

FINAL—Archaeological Monitoring Report for the Nānākuli Library, Nānākuli Ahupua‘a, Wai‘anae District, Island of O‘ahu, Hawai‘i

TMK: (1) 8-9-002:065 (por.)



Prepared For:

State of Hawai‘i Department of Accounting and General Services
1151 Punchbowl St. Room 427
Honolulu, HI 96813



September 2023

Keala Pono 

Keala Pono Archaeological Consulting, LLC • PO Box 1645, Kaneohe, HI 96744 • Phone 808.381.2361

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Prepared By:

Windy Keala McElroy, PhD
Megan Edwards, MA
and
Dietrix Duhaylonsod, BA

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MANAGEMENT SUMMARY

Archaeological monitoring was conducted for ground disturbing activity associated with construction of the Nānākuli Library on TMK: (1) 8-9-002:065 (por.) in Nānākuli Ahupua‘a, Wai‘anae District, on the island of O‘ahu, Hawai‘i. The remains of Camp Andrews, Sites 50-80-07-5946 and 50-80-07-7677 are located on the property, and Site 7677 (two coral pillars) was preserved in place. Two new features of Site 5946 were identified: a large septic tank and a possible pump well remnant. A variety of historic artifacts were recovered during monitoring, many of which were collected from the septic tank feature. Much of the cultural material dates to 1950–1968, after the camp’s heyday. The septic tank is thought to have functioned as a dump once it was no longer used by Camp Andrews.

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INTRODUCTION

At the request of CDS International, on behalf of the Department of Accounting and General Services (DAGS), Keala Pono Archaeological Consulting conducted archaeological monitoring for construction of the Nānākuli Public Library on a portion of TMK: (1) 8-9-002:065 in Nānākuli Ahupua‘a, Wai‘anae District, on the island of O‘ahu, Hawai‘i. The primary focus of the monitoring was on the identification and appropriate treatment of historic properties that might be affected during ground disturbance.

Archaeological monitoring was conducted in accordance with an archaeological monitoring plan (McElroy et al. 2014) reviewed and accepted by the Hawai‘i State Historic Preservation Division (SHPD). This report meets the requirements and standards of state historic preservation law. This includes Chapter 6E of the Hawai‘i Revised Statutes, and SHPD’s *Rules Governing Standards for Archaeological Monitoring Studies and Reports* (§13–279).

The report begins with a description of the project area and a historical overview of land use and archaeology in the region. The next section presents methods used in the fieldwork, followed by the results of the monitoring. Project results are summarized in the final section. Hawaiian words and technical terms are defined in a glossary at the end of the document. Appendices present SHPD review letters and data for collected cultural material.

Project and Location

TMK: (1) 8-9-002:065 (por.) is located within the ahupua‘a of Nānākuli on the leeward side of O‘ahu (Figures 1 and 2). The parcel is on the mauka side of Farrington Highway, which serves as the western property boundary. A canal borders the parcel on the south, and Nānāikapono Elementary School and its driveway are on the north and east. The project area includes 3.675 acres (1.5 ha) of the 15 acre (6.1 ha) property, which is owned by the Department of Land and Natural Resources (DLNR) of the State of Hawai‘i. It is located approximately .09 miles (150 m) from the coast at an elevation of roughly 10 feet (3.1 m) above mean sea level.

The scope of the project was to construct a new 18,000 square foot (.17 ha) public library for the Hawai‘i State Public Library Systems which has been in planning since 1994 (Figure 3). The new library is projected to serve the Nānākuli and Mā‘ili communities along the Wai‘anae coast. The new library must obtain a Leadership in Energy & Environmental Design (LEED) Silver Certification or greater. This is a green building certification that recognizes excellence in building strategies and practices. DAGS is requesting the Chapter 6E-8 Historic Properties review on behalf of the Department of Education (DOE) and the Hawai‘i State Public Library System (HSPLS).

Physical Environment

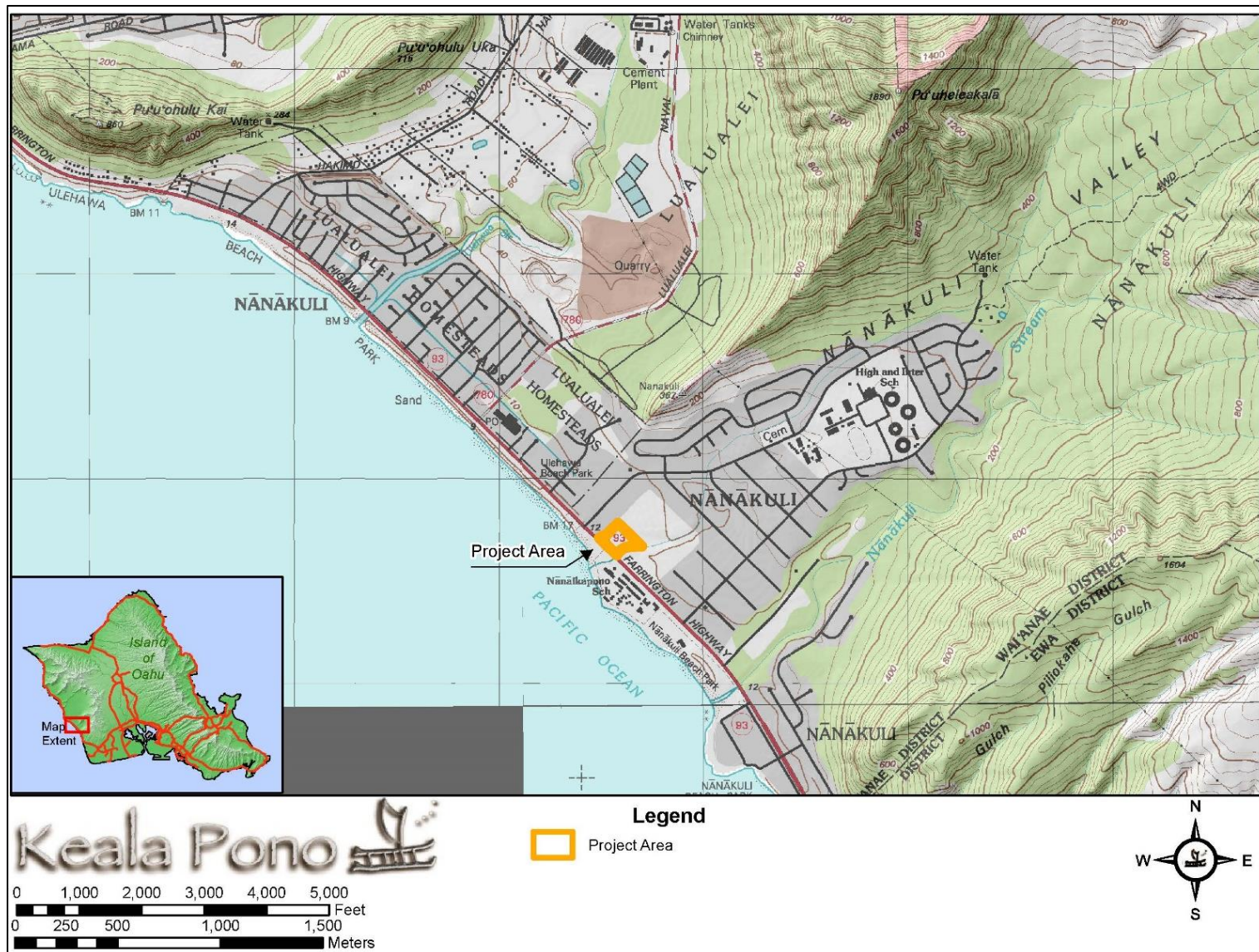
Nānākuli Valley is cut into the Wai‘anae Mountain Range, a heavily eroded shield volcano. Erosion has removed most of the western slope and exposed the internal structure of the volcano. The caldera of the Wai‘anae volcano was located just west of Kolekole Pass, and extended from the northern side of Mākaha Valley to the head of Nānākuli Valley (Macdonald et al. 1983).

Nānākuli Valley is 1.2 miles (1.9 km) wide at its mouth and extends 3.1 miles (5 km) inland, and is part of the Wai‘anae District on the leeward side of O‘ahu (Cordy 2002:77). It is situated between the ahupua‘a of Lualualei on the northwest and Honouliuli on the southeast and encompasses a total area of 1,602 acres (648 ha) (Juvik and Juvik 1998:306). Cordy defines the ahupua‘a boundaries further:

The south border of Nānākuli is at Nānākuli Point on the shore. Back across the coastal trail (today's highway), the south ridge of the valley begins and rises to Pu'u Manawahua. The ridge then meets the main ridgeline of the Wai'anāe mountains, which forms the back of the valley with Mauna Kapu and the light grey cliffs of Palikea at 3,098 feet. The north ridge then heads back toward the sea, forming the north side of the valley. The ridge dips in the back then rises to the high peak called Pu'u Heleakalā. (Cordy 2002:79)

Similar to the other Wai'anāe valleys, there is a lower valley and an upper valley, which gradually increases in elevation. The valley's many tributaries are located in the upper portion, all emerging from the 'Ewa side, and merge in the lower valley. They are intermittent streams that appear to not have run full-time in the past, due to the lack of remains of irrigated fields (Cordy 2002:79).

Situated on the dry coastal plain, the project area receives low rainfall of only 20–30 inches (51–76 cm) per year, and the wind generally comes from the east, over the Ko'olau and Wai'anāe mountain ranges (Juvik and Juvik 1998:50). Vegetation in the project area consists of koa haole and various grasses. Substrates are entirely coral outcrop, shown as CR in Figure 4. Sinkholes are a common feature on coral substrates, formed as water percolates downward and erodes the coral. Mamala stony silty clay loam, 0–12% slopes (MnC) occurs to the north of the project area (Foote et al. 1972).



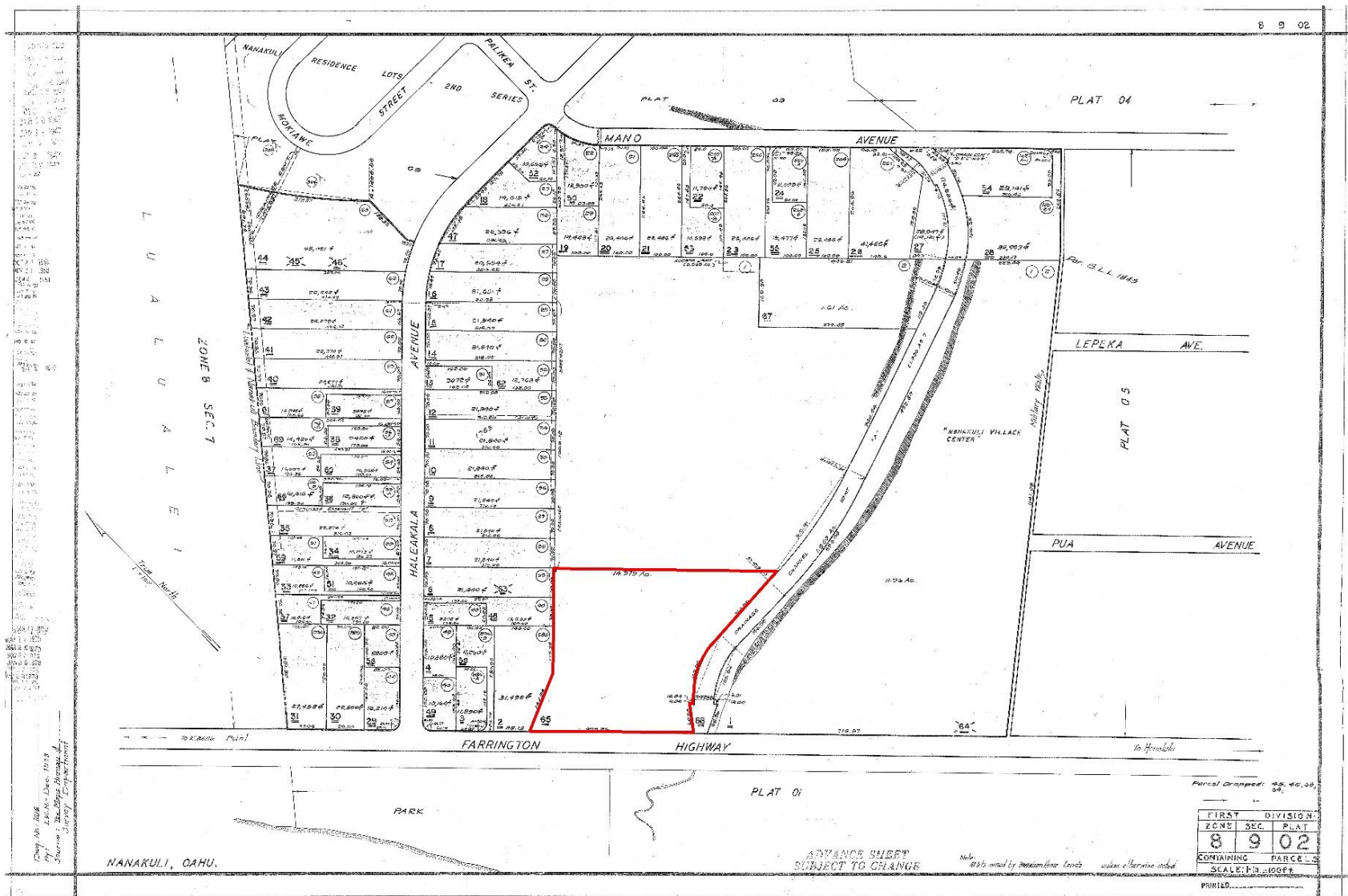


Figure 2. Project area (outlined in red) on TMK plat (1) 8-9:002.

