4.0 AFFECTED ENVIRONMENT

4.1 Property Description

The land of the corridor varies in topography, soils, and land uses. The area of Ahukini Point is highly urban with engineered fishing piers and jetty. The Hanama'ulu Beach Park is a cove where the waves are quieted by the function of the jetty.

The area above the rise at the Ahukini Fishing Piers rises sharply to a bluff that separates this property from the Airport Authority lands.

The land drops sharply into a ravine that approaches the abutments to the Hanama'ulu Railroad Bridge. The land gently slopes down to the ocean just south of the Radisson Hotel. The land is flat in the coastal area all the way across the Marine Camp, the Wailua Golf Course, and to the approach to the Kamalani Playbridge. The land of Kapule/Kuhio Highway is relatively flat, and highly engineered.

4.2 Geological Characteristics

4.2.1 Geology and Soils

There is a full soils report located in the Appendix B of this document

GEOLOGIC CONDITIONS

The Island of Kauai is composed of a single basalt shield volcano built by the extrusion of lava of the Waimea Canyon Volcanic Series during the late Pliocene Epoch (more than 2¼ million years before present). Following the cessation of this main shield building phase, there was renewed volcanic activity with the extrusion of basaltic lava of the post-erosional Koloa Volcanic Series and the concurrent deposition of the alluvial sediments of the Palikea Formation.

The majority of the Island of Kauai is covered by lava of the Waimea Canyon Volcanic Series. These lavas consist of four distinct formations: Napali, Olokele, Haupu, and Makaweli. These formations are comprised of thin-bedded a'a and pahoehoe flows to massive basalt flows that ponded in calderas and graben.

Rocks of the Koloa Volcanic Series cover most of the eastern half of the Island of Kauai. These rocks are generally characterized as thick flows of dense basalt extruded from groups of vents aligned in north-south trends in various locales. Associated with the vents are pyroclastic materials, which usually form low cinder cones at the vent.

During the Pleistocene Epoch (Ice Age), there were many sea level changes as a result of widespread glaciation in the continental areas of the world. As the great continental glaciers accumulated, the level of the ocean fell since there was less water available to fill the oceanic basins. Conversely, as the glaciers receded, or melted, global sea levels rose because more water was available. The land mass of Kauai remained essentially stable during these changes, and the fluctuations were eustatic in nature. These glacio-eustatic fluctuations resulted in stands of the sea that were both higher and lower relative to the present sea level of Kauai.

The basaltic rock built by the extrusion of lavas of the Koloa Volcanic Series are generally characterized by flows of jointed dense vesicular basalt inter-bedded with thin clinker layers. The weathering process has formed a mantle of residual soils which grade to saprolite with depth. In general, saprolite is composed of mainly silty material and is typical of the tropical weathering of volcanic rocks. The saprolite grades to basaltic rock formation with depth.

Erosion of the upper Koloa and Waimea Canyon Volcanic Series has deposited alluvial sediments along streams, drainageways, and low-lying areas. These sediments are generally unconsolidated to moderately consolidated, non-calcareous soil deposits. Agricultural and commercial developments within the last century have brought the project site to its present conditions.

The geology for the proposed path alignments were developed based on geologic references. The site geology for the two path alternatives is described in the following subsections.

Alternative No. 1

The proposed path alignment for Alternative No. 1 is mainly underlain by beach and dune sand deposits. The beach and dune sand deposits are characterized as unconsolidated calcareous deposits. These deposits are poorly graded and uniform in particle size. Recent alluvial deposits may be encountered further inland from the shoreline near the Kawailoa area and within the Hanama'ulu Stream area. The recent alluvial deposits are characterized as unconsolidated, non-calcareous soils. These recent alluvial deposits tend to be soft in consistency and compressible. In addition, basalt rock formation of the Koloa Volcanic Series may be encountered along the southern portion of the path alignment at the sides of Hanama'ulu Bay.

Alternative No. 2

This alternative alignment is mainly underlain by alluvial deposits consisting of recent and older alluvium. Characteristics of the recent alluvium are described above. The older alluvial deposits are more consolidated and stiffer in consistency compared to the recent alluvial deposits. The southern portion of path alignment is underlain by basalt rock formation of the Koloa Volcanic Series. We anticipate the presence of residual and saprolitic soils near the ground surface. These soils are developed from the in-situ weathering of the basalt formation. In addition, the northern portion of the path alignment near Lydgate Park is underlain by a dune sand deposit.

Specific soils information follows:

Beaches

Beaches (BS) occur as sandy, gravelly, or cobbly areas on all the islands in the survey area. They are washed and rewashed by ocean waves. The beaches consist mainly of light-colored sands derived from coral and seashells. A few of the beaches, however, are dark colored because their sands are from basalt and andesite.

Beaches have no value for farming. Where accessible and free of cobblestones and stones, they are highly suitable for recreational uses and resort development. (Capability classification VIIIw, non-irrigated).

Dune land

Dune land (DL) consists of hills and ridges of sand-size particles drifted and piled by wind. The hills and ridges are actively shifting or are so recently fixed or stabilized that no soil horizons have developed. The sand is dominantly from coral and seashells.

This miscellaneous land type occurs in coastal areas on the islands of Maui and Kauai.

Elevations range from nearly sea level to 150 feet. The annual rainfall amounts to 15 to 90 inches.

This land type is used for wildlife habitat and recreational areas and as a source of liming material. Vegetation is sparse, but ironwood trees, koa haole, tropical almond, kiawe, and mixed grasses have gained a foothold in places. (Capability classification VUle, non-irrigated).

Fill Land

This land type consists of areas filled with material from dredging, excavation from adjacent uplands, garbage, and bagasse and slurry from sugar mills. The areas are on the islands of Kauai, Maui, and Oahu.

Fill land (Fd).

This land type consists mostly of areas filled with bagasse and slurry from sugar mills. A few areas are filled with material from dredging and from soil excavations. Generally, these materials are dumped and spread over marshes, low-lying areas along the coastal flats, coral sand, coral limestone, or areas shallow to bedrock.

Hanalei Series

This series consists of somewhat poorly drained to poorly drained soils on bottom lands on the islands of Kauai and Oahu. These soils developed in alluvium derived from basic igneous rock. They are level to gently sloping. Elevations range from nearly sea level to 300 feet. The annual rainfall amounts to 20 to 120 inches. The mean annual soil temperature is 74° F. Hanalei soils are geographically associated with Haleiwa, Hihimanu, Mokuleia, and Pearl Harbor soils.

These soils are used for taro, pasture, sugarcane, and vegetables. The natural vegetation consists of paragrass, sensitiveplant, honohono, Java plum, and guava.

Hanalei silty clay, 0 to 2 percent slopes (HnA).

This soil is on stream bottoms and flood plains. Included in the areas mapped on Kauai along the Waimea River and in Waipaoiki Valley are small areas where the surface laver is 8 to 10 inches of reddish-brown silty clay. Included in the areas mapped on Oahu were small areas of very deep, well-drained alluvial soils and small areas of very poorly drained to poorly drained clay soils that are strongly mottled and are underlain by peat, muck, or massive marine clay.

In a representative profile the surface layer, about 10 inches thick, is dark-gray and very dark gray silty clay that has dark-brown and reddish mottles. The subsurface layer is very dark gray and dark-gray silty clay about 3 inches thick. The subsoil, about 13 inches thick, is mottled, dark-gray and dark grayish-brown silty clay loam that has angular blocky structure. The substratum is stratified alluvium. The soil is strongly acid to very strongly acid in the surface layer and neutral in the subsoil.

Permeability is moderate. Runoff is very slow, and the erosion hazard is no more than slight. The available moisture capacity is about 2.1 inches per foot of soil. Roots penetrate to the water table. Flooding is a hazard.

