3.16 WATER RESOURCES

3.16.1 Resource Definition

Water resources in Hawaiʻi are categorized into surface (including marine), groundwater (including aquifers), watersheds, and floodplains. The State of Hawaiʻi consists of the eight major and 124 minor islands in the 1,523-mile archipelago. The eight major islands are the islands of Hawaiʻi, Oʻahu, Maui, Kauai, Molokaʻi, Lānaʻi, Niihau, and Kahoolawe. The water resources that occur within the state's 6,423 square miles are:

- 249 miles of perennial rivers and streams
- 376 perennial rivers and streams
- approximately 1,500 intermittent streams
- 12 lakes, rivers, and ponds
- 2168 acres of lakes, rivers, and ponds
- 55 square miles of estuaries, harbors, and bays
- 1,052 miles of ocean coast (includes all the shorelines of the Northwest Hawaiian Island chain and 964 shoreline miles of the main islands)

Hawaiian *ahupuaʻa* is a traditional approach to the subdivision and allocation of land. Related to, and often defined and associated with, surface water features and watersheds, these land areas consist most frequently of a wedge-shaped portion of an island extending from the top of the local mountain (volcano) to the shore, often following the boundary of a stream and extending to the outer edge of the reef in the sea(Hukilau Network 2012).

Surface Waters and Floodplains

The unique characteristics of Hawaiʻi's topography, climate, and geology result in a highly variable and complex surface hydrology. Most Hawaiian streams originate in the mountains and terminate in the ocean. Variations in ocean tides, rainfall, soil type, and geology can affect stream hydrology. The surface-water resources of Hawaiʻi are of significant economic, ecologic, cultural, and aesthetic importance. Streams supply more than 50 percent of the irrigation water in Hawaiʻi, and although streams supply only a small percentage of the drinking water statewide, surface water is the main source of drinking water in some places. Streams also are a source of hydroelectric power, provide important riparian and instream habitats for many unique native species, support traditional and customary Hawaiian gathering rights and the practice of taro cultivation, and possess valued aesthetic qualities. Streams affect the physical, chemical, and aesthetic quality of receiving waters, such as estuaries, bays, and nearshore waters, which are critical to the tourism-based economy of the islands (USGS 2003).

Streams in Hawaiʻi can also experience extreme flash flood events characterized by high flows of short duration (stream levels can increase by several feet in less than an hour). These

temporal variations in stream flow are due to frequent storms of intense rainfall, small watersheds, steep topography, and limited channel storage. These flash flood events can cause massive erosion and deliver tons of sediments to receiving water bodies.

Groundwater-Aquifers

Groundwater in Hawaiʻi provides over 95 percent of the freshwater supply for the state. On oceanic islands, such as the Hawaiian Islands, fresh groundwater commonly occurs as a body of water called a freshwater lens that floats on saltwater and is separated from the saltwater by a transition zone of brackish water. The aquifers in the state are categorized as perched, confined (artesian), or unconfined as defined below (USGS 2000):

- perched – a water table trapped above its traditional location due to an impenetrable object
- confined (artesian) – an aquifer under pressure exceeding that of atmospheric pressure
- unconfined – An aquifer that is open to receive water from the surface, and can freely fluctuate with the rate of discharge or recharge of water

Wetlands

Wetlands are some of the most productive and dynamic habitats in the world. The characteristics of wetlands that are beneficial to society are called wetland values. Some examples of wetland values include reduced damage from flooding, water quality improvement, and fish and wildlife habitat enhancement. It is important to maintain and restore wetland functions and values because wetlands contribute to the overall health of the environment. Refer to Section 3.14 for a full discussion of wetlands and their habitat.

Coastal and Marine Waters

Hawaiʻi has 1,052 miles of ocean coastline; 410,000 acres of coral reef; and 55 square miles of estuaries, bays, and harbors. The health and function of coastal and marine waters are inextricably tied to the health of terrestrial groundwater, surface water, and wetlands of the Hawaiian Islands. Hawaiʻi is not vast, and almost half the land and nearly every community lie within 5 miles of the shoreline. Indeed, no point on the islands is farther than 28 miles from the sea, which means that all locations in Hawaiʻi are influenced by the ocean as the entire state is coastal (SOEST 2002).

3.16.2 Regulatory Setting

Clean Water Act

The federal CWA governs federal, state, and local regulations regarding the protection of water quality. Sections of the Act that are relevant to water quality and hydrology in the project areas, are summarized below.

CWA Section 303(d)

Under provisions of Section 303 of the CWA, states are required to report on the general water quality of surface water in their state. The state obtains and reviews all existing and readily available surface water quality data and related information, compares against the state's water quality standards, and determines the level of impairment of the water body. This report, known as the *303(d) List of Impaired Waters*, identifies water bodies that are not expected to meet state water quality standards, even after application of technology-based effluent limitations. Water bodies that appear on this list are therefore required to prepare action plans known as Total Maximum Daily Loads (TMDLs), to improve water quality (USEPA 2006). In Hawai'i, TMDLs are established, reviewed, and updated by the Department of Health – Environmental Planning Office (EPO). The EPO, under provisions of HRS Chapter 11-54, is responsible for several surface water quality management programs mandated by the federal CWA or dictated by state policy.

HDOH also maintains water quality standards maps for each island and has generally classified terrestrial waters as Class 1 or Class 2 and marine waters as Class A and AA, as defined in HRS Chapter 11-54.

> Class 1: It is the objective of Class 1 waters that these waters remain in their natural state as nearly as possible with an absolute minimum of pollution from any human-caused source. Water discharge into these waters is prohibited.
>
> Class 2: The objective of Class 2 waters is to protect their use for recreational purposes, the support and propagation of aquatic life, agricultural and industrial water supplies, shipping and navigation. These waters shall not act as receiving waters for any discharged which has not received the best degree of treatment or control compatible with the criteria established for this class.
>
> Class A: It is the objective of Class A waters that their use for recreational purposes and aesthetic enjoyment be protected. Any other use shall be permitted as long as it is compatible with the protection and propagation of fish, shellfish and wildlife, and with recreation in and on these waters. These waters shall not act as receiving waters for any discharge which has not received the best degree of treatment or control compatible with the criteria established for this class.

> Class AA: It is the objective of Class AA waters that these waters remain in their natural pristine state as nearly as possible with an absolute minimum of pollution or alteration of water quality from any human-caused source or actions. No zones of mixing shall be permitted in this class.

In addition to terrestrial and marine waters, HDOH further classifies marine bottom ecosystems in HRS Chapter 11-54 in the following manner.

> Class I: It is the objective of Class I marine bottom ecosystems that they remain as nearly as possible in their natural pristine state with an absolute minimum of pollution from any human-induced source. Uses of marine bottom ecosystems in this class are passive human uses without intervention or alteration, allowing the perpetuation and preservation of the marine bottom in a most natural state, such as aesthetic enjoyment, passive activities and preservation.
>
> Class II: It is the objective of Class II marine bottom ecosystems that their use for protection, including propagation of fish, shellfish and wildlife and for recreational purposes not be limited in any way. The uses to be protected in this class of marine bottom ecosystems are all used compatible with the protection and propagation of fish, shellfish, wildlife and recreation. Any action which may permanently or completely modify, alter, consume or degrade maritime bottoms such as structural flood control channelization, landfill and reclamation, navigational structures, structural shore protection and wastewater effluent outfall structures may be allowed upon securing approval in writing from the director.

CWA Section 401

Every applicant for a federal permit or license for any activity that may result in a discharge to a water body must obtain State Water Quality Certification (WQC) for the proposed activity and comply with state water quality standards prescribed in the certification. In Hawai‘i, these certifications (401 permits) are issued by HDOH Clean Water Branch under the authority of HAR Title 11 Chapter 55.

CWA Section 402

CWA Section 402 sets forth regulations that prohibit the discharge of pollutants into waters of the U.S. from any point source without obtaining an NPDES permit. HDOH implements the NPDES program for Hawai‘i. If development activity will disturb 1 acre or more of total land area, then a NPDES permit is required. This permit process is described in HAR Title 11 Chapter 55, “Water Pollution Control.” A County grading permit is required for any grading and grubbing work before an NPDES permit can be issued. The grading permit allows the grading, while the NPDES permit regulates stormwater runoff from the construction site.

CWA Section 403

CWA Section 403 provides that point-source discharges to the territorial seas, contiguous zones, and oceans are subject to regulatory requirements in addition to the technology, or water quality-based requirements applicable to typical discharges. The requirements are intended to ensure that no unreasonable degradation of the marine environment will occur as a result of a discharge, and to ensure that sensitive ecological communities are protected.