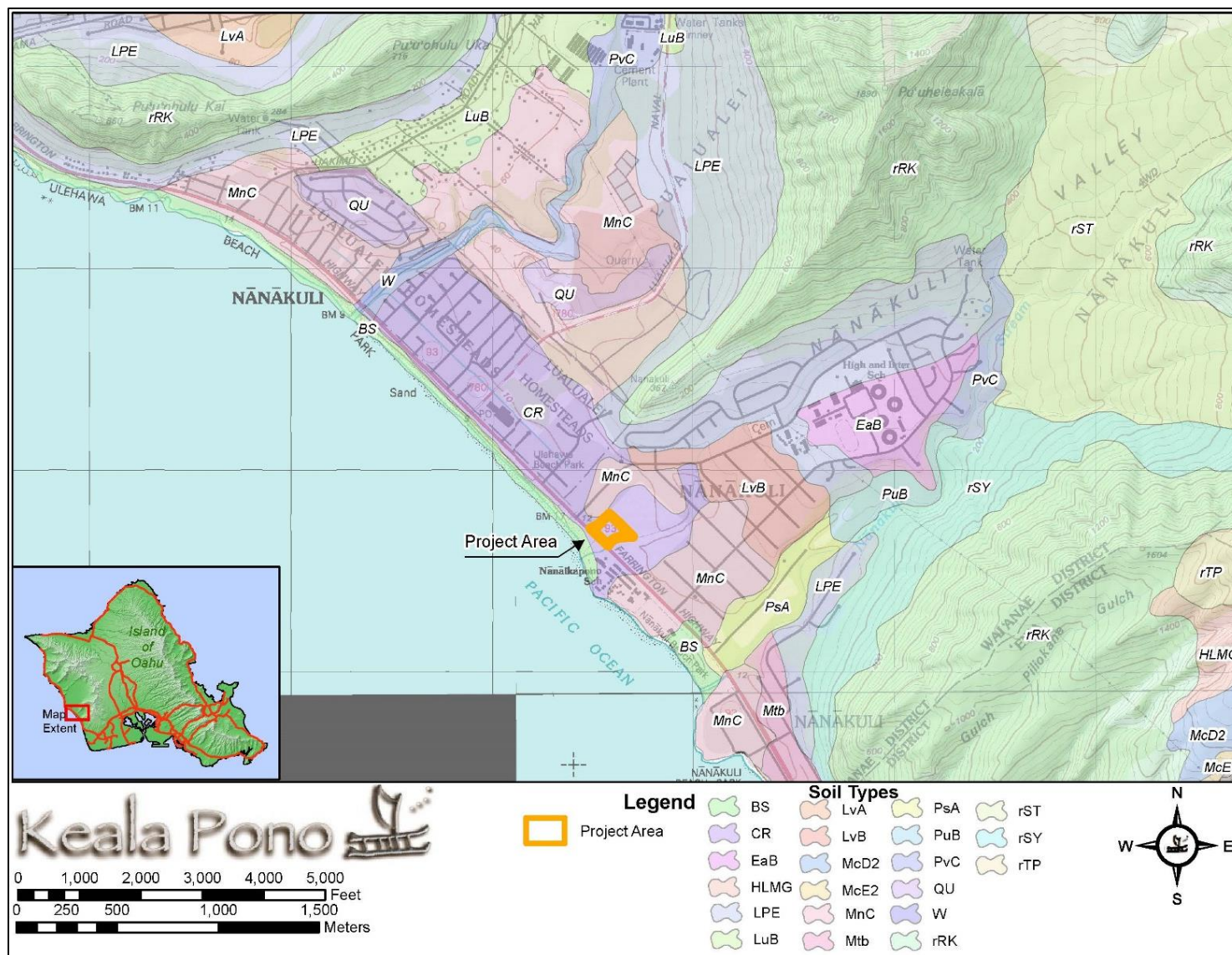


Figure 4. Soils in the vicinity of the project area.

BACKGROUND

This section of the report presents traditional and historic background information for Nānākuli, including place names, Hawaiian proverbs and mo‘olelo, land use, Māhele land tenure data, and a summary of previous archaeological research.

Inoa ‘Āina Nānākuli: Place Names

Nānākuli literally means “look at knee” or “look deaf” (Pukui et al. 1974). There are several stories that attempt to explain the origin of the name.

One mo‘olelo relates that Nānākuli is named in honor of the tattooed knee of Ka‘ōpulupulu, a priest whose chief, Kahāhana, turned a deaf (kuli) ear to his advice (Pukui et al. 1974):

Kahahana dug up bones from their burial places “to make arrows for rat-shooting and hooks for fishing. The bones of chiefs were bartered for skirts for chiefesses and handles for *kāhili*. Ka‘ōpulupulu pleaded with him in vain to stop this disrespectful deed, but Kahahana turned a deaf ear to Ka‘ōpulupulu’s pleas. As a sign of protest, Ka‘ōpulupulu, his followers, relatives and members of his household tattooed their knees to signify Kahahana’s unwillingness to listen to advice. (Kamakau 1992:133)

Sterling and Summers (1978) share another story based on the “look deaf” translation, as told to noted historian and author Mary Kawena Pukui in 1945 by Simeona Nawa‘a:

Simeona Nawa‘a came in to the Museum and sat down to talk to me. In the course of the conversation he told me these things:

Nanakuli – It was Kanui, a native woman of Wai‘anae who told him why this place was so named. In the olden days, this place was sparsely inhabited because of the scarcity of water. The fishing was good but planting very poor. When it rained, some sweet potatoes would be put into the ground, but the crops were always poor and miserable.

There were a few brackish pools from which they obtained their drinking water and it is only when they went to the upland of Waianae that they were able to get fresh water. They carried the water home in large calabashes hung on mamaka or carrying sticks and used their water very carefully after they got it home. They spent most of their time fishing and most of the fish they caught were dried as gifts for friends and relatives in the upland. Sometimes they carried dried and fresh fish to these people in the upland and in exchange received poi and other vegetable foods. And as often as not, it was the people of the upland who came with their products and when home with fish.

Because of the great scarcity of water and vegetable food, they were ashamed to greet passing strangers. They remained out of sight as much as possible. Sometimes they met people before they were able to hide, so they just looked at the strangers with expressionless faces and acted as though they were stone deaf and did not hear the greeting. This was so that the strangers would not ask for water which they did not have in that locality.

The strangers would go on to other places and mention the peculiar, deaf people who just stared and they would be told that the people were not deaf but ashamed of their inability to be hospitable. So the place they lived was called Nana, or look, and kuli, deaf—that is, Deaf mutes who just look (Nawa‘a 1956:2740 in Sterling and Summers 1978:61–62)

Another interpretation comes from an early 20th century resident of Nānākuli, Wm. Z.H. Olepau in 1933 as follows:

There were two women who went up the hill of “PuuHakila” or PuuHela to dry their Kapas. While the kapas were being dried they left and went down the hill to the pool for some water. They heard dogs barking so they stood, looking around for the barking was deafening. (Sterling and Summers 1978:62)

Olepau then explains why Nānākuli may have been named for the knee:

- (1) Women used to go to the top of a hill to dry their kapa, and when they got there, they looked at their knees – nana kuli.
- (2) Royalists of the valley used to sit with their knees up and watch their knees – nana kuli.

W.Z. Olepau, resident of Nanakuli, Mar. 20, 1933. (Sterling and Summers 1978:62)

Another explanation for the “looking at the knees” translation is related to an incident in the travels of the famous O‘ahu chief Kualī‘i. His attendants wished to relieve the king of his fatigue by pressing his knees (Thrum 1922:87).

While many stories attempt to interpret the meaning behind the place name Nānākuli, there are still others that refute that Nānākuli is the correct spelling, and thus the wrong meaning, for the ahupua‘a. Fred Cachola and Lehua Kapaku are two Nānākuli residents who share their beliefs with regard to the spelling of the name. In an interview, Cachola explains how he heard about the meaning when he was a school principal at Nānāikapono Elementary, from longtime resident Mrs. Eli:

So she said that the first principal of that school was Reverend Awai and that he knew that the tradition of that area, Nānākuli, had a Hawaiian hidden meaning which she told me was “Nānā-i-ka-ule.” I was kind of smiling. And she said, “Yeah, because that’s how in the old days this place was known for promiscuity. It got this name from ancient times. And it might have something to do with the mountain range.” Look at your map. Look at your map. The one that you were showing me. Because you can see the *ule* over there. See? There it is. See the testicles over here, and the penis sticking out there. So it could be [in] reference to that... And, that’s one interpretation of the name. And, it’s very Hawaiian. To me, it’s a very Hawaiian thing, very Hawaiian. (McGuire and Hammatt 2000:9)

In another interview, Lehua Kapaku, a resident of Nānākuli since 1960, shared a different story:

The Māui legend names off the various places this side of O‘ahu. Māui had so many brothers and he had two sisters. One was Lualualei and [the other was] his baby sister whom he treasured. The baby sister’s name was Nānāku‘ulei [which means] *look to my pretty lei*. To have the name “Lualualei” which is *sacred wreath*, and, then having a baby sister [whose name means] *looking deaf*, I just didn’t agree. I wasn’t satisfied with that. So, I accepted the Māui legend part where his baby sister was Nānāku‘ulei... This is the only place in the whole State to have a derogatory name, *look deaf*. You look at any other place, they have nice names... Only Nānākuli. So, it may have been a misprint... (McGuire and Hammatt 2000:13)

A major landmark in Nānākuli is Pu‘u Heleakalā, a hill located on the northwestern side of the valley. Not to be confused with the famous “Haleakalā” on Maui, Heleakalā translates to “snare by the sun,” for the pu‘u blocks the rays of the sun as it sets (Pukui et al. 1974:44). Pukui offers further insight into the name:

Heleakala Hill

A barren hill in Nanakuli, Waianae. Sometimes called Haleakala which Mrs. Pukui believes is probably wrong.

Hele – snare
a – belonging to
kala – sun

Heleakala meaning, where the sun is snared. This hill faces right into the setting sun and reference is made as to this place being ‘where the sun’s rays are broken.’ (Pukui 1953 in Sterling and Summers 1978:62)

The pu‘u is also described in the following historic account, originally printed in the Hawaiian language newspaper *Nupepa Kuokoa*:

....It wasn’t long when we arrived at Nānākuli and then to a place which bears a peculiar name, said to be the one on which the rays of the sun was broken. This is a barren hill as though plants hated all of its sides. I saw the cave in which Hina made tapa cloths on the slope of a hill facing a stream whose mouth was at a place with a peculiar name. (Kuokoa 1899 in Sterling and Summers 1978:62)

Other peaks include Pu‘u Manawahua, Mauna Kapu, and Palikea toward the back of the valley. Pu‘u Manawahua is 2,401 feet (732 m) high, and the name means “great grief hill” or “nausea hill” (Pukui et al. 1974:202). Mauna Kapu separates the Nānākuli and Honouliuli Forest Reserves and can be translated as “sacred mountain” (Pukui et al. 1974:148). Palikea rises 3,098 feet (944 m) high on the Lualualei side of Nānākuli. The name translates to “white cliff” (Pukui et al. 1974:177).

Nānākuli Beach Park is a recent name given by the City and County of Honolulu to the stretch of coastline including Pili o Kahe, Zablan Beach, and Kalaniana‘ole Beach. On the south end of the park is Pili o Kahe, which translates to “clinging to Kahe” (Pukui et al. 1974:185). Next to Pili o Kahe is Zablan Beach, named for a family who is connected with the area (Clark 1977:84). On the north end of the park is Kalaniana‘ole Beach, named after Prince Jonah Kūhiō Kalaniana‘ole, who created the Hawaiian Homes Commission Act of 1920. The beach was given the name in 1940 at the request of the Nānākuli homestead community.

Nānākuli ‘Ōlelo No‘eau and Mo‘olelo

‘Ōlelo no‘eau and mo‘olelo offer insight into what life may have been like in Nānākuli in ancient Hawai‘i. They also share topics of interest of the time that were meant to be passed down from one generation to the next.