Representative profile: Island of Kauai, lat. 22°12'37.8" N. and long. 159°28'47" W.

Ap-0 to 6 inches, dark-gray (10YR 4/1) silty clay; common distinct mottles of dark brown (7.5YR 4/4), red (2.5YR 5/6), and dark reddish brown (5YR 3/4) ; weak, coarse and medium, granular structure; very hard, friable, sticky and plastic; abundant fine and medium roots; many fine and medium pores; very strongly acid; abrupt, wavy boundary. 4 to 6 inches thick.

A1g-6 to 10 inches, very dark gray (10YR 3/1) silty clay; many distinct mottles of dark reddish brown (5YR 3/4), yellowish red (5YR 4/6), dark brown (7.5YR 4/4), and dark grayish brown (10YR 4/2); weak, coarse, prismatic structure; very hard, firm, sticky and plastic; abundant fine and medium roots; common fine and medium pores; strongly acid; gradual, smooth boundary. 3 to 5 inches thick.

A3g-10 to 13 inches, mixed, very dark gray (10YR 3/1) and dark gray (10YR 4/1) silty clay; many distinct mottles of yellowish red (5YR 4/6) and dark reddish brown (2.5YR 3/4); weak, coarse, prismatic structure; very hard, firm, sticky and plastic; common medium and fine roots; many fine and medium pores; slightly acid; gradual, smooth boundary. 2 to 4 inches thick.

B21g-13 to 18 inches, mixed, dark-gray (10YR 4/1) and dark grayish-brown (10YR 4/2) silty clay loam; many distinct mottles of strong brown and dark red (2.5YR 3/6); massive, but a few pockets have weak, medium, angular blocky structure; hard, firm, sticky and plastic; few medium and fine roots; many fine and medium pores; neutral; gradual, smooth boundary. 4 to 7 inches thick.

B22g-18 to 26 inches, dark grayish-brown (10YR 4/2) silty clay loam; many distinct mottles of dark red (2.5YR 3/6) and strong brown (7.5YR 5/6); weak, coarse, prismatic structure breaking to weak, fine and medium, angular blocky; slightly hard, firm, sticky and plastic; few medium and fine roots; many fine and medium pores; neutral; gradual, smooth boundary. 7 to 9 inches thick.

C-26 to 36 inches, dark grayish-brown (10YR 4/2) silty clay loam; common distinct mottles of strong brown (7.5YR 5/6), dark red (2.5YR 3/6), and red (2.5YR 4/6); massive; slightly hard, friable, sticky and plastic; few medium roots; many, fine and medium, tubular pores; slightly acid; water stands above this layer.

The A horizon ranges from 10YR to 2.5Y in hue, from 3 to 4 in value, and from 1 to 2 in chroma. Mottles range from a few faint ones to many distinct ones. The B horizon ranges from 10YR to 2.5Y in hue, from 2 to 4 in value, and from 1 to 2 in chroma. Mottles in the B and C horizons range from few to many. The depth to the seasonal high water table ranges from 2 to 5 feet. The C horizon is stratified. It ranges from silty clay to sand in texture.

This soil is used for taro, pasture, and sugarcane. (Capability classification Iiw).

Kalapa Series

This series consists of well-drained soils at the base of slopes on the island of Kauai. These soils developed in material weathered from basic igneous rock and in colluvium. They are moderately sloping to very steep. Elevations range from 200 to 1,200 feet. The annual rainfall amounts to 60 to 100 inches.

The mean annual soil temperature ranges from *690* to *740* F. Kalapa soils are geographically associated with Hihimanu and Hanama'ulu soils. These soils are used mainly for water supply, woodland, wildlife habitat, and pasture. A small acreage is used for irrigated sugarcane. The natural vegetation consists of guava, lantana, joee, sensitiveplant, pilipiliula, ohia, Japanese tea, and ferns.

Kalapa silty clay, 40 to 70 percent slopes (KdF).
This soil is on uplands. In a representative profile the surface layer is dark reddish-brown silty clay about 10 inches thick. The subsoil, about 40 inches thick, ranges from dark-red to dark reddish-brown silty clay and clay that has subangular blocky structure. The substratum is dark-brown, duskyred, and dark-red silty clay and soft, highly weathered rock. The soil is very strongly acid throughout the profile.

Permeability is moderately rapid. Runoff is very rapid, and the erosion hazard is severe to very severe. In places roots penetrate to a depth of 5 feet or more.

Representative profile: Island of Kauai, lat. *21055'14"* N. and long. 159026'00.3"W.

This soil is used for water supply, pasture, and woodland. (Capability classification Vile, non-irrigated; pasture group 8; woodland group 14)
This soil is used for irrigated sugarcane and pasture. (Capability classification I if irrigated, IVc if non-irrigated; sugarcane group 1; pasture group 2; woodland group 4).

Koloa Series

This series consists of well-drained soils on slopes of old volcanic vents and upland ridges on the island of Kauai. These soils are underlain by hard rock at a depth of 20 to 40 inches. They developed in material weathered from basic igneous rock. They are gently sloping to moderately steep. Elevations range from nearly sea level to 300 feet. The annual rainfall amounts to 40 to 60 inches. The mean annual soil temperature is 74° F. Koloa soils are geographically associated with Mamala and Waikomo soils. These soils are used for irrigated sugarcane. The natural vegetation is mainly koa haole.

Koloa stony silty clay, 3 to 8 percent slopes (KvB).
This soil occurs on upland slopes. Included in mapping were small areas that are more than 40 inches deep. In a representative profile the surface layer is dark reddish-brown stony silty clay about 7 inches thick. The subsoil, about 13 inches thick, is dark-red and dark reddish-brown stony silty clay that has subangular blocky structure. The substratum is hard rock. The soil is slightly acid to neutral throughout the profile.

Permeability is moderately slow. Runoff is slow, and the erosion hazard is slight. The available water capacity is about 1.8 inches per foot of soil. Roots penetrate to the bedrock. Representative profile: Island of Kauai, lat. 21°53'5.6" N. and long. 159°26'15" W.

This soil is used for sugarcane. (Capability classification lie if irrigated, IVe if nonirrigated; sugarcane group 1; pasture group 5; woodland group 5)

Koloa stony silty clay, 8 to 15 percent slopes (KvC).
On this soil, runoff is medium and the erosion hazard is moderate.

This soil is used for irrigated sugarcane. (Capability classification lIIe if irrigated, IVe if non irrigated; sugarcane group1; pasture group 5; woodland group 5)

Koloa stony silty clay, 15 to 25 percent slopes (KvD).
On this soil, runoff is medium and the erosion hazard is moderate to severe. Included in mapping were small areas where the slope is more than 40 percent. This soil is used for irrigated sugarcane, pasture, woodland, and wildlife habitat. (Capability classification IVe, irrigated or nonirrigated; sugarcane group 1; pasture group 5; woodland group 5).

Lihue Series

This series consists of well-drained soils on uplands on the island of Kauai. These soils developed in material weathered from basic igneous rock. They are gently sloping to steep. Elevations range from nearly sea level to 800 feet. The annual rainfall amounts to 40 to 60 inches. The mean annual soil temperature is 730 F. Lihue soils are geographically associated with loleau and Puhi soils.

These soils ~re used for irrigated sugarcane, pineapple, pasture, truck crops, orchards, wildlife habitat, woodland, and homesites. The natural vegetation consists of lantana, guava, koa haole, joee, kikuyugrass, molassesgrass, guineagrass, bermudagrass, and Java plum.