CWA Section 404

Section 404 of the CWA requires that any person conducting any activity that involves any discharge of dredged or fill material into waters of the U.S., including wetlands, obtain a permit. USACE is responsible for issuing permits for the placement of fill or discharge of material into waters of the U.S. required under CWA Sections 401 and 404. Structures that involve in-stream construction, such as bridges and culverts or levees, trigger the need for these permits.

Rivers and Harbors Act of 1899 (USACE) Section 10

Section 10 of the Rivers and Harbors Act of 1899 requires authorization from USACE for the construction of any structure in or over any navigable water of the U.S. or for work outside the limits defined for navigable waters of the U.S. if the structure or work affects the course, location, or condition of the navigable water body. The law applies to any dredging or disposing of dredged materials, excavating, filling, rechanneling, or any other modifying of a navigable water of the U.S. and applies to all structures.

Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and groundwater wells. SDWA authorizes USEPA to set national health-based standards for drinking water to protect against both naturally occurring and man-made contaminants that may be found in drinking water. In Hawaiʻi, the SDWA is administered by the Department of Health Safe Drinking Water Branch through the Safe Drinking Water Program, the Underground Injection Control Program (UIC), the Groundwater Protection Program, and the Drinking Water State Revolving Fund. (CWB 2012). HDOH has regulatory authority over water pollution control and ensuring safe drinking water under provisions of HRS Chapters 342D, 340E and 342H and HAR Title 11 Chapters 21 and 23.

USEPA has categorized certain aquifers in Hawaiʻi as "sole source" aquifers (SSAs). USEPA defines SSA as an aquifer that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer. To be designated an SSA, the area must not have an alternative

drinking water source that could supply all who depend on the aquifer for drinking water. Special care must be taken to protect aquifers that USEPA has designated SSAs. There are two SSAs in Hawaiʻi: the Southern Oʻahu Basal Aquifer and the Molokaʻi Aquifer. The Southern Oʻahu Basal Aquifer services the urbanized area of Honolulu and is centered at Pearl Harbor while the Molokaʻi Aquifer encompasses the entire island of Molokaʻi.

Coastal Zone Management Program

The OP oversees the Coastal Zone Management (CZM) Program. The Hawaiʻi CZM Program was approved by the NOAA in 1978. The Program was enacted as the State's policy umbrella for facilitating and ensuring interrelated and comprehensive coastal resource management. The CZM area encompasses the entire state of Hawaiʻi, including all marine waters seaward to the extent of the state's police power and management authority, including the 12-mile U.S. territorial sea and all archipelagic waters.

The CZM Program under HRS Chapter 205A is the guiding perspective for the design and implementation of allowable land and water uses and activities throughout Hawaiʻi. SMAs are a subset of the state's coastal zone and include all lands and waters beginning at the shoreline and extending inland or *mauka* at least 100 yards. The counties administer the SMA permit process as a way of reviewing proposed uses within this zone. Although each county has its own procedures for administering SMA permits, the requirements and review processes for SMA applications are similar for all four counties and are based on HRS Chapter 205A-26 (OP 2011). The CZM Program as it pertains to land use is further discussed in Section 3.5, Land Use.

Hawaiʻi Water Plan

The State Water Code in HRS Chapter 174C recognizes the need for a program of comprehensive water resources planning to address the problems of supply and conservation of water and establishes the Hawaiʻi Water Plan as the guide for implementing this policy. The Hawaiʻi Water Plan consists of five constituent parts: (1) a Water Resource Protection Plan that is prepared by the Commission on Water Resource Management (Commission), (2) a Water Quality Plan that is prepared by the Department of Health, (3) a State Water Projects Plan that is prepared by the Engineering Division DLNR, (4) an Agricultural Water Use and Development Plan which is prepared by the Department of Agriculture, and (5) Water Use and Development Plans prepared by each separate county (Commission 2012).

County Water Use and Development Plans

The purpose of the County Water Use and Development Plans is to inventory all projected water demands within each county and ensure that the future water needs of the county are met. The Plans set forth the "allocation of water to land use in that county" and maintain

consistency with county zoning and land use policies. The Plans serve to inform future land use planning and provide guidance to the Commission for decision-making on water allocations and water reservation requests (Commission 2012).

Federal Agency Involvement

In addition to the State CZM Program approved by NOAA, and the clean water provisions, laws and regulations administered by by USEPA/HDOH, there are federal agencies with varying degrees of jurisdictional oversight for ocean water quality within the site study areas. Agency oversight for coastal and ocean water resources is primarily related to, and focused on, habitat and species preservation, propagation, and restoration. The habitat resource oversight role of these agencies is discussed in detail in Section 3.7. The following agencies may be involved with a future project, primarily as it relates to location, placement, operation, and future decommissioning of undersea cables and any appurtenant infrastructure.

- Department of Commerce (DOC)
    - HIHWNMS and
    - NMFS
- DOI
    - NPS
    - BOEM

3.16.3 Region of Influence

Terrestrial

While the landing site areas being considered on each of the islands extend only 1 km inland, water resource impacts from a proposed development could impact hydrologic features upstream and outside this 1-km range. The ROI will be focused on any proposed development that may occur, in, around, on top, or somehow linked to known water and hydrological resources in the site study area on the various islands. Development on or near identified wetlands or proximate to surface water and drainage ways may require special review. These locations will also be subject to a range of recommended mitigation measures; BMPs; regulatory oversight; and statute compliance at the federal, state and local level.

Marine

The ROI would include the cable corridors being considered for placement of the undersea cable between islands or between island locations. The ROI for the cable will be a 200-foot-wide corridor commencing at the shoreline, extending through the 3-nautical-mile state water limits, and then through federal territorial waters (EEZ) extending up to 200 nautical miles out to sea.

Since no project island is greater than 200 nautical miles from another island, federal jurisdiction would encompass the entire corridor area between Hawai‘i’s 3-nautical-mile limit of each island.

3.16.4 Affected Environment

General

Hawai‘i’s islands can generally be divided into two regions, windward and leeward, which are related to the northeasterly trade winds and mountains. On the windward side, orographic rainfall results in high mean annual rainfall sometimes 15 times greater than the mean for Hawai‘i (25–30 inches). Consequently, the majority of Hawai‘i’s perennial streams are located on the windward side of islands. Mean annual rainfall on the leeward side can be in the single digits and intermittent streams that are dry during most of the year are more commonly located in leeward watersheds. Many Hawaiian streams are fed by groundwater that seeps into their channels and thereby sustains a host of native aquatic ecosystems. This water is called *base flow*; it is the portion of stream discharge that is not attributable to direct runoff from precipitation. According to USGS, base flow to Hawai‘i streams is decreasing, as is the long-term annual trend in rainfall.

Maui County – O‘ahu Routing Specific

The following locations are defined using numerous sources of information from the State of Hawai‘i and federal agencies. Specific impaired waters in the various landing site area s will not be identified in this section. Due to the changing nature, status, and iterations of the *303(d) List of Impaired Waters* discussed in Section 3.16.2 above, it is recommended that this list be consulted at the time of development for the latest and most accurate descriptions of any waters in the landing site area s that are on the *303(d) List of Impaired Waters.*

Maui

Maui-Kahului Harbor

Terrestrial Waters

An overview of the aquifers and watersheds, and the water bodies, wetlands, and riparian areas for the Maui-Kahului Harbor landing site area is shown in Figures 3.16-1 and 3.16-2. The landing site area straddles two aquifers; the Iao aquifer north of the harbor, and the Kahului aquifer, which extends to the south and eastern end of the landing site area. Due to the topographically flat location between two large mountain systems, four watersheds traverse this landing site area. The four watersheds from north to south are Waiehu, Iao, Kalialinui, and Kailua Gulch. As with watersheds, surface waters are numerous in this area as waters flow from the precipitation-rich northeast faces of the mountains to the flat lands radiating from the harbor.

Surface waters draining from the mountains include the Waiehu and Wailuku Streams in the north end of the landing site area and the Kalialinui Gulch, which travels through the airport area. As shown on the 1987 HDOH Water Quality Standards Map for Maui, inland waters in this area are designated Class 2 and the landing site area is bifurcated by two hydrographic areas (II and III). The Kanaha Pond State Wildlife Sanctuary is located just east of the harbor and west of the airport. The island's main commercial and industrial center sits contiguous to the south and west of the sanctuary.