‘Ōlelo No‘eau

Whereas no ‘ōlelo no‘eau were found specifically for Nānākuli, the following sayings relating to the greater Wai‘anae District paint a picture of the region in times past. They describe a mountain goddess, a coconut grove, and also politics and power of the land.

He lokomaika‘i ka manu o Kaiona.

Kind is the bird of Kaiona.

Said of one who helps a lost person find his way home. The goddess Kaiona, who lived the Wai‘anae Mountains of O‘ahu, was said to have pet birds who could guide anyone lost in the forest back to his companion.

(Pukui 1983:85)

Ka wahine hele lā o Kaiona, alualu wai li'ulā o ke kaha pua 'ōhai.

The woman, Kaiona, who travels in the sunshine pursuing the mirage of the place where the 'ōhai blossoms grow.

Kaiona was a goddess of Ka'ala and the Wai'anae Mountains. She was a kind person who helped anyone who lost his way in the mountains by sending a bird, a 'iwa, to guide the lost one out of the forest. In modern times Princess Bernice Pauahi was compared to Kaiona in songs.

(Pukui 1983:177)

E nui ke aho, e ku'u keiki, a moe i ke kai, no ke kai la ho'i ka 'āina.

Take a deep breath, my son, and lay yourself in the sea, for then the land shall belong to the sea.

Uttered by the priest Ka'opulupulu at Wai'anae. Weary with the cruelty and injustice of Kahāhana, chief of O'ahu, Ka'opulupulu walked with his son to Wai'anae, where he told his son to throw himself into the sea. The boy obeyed, and there died. Ka'opulupulu was later slain and taken to Waikīkī where he was laid on the sacrificial altar at Helumoa.

(Pukui 1983:44)

Ka malu niu o Pōkā'i.

The coco-palm shade of Pōkā'i.

Refers to Wai'anae, on O'ahu. At Pōkā'i was the largest and best-known coconut grove on O'ahu, famed in chants and songs.

(Pukui 1983:160)

Kapakahi ka lā ma Wai'anae.

Lopsided is the sun at Wai'anae.

Used to refer to anything lopsided, crooked, or not right. First uttered by Hi'iaka in a rebuke to Lohi'au and Wahine'ōma'o for talking when she had warned them not to.

(Pukui 1983:164)

Malolo kai e! Malolo kai!

Tide is not high! Tide is not high!

Said of a threatening disaster. Robbers once lived at a place in Wai'anae now known as Malolo-kai. Their spies watched for travelers to kill and rob. When there were only a few that could be easily overcome, the spies cried, "Low tide!" which meant disaster for the travelers. But if there were too many to attack, the cry was "High tide!"

(Pukui 1983:232)

Ola Wai'anae i ka makani Kaiaulu.

Wai'anae is made comfortable by the Kaiaulu breeze.

Chanted by Hi'iaka at Ka'ena, O'ahu, after her return from Kaua'i.

(Pukui 1983:272)

Mo'olelo

From the following mo'olelo about fishing, we can learn what the social and political life may have been like in pre-contact in Nānākuli.

In the time when Kahekili, ruler of Maui ruled Oahu, after the battle with Kahahana, his own nephew, there lived a man at Nanakuli, Waianae, island of Oahu. He was a man that never thought of nor kept any of the gods of old Hawaii. He was ungodly lazy, poor and simply lived on the charity of his host.

One night, he had a dream. A small stone image spoke to him saying, “Say! Say! Wake up you and come and get me. I am dying of cold where I am. Come and get me. There I am, placed by the small heap of rocks placed on the ridge.” The man awoke with a start and found that it was a dream. He thought nothing of this thing, this worthless idea of a stone speaking and fell off to sleep again. After he had fallen asleep again, the stone image bestirred him. He awoke and went where the stone had instructed him. When he got there, he found the stone, carried it home, washed it clean and kept it.

The next night, the stone told that there are visitors at the shore, a school of fish and that he should fetch nets and a canoe. The man looked around and said that he couldn’t get any fish because he lacked a canoe and nets. Therefore, he went to speak to the konohiki of the land, “I have been told that there are visitors to the shore. It will be well to get the nets and canoes ready to go to sea.”

The konohiki of the land made ready with nets and canoes and set out to sea. On this trip, there were so much fish caught that a stench rose up on the shore. People went from Ewa, Waianae and Waialua to get some fish but the supply was inexhaustible. The fish kept coming to the same place for several days. When the fish came the keeper of the stone god took one fish and gave it to him because he was told to do so in a dream. Whenever fish was caught, one should be given to him. The keeper did so.

He became a great favorite of the konohiki’s and received property, fish nets, canoe and land, such wealth as he have never seen before. The konohiki continued caring for him and they shared their wealth together for a long time.

One day some keepers of gods discovered the man had a stone and so some of them, from Ewa, came and carried it away. The spirit of that stone image went to his keeper to tell him where he had been taken, the land and the house in which it was placed. Then its keeper went and found it in the very place that the stone image described...

(signed) D. Kalakaua

(Kalakaua Ms.:241 in Sterling and Summers 1978:63)

The legendary hero Maui, a significant figure in Hawaiian mo‘olelo, is associated with several places in Nānākuli, including a rock, a shelter, and a spring (Site 50-80-07-148):

Site 148. Large rock said to be named Maui, about 1.1 mile from Nanakuli station toward Puu o Hulu.

Northeast of the road on the property of E.P. Fogarty is a rock said to be named after the Hawaiian hero, Maui who is said to have landed here when he first came to the Hawaiian islands from the south. This stone at the time was surrounded by water, and it was here that Maui reposed and sunned himself. In the bluff just northeast of the rock is a shelter in which he lived, and in the vicinity was a spring where he obtained water. The large rock is now split in half and adorned with many small, oddly-shaped rocks. It is said to be bad fortune to build one’s house across a line drawn directly from the rock to the shore. J.J. Mathews is said to have collected detailed information in regard to this site. (McAllister 1933:110)

Power and Warfare in Wai‘anae

For centuries, O‘ahu chiefs competed against one another for power on O‘ahu and the other islands. In the 1400s, the Māweke-Kumuhonua line unified O‘ahu’s rule, Līhu‘e (also known as Wai‘anae Uka) was the royal center, and oral histories portray this time as peaceful and prosperous. Of the Māweke line, La‘akona, who lived in ‘Ewa and controlled Wai‘anae, reigned until Haka, an evil

ruler, assumed power between 1520 and 1540. He was later captured and slain somewhere between the valleys of Mākaha and Wai‘anae (Cordy 2002:26).

In the 1600s and 1700s, population grew on O‘ahu and the island was ruled under Kala‘imanuia (1600–1620), Kākuihihewa (1640–1660), Kualī‘i (1720–1740), and Peleiōholani (1740–1779). Power declined and was built back up several times among these rulers, but by 1778 the Kingdom included Moloka‘i, O‘ahu, and portions of Kaua‘i (Cordy 2002:32).

In 1783 Maui invaded O‘ahu after Maui’s ruler Kahekili tricked O‘ahu’s chief Kahāhana into killing his high priest. This was a significant turn of events, as the high priest, Ka‘ōpuluhulu, controlled the Waimea-Pūpūkea area on O‘ahu’s North Shore, including the large heiau Pu‘u o Mahuka in Pūpūkea and Kunaiwa in Wai‘anae (Cordy 2002:37). The O‘ahu army was defeated and Kahāhana was caught and killed in 1785. In response, Kahāhana’s supporters revolted, but with many losses in ‘Ewa, they pulled back to the valleys of Wai‘anae where many more were killed. The Maui Kingdom ruled O‘ahu for ten years under Kahekili and his son Kalanikūpule until they were defeated by Kamehameha’s Hawai‘i Kingdom army in 1795.

Land Use and Subsistence

The Wai‘anae coast was one of three dry areas on the island of O‘ahu (Handy et al. 1972). Due to low rainfall and intermittent streams, there were not many options for agriculture. Sweet potato, or ‘uala (*Ipomoea batatas*), was the staple crop, planted throughout the dry slopes of the Wai‘anae region (Handy 1940:156). Throughout the district, a pattern of small coastal villages with farms in the upper valleys was likely the norm (Cordy 2002). The seas fronting the district were prime fishing grounds, thus fishing and sweet potato cultivation were the main subsistence activities:

Undoubtedly there were also small settlements subsisting mainly on sweet potato, in the valleys where constant streams were lacking (Nanakuli and Makua). Along this coast the fishing is excellent. In famine times, then, there was reef fishing, and the Wai‘anae Mountains had wild banana, *ti*, fern, and other roots that were edible...(Handy et al. 1972:275–276)

Handy (1940) describes a broken platform, pavings, and a house site in Nānākuli, indicating traditional habitation along the stream. Handy also talked with a rancher, however, who stated that “there are no terrace remains anywhere in Nanakuli valley, nor any available water for irrigation, except at the very head of the valley’s head, far up the mountains” (Handy 1940:83). The rancher also mentioned that at the top of the valley there are abandoned terraces, platforms, and orange trees that mark habitation sites.

We know much of Wai‘anae’s cultural history through John Papa ‘Ī‘ī’s series of articles in the Hawaiian newspaper *Ka Nupepa Ku‘oko‘a*. ‘Ī‘ī was born in 1800 and died in 1870, and his writing was translated by Mary Kawena Pukui in 1959 in a book titled *Fragments of Hawaiian History*. Below are entries that detail his experiences while visiting relatives in Nānākuli:

Li’s aunt on his father’s side, Kaneiakama, came from Waianae with her husband Paakonia. They visited the family’s houses to rest a while before continuing on to Honolulu to their landlord. These people, who were bracelet-makers and residents of that land of the foamy sea, were well known. They were of chiefly stock and were privileged to place their bundles with those of the chiefs. Their landlord, Pahoa, was in charge of Ka‘ahumanu’s extensive lands, granted her by her husband, Kamehameha; and there were very few *ahupua‘a* in which she did not have a portion, for she was a great favorite of the king. Ka‘ahumanu was fond of Kaneiakama and admired her skill in composing chants. Because of this, perhaps, the land at Waianae was given to Kaneiakama and her husband. (‘Ī‘ī 1993:26)

There were three such journeys, one by way of Pohakea, one through Kolekole, and one by a route below Puu o Kapolei. On the first two trips they went to Pahoauka, where his aunt and uncle lived. (‘Ī‘Ī 1993:27)

Ii was eight or nine years old when he was again seized by a desire to go to visit his aunt Kaneiakama, and he was given permission to do so. He had heard that his aunt was at Nanakuli, so he and his attendant departed by way of Puu o Kapolei to Waimanalo and on to Nanakuli. There he found his aunt and her husband who were in charge of the fishing.” (‘Ī‘Ī 1993:29)

During his visit Ii observed how the children of Nanakuli produced a long quavering sound while chanting. This was performed while the children sat on the branches of the breadfruit trees. They sat apart from each other on branches from the base to the top, chanting. When the boy listened carefully to the long, drawn out sound, he could distinguish the words that they were chanting. He asked his aunt to let him join the children, and he quickly saw how the quavery sound was produced. He noted that one of the boys held up two fingers on his right hand and tapped his throat in order to make the quaver. Ii learned the chant at once. This is the chant that they were using:

Kau koli‘i ka la i luna o Maunaloa,
E ke ao e lele koa,
Halulu i ka mauna
Kikaha ke kuahiwi o Kona he la‘i,
Ku papu Hilo i ka ua.
Paliloa Hamakua,
‘Ope‘ope Kohala i ka makani,
Huki Kauiki pa i ka lani, etc. [sic]
The sun sends a streak of light on Maunaloa,
The clouds go scurrying by,
There is a rumble on the mountain top
That echoes from the mountain of Kona, the calm.
Hilo stands directly in the rain. Hamakua’s cliffs are tall,
Kohala is buffeted by the wind,
Kauiki reaches and touches the sky, etc.

