, keeping adjacent paved roads clean, and by covering open-bodied trucks. Dust control measures will include, but not be limited to, the following:

- Planning phases of construction to minimize dust generating activities;
- Minimizing the use of dust generating materials and centralizing material transfer points and on-site vehicle travel ways;
- Locating dusty equipment in areas of least impact;
- Providing an adequate water source at the site prior to start-up of construction activities;
- Landscaping bare areas, including slopes, starting from the initial grading phase; and,

- Providing adequate dust control measures during weekends, after hours, and prior to daily start-up of construction.
- Construction-related exhaust emissions will be mitigated by ensuring that project contractors properly maintain their internal combustion engines and comply with HAR Chapters 11-59 and 11-60, regarding Air Pollution Control.

3.10 Noise

Ambient noise in the proposed project area is generated from natural and man made sources. Because of various uses throughout the project corridor, some areas are more subject to noise than others. Urban and resort areas are subject to more human generated noise, which includes vehicular traffic, recreational activities, and individual home and business uses. Along the coastal corridor of the project, remote noise from aircraft combined with naturally occurring sounds from wind and other sources generates relatively low background noise.

Construction activities will generate noise which could impact nearby areas. Noise levels of diesel powered construction equipment typically range from 80 to 90 dBA at 50 feet distance. The actual noise levels produced are dependent on the construction methods employed during each phase of the construction process. Earth moving equipment, including diesel engine powered bulldozers, trucks, backhoes, front-end loaders, graders, etc. will probably be the noisiest equipment used during construction.

Impacts and Mitigation

Construction noise will be temporary and will cease when construction is complete. Adverse impacts from construction noise are not expected to pose a hazard to “public health and welfare” due to the temporary nature of the work, the absence of sensitive land uses in the surrounding area, and the application of mitigation measures that will be employed to minimize noise impacts.

All project activities will comply with HAR Chapter 11-46, Community Noise Control. Excessive noise levels generated by construction activities will require that a noise permit be filed with the DOH, Noise, Radiation and Indoor Air Quality Branch. The provisions of the noise permit will require that contractors use mufflers on all combustion powered construction vehicles and machinery, and maintain all noise attenuation equipment in good operating condition. Faulty equipment will be repaired or replaced. Additionally, trucks and other construction vehicles will be routed to avoid residential communities whenever possible.

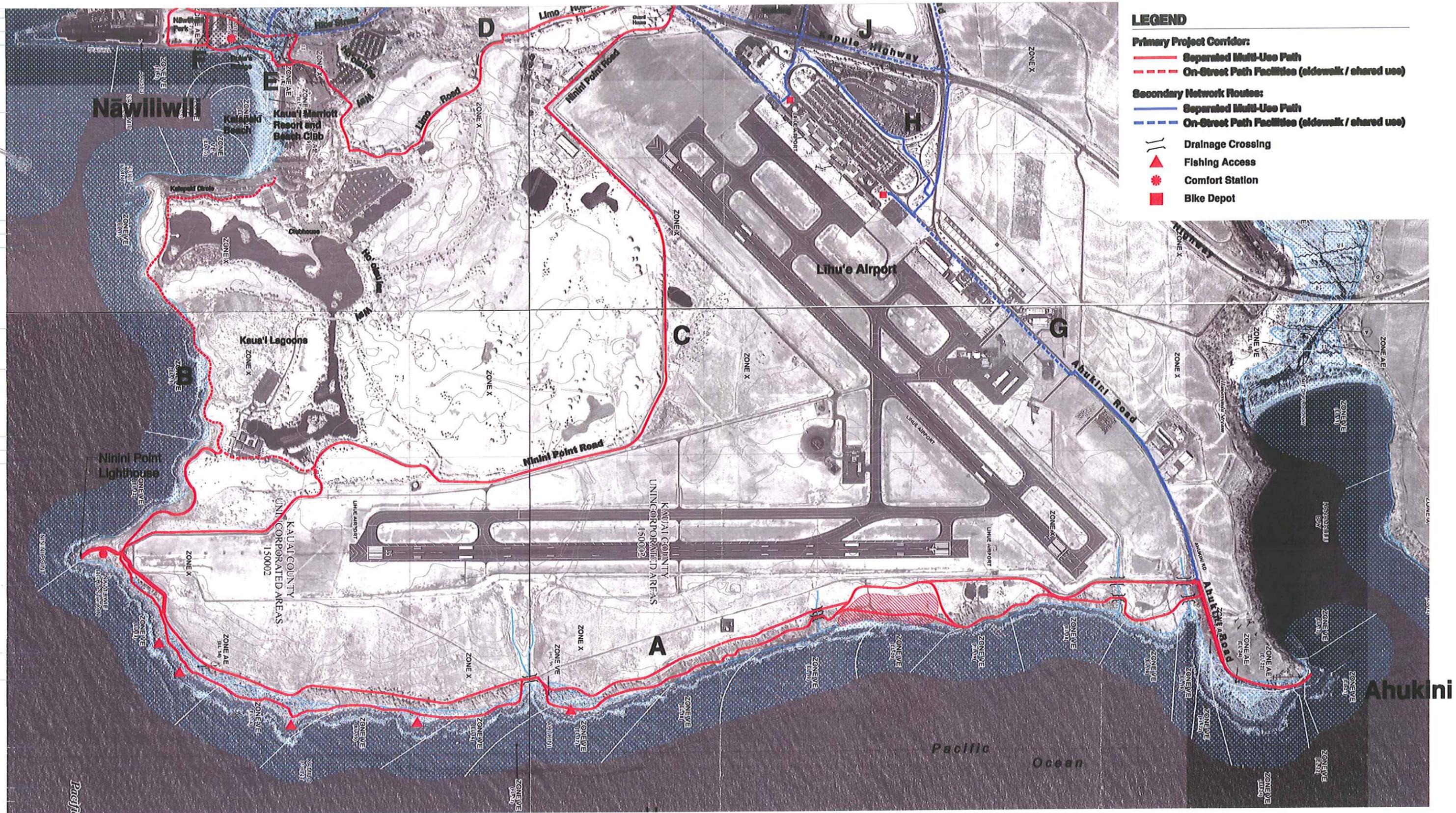
Under current permit procedures, noisy construction activities are normally restricted to the hours between 7:00 AM and 6:00 PM, Monday through Friday, and between 9:00 AM and 6:00 PM on Saturday. Construction activities and use of heavy equipment will be scheduled as much as possible during daylight hours to avoid disturbing area residents during the evening. If work during the nighttime hours is required, a variance from the existing state noise regulations will be requested from the DOH. Construction activities will be suspended on Sundays and during Holidays.