State Waters

The waters offshore from the landing site area are generally known as Kahului Bay. The harbor is considered a zone of mixing between freshwater drainage and brackish water in the harbor. Offshore waters around the landing site area are considered Class A on the 1987 HDOH Water Quality Standards Map.

Maui-Kapalua (West Maui)

Terrestrial Waters

An overview of the aquifers and watersheds, and the water bodies, wetlands, and riparian areas for the Maui-Kapalua landing site area is shown in Figures 3.16-3 and 3.16-4. The Kapalua project boundaries are defined by Oneloa Bay and Mokuleia Bay. The landing site area sits on the Honolua aquifer with the very northern tip of the landing site area north of Lipoa Point located within the Honokahau aquifer areas. Four watersheds demarcate the area including north to south: Honokahau, Honolua, Honokahua, and Kahana. The landing site area contains three streams all flowing to Mokuleia Bay: Papua and Kahauki Gulchs, and Honokahua. As shown on the 1987 HDOH Water Quality Standards Map for Maui, these waters are designated Class 2 and the landing site area is located in hydrographic area (I).

State Waters

Two small bays in the landing site area are designated as the Honolua-Mokuleia Marine Life Conservation District. The offshore landing site area also falls within the HIHWNMS. (These designations are discussed in Section 3.7). Offshore waters around the landing site area are classified as Class A on the 1987 HDOH Water Quality Standards Map.

<u>Lānaʻi</u>

Terrestrial Waters

An overview of the aquifers and watersheds, and the water bodies, wetlands, and riparian areas for the Lānaʻi landing site area is shown in Figures 3.16-5 and 3.16-6. The landing site area is

located on the windy, dry leeward side of the island and, as such, contains only 16 intermittent stream gullies. When it does rain, the topography and eroded condition of this area facilitate flash flooding, increased erosion, and subsequent ocean sedimentation. As shown on the 1987 HDOH Water Quality Standards Map for Lānaʻi, inland waters are designated Class 2 and the landing site area straddles the only two hydrographic areas on the island (I and II) while the landing site area sits on both the Honopu and Paomal aquifers. Five watersheds are located in the landing site area from north to south: Kahua, Hawaiʻilanui, Lapaiki, Puumaiekahi, and Kaapahu.

State Waters

Offshore waters around the landing site area are considered Class AA on the 1987 HDOH Water Quality Standards Map and are bounded by the 100-fm contour. This same area is within the HIHWNMS.

<u>Molokaʻi</u>

Molokaʻi-Kaluakoi (West Molokaʻi)

Terrestrial

An overview of the aquifers and watersheds, and the water bodies, wetlands, and riparian areas for the Kaluako landing site area is shown in Figures 3.16-7 and 3.16-8. As with Lānaʻi, this landing site area is situated in the dry far leeward side of the island and contains only 12 intermittent streams and gulches all running in an east-west direction and susceptible to flash flooding, rapid erosion, and ocean sedimentation during intense rain events. The entire landing site area sits on the Kaluakoi aquifer as well as three watersheds: Kaa, Papohaku, and Kaunala. The landing site area overlays the Molokaʻi aquifer, which is an SSA as defined and regulated by USEPA. As shown on the 1987 HDOH Water Quality Standards Map for Molokaʻi, these intermittent gulches and streams are designated Class 2 and the landing site area straddles hydrographic areas (III and IV).

State Waters

Offshore waters around the landing site area are considered Class AA in the 1987 HDOH Water Quality Standards Map and, like the Lānaʻi location, these offshore waters are located within the HIHWNMS.

Molokaʻi-Kaunakakai (South Molokaʻi)

Terrestrial Waters

An overview of the aquifers and watersheds, and the water bodies, wetlands, and riparian areas for the Molokaʻi-Kaunakakai landing site area is shown in Figures 3.16-9 and 3.16-10. This landing site area sits on the Manawainui aquifer and a small portion of the Punakou aquifer, while four watersheds define the area from west to east: Kolo, Waiahewahewa, Kaluapeelua, and Kamiloloa. The landing site area overlays the Molokaʻi aquifer, which is an SSA as defined and regulated by USEPA. Streams and gulches are limited in the area with the only significant stream being Manawainui Gulch. Like the west Molokaʻi location, this landing site area straddles two hydrographic areas (III and IV) and the terrestrial waters are designated as Class 2 on the 1987 HDOH Water Quality Standards Map for Molokaʻi. The site contains three fish ponds and sits just to the west of a large fish pond-wetland area.

State Waters

Offshore waters around the landing site area are considered Class A on the 1987 HDOH Water Quality Standards Map. This A classification extends from Heleolono Harbor in the west to Kaunakakai Harbor in the east. Like west Molokaʻi, these offshore waters are located within the HIHWNMS.

<u>Oʻahu</u>

MCBH at Kāneʻohe Bay

Terrestrial Waters

An overview of the aquifers and watersheds, and the water bodies, wetlands, and riparian areas for the MCBH at Kāneʻohe Bay landing site area is shown in Figures 3.16-11 and 3.16-12. There are two watersheds (Kawainui and Kaelepulu) with a very small portion of a third (Waimanalo) at the very southern end of the project area. The entire site is within the Waimanalo aquifer. Just outside the landing site area are three very important hydrological features that help define the hydrology of the area: Kawainui Marsh, Kaelepulu Pond (Enchanted Lake), and the western half of the Nuupia Fish Pond complex at MCBH Hawaiʻi. (The eastern half of the pond complex is located within the project area.) The Kawainui Marsh located just inland of the landing site area is separated from the town of Kailua by the Kailua Canal; a USACE project that rerouted the marsh drainage north and channelized its drainage to Kailua Bay providing a measure of flood control for the town. All of these aforementioned natural and man-made hydrologic features are influenced by the substantial amount of precipitation that falls on the windward side of Oʻahu, due to the steep mountain chain capturing moisture as clouds climb to reach the leeward side. Within the project area, the Nuupia and Kaluapuhi Fish

Pond areas have an inland waterway designation of Class I while the remaining inland waters in the landing site area are designated Class 2 on the 1987 HDOH Water Quality Standard Maps. This same pond complex also has protected status as an estuarine and marine habitat sanctuary.

State Waters

Offshore waters around the landing site area centered at Kailua Bay are considered Class A on the 1987 HDOH Water Quality Standards Map. The Mokolea Seabird Sanctuary consists of a small islet approximately 1 km off the shore directly out from Fort Hase Beach.

Pearl Harbor

Terrestrial Waters

An overview of the aquifers and watersheds, and the water bodies, wetlands, and riparian areas for the Pearl Harbor landing site area is shown in Figures 3.16-13 and 3.16-14. The Pearl Harbor landing site area is divided between (west to east) the Waipahu-Waiawa, Waimalu, Moanalua, Kalihi, and Nuuanu aquifers. The landing site area overlays the Southern O‘ahu Basal Aquifer, which is an SSA as defined and regulated by USEPA. The landing site area contains portions of 10 watersheds: Kaloi, Honouliuli, Halawa, Manuwai, Keehi, Moanalua, Kalihi, Kapalama, and Nuuanu, and a portion of the Ala Wai watershed at the far eastern end of the landing site area in Kakaako. Most of these watersheds are centered on their namesake streams and most of these streams are channelized as they wind through urban Honolulu on the way to draining to the ocean.

The large and complex hydrology of the Pearl Harbor area, with its estuaries, drainage streams, and three large “lochs” separated by two land peninsulas as well as Ford Island; this area is located just inland from the project area. The landing site area itself only encompasses the narrow ocean entrance connecting the harbor to the sea. As shown on the 1987 HDOH Water Quality Standard Maps, terrestrial waters in the landing site area are classified as Class 2 and are located in two hydrographic areas (III and IV). This map also designates the Pearl Harbor Estuary with its zone of mixing at the entrance to the harbor as well as three other zones of mixing at the Kapalama, Iwilei, and Honolulu harbor areas. The landing site area contains some historic fish ponds between Sand Island Access Road and Keehi Lagoon as well three historic fish ponds within the confines of a Honolulu International Airport runway area. Both Sand Island and the Reef Runway at Honolulu International Airport were left outside the landing site area boundaries. These two areas were both artificially created and consist almost entirely of fill materials.

State Waters

Development, fill, and alteration have significantly changed the hydrological functions, locations, and shoreline of the Pearl Harbor project area. The historic intensity and types of uses, as well as their proximity to each other, have resulted in a range of water quality challenges and problems unequaled in the other project areas. Areas just offshore from the terrestrial limits of the landing site area include estuarine and marine wetlands offshore from Keehi Lagoon and the Reef Runway, and estuarine and marine deepwater areas throughout the entire length of the project area. These state waters fall under Class A as shown on the 1987 HDOH Water Quality Standard Maps.