This was memorized by all and was chanted in perfect unison, and the boy noticed how pleasing it was. Thus did Ii enjoy himself with the children of Nanakuli, and he continued to spend his spare time with them. (‘Ī‘Ī 1993:29)

Heiau

‘Ilihune Heiau (Site 50-80-07-147) was a noted religious structure in Nānākuli. Nothing of it remains today, however, as many heiau were used as cattle pens, and rocks were moved during the time of ranching. The scant information known for the heiau is as follows:

Ahupuaa: Nanakuli

“poor, destitute”

Comments: Site 147. Approximate site of Ilihune heiau, Nanakuli, of which nothing remains. Thrum notes: A small walled heiau of pookanaka class; used about 1860 by Frank Manini as a cattle pen, for which natives prophesied his poverty and death.” (McAllister 1933:110)

On the night of Po Kane there are some who hear a voice of a child calling e-----. This voice trails off and ends up at a place called a heiau by some – a cattle pen by others. (Soong in Sterling and Summers 1978:62)

Archaeological research has found a small shrine in the upper valley, but it is hard to determine if there were others due to the disturbance of the ruins (Cordy 2002:84). Another heiau overlooking Nānākuli includes one from Honouliuli Ahupua‘a (Site 50-80-07-137):

Puu Kuua Heiau

pu‘u ku‘ua. PEM: relinquished hill. Honouliuli Ahupua‘a

“Site 137. Puu Kuua heiau, Palikea, Honouliuli. The heiau was located on the ridge overlooking Nanakuli, as well as Honouliuli, at the approximate height of 1800 feet. [This is far from Palikea as currently identified.] Most of the stones of the heiau were used for a cattle pen... That portion of the *heiau* which has not been cleared for pineapples has been planted in ironwoods.” Coordinates at 1800 ft. elevation. (McAllister 1933:108)

Nānākuli in the Historic Period

In the late 1700s to early 1800s, foreigners and locals provided written accounts of visits and descriptions of what life was like during this period. One of the earliest accounts of the area is from 1798 when George Vancouver sailed along the Wai‘anae coast and described what he saw:

From these shores we were visited by some of the natives, in the most wretched canoes I had ever yet seen amongst the South-Sea islanders; they corresponded however with the appearance of the country, which from the commencement of the high land to the wet land of Opooroah, was composed of one barren rocky waste, nearly destitute of verdure, cultivation, or inhabitants, with little variation all the way to the west point of the island. Not far from the s.w. point is a small grove of shabby cocoanut trees, and along those shores are a few straggling fishermen’s huts. Nearly in the middle of the side of the island is the only village we had seen westward from Opooroah. In its neighborhood the bases of the mountains retire further from the sea-shore, and a narrow valley, presenting a fertile cultivated aspect, seemed to separate the wind distance through, the hills. The shore here forms a small sandy bay. On its southern side, between the two rocky precipices, in a grove of cocoanut trees is situated the village... The few inhabitants who visited us from the village, earnestly intreated our anchoring, and told us, that if we would stay until morning, their chief would be on board with a number of hogs, and a great quantity of vegetables. (Vancouver 1967:217)

In the early 1800s, John Papa ‘Ī‘ī visited his aunt in Nānākuli, describing in little detail that ‘ulu trees were present and fishing was taking place. There were also reports in 1818 by Hunnewell and 1828 by Chamberlain that there were a number of villages in the area (Cordy 2002:80).

In the early 1800s, many chiefs in Wai‘anae had their people go to the mountains to gather sandalwood, an item in high demand for trade with foreigners (Cordy 2002:41). This new effort changed the traditional way of life, and may have contributed to population decline during this time. By the mid to late 1800s, much of the land was leased for ranching purposes.

In the *1880 Hawaiian Kingdom Statistical and Commercial Directory and Tourist’s Guide*, a writer describes his visit to Nānākuli, observing that much of the land was being used for grazing:

Leaving Waianae, a ride of about two miles brought me to the Lualualei Valley, another romantic place opening to the sea and surrounded in every other direction by high mountains. This valle is occupied as a grazing farm by Messrs. Dowsett & Galbraith, who lease some sixteen thousand acres from the Crown. Its dimensions do not differ materially

from those of the Waianae Valley, except that it is broader—say, two miles in width by a length of six or seven miles. The hills which inclose [sic] it, however, are not so precipitous as those at Waianae, and have, therefore, more grazing land on their lower slopes, a circumstance which adds greatly to the value of the property as a stock farm. Although only occupied for grazing purposes at present, there is nothing in the nature of the soil to prevent the cultivation of the sugar cane, Indian corn, etc. Arrangements for irrigation, however, will be a necessary preliminary to cultivation.

From the Lualualei Valley to the Nanakuli Valley I had a rather dreary ride of three miles. The intervening country towards the sea is barren, with a little pasturage at the base of the mountains. The track, however, is in very good order, much better than I expected to find it, looking to the mountainous and rocky character of the country through which it passes. At Nanakuli and Hoaeae, close adjoining, the Messrs. Robinson have cattle ranches. The pasture here cannot be compared with that in the valleys I had just left behind, but inland among the mountain ranges it is much better. This, indeed, is a characteristic of the ranges throughout the island.

During my journey along the western coast of this island, where the road is generally so much more fatiguing to the traveler than that of the windward side, I have often pulled up to give both horse and rider a spell, whilst I entered into a chat with some group of natives whom I have fallen in with, or those whose hamlets I have been passing at the time. More than once, too, I have passed the night at their houses. I have always found them very sociable and thoroughly hospitable....(Bowser 1881:493-494)

Handy's *The Hawaiian Planter*, published in 1940, gives further description of Nānākuli in the late 1800s, including an account from a rancher who had been living and working there for 50 years:

On the south side of the stream, about a quarter of a mile inland from the main coastal road, there is a broken platform (Paepae) built of small rocks with apparently a small paved area below, close to the stream bed. Extending inland along the south bank of the stream bed for about 75 yards there is a rough stone facing from 1 to 2 feet high in general level along the top. This might be judged to be a terrace area were it not that the ground behind the stone facing is not level; however, that might be due to washing out when the stream was in flood. According to Ernest Rankin, a rancher in this and other valleys for years past and now living on a homestead on the ridge north and above this site, the stonework just described was not terracing for taro patches but was built by a man named Whitney 40 years ago when he located a house and cattle shelter at that point. Behind the terrace there are six large old monkeypod trees, indicating earlier habitation. On the north side of the stream at this point, there is a fairly recent habitation site, with several large trees, also papayas and traces of sugar cane plantings. Nearby are a tiny stone paving and the remains of an old Hawaiian house.

According to Rankin there are no terrace remains anywhere in Nanakuli valley, nor any available water for irrigation, except at the very head of the valley's head, far up in the mountains. High in the small gulches at the valley's head there are some abandoned terraces, stone platforms, and orange trees marking the sites of ancient Hawaiian habitations. But as long ago as 1890 when Rankin first frequented the valley as a cowboy, there was not one Hawaiian living there. (Handy 1940:83)

Māhele Land Tenure and Historic Land Use

From 1848 through 1855, the Māhele divided and privatized the land across the islands, and the entire Waiʻanae District, aside from Mākaha, was designated as Crown Land. At this time the area was sparsely populated by Hawaiians. For example, only five Māhele land claims were made for all

of Nānākuli (LCA 830, 833, 846, 7455, and 8153), and none were awarded (Table 1). The Nānākuli claims mention a muliwai and pond in addition to house lots and agricultural plots in kula lands and wauke plantations in the uplands. It is not clear exactly where the LCAs were located, although Berdy et al. (2002:10) surmise that they were situated in the upper valley where permanent habitation sites have been found. Only a small population of roughly 50 individuals lived in coastal Nānākuli during the mid-1800s (Cordy 1997). By 1881 there were just four Nānākuli residents listed in the Hawaiian Island Directory (Cordy 1997).

The Waianae Sugar Plantation was founded in 1878 by H.A. Widemann, and the leeward community grew substantially. During the 1890s the O‘ahu Railway and Land Co. (O.R.&L.) railroad was constructed to bring crops and animals from the Leeward Coast to Pearl Harbor. This railway would eventually run through all of the Wai‘anae District and around Ka‘ena Point to Kahuku. Vestiges of the old rail line can still be seen along Farrington Highway.

After the overthrow of the monarchy in 1893, the Crown Lands were combined with the Government Lands. In 1898, when Hawai‘i became a U.S. Territory, all lands combined were ceded to the United States. It was not until the passage of the 1920 Hawaiian Homes Commission Act that the ceded lands (roughly 188,000 acres) were set aside to benefit Native Hawaiians (Juvik and Juvik, 1998:228). Following this, Native Hawaiian homesteading in Nānākuli ensued, with 241 lots for applicants to choose from. The establishment of the Nānākuli Hawaiian homestead community is described below:

Among the areas designated as Hawaiian homesteads was a hot, stickery portion of Nānākuli. By 1929 this land had been divided into house lots and plans were underway to bring in homesteaders. From the beginning, there was criticism of the project. Frederick Ohrt, manager of the Water Board in Honolulu, said there wasn’t enough water in Nānākuli to supply the homesteaders (McGrath et al. 1973:111).

In the early 1900s, a series of parcels were sold in nearby Lualualei, classified as pastoral lands because of the dearth of water. Roughly 40 families settled on the smaller lots, while families such as the Von Holts, McCandlesses, and Dowsetts laid claim to the large parcels there.

In March 1917, 31.36 acres within Nānākuli were set aside as a U.S. military reservation which was designated as Camp Andrews in 1941. A 1943 article in *Paradise of the Pacific* explains how Camp Andrews, an overnight rest and recreation center, was the answer to relaxation for “fighting men” of the time and had cabins and picnic benches (Allen 1999).

Table 1. Māhele Data for Nānākuli

LCA	Claimant	‘Ili	Awarded	Description
830	Mahiki		No	3 ‘āpana, 1 house lot, cairns, streams
833	Kahaanui	Kaape	No	4 ‘āpana, 1 house lot, cairns, streams
846	Awa		No	5 ‘āpana, 1 house lot, streams
7455	Kuluahi	Hapai	No	1 ‘āpana, 1 kula, 1 house lot, wauke, muliwai, pond
8153	Haulula	Kuamokahi	No	1 ‘āpana, 1 kula, 1 house lot, wauke, ‘uala

The answer to this problem was construction of a camp accessible to railroad and highway transportation. Camp Andrews resulted—a peaceful haven where there is no routine, no reveille, and where a thousand men and fifty officers can rest after returning from the bloody shambles of the Southwest Pacific.

Camp Andrews... is located at Nanakuli on the south-western shore of Oahu, twenty-six miles from “Pearl.” It had been established early in 1941 by the Hawaiian Detachment but in December of that year it was turned over to Commander Hickey. Dances and USO shows help provide fun for the men during their “away from it all” two days at Camp Andrews. (*Paradise of the Pacific* 1943)

Sugarcane production and military activity dominated the first half of the 20th century on the Leeward Coast. World War II was devastating for the Waianae Sugar Plantation as high paying defense jobs created a labor shortage. All sugarcane production in the Wai‘anae District was eliminated during the 1940s due to labor shortages, water shortages, military procurement of land, and other more productive agricultural regions taking over. The O.R.&L. railway was officially abandoned in 1946.

During World War II, concrete bunkers, pill-boxes and gun emplacements were built along the Leeward Coast. Many of these concrete features are still present today. At times as many as 20,000 troops were training in the Wai‘anae District. McGrath et al. write, “American troops caused more destruction on the Waianae coast than the Japanese” (1973:135–136).

Historic Maps

The earliest map found for Nānākuli is an 1854 Government Survey map (Figure 5). Few details are depicted, but the coastline and mountains can be seen, and two points on the mountains are labeled. “HALEMANU” is on the northwest, and “GREEN HILL” is on the southeast. The expanse to the east of Green Hill is labeled as “J. MEEK’S LAND.” The coastal road is shown, and an old house is illustrated along the shore.

A 1912 Hawaii Territory survey map shows the Nānākuli region in more detail (Figure 6). Several places are named, such as Heleakalā and Manawahua Peaks. Two points half way up the valley are labeled “end of fence,” indicating that a fenceline once stood there. Nānākuli Cemetery is shown adjacent to Haleakalā Avenue, and a “Tank, Pump, and Tunnel Site” are illustrated to the east. An electric transmission line crosses the valley, and the military reservation is shown near the coast. Also along the shoreline are the Government Road, O.R.&L. railroad track, a park, and an area of standing water.

A 1925 Hawaii Territory survey map depicts the 1,101-acre Nānākuli Forest Reserve and surrounding area (Figure 7). Places labeled on the mountains surrounding Nānākuli include Heleakalā Peak, Palikea, Pōhākea, Maunakapu, and Manawahua. The coastal road and shoreline are illustrated, but no other details are shown in Nānākuli.

By 1930, Nānākuli is illustrated as a large community with many residences (Figure 8). A Hawaiian Homelands map shows the Nānākuli subdivision much as it stands today. A feature that appears to be a rock wall runs across the military reservation. Nānākuli Beach Park is depicted with a flooded area near the current highway. Just makai of the highway was an “Old Road” and the O.R.&L. railway.