Lihue silty clay, 0 to 8 percent slopes (LhB).
This soil is on the tops of broad interfluves in the uplands. Included in mapping were small areas of a soil that has a very dark grayish-brown surface layer and a mottled subsoil.

In a representative profile the surface layer is dusky red silty clay about 12 inches thick. The subsoil, more than 48 inches thick, is dark-red and dark reddish-brown, compact silty clay that has sub-angular blocky structure. The substratum is soft, weathered rock. The surface layer is strongly acid. The subsoil is slightly acid to neutral.

Permeability is moderately rapid. Runoff is slow, and the erosion hazard is no more than slight. The available water capacity is about 1.5 inches per foot of soil. In places roots penetrate to a depth of 5 feet or more.

Representative profile: Island of Kauai, lat. 21059'06.7" N. and long. 159021'50"W.

This soil is used for sugarcane, pineapple, pasture, truck crops, orchards, wildlife habitat, and homesites. (Capability classification lie, irrigated or nonirrigated; sugarcane group 1; pineapple group 5; pasture group 5; woodland group 5)

Lihue silty clay, 8 to 15 percent slopes (LhC).
On this soil, runoff is slow and the erosion hazard is slight. This soil is used for sugarcane, pineapple, pasture, truck crops, orchards, wildlife habitat, and homesites. (Capability classification lIIe, irrigated or nonirrigated; sugarcane group 1; pineapple group 6; pasture group 5; woodland group 5)

Lihue silty clay, 25 to 40 percent slopes, eroded (LhE2).
This soil is similar to Lihue silty clay, 0 to 8 percent slopes, except that the surface layer is thin. Runoff is rapid, and the erosion hazard is severe. This soil is used for pasture, woodland, and wildlife habitat. Small areas are

used for pineapple and sugarcane. (Capability classification Vie, nonirrigated; pasture group 5; woodland group 5)

Lihue gravelly silty clay, 0 to 8 percent slopes (LIB).
This soil is similar to Lihue silty clay, 0 to 8 percent slopes, except that it contains ironstone-gibbsite pebbles and has brighter colors in the B horizon. Included in mapping in the Eleele area and north of the town of Hanama'ulu were small areas of soils that have a dark yellowish-brown, friable subsoil.

This soil is used for sugarcane, pasture, and homesites. (Capability classification lie, irrigated or nonirrigated; sugarcane group 1; pineapple group 5 ; pasture group 5 ; woodland group 5)

Lihue gravelly silty clay, 8 to 15 percent slopes (LlC).
On this soil, runoff is slow and the erosion hazard is slight. Included in mapping were areas where the slope is as much as 25 percent. This soil is used for sugarcane, pasture, wildlife habitat, and homesites. (Capability classification lIIe, irrigated or nonirrigated; sugarcane group 1; pineapple group 6; pasture group 5; woodland group 5)

Mokuleia Series

This series consists of well-drained soils along the coastal plains on the islands of Oahu and Kauai. These soils formed in recent alluvium deposited over coral sand. They are shallow and nearly level. Elevations range from nearly sea level to 100 feet. The annual rainfall amounts to 15 to 40 inches on Oahu and 50 to 100 inches on Kauai. The mean annual soil temperature is 74° F. Mokuleia soils are geographically associated with Hanalei, Jaucas, and Keaau soils.

In this survey area a poorly drained variant of the Mokuleia series was mapped. This soil, Mokuleia clay loam, poorly drained variant, is described in alphabetical order, along with other mapping units of this series.

These soils are used for sugarcane, truck crops, and pasture. The natural vegetation consists of kiawe, klu, koa haole, and bermudagrass in the drier areas and napiergrass, guava, and joee in the wetter areas.

Mokuleia fine sandy loam (Mr).
This soil occurs on the eastern and northern coastal plains of Kauai. It is nearly level. This soil has a profile like that of Mokuleia clay loam, except for the texture of the surface layer.

Permeability is moderately rapid in the surface layer and rapid in the subsoil. Runoff is very slow, and the erosion hazard is slight. The available water capacity is about 1 inch per foot in the surface layer and 0.7 inch per foot in the subsoil. Included in mapping were small areas where the slope is as much as 8 percent.

This soil is used for pasture. (Capability classification Ills if irrigated, IVs if nonirrigated; sugarcane group 1; pasture group 3)

Mokuleia clay loam, poorly drained variant (Mta).
This soil occurs on Kauai. It is nearly level. The soil is poorly drained, and in this way, it differs from other soils of the Mokuleia series. The surface layer is dark brown to black and is mottled.

This soil is used for sugarcane, taro, and pasture. (Capability classification IIIw, irrigated or non-irrigated; sugarcane group 3; pasture group 3)

Rough Broken Land

Rough broken land (rRR) consists of very steep land broken by numerous intermittent drainage channels. In most places it is not stony. It occurs in gulches and on mountainsides on all the islands except Oahu. The slope is 40 to 70 percent. Elevations range from nearly sea level to about 8,000 feet. The local relief is generally between 25 and 500 feet. Runoff is rapid, and geologic erosion is active. The annual rainfall amounts to 25 to more than 200 inches.

These soils are variable. They are 20 to more than 60 inches deep over soft, weathered rock. In most places some weathered rock fragments are mixed with the soil material. Small areas of rock outcrop, stones, and soil slips are common. Included in mapping were areas of colluvium and alluvium along gulch bottoms.

This land type is used primarily for watershed and wildlife habitat. In places it is used also for pasture and woodland. The dominant natural vegetation in the drier areas consists of guava, lantana, Natal redtop, bermudagrass, koa haole, and molassesgrass. Ohia, kukui, koa, and ferns are dominant in the wetter areas. Puakeawe, aalii, and sweet vernalgrass are common at the higher elevations. (Capability classification VIIe, nonirrigated.

This land type is used mostly for the production of sugarcane. (Not in a capability classification)

The following is the Legend for the next Soil Maps:

Map Symbol	**Soil Name**
BS	Beaches
DL	Dune Land
Fd	Fill Land
HnA	Hanalei silty clay, 0 to 2 percent slopes
KdF	Kalapa silty clay, 40 to 70 percent slopes
KvB	Koloa stony silty clay, 3 to 8 percent slopes
KvC	Koloa stony silty clay, 8 to 15 percent slopes
KvD	Koloa stony silty clay, 15 to 25 percent slopes
LhB	Lihue silty clay, 0 to 8 percent slopes
LhC	Lihue sitly clay, 8 to 15 percent slopes
LhE2	Lihue silty clay, 25 to 40 percent slopes, eroded
LiB	Lihue gravelly silty clay, 0 to 8 percent slopes
LiC	Lihue gravelly silty clay, 8 to 15 percent slopes
Mr	Mokuleia fine sandy loam
Mta	Mokuleia clay loam, poorly drained variant
RRR	Rough broken land

Soil Unit Map 3.1 (11x17)

Soil Unit Map 3.2 (11x17)

Soil Unit Map 3.3 (11x17)

Soil Unit Map 3.4 (11x17)

Soil Unit Map 3.5 (11x17)

Soil Unit Map 3.6 (11x17)

4.2.2 Topography

The topography varies along the path corridor, from hilly at the Lydgate Play Structure, to relatively flat on the golf course and through the Marine Camp Site, two drainage ways occur in the project site including the drainage area north of the Radisson, the area fronting the Radisson, the wetlands which occur north of the Radisson Hotel. The layout rises at the gate to the Ocean Bay Plantation, otherwise known as the Ocean Bay Plantation and runs in a steady, but slight incline all across the bluff towards the Hanama'ulu railroad bridge, then drops dramatically to meet the airport property and flattens out at the bluff above the Ahukini Point fishing piers. The topography of Kapule/Kuhio Highway is relatively flat.