Federal Waters

BOEM Jurisdiction

The Outer Continental Shelf (OCS) is defined as encompassing 200-nautical mile territorial waters offshore of Hawaiʻi's islands, less 3-nautical-mile limit (state waters) surrounding each island. Since less than 200 nautical miles separate the project islands, the OCS would cover marine waters of the entire landing site area less the 3 nautical miles of state waters surrounding each Hawaiian island.

NOAA Jurisdiction

NOAA jurisdictional waters in the vicinity of potential interisland cable corridors landing site areas consist of the HIHWNMS. A portion of the Sanctuary extends in a wide band of open ocean from approximately 40 miles west of Molokaʻi to the western coast of Maui, encompassing all of the coastline of Molokaʻi except for its northern shore, all of the coastline of Lānaʻi, and virtually all of the western coastline of Maui. There are noncontiguous portions of the HIHWNMS adjacent to the south and north shores of Oʻahu, however, these portions of the HIHWNMS do not extend to either the Pearl Harbor Kāneʻohe Bay landing site areas. NOAA also maintains the Papahanaumokuakea Marine National Monument marine protected area. This particular monument is centered on the Northwest Hawaiian Islands and does not encompass any of the main Hawaiian Islands including any area of analysis in this study.

3.16.5 Potential Impacts of Cable System Implementation

General Description of Impact Types

Terrestrial

All of the landing site areas on the various islands encompass various types of water resources. Water resource impact types are not localized to one island project location nor a specific type

of water resource. In general, the leeward locations of islands tend to be drier, with fewer terrestrial water resources and less precipitation. Since no location in Hawai‘i is more than 30 miles from the shore, coastal and marine resources are especially vulnerable to human activities that occur inland. Stream channelization, loss of riparian vegetation, and paving in lowland and coastal areas contribute to a higher than normal volume and velocity of freshwater being delivered to the ocean with the resulting low salinity levels. These low levels of salinity, combined with the reduced quality and increased turbidity of the runoff, can adversely affect the sensitive coral reef ecosystems. Most estuaries in Hawai‘i are within embayments that generally are not subject to rapid and efficient flushing. Sediment and other pollutants in runoff can accumulate in estuaries and degrade water quality. A discussion of specific impacts to terrestrial and marine habitats and species is found in Sections 3.7 and 3.14.

Future construction of converter stations as well as the landings for undersea cables will most likely require excavation, land clearing, and grading activities regardless of the proposed location. These activities could affect adjacent surface water features or groundwater resources and may particularly result in point source discharge that exceeds state water quality standards, cause substantial erosion or downstream sedimentation, and/or affect groundwater quality and quantity. Additionally, the water bodies at some of the proposed future development sites may be listed on the CWA Section 303(d) list of impaired waters.

Federal Waters

BOEM Jurisdiction

BOEM lease and ROW jurisdiction would depend on where corridors are proposed for an undersea cable route. BOEM has the authority to issue ROW grants for offshore transmission lines linking renewable energy installations in the OCS. However, BOEM specifically does not have the authority to grant energy leases or ROWs in National Marine Sanctuaries (NMS) as defined below and as discussed further in Section 3.7. If a leasable area, not within HIHWNMS jurisdiction were found, the proposal to place a cable in the OCS would trigger the preparation of a NEPA environmental review, which would be submitted as part of the BOEM ROW application. Impacts to marine waters would be analyzed as part of that process.

NOAA Jurisdiction

Avoidance of the NMSs may drive the design, location, and placement of cable corridors and landings, and the alternatives to each. This area is best avoided for cable-laying as BOEM cannot issue an ROW permit within HIHWNMS boundaries and a process for securing approval from NOAA for the laying of a cable and/or granting of a ROW has not been codified at this time. If NOAA defines a future process for the permitting of cables in the NMSs, like BOEM, a NEPA environmental review would be required to analyze the full range of marine impacts from this type of development.

3.16.6 General Siting Criteria and Special Conservation and Construction Measures

General Level Special CCMs

The range of CCMs listed below could be applied to all future projects independent of island or project location. Construction techniques and operational procedures would likely be similar at each location. The most important variables for determining the menu of CCMs to be used would likely be the project's proximity to surface water bodies, the site topography, and existing receiving water quality in the area. The following CCMs are listed in the phases that they would be incorporated for a project.

At the Design Phase

WR-1 Facilities should be designed to be located as far as practicable from natural drainages to avoid or minimize hydro-modification impacts as well as impacts to water quality as a result of project construction and operation.

WR-2 Designate on-site material delivery and storage areas. Areas should be located near construction entrances and away from watercourses. Earth berms or other containment measures should surround storage areas.

WR-3 A comprehensive set of storm water planning, design, and construction elements should be used to maintain or restore predevelopment hydrology of the site. Depending on site conditions, purpose, and surrounding landscape, low impact development (LID) strategies should be included in the design, such as detention basins, biofiltration cells, vegetated swales, infiltration strips, or other similar earth-based vegetated system for accepting and conveying runoff associated with new paved surfaces and other permanent impervious features.

WR-4 Contractors should develop plans that ensure protection of workers and proper disposal of contaminated groundwater and saturated soil, if encountered.

WR-5 Training should be provided for employees and contractors on proper material delivery and storage practices and procedures.

WR-6 Issues related to groundwater quality should be disclosed to the construction contractors, including disposal options and associated regulatory requirements for dewatering.

WR-7 Select and design project-related access routes to minimize impacts to receiving waters, in particular the discharge of identified pollutants to an already impaired

water body or routes that require crossing or bridging natural water or drainage ways.

Prior to Construction

WR-8 For landing site areas involving construction activities that disturb one or more acres, filing of an NOI with the HDOH would be required. The contractor would submit a Storm Water Pollution Prevention Plan (SWPPP) under provisions of Section 402 of the CWA. The SWPPP would identify appropriate CCMs to control and minimize erosion at the construction site and postconstruction CCMs to stabilize soils when construction is complete. This plan would include water quality protection and monitoring measures as well as any other provisions of the NPDES process. CCMs may be required and implemented before and during construction, and would continue through the postconstruction operational phase.

WR-9 For coastal sites and other sites with a shallow groundwater table, dewatering of the foundation excavation may be required. Dewatering activities at construction sites are often covered by a WQC under provisions of Section 401 of the CWA. This WQC would be submitted and processed through HDOH-Clean Water Branch.

WR-10 If site development necessitates placing fill in a drainage or wetland, the project would obtain a Section 404 Nationwide Permit through USACE. Depending on the type of development, a Section 10 permit may also be required by USACE.

During Construction

WR-11 Clearing and grading of native vegetation should be limited to the minimum amount needed to construct, allow access, and provide fire protection as needed.

WR-12 A material and waste management program should be implemented during construction within the site project limits, such as solid, sanitary, septic, hazardous, contaminated soil, concrete, and construction waste management; spill prevention; appropriate material delivery and storage; employee training; dust control; and vehicle and equipment cleaning, maintenance, and fueling.

WR-13 Stormwater and erosion controls should be installed prior to soil disturbance on the construction site. Where determined necessary, silt fencing, straw wattles, temporary earthen berm, or similar runoff barrier would be placed along the perimeter of the landing site area using methodologies and orientations appropriate to control erosion.

WR-14 Stockpiles of soil, concrete material, etc., should be covered with a tarp or blanket and/or surrounded with straw wattles or gravel bags. Slopes should be protected with straw wattles or blankets or similar type of slope protection.

WR-15 Whenever possible, grading should be phased to limit soil exposure and minimize potential sediment transport. Finished areas should be revegetated and/or hydroseeded with native species known to exist in the project area.

WR-16 Storm drain inlets should be protected using gravel bags or certified weed-free straw wattles, filter fabrics, absorbent socks, rubber covers, or other materials appropriate for the location. Construction entrances and laydown areas should be stabilized.

WR-17 Sedimentation basins should be constructed where appropriate and include standpipe design discharge outlets that allow collected water to drain off at a controlled rate. Check dams could be used to reduce runoff velocities where necessary.

Postconstruction

WR-18 All structural CCMs should be maintained as designed postconstruction, for optimum efficient operation, including:

a. Cleaning and removing debris from inlets, outlets, or catchments after major storm events.