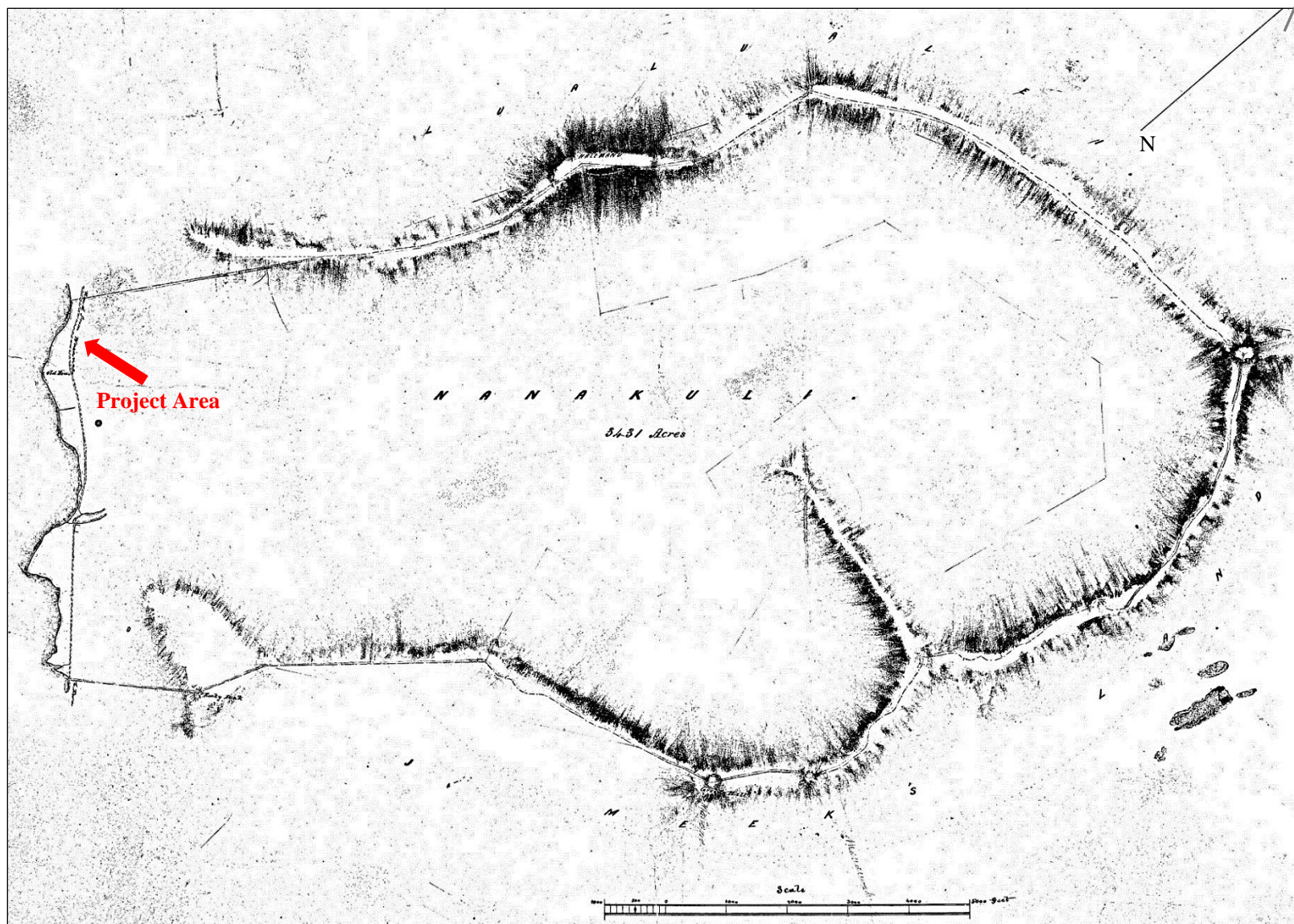


Figure 5. Portion of an 1854 Hawaiian Government Survey map (Webster 1854).

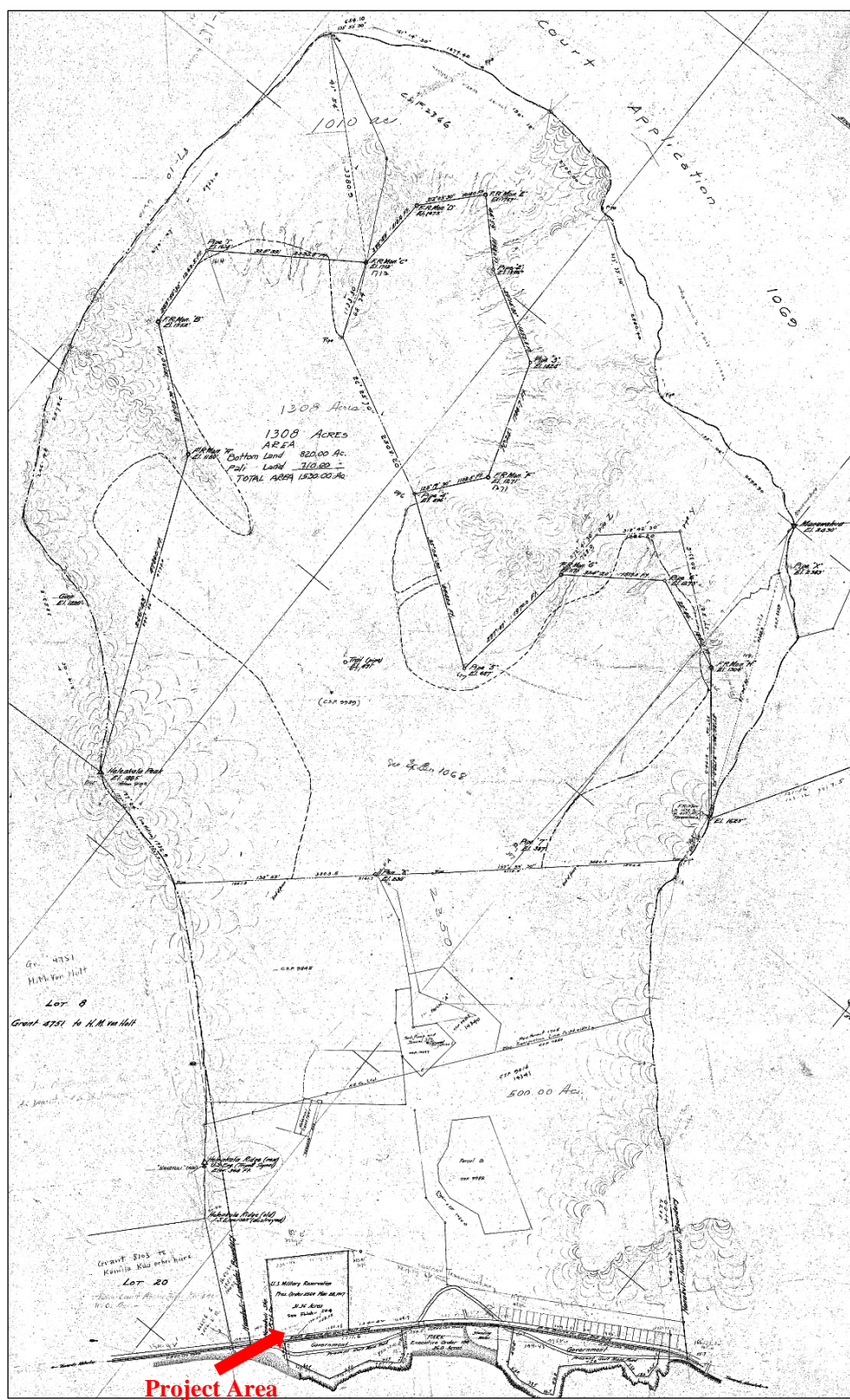


Figure 6. Portion of 1912 Hawaii Territory Survey Map (Newton 1912).

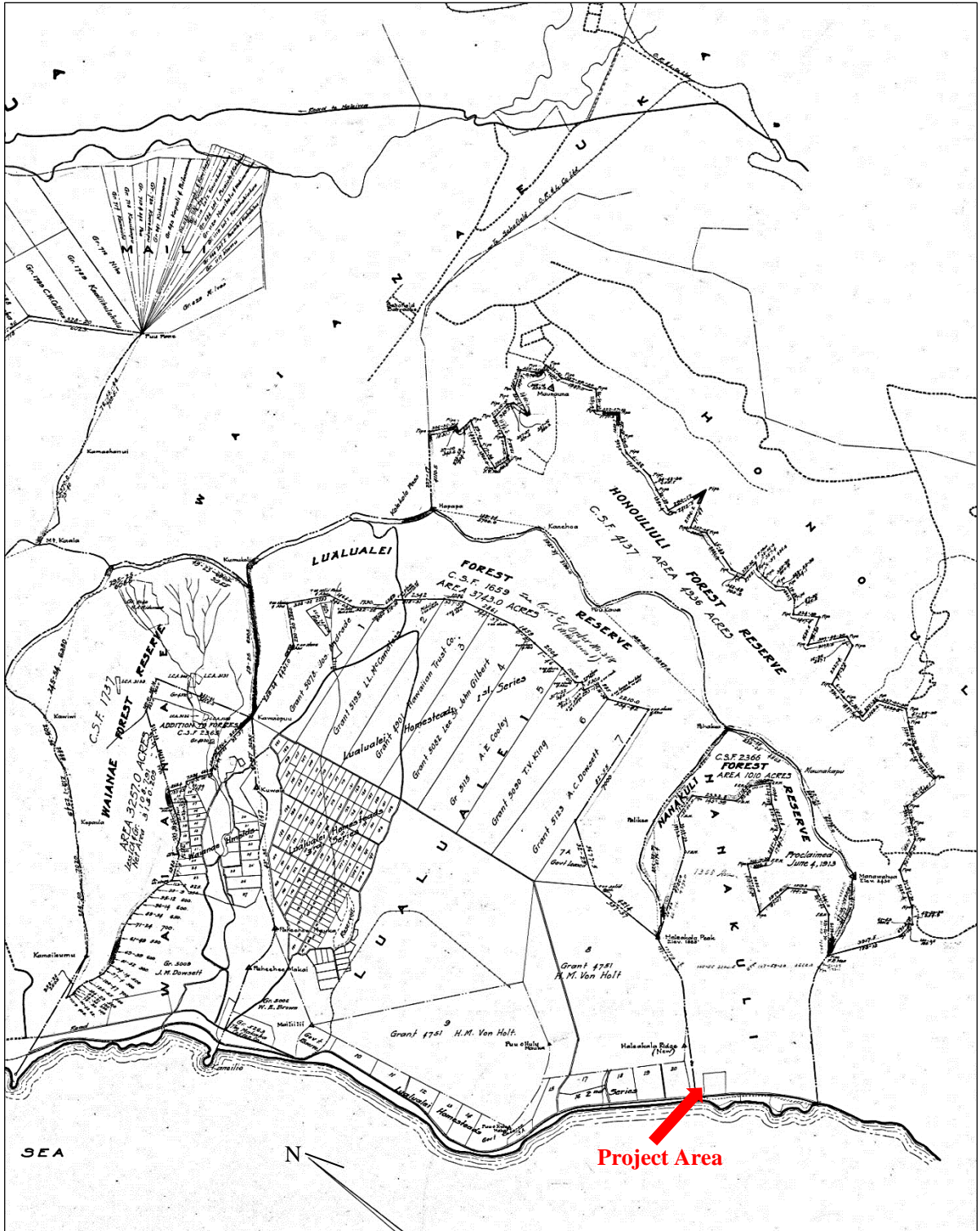


Figure 7. Portion of a 1925 Hawaii Territory Survey map (Wall 1925).