4.2.3 Climate

Climate conditions in the area are known to have mean temperatures ranging from 70.3 degrees Fahrenheit in the winter to 78.4 degrees Fahrenheit in the summertime. The relative humidity levels vary from 63% to 88%. The annual average rainfall is approximately 45 inches.

4.2.4 Air Quality

4.2.4.1 Air Quality Issues

The air on the island of Kauai is good and meets the standards of the Clean Air Act. The only issues related to air quality for this project would be during the actual construction of the project, and would be temporary in nature. There would be no long term negative consequences related to air quality to the island. There might possibly be positive long-term consequences for the air quality with reduced vehicular exhaust fumes from reduced car traffic with increased bicycle use along the corridor.

4.2.4.2 Air Quality Mitigation Measures for Construction Related Emissions

Construction Related Dust. Best Management Practices will be incorporated into the construction of the path project. Some of these measures will include:

- Irrigate the construction site during periods of drought or high winds
- Install silt screening in the areas of disturbance
- Clean roads of construction dirt from the construction vehicles
- Cover open beds of trucks hauling materials into and out of the site
- Disturb only the areas of construction that are in the immediate zone of construction to limit the amount of time that the areas will be subject to erosion

Vehicular Emissions. To minimize the amount of exhaust from the construction trucks and other vehicles, all equipment shall be maintained properly to minimize emissions during the time of construction.

The contractor shall incorporate the measures required by the State Department of Health Rules and Regulations in Chapter 43, Section 10 and the Hawai'i Administrative Rules Chapter 11-60.1 "Air Pollution Control, Section 11-60.1-33 related to Fugitive Dust emissions.

4.2.5 Coastal Resources and Processes

There is an additional Coastal Processes Report located in the Appendix section of this document.

The coastal segment from Ahukini Point to Lydgate Park is characterized by a complex shoreline environment. Rocky, stable coastal segments alternate with sandy stretches that experience both episodic and chronic erosion as well as quasi-stability.

The shoreline region of greatest vulnerability is the sandy coast along the Wailua Golf Course extending from the 17th green to the end of the 2nd fairway at the 2nd putting green. This coastal segment provides unparalleled views and access to the seashore, a sandy beach, a dynamic wave environment, and a broad fringing reef facing directly into prevailing trade wind seas.

While the beach is of moderate width and in places enjoys a healthy sand-budget, the coastal dune system has been severely impacted by anthropogenic efforts at shoreline stabilization. Large basalt boulders, dirt fill, non-endemic vegetation, frequent vehicular traffic, sand mining, and topographic leveling have reduced the dune portion of the profile to a secondary feature containing less than 5 CY/ft of sand, or rendering it absent all-together. The demise of the dune and its critically important role as a sand reservoir portends a future of poor shoreline stability in the face of continuing, probably accelerating sea-level rise and aperiodic storminess. Indeed, golfers report significant shoreline recession in recent decades exceeding 40 ft in places.

The pattern and rate of erosion along this segment is documented using a time series of early 20th Century NOAA T-sheets and more recent aerial photos. Resulting data are rough and only provide approximations of past trends without an error analysis. They nonetheless reveal that chronic erosion of 1 to 2 ft/yr occurs at erosional hotspots that are adjacent to shoreline segments that are unstable, but not chronically eroding. The unstable segments apparently react to strong windward storm events and hurricanes, while remaining quasi-stable during intervening years. It is this finding that led to the conclusion that dune nourishment might be a successful tool to enhance shoreline stability, especially during years lacking high storminess.

Enhanced sand volume in the coastal dune might serve several purposes: 1) Providing a bed for pathway construction that emphasized design features focused on minimal environmental impact and a small, lightweight footprint; 2) Burying a jeep trail used by off-road vehicles that impact the beach and dune system thereby eliminating in places and discouraging in others the local pattern of driving on the beach; 3) Restoring the endemic substrate for coastal vegetation growth; 4) providing a pathway route removed for the golf course but not located directly upon the beach, and; 5) restoring the natural function of the dune system as a storage location for excess beach sand.

The design of the dune is based on sand fill averaging 8-10 cy/ft, a robust volume of sand for this dynamic shoreline. Several unresolved questions characterize the dune restoration effort:
1) How long will the fill last? 2) Where can the county acquire a sufficient quality and quantity of sand? 3) Will the placed sand experience cementation? 4) Does sufficient sand exist for future maintenance?

Answers:

1) Unknown. But much of the shoreline does not record chronic erosion in the time series analysis and it is hoped that the placed sand will remain stable for 5 years. Locations experiencing chronic recession average rates of 1 to 2 ft/yr and the dune location is over 30 ft from the waters edge in most places – hence, provided a large storm does not remove the dune we gage a successful fill effort as one lasting approximately 5 years before renourishment.
2) Sand sources are currently being assessed by county and university sources for placement at Poipu Beach Park. Two primary locations exist – Mahalepu and Mana plain. Both sources need to be further evaluated with regard to such issues as should the sand be improved with washing and should additional geologic exploration of cleaner sandy strata at Mana be performed.
3) It is not expected that the placed sand will undergo cementation because it is removed from daily high tide and not subject to intertidal carbon dioxide production. One action that should improve the sand success would be to wash it and remove the large volume of fines.
4) There does appear to be sufficient sand for future nourishment but it is still located in the ground. The county must not wait to acquire and process this sand as the timing of when it will be needed is unknown.

On inescapable conclusion of this project has been the realization that sand is a valuable commodity and the county budget process should include a recurring item for the exploration, and processing of high quality sand. Continued erosion resulting from sea level rise, past poor management practices, and storminess along the Kauai shoreline will require an increasing commitment to sand nourishment if the county wishes to maintain tourism as a primary industry.

4.2.6 Hydrology and Water Quality

The proposed path project will cross a tidal drainage area located between the Marine Camp and the Kauai Beach Villas, and another drainage area south of the Radisson. The second drainage area, is dry and does not function as a drainage area except in periods of extreme precipitation. The project also crosses the Hanama'ulu Stream. There is a pond between the Radisson and the Ocean Bay Plantation property. Gary Uenunten, of the Water Quality Division will test the water in all of these areas to determine current water quality issues.

Priorities ranking for the streams along the proposed path corridor are impacted by the following ranking system. EPA regulations codify and interpret the requirement in Section 303(d)(l)(A) of the Act that States establish a priority ranking for listed waters. The regulations at 40 CFR 130.7(b)(4) require States to prioritize waters on their Section 303(d) lists for TMDL development, and also identify those WQLSs targeted for TMDL development in the next two years. In prioritizing and targeting waters, States must, at a minimum, take into account the severity of the pollution and the uses to be made of such waters. See Section 303(d)(l)(A). As long as these factors are taken into account, the Act provides that States establish priorities. Further, the State of Hawaii may consider other factors relevant to prioritizing waters for TMDL development, including immediate programmatic needs, vulnerability of particular waters as aquatic habitats, recreational, economic, and aesthetic importance of particular waters, degree of public interest and support, and State or national policies and priorities. See 57 FR 33040, 33045 (July 24, 1992), and EPA's 1991 Guidance.2.

The State's listing criteria provide that, in general, streams listed are based on data collected from two or more sampling sites. This criterion is based on a concern that data from a single sampling station may not be representative of water quality conditions for the whole stream. Unlike many States, Hawaii has not formally segmented its relatively short fresh water streams into discrete reaches in its water quality standards. The State's technical judgement that data from a single sampling point may not be representative reflects the consideration that water quality conditions may vary substantially within fairly short distances along Hawaiian streams.

(This information is provided from the EPA, Region IX, Letter to the Deputy Director for Environmental Health, Honolulu.)