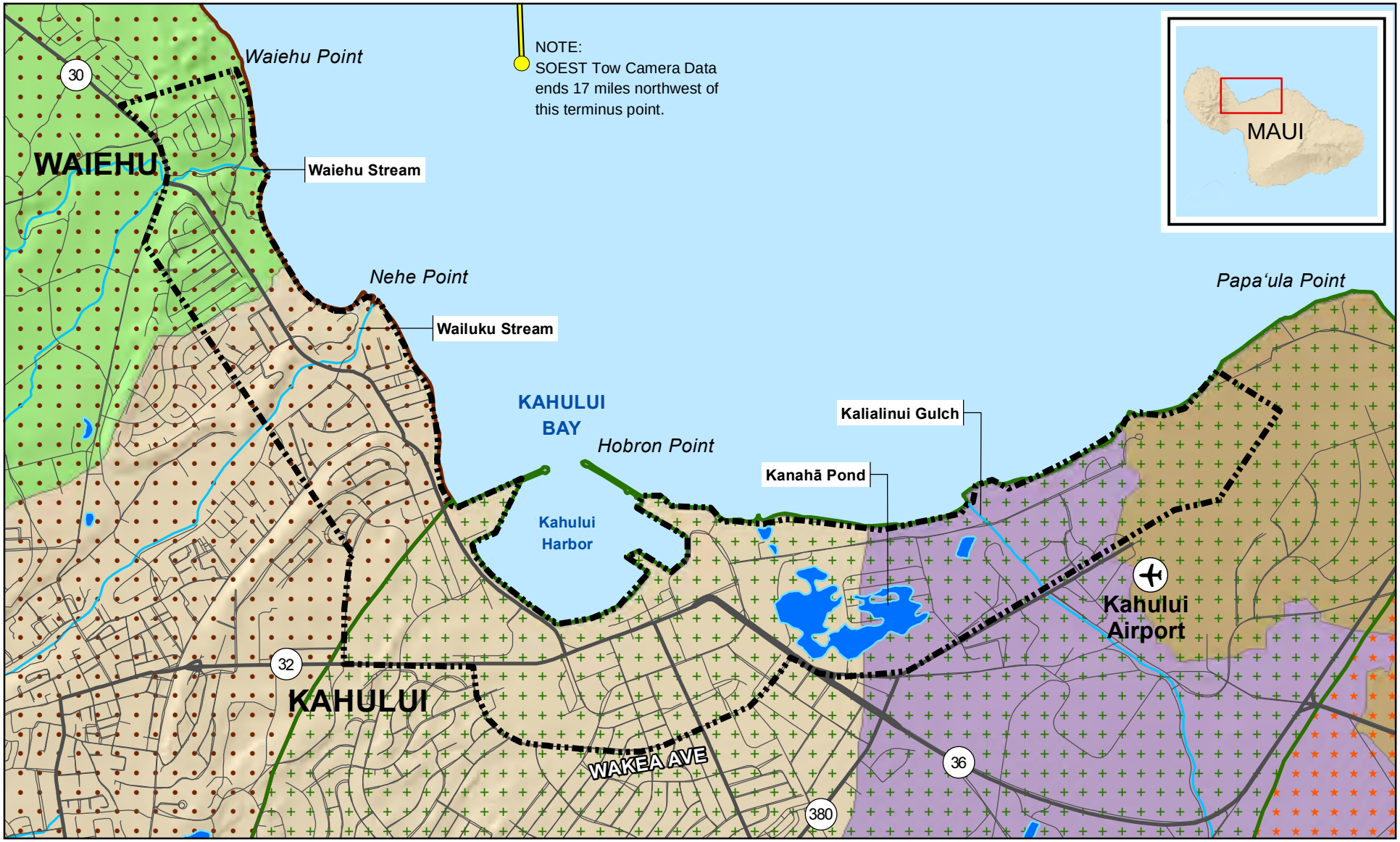
b. Mowing and maintaining vegetated CCMs (e.g., maintaining swales and/or detention/retention systems to original cross sections and infiltration rates).

c. Repairing or replacing armor rock or stone aggregate that serves as scour protection (e.g., riprap).

d. Seeding or sodding to restore or maintain ground cover.

e. Repairing erosion areas and stabilizing repairs with additional erosion control protection.

f. Removing and replacing all dead and diseased vegetation as necessary to maintain vegetation coverage and minimize erosion.



Kahului Maui Landing Site Area: Aquifers and Watersheds

- Route with camera data *
- Route without camera data **
- Highways & Major Roads
- Other Roads
- SOEST Cable Routes
- HIREP Study Analysis Area
- Drainages, Rivers and Streams
- Freshwater Lake or Pond
- Open Water
- 'Īao Aquifer
- Kahului Aquifer
- Pā'ia Aquifer

Watersheds

- Waiehu
- 'Īao
- Kalialinui
- Kailua Gulch

N

0 2,500 Feet

* Symbol denotes shoreward extent of tow camera data for cable route (unless otherwise noted).
** Symbol denotes shoreward approach of cable route without tow camera data.

Date: 4/26/2012
Data Sources: HI-DBEDT, USGS, UH-SOEST, AECOM, 2012

Figure 3.16-1

Kahului Maui Landing Site Area: Water Bodies, Wetlands, and Riparian Areas

- Route with camera data *
- Route without camera data **
- Highways & Major Roads
- Other Roads
- SOEST Cable Routes
- HIREP Study Analysis Area
- Dam Locations

Streams
- Perennial
- Non-Perennial
- Intermittent

Wetland Type
- Freshwater Pond
- Lake
- Riverine
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Estuarine and Marine Wetland
- Estuarine and Marine Deepwater
- Open Water

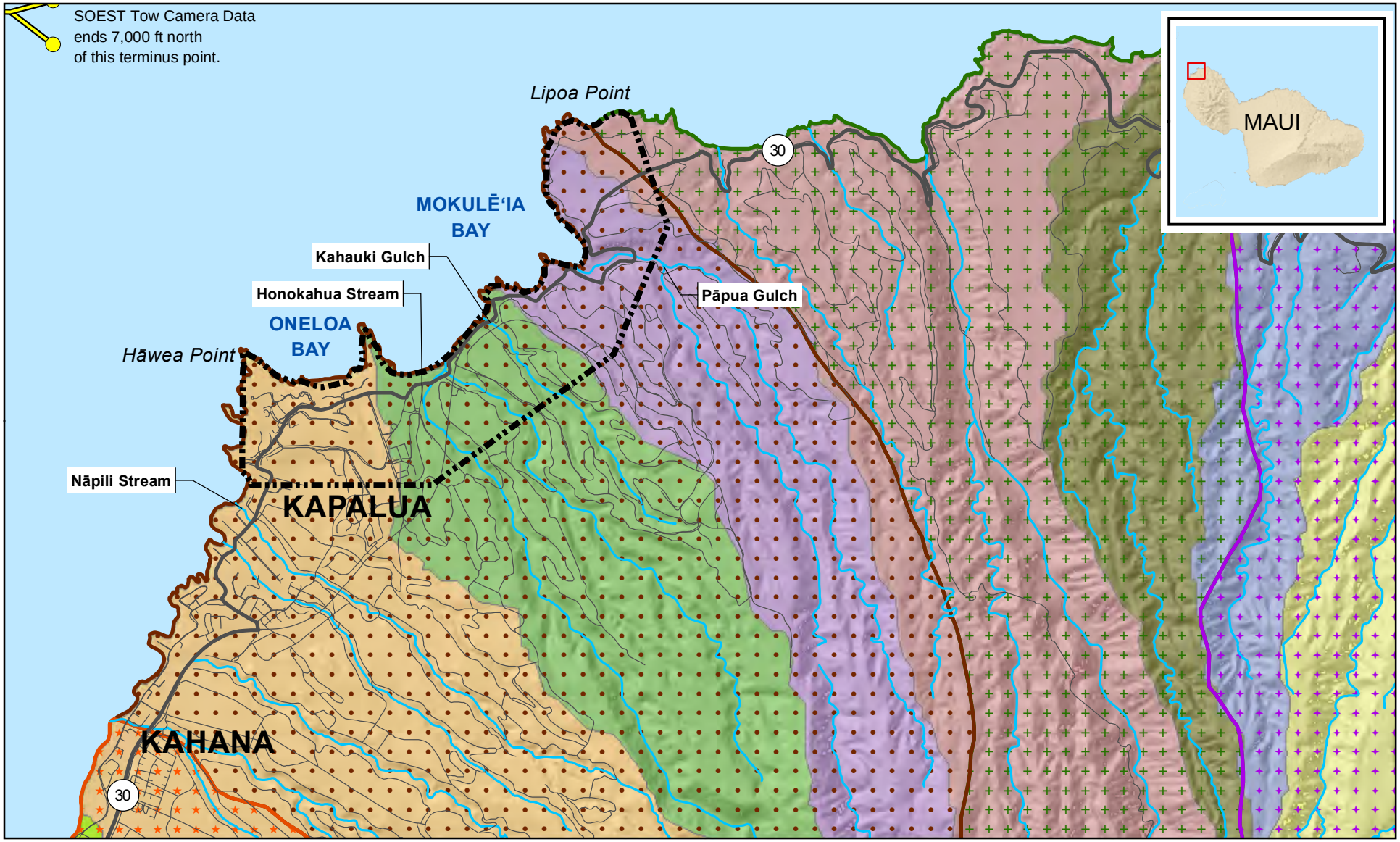
N

0 2,500 Feet

* Symbol denotes shoreward extent of tow camera data for cable route (unless otherwise noted).
** Symbol denotes shoreward approach of cable route without tow camera data.