3.11 Flood Hazards

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) indicates that the project corridor passes through the following special flood hazard areas inundated by 100-year flood: VE (in which flood elevations of 13-22 feet msl have been determined) and AE (in which flood elevations of seven feet msl have been determined). The project corridor also passes through Zone X which has been determined to be outside the 0.2% annual chance floodplain. See **Figure 3-2: FEMA-FIRM**.

Impacts and Mitigation

The project is not expected to exacerbate or reduce flood zone areas, as identified by Federal Emergency Management Agency Flood Insurance Rate Maps. The path will be designed outside of the flood zone when possible. Alternative routes will also be provided to allow path users to detour away from flooded areas if and when they should occur. Construction of the path way will be designed to withstand flood occurrences as estimated by FEMA. See Section 3.12.4., *Impacts and Mitigation*, for further discussion on flood zones along the coastline between Ahukini and Ninini Point.



Nāwiliwili - Ahukini Shared-Use Path
 County of Kaua'i
 Lihue, Island of Kauai, Hawaii

FIGURE 3-2: FEMA-FIRM Map

3.12 Other Hazards

In addition to flooding, other natural hazards include volcanic, seismic activity, storms, tsunamis, and high waves. The overall hazard assessment for the coastal section of the project is moderate according to The United States Geological Survey, *Atlas of Natural Hazards in the Hawaiian Coastal Zone*.

3.12.1 Earthquake

The 2006 International Building Code (IBC) provides minimum design criteria to address potential for damages due to seismic disturbances. The IBC scale is rated from Seismic Zone A through Zone E, with A the lowest level for potential seismic induced ground movement. Kaua'i has been designated within Seismic Zone B.

3.12.2 Hurricane

The Hawaiian Islands are seasonally affected by Pacific hurricanes from the late summer to early winter months. The County of Kaua'i has been affected twice since 1982 by devastating hurricanes, 'Iwa in 1982 and 'Iniki in 1992. It is difficult to predict these natural occurrences, but it is reasonable to assume that future events will occur. The project site is, however, no more or less vulnerable than the rest of the island to the destructive winds and torrential rains associated with hurricanes.

3.12.3 Tsunami

Natural hazards endemic to all of Hawai'i, including Kaua'i, involves tsunami action. There have been four episodes since 1946. These occurrences happened in 1946, 1957, 1960 and 1964 respectively. The run-up heights vary from 1 foot to 14 feet. Figure 3-3 shows the tsunami evacuation zone within the project area.

3.12.4 High Waves

Strong trade wind events are responsible for the majority of large wave action along the eastern coast of Kaua'i. Passing hurricanes have generated the highest wave heights along the east facing shores and may coincide with a high tide and typically generate a strong storm surge. The wave action generated by hurricanes 'Iwa (1982) and 'Iniki (1992) varied from 10-20 feet.