The Kapaa Stream was listed as a Priority 1 stream in 2002 for turbidity, and showed exceedance for the wet season turbidity standard. More sampling was recommended for this stream during the dry season.

The Hanama'ulu Stream is listed as a Priority 2a stream showing exceedance of wet season turbidity.

4.2.6.1 Potential Impacts

The path will not negatively impact any of these systems. All drainage areas will be bridged, and the pond or any associated wetlands soils or plants will not be disturbed. The Hanama'ulu stream will be crossed with the retrofit of the historic Hanama'ulu Railroad Bridge.

4.2.7 Natural Hazards

The natural hazards endemic to all of Hawaii, to include Kauai , involves tsunami action. There have been four episodes since 1946. These occurrences happened in 1946, 1957, 1960 and 1964 respectively. The runup heights vary from 9.5 feet to 20 feet.

Most of the area of the project is designated VE by the FEMA Flood Insurance Rate Maps for Kauai.

Further natural hazards include hurricanes and swells. Swells have had a range of waves from four to ten feet. The most recent hurricanes to affect the island of Kauai were Hurricane Iwa in 1982, and Hurricane Iniki in 1992. The wave action from these hurricanes varied from 17 to 40 feet.

Earthquakes in Hawaii are typically associated with volcano action. The data suggests that Kauai has had lower intensity of seismic activity than most of the Hawaiian islands. The Island of Kauai is designated as a Seismic Zone 1, which is the lowest rating according to the Uniform Building Code criteria.

4.2.7.1 Mitigation Measures

The path will be designed in such a way to minimize impacts from wave action. If the coastal path alignment is selected, the path fronting the shoreline will be designed as a removable boardwalk attached on helical piles or a

plank system that sits directly on top of the sand. The structures of the comfort stations will be located outside of the Federal Emergency Management Agency (FEMA) VE Zone as identified on the Flood Insurance Rate Maps (FIRM) dated September 16, 2005. In addition, the comfort stations will be located behind the 40 - foot shoreline setback. The Kapule/Kuhio Highway alignment would be the less subject to these forces. The affect of seismic activity does not alter based on the alignment choices.

4.2.8 Noise

Currently, the noise of the corridor is not significant, with the exception of the sound of the traffic along Kapule/Kuhio Highway. The effect of the path to current noise levels would be mostly an issue with the golfers on Wailua Golf Course.

4.2.8.1 Mitigation Measures

When construction is commencing, there will be typical associated noise. This impact is temporary and confined to the period of construction. The impacts to the golfers is more long term. The nightime impacts of path users to the Kauai Beach Villas and/or the Radisson Hotel could be an issue if the path is used during those times.

4.2.9 Hazardous Materials

4.2.9.1 Hazardous Waste Issues

§11-261-3 Definition of hazardous waste. (a) A solid waste, as defined in section 11-261-2, is a hazardous waste if: (1) It is not excluded from regulation as a hazardous waste under subsection 11-261-4(b); and (2) It meets any of the following criteria:(i) It exhibits any of the characteristics of hazardous waste identified in subchapter C except that any mixture of a waste from the extraction, beneficiation, and processing of ores and minerals excluded under subsection 11-261-4(b)(7) and any other solid waste exhibiting a characteristic of hazardous waste under subchapter C only if it exhibits a characteristic that would not have been exhibited by the excluded waste alone if such mixture had not occurred or if it continues to exhibit any of the characteristics exhibited by the non-excluded wastes prior to mixture. Further,for the purposes of applying the Toxicity Characteristic to such mixtures, the mixture is also a hazardous waste if it exceeds the maximum concentration for any contaminant listed in table I to section 11-261-24 that would not have been exceeded by the excluded waste alone if the mixture had not occurred or if it continues to exceed the maximum concentration for any contaminant exceeded by the nonexempt waste prior to mixture. (ii) It is listed in subchapter D. 261-8 §11-261-3 (iii) It is a mixture of a solid waste and a hazardous waste that is listed in subchapter D solely because it exhibits one or more of the characteristics of hazardous waste identified in subchapter C, unless the resultant mixture no longer exhibits any characteristic of hazardous waste identified in subchapter C, or unless the solid waste is excluded from regulation under paragraph 11-261-4(b)(7) and the resultant mixture no longer exhibits any characteristic of hazardous waste identified in subchapter C for which the hazardous waste listed in subchapter D was listed. (However, non-wastewater mixtures are still subject to the requirements of chapter 11-268, even if they no longer exhibit a characteristic at the point of land disposal). (iv) It is a mixture of solid waste and one or more hazardous wastes listed in subchapter D; however, the following mixtures of solid wastes and hazardous wastes listed in subchapter D are not hazardous wastes (except by application of subparagraphs (a)(2)(i) or (ii) of this section) if the generator can demonstrate that the mixture consists of wastewater the discharge of which is subject to regulation under either section 402 or section 307(b) of the Federal Clean Water Act (including wastewater at facilities which have eliminated the discharge of wastewater).

4.2.9.2 Hazardous Waste Sites Listed

- Radisson Kauai Beach Resort – No Further Action Required
- Kauai Hilton Beach Villas – No Further Action
- Amfac Sugar, Lihue Herbicide Mixing Plant, 3-4671 Kapule/Kuhio Highway, Ongoing Superfund

4.2.9.3 Mitigation Measures

It is not expected that there is any hazardous material impact by the construction or the path to be impacted by the hazardous sites that may or may not be along the corridor.

4.3 BIOLOGICAL ENVIRONMENT

This document does not include specific assessments for plants, birds or marine animals as the only areas of this project that are relatively undisturbed were studied with the preparation of the EIS for the Ocean Bay Plantation project, and the Lihue/Hanama'ulu Master Plan. Both of these studies are listed in the references section of this document.

According to Dr. David Lorence, Director of Science, and the B. Evans Chair of Botany at the National Tropical Botanical Garden, there are no known terrestrial endangered plants on the island of Kauai. The plant species found along the corridor include, but are not limited to: guava, lantana, Chinaberry Tree (Melia azedarch), kolomana, hau, silk oak, Ironwood Trees, California grass, Guinea grass, and molasses grass (Melinis minutiflora), yellow granddilla vines (Passaflora laurifolia). Where the sugarcane was taken out of production is primarily guinea grass and koa-haole. It was documented in the Ocean Bay Plantation EIS in a study conducted by Char & Associates in September 2001 that no endangered species of plants were identified on their project site.

4.3.1 SIGNIFICANT HABITATS

a. Sandy Substrate Areas
Plants in this area include naupaka (Scaevola sericea), tree heliotrope (Tournefortia argeneaa), 'aki'aki grass (Sporobolus virginicus) pohuehue (Ipomoea pes-caprae) and nana (Vigna marina) and hala (Pandanus tectorius).

b. Rocky Outcrops
Ironwood Trees, naupaka, ilima papa (Sida fallax), pa'uohi'iaka (Jacquemontia ovalifolia ssp. sandwicensis), 'aki'aki grass, and 'akulikuli (Sessuvium portulacastrum).

c. Abandoned Sugar Cane Fields
Plants on these abandoned fields include: Guava, lantana, Chinaberry Tree, kolomona, hau, silk oak and Ironwood Trees, California grass, Guinea grass, and molasses grass.

d. Forested Areas
Dominated by Ironwood Trees, Coconut Palms, some java plum, and Eucalyptus citirodora.

e. Lydgate Park Play Bridge Section
The area here is a swale that allows vehicle traffic to the beach under the play structure. The bridge from the existing play structure south towards the golf course will connect the play bridge to the existing grade in the ironwood trees. The grades on each side of the play bridge lead down a steep bluff to the swale. The soil is sandy and the woods south of the play bridge are comprised primarily of ironwoods.

f. Wailua Golf Course
The fairways and green areas that the path intersects with are gentle sloping, with final grades to the ocean at hole number 17 and 2. The driving range area is flat. All soils are sandy or sand. Along hole number 2, there is an abandoned asphalt road between the fairway and the ocean.

g. Marine Camp Section
Here is an area of red dirt and sand that has been subject to serious interference in the past. Much of the original sand and topsoil has been removed and dirt has been replaced in this area.