Date: 4/26/2012
Data Sources: HI-DBEDT, USFWS, UH-SOEST, AECOM, 2012

Figure 3.16-2



West Maui Landing Site Area: Aquifers and Watersheds

- Route with camera data *
- Route without camera data **
- Highways & Major Roads
- Other Roads
- SOEST Cable Routes
- HIREP Study Analysis Area
- Drainages, Rivers and Streams
- Open Water
- Honolua Aquifer
- Honokohau Aquifer
- Honokōwai Aquifer
- Kahkuloa Aquifer

Watersheds

- Kahana
- Honokahua
- Honolua
- Honokōhau
- Anakaluahine
- Honanana
- Honokōwai
- Poelua

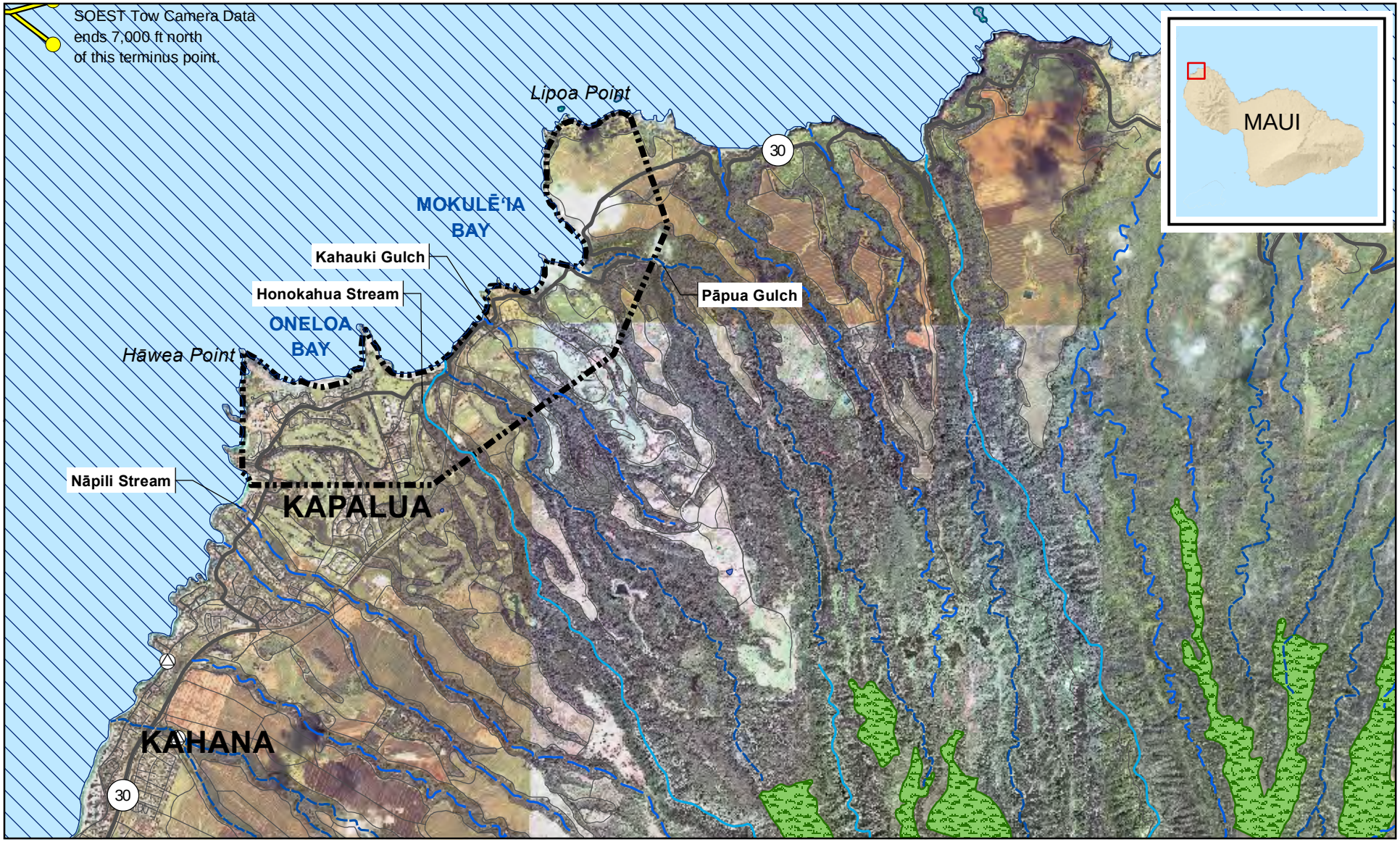
N

0 2,500 Feet

* Symbol denotes shoreward extent of tow camera data for cable route (unless otherwise noted).
** Symbol denotes shoreward approach of cable route without tow camera data.

Date: 4/26/2012
Data Sources: HI-DBEDT, USGS, UH-SOEST, AECOM, 2012

Figure 3.16-3



West Maui Landing Site Area: Water Bodies, Wetlands, and Riparian Areas

- Route with camera data *
- Route without camera data **
- Highways & Major Roads
- Other Roads
- SOEST Cable Routes
- HIREP Study Analysis Area

Streams
- Perennial
- Non-Perennial
- Intermittent

Wetland Type
- Freshwater Pond
- Lake
- Riverine
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Estuarine and Marine Wetland
- Estuarine and Marine Deepwater
- Open Water