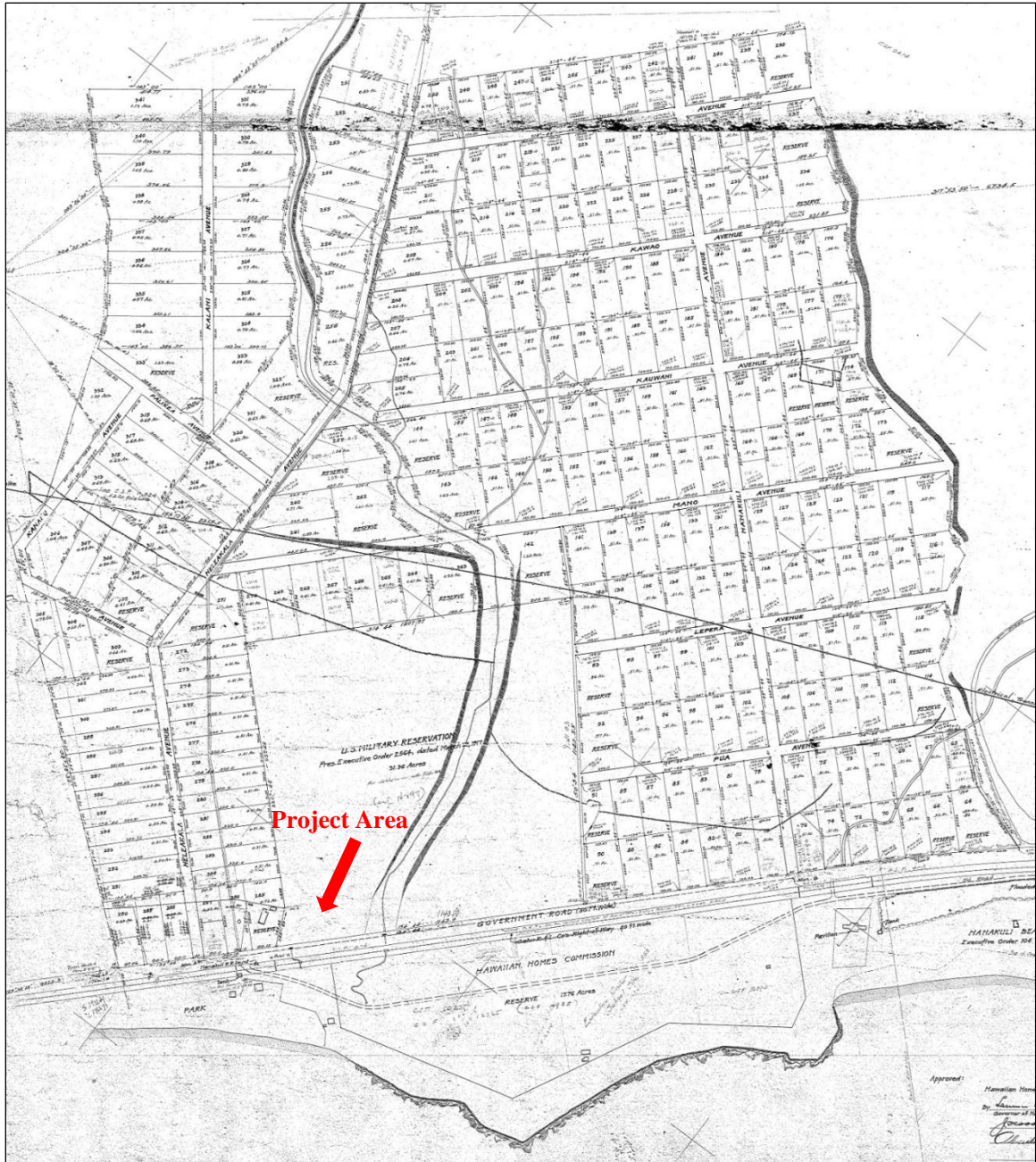


Figure 8. Portion of a 1930 Hawaiian Homes Commission map (Evans 1930).

A 1953 USGS map also depicts a modern Nānākuli community (Figure 9). Additions include water tanks at the coast and farther inland, as well as a pipeline and quarry mauka of the subdivision. A jeep trail extends the length of the valley into the forest reserve, and the Palikea Trail runs along the ridge.

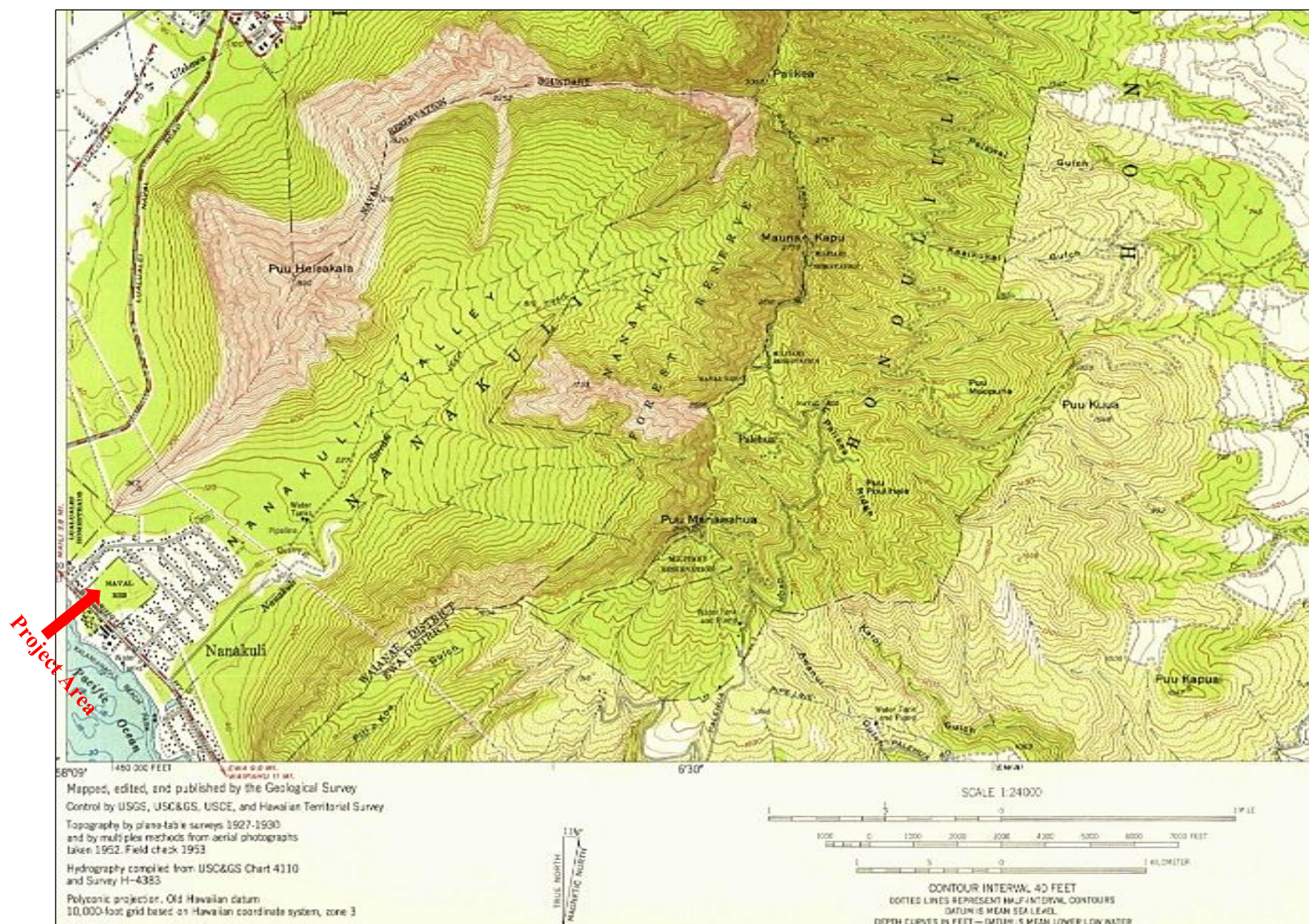


Figure 9. Portion of a 1953 USGS Schofield Barracks Quadrangle map (USGS 1953).

Previous Archaeology

Many archaeological projects have been carried out in Nānākuli (Table 2). The following paragraphs summarize the most relevant studies which lie in the vicinity of the project area. Their locations are illustrated in Figure 10. This is followed by a timeline of the archaeological work conducted on the subject parcel.

Archaeological Projects in Nānākuli

The first archaeological work in Nānākuli was done by J.G. McAllister from 1929 to 1930, as part of an island-wide archaeological survey on O‘ahu. He identified one site, ‘Ilihune Heiau, Site 50-80-07-147, near the mouth of the valley, of which he noted that nothing remained (see Heiau section).

An archaeological inventory survey of a property to the northeast identified portions of the two sites located on the subject property (Site 50-80-07-5946 and 50-80-07-5947) (Berdy 2002). The boundaries were extended for Site 5946, the remains of Camp Andrews. They now include a concrete pad and fence line in the makai portion of TMK: (1) 8-9-002:001. Several sinkholes were also identified on the parcel, part of Site 50-80-07-5047. An archaeological monitoring plan was written (Chaffee and Dega 2009) and the monitoring produced no findings (McElroy and Hitt 2016).

Three archaeological monitoring projects were conducted along Farrington Highway, makai of the subject property. In 2005, five charcoal deposits were found during monitoring, but none were given site numbers (Ostroff and Desilets 2005). The closest deposit to the current project area was near Ulehawa Beach Park in Lualualei. A year later, archaeological monitoring conducted for fiber optic installation along much of the same route produced no cultural material or deposits (Souza and Hammatt 2006). A literature review and field inspection were completed for a portion of the same highway corridor (Altizer et al. 2011). Three cultural resources were identified, including a portion of the old O.R.&L. railroad track (Site 50-80-12-9714); an historic section of Farrington Highway (Site 50-80-07-6824); and the subsurface deposits previously recorded by Ostroff and Desilets (2005).

Other work in the vicinity of the project area did not produce any significant finds (see Table 2). These include an archaeological survey and assessment (McDermott and Hammatt 1999), monitoring (Whitehead and Cleghorn 2003; Cordy and Hammatt 2005; LeSuer and Cleghorn 2005), and subsurface testing (Ogden 1995).

Archaeological Work on the Subject Property

The following chronology outlines the archaeological work done on the subject parcel. An archaeological assessment, traditional cultural practices assessment, archaeological inventory survey, data recovery plan, archaeological monitoring plan, preservation plan, burial treatment plan, archaeological monitoring report, data recovery report, and addendum to the archaeological monitoring plan were completed. Review letters for these projects found at the SHPD Kapolei office are included in Appendix A.

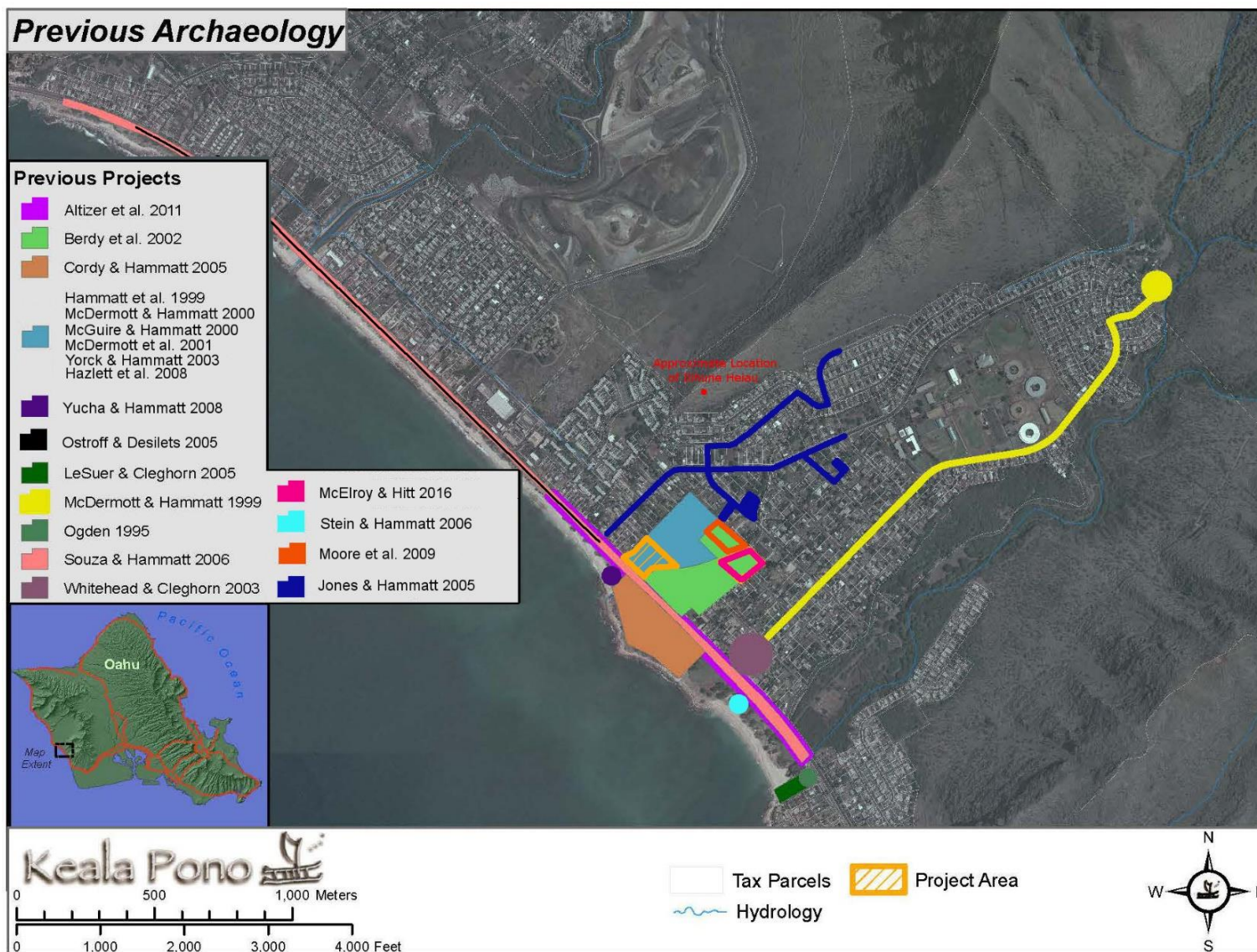


Figure 10. Previous archaeological studies in the vicinity of the project area.