The terrain is relatively flat, and leads to a drainage area north of the Radisson Hotel.

h. Radisson Hotel and Kauai Beach Villas
The area where the path will be aligned will be is flat and mostly grassed as it runs directly in front of rooms and the cabana and bar.

i. Wetlands # 2
The area immediately south of the Radisson is known as "nukolii" and is considered fragile. It is known to have been a mass burial area and has wetlands. The wetlands here have wetland vegetation and standing water and the topography is lowland and sloping to the center where the water has collected.

j. Ocean Bay Plantation
This area rises in topography and has varied vegetation with stands of trees and understory and also, areas of guinea grass where the sugar cane was taken from cultivation. This area leads to a steep bluff south of Hanama'ulu towards Hanama'ulu Beach.

k. Hanama'ulu Beach
This area has a large parking lot and large grassed areas accessing the curve of the beach. There are two comfort stations located at the beach park and picnic tables and a shade meeting structure. The river flows directly south of the beach park and the railroad bridge crosses over leading to Hanama'ulu.

l. Ahukini Point
There is a bluff above the fishing piers and parking lot. The recreational area is very flat, and the bluff above that belongs to the airport authority rises steeply above the fishing piers.

m. Kapule/Kuhio Highway
Kapule/Kuhio Highway is a very busy, major thoroughfare for the island. The traffic moves fast and would pose significant safety issues as well as cultural ones specifically relating the the existing re-internment site in the parking lot of the Wailua Golf Course. It may be necessary, however to locate portions of the path along this roadway, due to property acquisition and/or easement difficulties.

4.3.1.1 Mitigation Measures
None of the plants observed along any of the potential corridors is threatened, endangered or is a species of concern for the U.S. Fish and Wildlife Service 1999a, and b.

It is not anticipated that there will be any negative impact to the habitats and/or plant communities along the corridor; however, the following is a list of the measures that will be taken:

- The path will be routed around any major trees, avoiding the drip line.
- The plants will be irrigated, at least until they are established.
- The plant material selected will fit with the character and nature of the surrounding landscape.
- Areas disturbed by construction will be re-vegetated as soon as possible after construction of each area.

- To minimize erosion along the coast, plant materials along the coast will not be disturbed during or to facilitate path alignment.

- If the path alignment occurs along the coast in the area of the 1st and 2nd. Fairway of the golf course, dune renourishment may be incorporated by adding sand to the existing beach to create and augment dunes in the areas of coastal erosion.

- In order to protect wetlands that may occur along the alternative routes of the corridor, the first course of action will be to avoid the wetlands. If avoidance is not feasible, the wetlands will be bridged with the abutments outside of the wetland area, and/or a boardwalk may be floated over the wetlands, thereby not constituting a "fill" in the wetlands.

- The only areas along any of the alternatives for the path where native vegetation occurs is in the area of the ironwood forest leading south between the Lydgate Park Playbridge and the Wailua Golf Course, in the area of Ocean Bay Plantation, behind Hanama'ulu Beach Park by the Hanama'ulu Railroad Bridge and the bluff leading to Ahukini Point. The final path alignment will be routed to avoid any major trees in these areas, and the social trail in the ironwood trees will be used to place the path in this area.

4.3.2 FLORA

NEHE (Lipochaeta integrifolia) and PA'U O HI'IKA (Jacquemontia ovalifolia)

GUINEA GRASS

MOTHER IN LAW TONGUE (Sansevieria trifasciata)

KOLOMANA (Senna surattensis)

VITEX ROTUNDIFOLIA (Beach Vitex)

NOHU (Tribulus cistoides)

PSYDRAX ODORATA (Alahe'e)

KOU HAOLE (Geiger Tree)

COCONUT PALM (Cocos nucifera) and LOULU LELO (Prichardia hillebrandii)

NAUPAKA KAHAKAI (Scaevola taccada)

SIDA FALLAX (Ilima)

4.3.3 TERRESTRIAL FAUNA

This document does not include specific assessments for plants, birds or marine animals as the only areas of this project that are relatively undisturbed were studied with the preparation of the EIS for the Ocean Bay Plantation project, and the Lihue/Hanama'ulu Master Plan. Both of these studies are listed in the references section of this document.

In the EIS prepared for the Lihue-Hanama'ulu Master Plan, conducted by Phillip Bruner, in August, 1994 found that there were no native land or water birds, but did find four Hawaiian Duck and Common Moorhens found off-site in the Hanama'ulu wetlands. The study recorded no native seabirds or migratory native birds, however, it was noted that the endangered Newell's Shearwater may fly over the property as they move between nesting and foraging.

An avian and terrestrial fauna study was conducted by Rana Production, Ltd. also in September, 2001 for the Ocean Bay Plantation EIS. The only endangered avian species found was the Hawaiian hoary bat (Lasiurus cinereus semotus) . Of the avian endangered species documented are: Hawaiian coot (Fulica alai), the endangered subspecies of the ua'u (Pterodroma phaeophgia sandwichensis), the 'a'o (Puffinus auricularis newelis), and the 'ua'u kani (Puffinus pacificus).

4.3.3.1 Mitigation Measures

It is not anticipated that there will be any negative impact to the terrestrial environment during construction, however, it is anticipated that a signage program can be incorporated into the path program to educate path users to the importance of the terrestrial environs of the corridor.

4.3.4 MARINE FAUNA

This document does not include specific assessments for plants, birds or marine animals as the only areas of this project that are relatively undisturbed were studied with the preparation of the EIS for the Ocean Bay Plantation project, and the Lihue/Hanama'ulu Master Plan. Both of these studies are listed in the references section of this document.

According to Dr. Jeffrey Walters, the Co-Manager of the Hawaiian Islands Humpback Whale National Marine Sanctuary for the State of Hawaii, Department of Land and Natural Resources Division of Aquatic Resources, Kauai serves as a location for pioneer the humpback whales, green sea turtles and monk seals coming south and population. There are approximately 200-300 seals in the main eight Hawaiian islands. A typical day for a monk seal is to lay on the beach during the day to dry out and digest food and to rest, then to go into the sea to feed during the night.

Kauai is the prototype for re-populating the monk seal populations. They have a thirteen month gestation period which begins in June.

The Green Sea Turtles are threatened. They breed in the northwest islands and come south to feed and live. They are at present, exploding in population. The Hawksbill Turtle will nest on other main Hawaiian islands, but on Kauai.

The Humpback Whale season is November to May, with January to March being the peak season.

MONK SEAL BEACHED MAKAI OF THE RADISSON HOTEL

4.3.4.1 Mitigation Measures

It is not anticipated that there will be any negative impact to the marine animal environment during construction, however, it is anticipated that an educational signage program can be incorporated into the path program to educate path users about Monk Seals and a description identifying the importance of the protocol that is followed when a Monk Seal beaches itself onto the shore. In addition interpretive signs can be established for other marine animals such as green sea turtles, whales, and tropical fish that are occasionally be observed along of the corridor.

The Hawaii Division of Aquatic Resources has offered to assist the County and the design team in the development of this signage program.

4.4 SOCIO-ECONOMIC ENVIRONMENT

4.4.1 Archaeological, Historic and Cultural Resources and Native Hawaiian Rights Issues

The full discussion of Archaeological, Historic and Cultural Resources and Native Hawaiian Right Issues is found in Appendix B of this document.