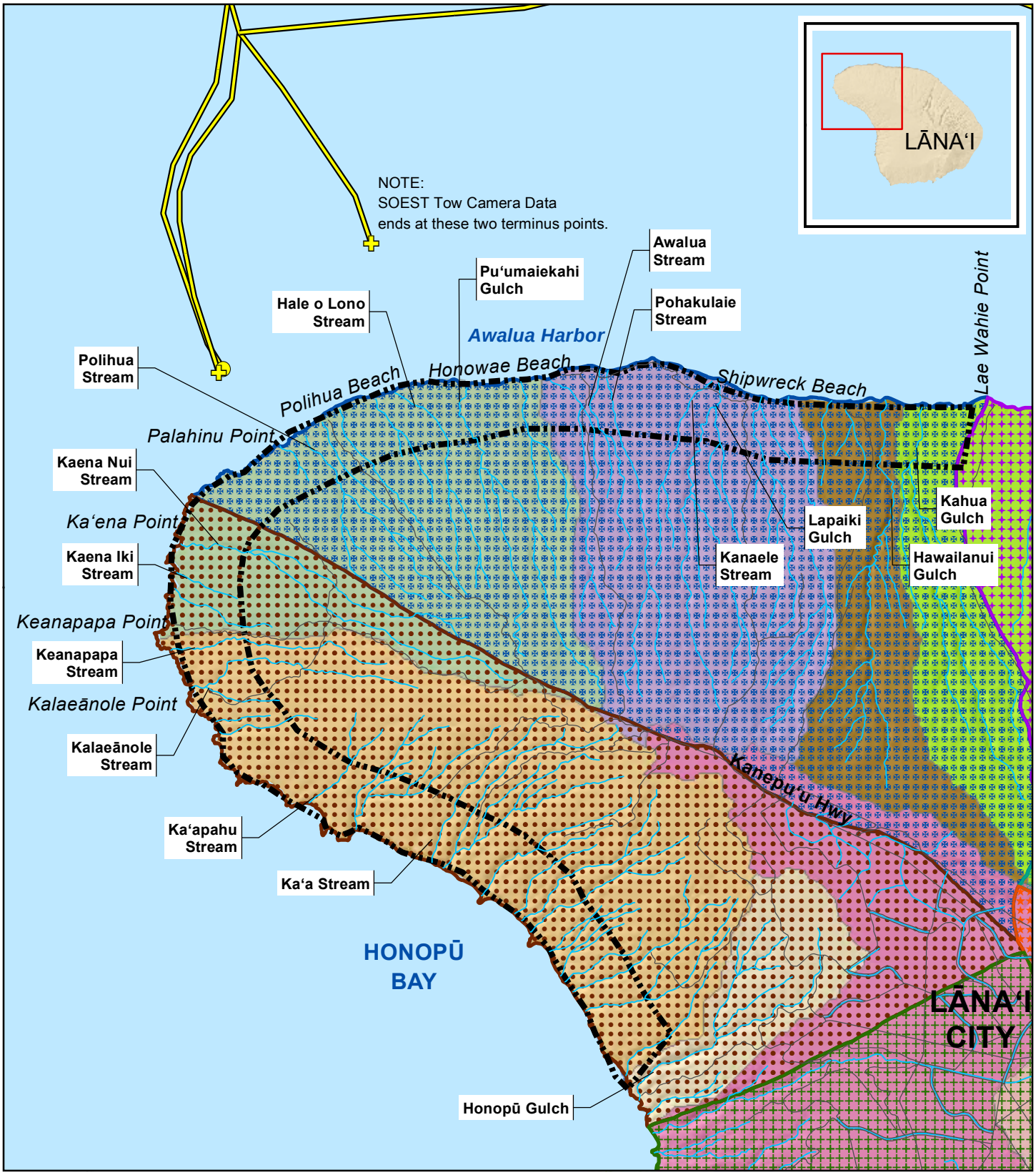
N

0 2,500 Feet

* Symbol denotes shoreward extent of tow camera data for cable route (unless otherwise noted).
** Symbol denotes shoreward approach of cable route without tow camera data.

Date: 4/26/2012
Data Sources: HI-DBEDT,USGS, USFWS, UH-SOEST, AECOM, 2012

Figure 3.16-4



Lānaʻi Landing Site Area: Aquifers and Watersheds

- Route with camera data *
- Route without camera data **
- Highways & Major Roads
- Other Roads
- SOEST Cable Routes
- HIREP Study Analysis Area
- Drainages, Rivers and Streams
- Open Water
- Honopu Aquifer
- Kaumalapau Aquifer
- Maunalei Aquifer
- Paomai Aquifer
- Leeward Aquifer
- Windward Aquifer

Watersheds

- Hawaiilanui
- Honopū
- Kaʻāpahu
- Kahua
- Lapaiki
- Palawai Basin
- Paliamano
- Puumaiekahi

N

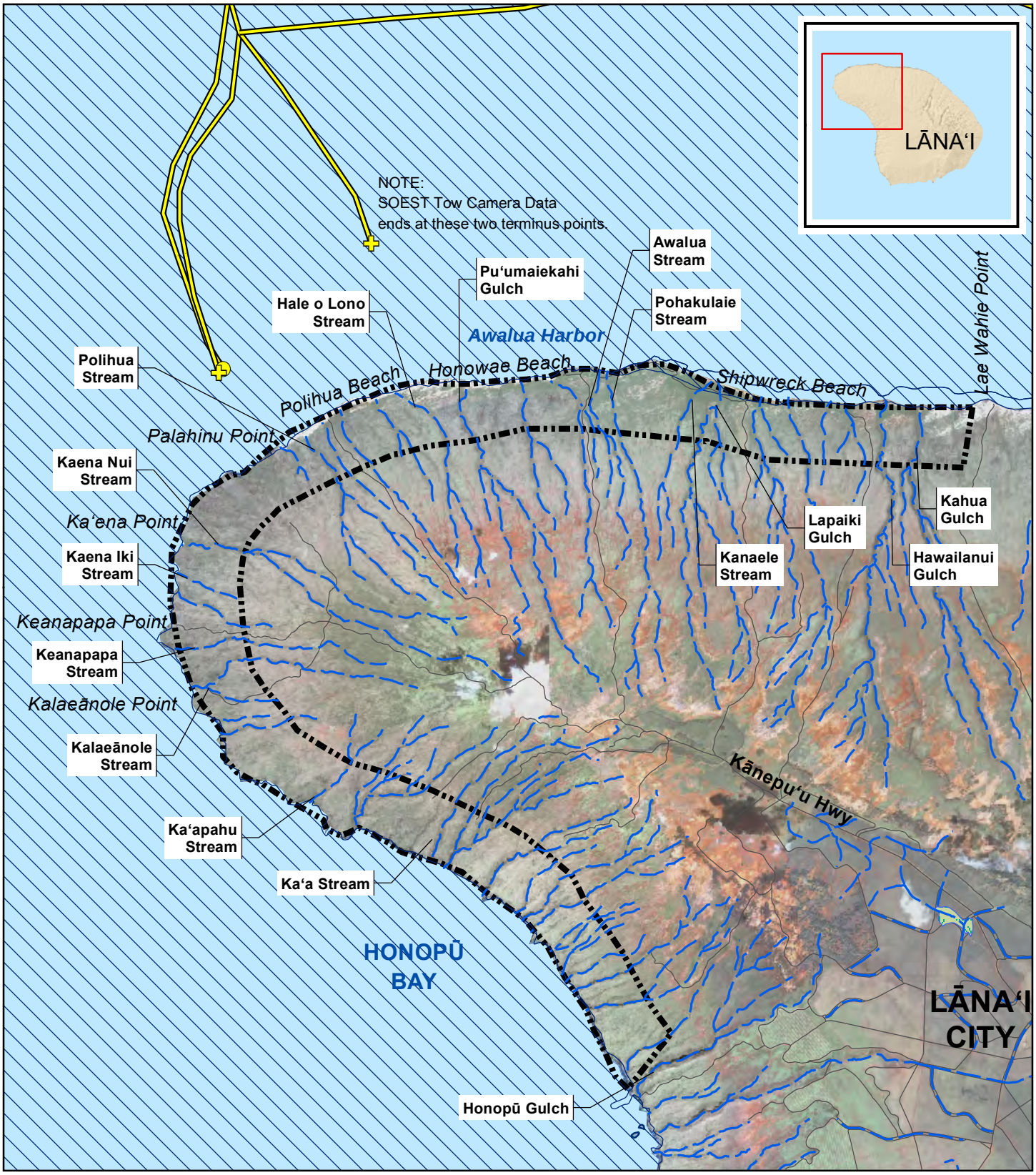
0 5,000 Feet

* Symbol denotes shoreward extent of tow camera data for cable route (unless otherwise noted).
** Symbol denotes shoreward approach of cable route without tow camera data.

Date: 4/28/2012

Data Sources: HI-DBEDT, NOAA, UH-SOEST, AECOM, 2012

Figure 3.16-5



Lānaʻi Landing Site Area: Water Bodies, Wetlands, and Riparian Areas

- Route with camera data *
- Route without camera data **
- Highways & Major Roads
- Other Roads
- SOEST Cable Routes
- HIREP Study Analysis Area

Streams
- Perennial
- Non-Perennial
- Intermittent

Wetland Type
- Freshwater Pond
- Lake
- Riverine
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Estuarine and Marine Wetland
- Estuarine and Marine Deepwater
- Open Water