Table 2. Previous Archaeology in Nānākuli

Author and Year	Location	TMK: (1)	Type of Study	Findings
McAllister 1933	Island-wide	Multiple	Survey	‘Ilihune Heiau, now destroyed.
Nakamura & Pantaleo 1994	Nānākuli & Lualualei Ahupua ‘a	Multiple	Reconnaissance Survey	Extensive surface disturbance noted.
Ogden Environmental and Energy Services Company 1995	MILCON-313, Naval Undersea Warfare Engineering Station (NUWES) Facility, Lualualei and Nānākuli	8-9-006:088	Subsurface Testing	No cultural properties were identified.
Cordy 1997	Nānākuli Ahupua‘a	8-9	Inventory Survey	Recorded agricultural sites, scattered habitation sites, and possible religious structures in upper Nānākuli Valley. Few sites were located in the lower valley, although the beach region was not included.
McDermott & Hammatt 1999	Proposed Nānākuli 242 Reservoir Site, and Nānākuli Ave.	8-9-008:003	Inventory Survey	No significant historic properties were identified.
Hammatt et al. 1999	Portion of former location of Camp Andrews	8-9-002:065	Assessment	Identified remains of Camp Andrews and numerous sinkholes which may provide additional information on traditional land use, flora and fauna.
McDermott & Hammatt 2000	Proposed Nānākuli IV Elementary Site	8-9-002:065, 023, por. 1	Inventory Survey with Subsurface Testing	Recorded sinkholes containing historic trash, traditional Hawaiian artifacts and midden, paleontological remains, and a human burial.
McGuire & Hammatt 2000	Proposed Nānākuli IV Elementary Site	8-9-002:065, 023, por. 1	Traditional Practices Assessment	Little documentation found for traditional cultural practices; historic land use includes ranching and military recreation. Describes the traditional practice of placing burials within sinkholes found on the subject property.
McDermott et al. 2001	Proposed Nānākuli IV Elementary Site	8-9-002:065, 023, por. 1	Inventory Survey with Subsurface Testing	Identified Site 50-80-07-5946, the remains of Camp Andrews and Site 50-80-07-5947, sinkholes with cultural deposits.
Berdy et al. 2002	Proposed Nanakuli Kokua Ohana Center	8-9-002:001	Inventory Survey with Subsurface Testing	Identified the two previously recorded sites above (5946 and 5947) and extended the boundaries of Site 5946.
Yorck & Hammatt 2003	Proposed Nānākuli IV Elementary Site	8-9-002:065	Monitoring	No cultural properties were identified.
Whitehead & Cleghorn 2003	Nānākuli Water System Improvements, Nānākuli Ave.	8-9-005	Monitoring	No archaeological features or sites were reported, although a possible cultural layer consisting of charcoal flecking and single piece of marine shell was recorded.

Table 2. (cont.)

Author and Year	Location	TMK: (1)	Type of Study	Findings
Cordy & Hammatt 2005	Ka Waihona O Ka Na‘auau Public Charter School	8-9-001:004	Monitoring	No cultural properties were identified.
Jones & Hammatt 2005	Dept. of Hawaiian Homelands Subdivision	Multiple	Monitoring	No cultural properties were identified.
LeSuer & Cleghorn 2005	Nānākuli Beach Park	8-9-006:001	Monitoring	No cultural properties were identified.
Ostroff & Desilets 2005	Farrington Highway	Multiple	Monitoring	Recorded five charcoal deposits, one of which may have been associated with Site 50-80-07-6671 in Lualualei.
Souza & Hammatt 2006	Farrington Highway	8-9-005:007, 8-7-006:013	Monitoring	No cultural properties were identified.
Stein & Hammatt 2006	Nānākuli Beach Park	8-9-001:002	Monitoring	No cultural properties were identified.
Hazlett et al. 2008	Proposed Nānākuli IV Elementary Site	8-9-002:065	Data Recovery	Excavated Sinkholes 1, 4, 9, & 12. Water within the sinkholes was found to be non-potable.
Yucha & Hammatt 2008	Nānākuli Beach Park	8-9-001:002	Monitoring	No cultural properties were identified.
Moore et al. 2009	Boys & Girls Club of Hawaii, Nanakuli Youth Education Town (YET)	8-9-002: 067	Monitoring	Two surface scatters encountered, consisting of basalt flakes, a coral abrader, and midden.
Altizer et al. 2011	Farrington Highway	Multiple	Archaeological Field Inspection and Literature Review	Identified three cultural resources: a section of OR&L Railroad; an historic section of Farrington Highway; and previously recorded subsurface charcoal deposits.
McElroy & Hitt 2016	Hale Makana o Nānākuli	8-9-002:001	Monitoring	No cultural properties were identified.

1999 - Archaeological Assessment (Hammatt et al. 1999)

This assessment identified the structural remains of Camp Andrews (concrete slabs, trash deposits, gateway structure) and also the numerous limestone sinkholes in the project area. An archaeological inventory survey was recommended.

2000 - Traditional Cultural Practices Assessment (McGuire and Hammatt 2000)

This assessment was done concurrently with the inventory survey that was recommended in 1999. Interviews with five informants produced information on the former Camp Andrews, although not much data was found during archival research. Recommendations included further testing of the sinkholes, conducting additional research on Camp Andrews, as well as preparing a burial treatment plan and a mitigation plan.

2001 - Archaeological Inventory Survey (McDermott et al. 2001)

Fieldwork for this survey was done over 2000 and 2001. The survey identified 17 sinkholes, and two of the largest (Sink 1 and Sink 2) had subsurface testing conducted. The presence of historic and prehistoric cultural deposits were confirmed. These results were communicated via a letter to Sara Collins at SHPD (see Appendix A). Site number 50-80-07-5946 was assigned to Camp Andrews and 50-80-07-5947 was assigned to the collective sinkholes (Figure 11). During this fieldwork, the sinkholes were cleared and additional subsurface testing was conducted. Human remains found in Sink 2 are believed to be a complete burial, while only 3.5 g of isolated, fragmented human remains were found in Sink 9. Recommendations include additional data recovery on Sinks 1, 5, 8, and 9; no further work for Camp Andrews; and preparation of a preservation plan for Site 5947 to cap Sinks 1, 2, and 9 prior to grading. The O'ahu Island Burial Council (OIBC) recommended no data recovery for Sink 2. Preparation of an archaeological monitoring plan, monitoring fieldwork, and an archaeological monitoring report were also recommended.

2001 - Burial Treatment Plan (McDermott 2001)

This plan provides details of the finding of human remains within Sink 2 and Sink 9 as well as recommendations for treatment of the iwi. The remains in Sink 2 appeared to be an articulated adult burial, the lower body of which was exposed during excavation. Historic artifacts were not found with the remains, and the individual was likely in a flexed position, suggesting a traditional age (pre-1778) for the burial. Excavation was halted and the remains were left in place.

The iwi in Sink 9 were fragmented and together weighed only 3.5 g. One bone fragment was identified as conclusively human. It was determined to be a humerus of a 2–3 year old child. Four other bone fragments from Sink 9 might possibly be human but could not be definitively identified. The remains were not associated with an intact burial but thought to be a part of a traditional midden deposit. The iwi of Sink 9 were temporarily curated at the SHPD burials program.

It was recommended that all of the remains were relocated, as the community generally did not want them to be preserved in place beneath the school to be constructed there. The relocation did not happen, however, and the iwi from both sinks were preserved within Sink 9 (see below).

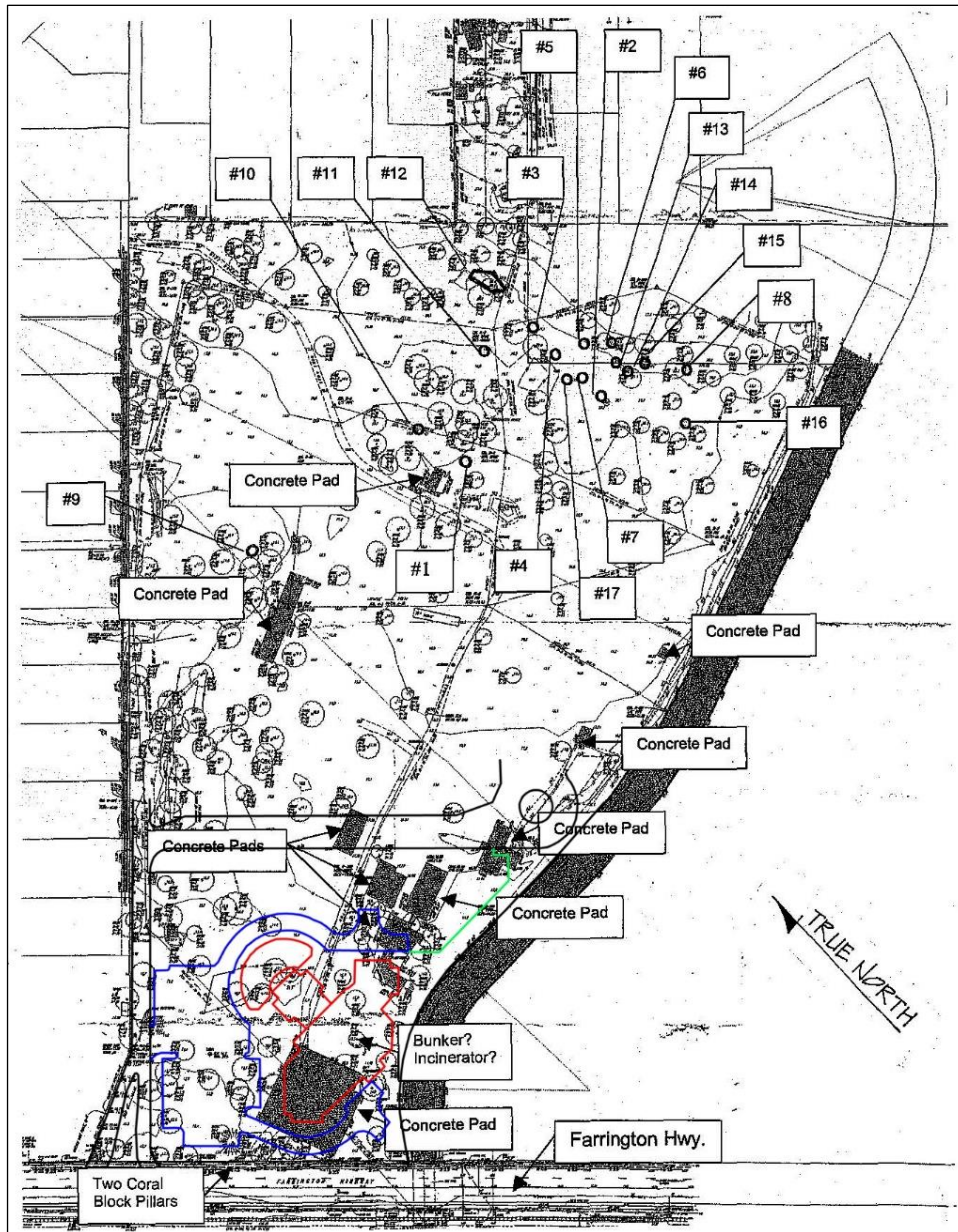


Figure 11. Location of features identified by McDermott et al. (2001:Figure 3) with overlay of the library construction plans. Sinkholes 1–17 make up Site 5947; “Two Coral Block Pillars” are Site 7767; the remaining labeled features comprise Site 5946.

2001 - Data Recovery Plan for Site 5947 (Hammatt et al. 2001a)

This document details the data recovery plan for Site 5947. The plan focuses the research around three major points: 1) the formation of sinkholes and their archaeological implications; 2) the connection between faunal extinction and the Polynesian settlement of Hawai‘i; and 3) the use of sinkhole environments in Hawaiian society. Proposed excavations consisted of 1.5 m² in Sink 9, and

column samples in Sinks 1, 4, 5, and 12. Any additional human remains encountered would be reinterred in Sink 2.

2001 - Archaeological Monitoring Plan (Hammatt et al. 2001b)

This plan sets forth recommendations for archaeological monitoring. On-site monitoring was recommended for grading/grubbing on the northeast side of the property and any open trenching within 50 ft. of Farrington Hwy. On-call monitoring was recommended for all work in the southwest-central and trenching in the northeast-central portions of the parcel (previous work and monitoring of grading/grubbing in this area was deemed sufficient to record and mitigate historic properties). The need for on-site monitoring will be re-evaluated after or during monitoring of the grading/grubbing.

2001 - Preservation Plan for Site 50-80-07-5947 (Appendix in Hammatt et al. 2001b)

This plan sets forth recommendations for preservation of Sinks 1, 2, and 9 as follows:

Sink 1: finished grade will be 1 ft. higher than the existing grade; it was recommended to fill in the sink to near existing grade.

Sink 2: “The treatment of Sink 2 containing a known burial was the subject of much discussion and has now been resolved in detail (Addendum to the Burial Treatment Plan; Don Hibbard’s letter to Gordon Matsuoka dated November 21, 200)” [typo in date in the original].

Sink 9: finished grade will be 2 ft. higher than the existing grade; most of the deposit was already removed; it was recommended to fill in the sink to near existing grade.