LEGEND

-  Tsunami Evacuation Zone
-  Primary Project Corridor
-  Secondary Network Corridors

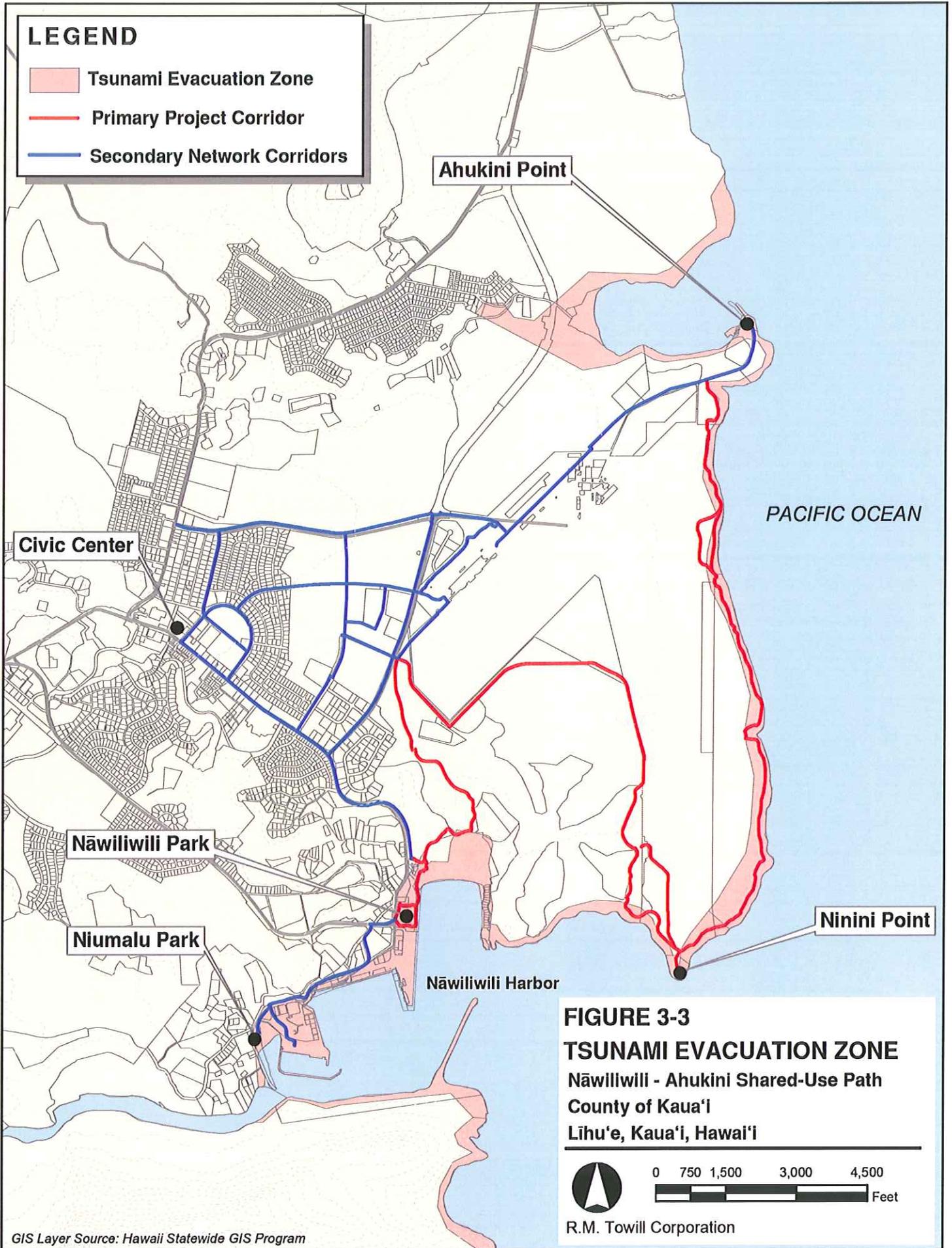
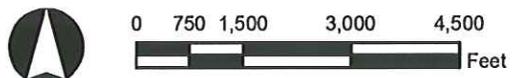


FIGURE 3-3
TSUNAMI EVACUATION ZONE
Nāwiliwili - Ahukini Shared-Use Path
County of Kaua'i
Līhu'e, Kaua'i, Hawai'i



R.M. Towill Corporation

GIS Layer Source: Hawaii Statewide GIS Program

Impacts and Mitigation:

The project is not expected to exacerbate or reduce the consequences of these natural occurrences. However, some improvements may be subject to damage if and when these events occur. The path, between Ahukini and Ninini Point, will be aligned outside of the wave zone and will not be subject to wave action. At Nāwiliwili Beach Park, pathway improvements will follow existing developed corridors along the breakwater. Improvements will be designed to withstand periodic saltwater inundation and energy from high wave conditions. Alternative connections will be provided to allow path uses to detour away from the breakwater alignment. The comfort station at Ninini Point will be located outside of the Federal Emergency Management Agency (FEMA) VE Zone, which has a range identified on the Flood Insurance Rate Maps (FIRM) of 13 feet. All proposed structures will be constructed based on IBC Zone B seismic design standards.