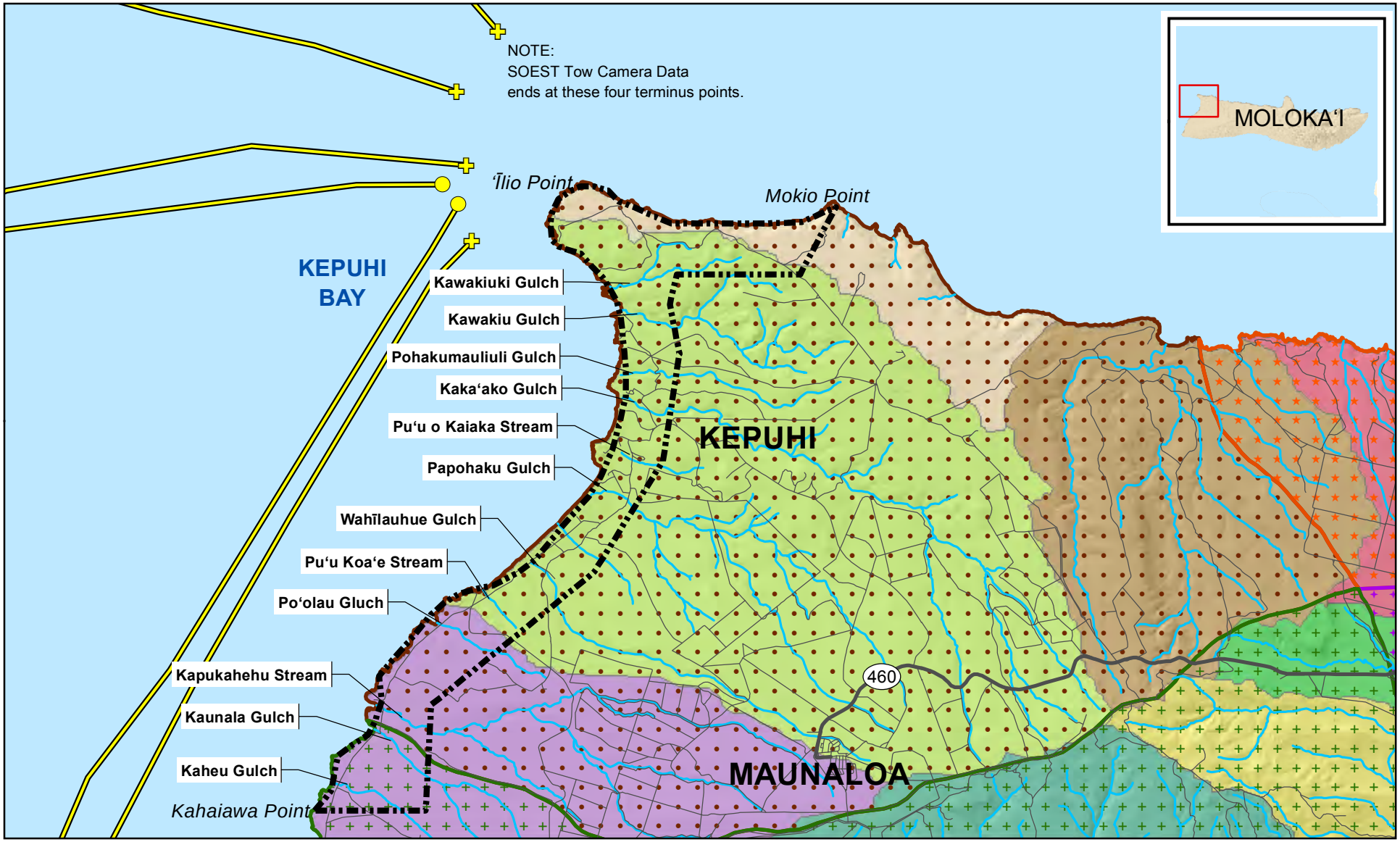
N

0 5,000 Feet

* Symbol denotes shoreward extent of tow camera data for cable route (unless otherwise noted).
** Symbol denotes shoreward approach of cable route without tow camera data.

Date: 4/26/2012
Data Sources: HI-DBEDT, NOAA, USFWS, UH-SOEST, AECOM, 2012

Figure 3.16-6



West Moloka'i Landing Site Area: Aquifers and Watersheds

- Route with camera data *
- Route without camera data **
- Highways & Major Roads
- Other Roads
- SOEST Cable Routes
- HIREP Study Analysis Area
- Drainages, Rivers and Streams
- Open Water

Watersheds

- Papōhaku
- Kaunala
- Ka'a
- Mo'omomi
- Kolo
- Kaluape'elua
- Waiahewahewa
- Maneopāpa

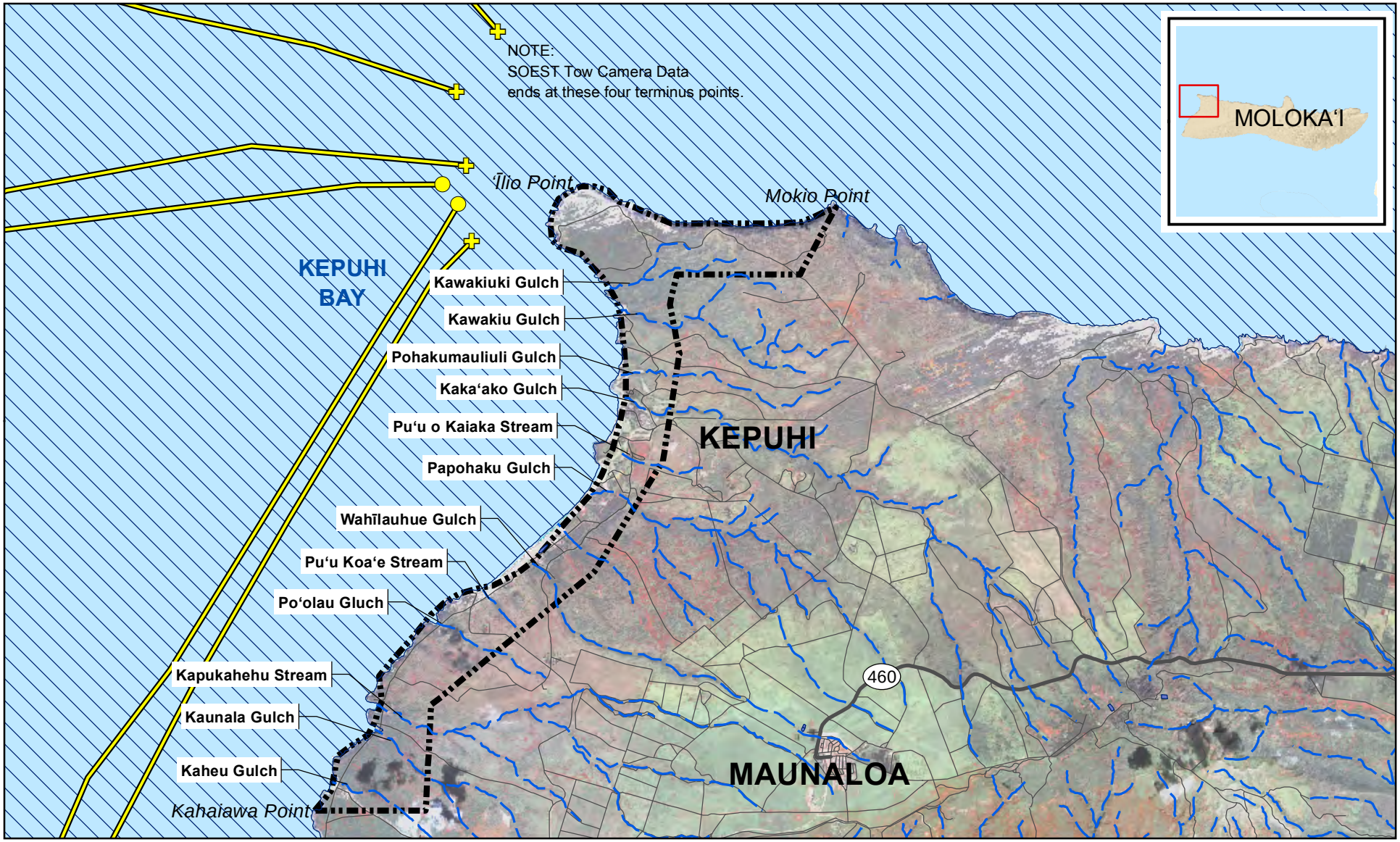
N

0 5,000 Feet

* Symbol denotes shoreward extent of tow camera data for cable route (unless otherwise noted).
** Symbol denotes shoreward approach of cable route without tow camera data.

Date: 4/26/2012
Data Sources: HI-DBEDT, USGS, UH-SOEST, AECOM, 2012

Figure 3.16-7



West Moloka'i Landing Site Area: Water Bodies, Wetlands, and Riparian Areas

- Route with camera data *
- Route without camera data **
- Highways & Major Roads
- Other Roads
- SOEST Cable Routes
- HIREP Study Analysis Area

Streams
- Perennial
- Non-Perennial
- Intermittent

Wetland Type
- Freshwater Pond
- Lake
- Riverine
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Estuarine and Marine Wetland
- Estuarine and Marine Deepwater
- Open Water

N

0 5,000 Feet

* Symbol denotes shoreward extent of tow camera data for cable route (unless otherwise noted).
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Date: 4/26/2012
Data Sources: HI-DBEDT, USFWS, USGS, UH-SOEST, AECOM, 2012

Figure 3.16-8