4.4.1.1 Impacts to Socio-Economic Environment Impacts

The pathway essentially runs north-south from Ahukini to Lydgate Park. Both traditional Native Hawaiian archaeological sites and historical sites are present within and near the pathway area. These are summarized below, as is cultural information for the area.

4.4.1.2 Impacts to Archaeological Resources

There have been at least 15 archaeological projects conducted in this area from Thrum in 1907 to SCS in 2004. These have led to the documentation of numerous prehistoric sites. In 1906 Thrum compiled *heiau* throughout the islands. In this area, he recorded two *heiau*: Ahukini and Kalauokamanu. These *heiau* were not marked on maps but were simply described. Both *heiau* had been destroyed supposedly as of 1855. During Bennett's island-wide survey in 1928-1929, the two *heiau*, now known as Site 101 and Site 102 were also noted. Ahukini Heiau supposedly was built near Ahukini Point on a bluff overlooking the sea while the location of Kalauokamanu was never identified. He did note that both *heiau* were previously destroyed.

Site 1839, occurring to the north of Hanama'ulu Bay, represents the first fully known prehistoric site in the coastal Hanama'ulu area. This site is a prehistoric complex occurring on the flats and is composed of a wall and terrace suspected to be related to temporary habitation. Proceeding to the north, around the point and onto the flat coastal plains toward Wailua, several prehistoric sites are present. Site 1838 consists of a prehistoric cultural deposit partially eroding out of modified sand dunes. The layers contained charcoal, shells, and coral fragments. The site had been disturbed during military training exercises in the 1940s. The cultural deposit, now a small remnant, was dated to AD 1170-1400, and represents temporary habitation of the area.

Site 885, also occurring just to the south of the present-day Raddison Hotel, represents a possible traditional Native Hawaiian burial ground. Multiple burials have been documented in this sandy location. The most well-known site in this area, due to the influx of CRM research related to golf course activities and development of Lydgate Park, is Site 103, originally recorded by Bennett during island-wide survey in 1928-1929. Bennett makes first mention of Site 103 in this area: "in the sand dunes that run along the shore half way between Hanama'ulu and Wailua River are many burials." At this writing, over 66 burials have been identified throughout the golf course area alone, with most of these having been re-interred in a burial crypt at the golf course itself. Site 1980, which occurs on the golf course to the east of the existing correction facility, represents eight traditional-period burials identified in sandy contexts between coastline and marshy areas to the west. This site is likely associated with the aforementioned Site 103.

Overall, the flatlands between the Kawailoa Dunes and Kalepa Ridge contain swampy areas fed by springs at the base of the ridge that allowed for limited prehistoric taro cultivation on the margins of the marsh. The coastal dunes between the marshland and the sea were primarily used for human interment (Site 103) while the direct coastline contains evidence for temporary or seasonal fishing camps and other marine acquisition. Should the path alignment occur along Kapule/Kuhio Highway in the area of the re-internment site, the re-internment site would be affected.

4.4.1.3 Impacts to Historical Resources

Historical sites are also prevalent along this portion of the path. Ahukini Landing itself, a probable late 19th construction, is present inside the breakwall of the bay. Plantation housing for sugar cane workers has been noted just to the south of the point. Foundations still exist in remnant state. Moving inland to the west, several more sites are present. Site 1845 is the historic Hanama'ulu Railroad Bridge. This bridge is being preserved and represents the plantation era. Site 2066 consists of multiple features: an upright (burial?), historic road, and historic house foundation. Site 2067 consists of a historic cemetery perhaps dating to the 1880s. The cemetery is present on the *mauka* side of the highway on the edge of former sugar cane lands. Prior to construction of Ahukini Landing, an old wharf was present on the northern flank of Hanama'ulu Bay. This is Site 1843 and consists of a concrete wall, foundation, and sugar cane road. This is the location of the old wharf. Site 1841 occurs just to the north of the bay and also represents the historic period: a road and a trail running along the coast. It is possible this trail has some time depth from prehistoric times.

As one rounds the point to the north of Hanama'ulu Bay, three sites are present above the rocky coastline. Site 2068 consists of a looted, historic-period trash dump dating between 1880 and 1910. Datable artifacts include glass and ceramic fragments that were recovered from the bluff, at the edge of plantation lands. Site 1840, nearby, consists of a historic-period retaining wall related to sugar cane or military transport. Site 1846, consisting of two historic railroad bridges used for hauling sugar cane from the fields to Lihue, is present more inland and south of the Radisson Hotel. Finally, a WWII Marine Camp was present also to the south of the Radisson Hotel.

The historic infrastructure from Ahukini Landing toward the Lydgate area is dominated by plantation-era construction representing transport and processing relative to the sugar cane industry. It is very possible that the disturbance caused by the historic sugar cane industry destroyed many prehistoric sites in the area, including dryland agricultural loci and house sites (see Corbin *et al*. 2002). During WWII, the military enhanced some of these features for their own transport and access and often created new roads through the area. However, the history of this area still remains entrenched within the bygone plantation-era.

4.4.1.4 Impacts to Cultural Resources

As Corbin *et al*. (2002) state, Hanama'ulu translates as "tired (as from walking) bay" and is said to be the birthplace of the hero Kawelo. This area was referred to as Puna District at the time of the Great Mahele of 1848, not Lihue District as it is now. The Hanama'ulu area is not specifically mentioned in many historical texts. However, Hanama'ulu is noted *Olelo No`eau*, a book of Hawaiian sayings and epithets (Corbin *et al*. 2002:B-1):

No Hanama`ulu ka ipu puehu ("The quickly emptied container belongs to Hanama`ulu").

Pukui (1983:No. 2230) identified another quote about the area:
"Said of the stingy people of Hanama`ulu, Kaua`i—no hospitality there. At one time, food containers would be hidden away and the people of Hanama`ulu would apologize for having so little to offer their guests."

From Hanama'ulu Bay to the west, toward Lihue, multiple Land Commission Awards are present. In general, the LCA's primarily denote *lo`i* lands (taro fields). Here, dryland taro cultivation was probably practiced while coconut, sweet potato, and breadfruit were also likely grown. The Mahele records of the Hanama'ulu area tell of native tenants living in the valleys and by the shoreline. House sites, taro pond fields, irrigation systems, dryland agricultural parcels, fishponds, pastures, and other features were across the landscape. Many of these lands were cleared during Plantation days, thus masking or erasing these sites.

The cultural significance of the Wailua Area, further to the North, is well documented. Center of the isle's political and economic universe, Wailua was the chiefly seat of Kaua`i during prehistoric times, as is attested by the numerous *heiau* and other ceremonial sites occurring along the Wailua River basin. The Wailua area is covered in some detail in other sources.

4.4.1.5 Impacts to Native Hawaiian Rights

According to Wade Ishikara, of Department of Land and Natural Resources, Aquatic Resources Division, many local men fish in the areas of the Marine Camp and Ahukini Point. According to LaFrance Kapaka Arboleda, of Office of Hawaiian Affairs, Burial Council indicates that in the area south of the Hanama'ulu Railroad Bridge, may be an area of mass burials, known as "nokuli'i".

Swimming and fishing is available at the Hanama'ulu Beach Park, and fishing is also common at Ahukini Point.

None of these areas will be damaged or affected nor will access to these areas by the native Hawaiians or local fishermen or park users be impeded by the construction of the path project.

According to members of a native Hawaiian family and their friends, there are a number of ancient historic paths used by the native Hawaiians, which may or may not occur on this path corridor.

Further, this group stakes a claim on all the property of the corridor, with the view that all the land of Hawai'i belongs to all the native Hawaiians. All lands that contain wetlands or ponds are to be preserved for taro fields, and all the dry land should be preserved for home sites.

Swimming and fishing is available at the Hanama'ulu Beach Park, and fishing is also common at Ahukini Point.

None of these areas will be damaged or affected nor will access to these areas by the native Hawaiians or local fishermen or park users be impeded by the construction of the path project

4.4.1.6 Summary

Overall, this portion of eastern Kauai contains abundant evidence for historic networks related to plantation-era days and prehistoric sites related to burial and temporary habitation loci. While none of the sites beyond Ahukini Landing remain in spectacular form, they do allude to land tenure in the area during the late 1880s onwards. The two prehistoric sites identified near the rocky coastline north of Hanama'ulu Bay provide foreshadowing for the large number of prehistoric sites occurring to the north along the sandy coastal flats. The former presence of two *heiau* in the Ahukini area reflects a ceremonial presence as well as indicating that a fairly substantial prehistoric population was presumably living in the area, most likely around the bay and inland valleys. These inland valleys were cultivated for taro and other subsistence crops. The path will cross these various important historical zones, which give opportunities for educational signage and outdoor classroom experiences.

4.4.2 Mitigation Measures

The historic and cultural sites are to be avoided where possible.
A mitigation and Monitoring Plan shall be developed to determine what measures will be taken when and if cultural artifacts are found during and/or before construction commences.

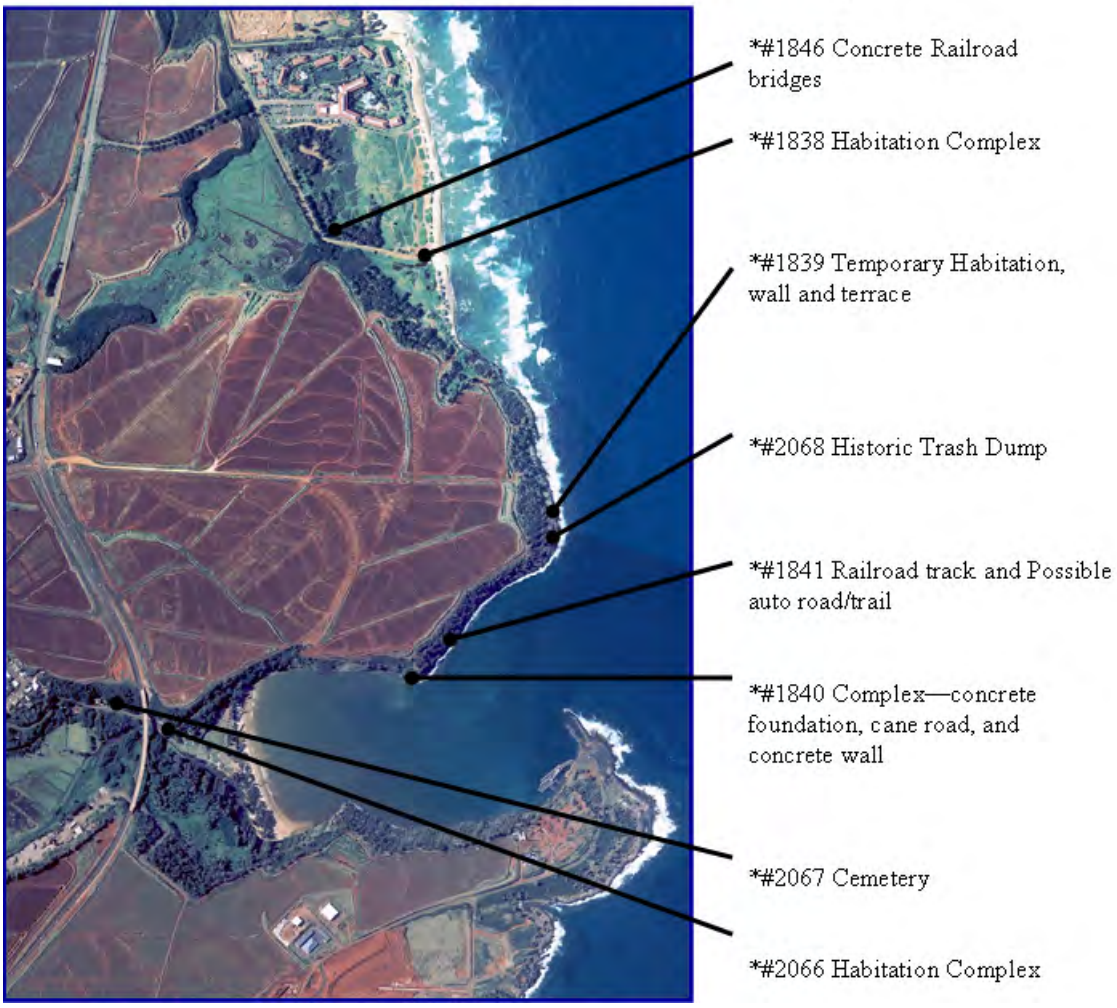
To protect the historic character of the Hanama'ulu Railroad Bridge, work to the bridge will be as minimal as possible. Structural repairs will be done to restore and stabilize the bridge. Further, handrails and other features that will be required for public safety shall be incorporated with sensitivity to the historic nature of the bridge and to minimize the visual effect of handrails by using tension cabling for the handrails.

The design team is to work with the Office of Hawaiian Affairs and Hawaiian Homelands, local Hawaiians and Burial Council, and whomever OHA recommends to understand the needs and wishes of the Native Hawaiians. The ancient ala loa (ancient paths) are to be used where feasible and desirable, and signage to celebrate and educate about the Hawaiian heritage should be incorporated where budget and design allows.

Archaeological Conditions Map

*Known Archaeological Sites

Archeological Conditions Map



*Known Archaeological Sites

4.5 PUBLIC INFRASTRUCTURE AND FACILITIES

4.5.1 Vehicular Access

Access to the path by vehicles can be accomplished in several locations along the corridor:

Beginning from the north end, there is parking available at the Play Structure at Lydgate Park. Cars can access the system at the Wailua Golf Course, at the Marine Camp area, also access is available from the Radisson Hotel to the existing Comfort Station, access is available to the Hanama'ulu Beach Park, and from Ahukini Point where parking is available.

4.5.2 Water

The County Water Department will supply adequate water to the path project.

4.5.3 Wastewater

The waste from the comfort stations will use septic tanks and leach fields.

4.5.4 Power & Communications

There is power and electricity in Kapule/Kuhio Highway. The existing capacity is adequate to serve the project.

4.5.5 Schools

The only school near the project corridor vicinity is King Kaumaulii Elementary School in Hanama'ulu

4.5.6 Parks & Recreation Facilities

There are three county parks and one state parks recreational facility within the boundaries of this project. On the north end is the county park, known as Lydgate Park. The second county park is the Marine Camp, and towards the south end of the project is the third county park, Hanama'ulu Beach Park. Ahukini Point at the south end is a State Park Recreation Area providing fishing opportunities.

4.6 Public Health and Safety

4.6.1 Police Services

Services will be provided by the County of Kauai Police Department. The Deputy Chief, Ron Venneman requests that access be available for the police cars at reasonable points along the corridor, that the path use at night be considered the same as any other County park facility, and that emergency call boxes be installed in the more remote locations along the corridor.

4.6.2 Fire and Emergency Services

Fire protection and Emergency services will be provided from the County of Kauai Fire Department. The closest hospital is Wilcox Hospital in Lihue, and will be the service provider for emergencies.

The Prevention Captain, Chief David Bukowski, requests that access be available for fire trucks at intervals of no less than ¼ mile, and on either end of the Hanama'ulu Railroad Bridge.