2003 - Archaeological Monitoring Report for Nanakuli IV Elementary School Project (Yorck and Hammatt 2003)

This report presents the results of the archaeological monitoring of grubbing, grading, and trenching work done at the project site. There was the documentation of two historic artifacts which confirmed the previous land use by the military. One was a mess hall butter knife, while the other was a U.S. Navy identification tag or “dog tag” of a serviceman. The report also confirms the backfilling of Sinks 1 and 9, as outlined in the preservation plan (Hammatt 2001b:Appendix). Sink 2 was prepared as a burial crypt and the human remains from Sink 9 were interred there.

2005 - Data Recovery Report for Site 5947 (Hazlett et al. 2005 [Revised 2008])

The data recovery addresses the three main research questions set forth in the data recovery plan. Sinkholes 1, 4, 9, and 12 were excavated and extensive laboratory analyses were conducted. The research questions could not be answered, however. The water within the sinkholes was found to be not potable and the sinkholes were therefore not used as wells. The data gathered added little new information, and no further work was recommended.

2006 - Addendum to Archaeological Monitoring Plan (Hammatt and Shideler 2006)

This plan sets forth revised recommendations for archaeological monitoring. On-site monitoring was recommended for all initial trenching.

Summary of Environmental and Cultural Background

Nānākuli is an ahupua‘a of the Wai‘anae moku on the western coast of O‘ahu. It is made up of an upper and lower valley with tributaries originating from the mountain tops that descend and meet to form Nānākuli Stream. The valley receives low amounts of rainfall, therefore traditional agriculture consisted of sweet potato and other dryland crops, and fishing was a main form of subsistence.

Pre-contact Wai‘anae appears to have been a well-populated moku and a ruling center for O‘ahu in the early to mid-1500s (Cordy 2002). There were three gods that lived on top of Mount Ka‘ala in the Wai‘anae mountains, and ‘ōlelo no‘eau describe the goddess Kaiona who helped people who were lost in the mountains. Fishing and the coconut grove of Pōkā‘ī also appear often in mo‘olelo.

The best descriptions of Nānākuli, however, come from John Papa ‘Ī‘ī, who published a series of articles in *Ka Nupepa Ku‘oko‘a* in the 1800s about his travels there. He paints a picture of a community who spent much of their time fishing. While Nānākuli was not as populated as the other ahupua‘a in Wai‘anae at this time, it was a permanent residence for a small community until the mid to late 1800s.

In the early 1800s, during the height of the sandalwood trade, the traditional way of life changed, and population declined. There were no LCA awards given in Nānākuli. The land in Nānākuli, owned by the king, was leased out to ranchers. Much of the ranching has disturbed historic sites and, in at least one case, used historic site walls as cattle pens.

The later historic period saw continued growth of Nānākuli. The Waianae Sugar Plantation was founded in 1878, and the O.R.&L. railroad passed through Nānākuli along the coast. In 1917, a portion of land was set aside for a U.S. military reservation which was turned into Camp Andrews in 1941. After the passage of the 1920 Hawaiian Homes Commission Act, the Nānākuli Hawaiian Homestead subdivision was established, though the dearth of water continued to be a problem in the region.

Archaeological Implications and Anticipated Finds

Settlement patterns in Nānākuli were likely similar to the rest of the Wai‘anae District (e.g., Cordy 2002). Initial settlement probably began with small groups of people living near the coast to take advantage of the abundant marine resources. The population then spread farther inland behind the coastal dunes and along the coastal trail which is roughly the route of today’s Farrington Highway. Finally, the back valley areas were settled as people began to utilize more agriculturally productive zones. Archaeological evidence has shown that the upper valley currently hosts many house sites and dryland agricultural terraces. Early descriptions of Nānākuli depict a barren land with few houses and an area that lacks water and agricultural resources. However, the land may have appeared desolate from the coast because many of the people lived in the upper valley, and this was not visible from the shore.

Based on the previous archaeological work on the property including the identification of Camp Andrews, anticipated finds include sinkholes and historic military remnants. Sinkholes just mauka of the project area have housed human burials, traditional Hawaiian artifacts, and midden, and it is possible that these might be found during excavation. Surface remains of Camp Andrews also occur on the parcel, and it is likely that structural remnants and historic artifacts associated with the camp will be found. These may take the form of concrete slabs, walls, or foundations; metal, wood, or glass building materials; or bottles, ceramics, and other such items typically recovered from historic-era sites in Hawai‘i.

METHODS

Archaeological monitoring was carried out between March 7, 2016 and January 17, 2017, with a total of 1,105 person-hours of monitoring completed during this time. Archaeological monitors included Juanita Aguerrebere, BA, Anthony Alvarez, MA, Trisha Drennan, MA, Dietrix Duhaylonsod, BA, Robin Keli'i, BA, Jeffrey Lapinad, Windy McElroy, PhD, and Lisa Rey, BA. The archaeological monitor was on site full time for all excavation within the project area. Dr. McElroy served as Principal Investigator, overseeing all aspects of the project.

Archaeological monitoring was guided by a SHPD-approved archaeological monitoring plan, and there were no deviations from the plan (McElroy et al. 2014). On the first day of work, the archaeological monitor spoke with the construction team to ensure that they understood the purpose of the monitoring and that the monitor has the authority to halt construction activity. Excavation was conducted with excavators, backhoes, and various other equipment (Figure 12).

Representative profiles were drawn and photographed. Profile locations were recorded with a 3 m-accurate Garmin 62st GPS unit. Digital photos were taken of various stages of the work and also where profiles were drawn. Soils were described using Munsell Soil Color Charts, a soil texture flow chart (Thien 1979), and the U.S. Department of Agriculture soil manual. The scale in all field photographs is marked in 10 cm increments. The north arrow on all maps points to magnetic north. Throughout this report rock sizes follow the conventions outlined in *Field Book for Describing and Sampling Soils*: Gravel <7 cm; Cobble 7–25 cm; Stone 25–60 cm; Boulder >60 cm (Schoeneberger et al. 2002:2-35). Collected material is being temporarily curated at the Keala Pono office in Kapolei, Hawai'i until it can be turned over to the landowner.



Figure 12. Ground disturbance with excavators. Orientation is to the east.

RESULTS

Archaeological monitoring was conducted for all ground disturbance at the Nānākuli Library construction site. A total of three profiles are presented below for various locations within the project area; together, they characterize the stratigraphy over the area of study (Figure 13). Stratigraphy generally consisted of fill above solid coral (Table 3). Two buried concrete structures were encountered. The largest (Feature 1) is a septic tank, while the smaller structure is thought to be a pipe well remnant (Feature 2). Both structures may be associated with the former Camp Andrews and will thus be included within State Inventory of Historic Places (SIHP) 50-80-07-5946. A variety of historic material was collected from the excavations, particularly within the septic tank.

Stratigraphy

Profile 1 was taken on the northwest end of the property at a sewer line excavation. The trench was excavated to 150 cmbs (cm below surface), and stratigraphy consisted of a layer of fill with abundant coral cobbles and gravel above a solid coral shelf (Figure 15).

Profile 2 was drawn on the south side of the parcel, at one of the building footings. The trench was excavated to 86 cmbs, and three layers of fill were encountered above the basal coral shelf (Figure 16).

Profile 3 was taken on the west end of the parcel where excavation for a drywell reached 200 cmbs. Stratigraphy consisted of two layers of fill above the solid coral shelf (Figure 17).

SIHP 50-80-07-5946

SIHP 50-80-07-5946 is a previously documented site that consists of the remains of the former Camp Andrews. Associated with this site is SIHP 50-80-07-7677, which are two concrete pillars that marked the entrance of the former Camp Andrews. SIHP 7677 was preserved in place and protected during construction, as outlined in the archaeological monitoring plan for this project (Figure 18) (McElroy et al. 2014). These two pillars are the only remaining surface features of the camp within the project area.

Two new features of SIHP 5946 were identified during archaeological monitoring (see Figure 13). Feature 1 is a large septic tank, while Feature 2 is a possible pump well remnant. Both features were dismantled and/or filled over during construction, in consultation with SHPD.

Feature 1 is a large concrete structure with several rectangular openings (Figure 19). The feature is located on the south side of the project site near the end of a new paved service road (see Figure 13). The exposed portion of the feature measured 14.3 m long by 5 m wide at its widest point. At the north end, the top of the feature was situated at 130 cmbs, while the south end was at a depth of 67 cmbs, because the ground surface was sloping down to the south (Figure 20). The rectangular openings were raised above the top of the feature by 15 cm. These openings measured 1.5 m long and 50 cm wide and were covered by metal plates (Figure 21). In the interior of the septic tank were a metal pipe and various metal cables (Figure 22).

In consultation with SHPD, the top of the septic tank was removed and its contents were mechanically excavated. Removal of the septic tank top revealed a partition within the structure that created two long rectangles (Figure 23). Excavation of the fill within the septic tank yielded a variety of historic cultural material (see Laboratory Analysis). A 1942 map of Camp Andrews depicts the septic tank, indicating that the structure dates to that time or earlier (Figure 24).

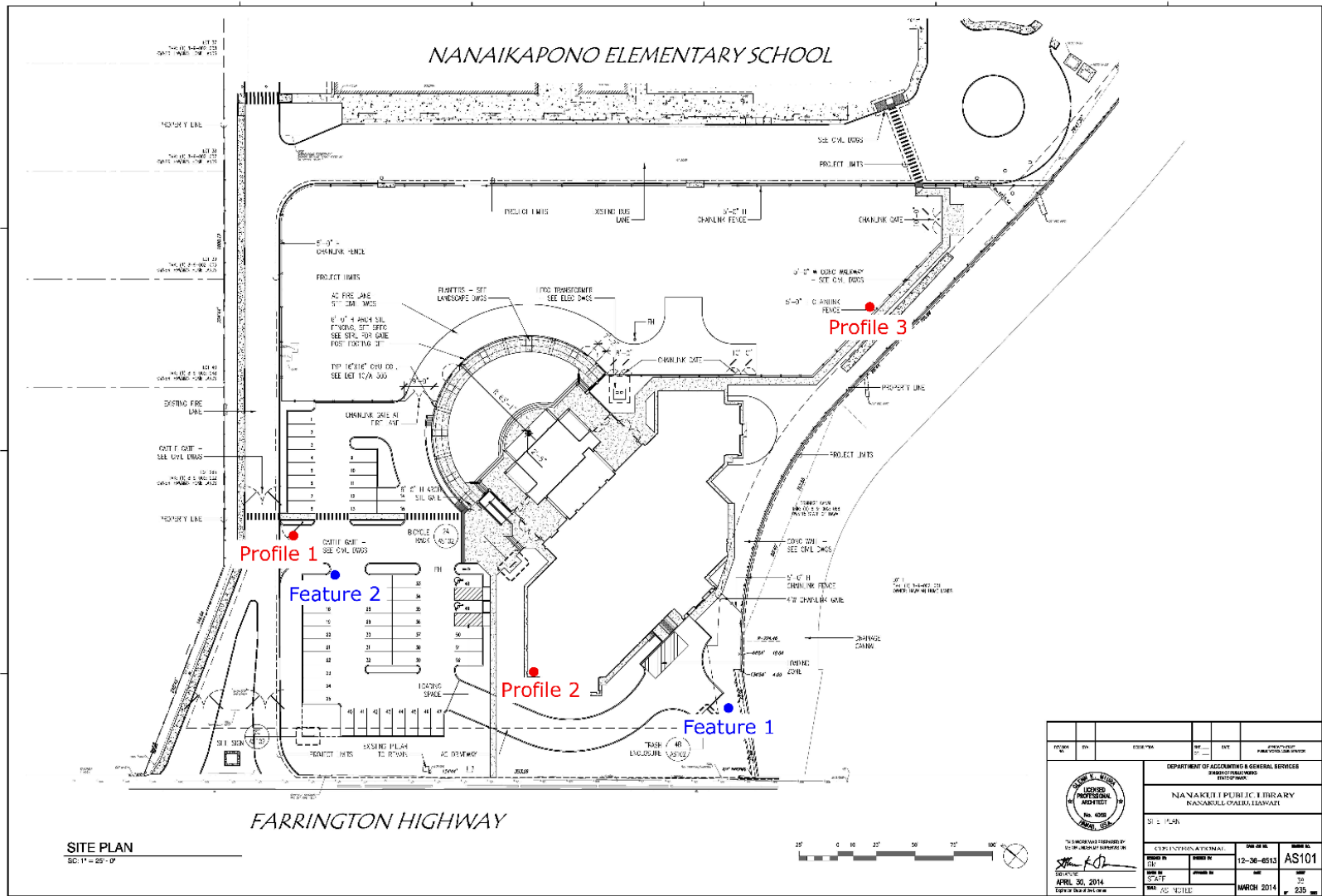


Figure 13. Location of features and profiles on the construction footprint for the Nānākuli Library.

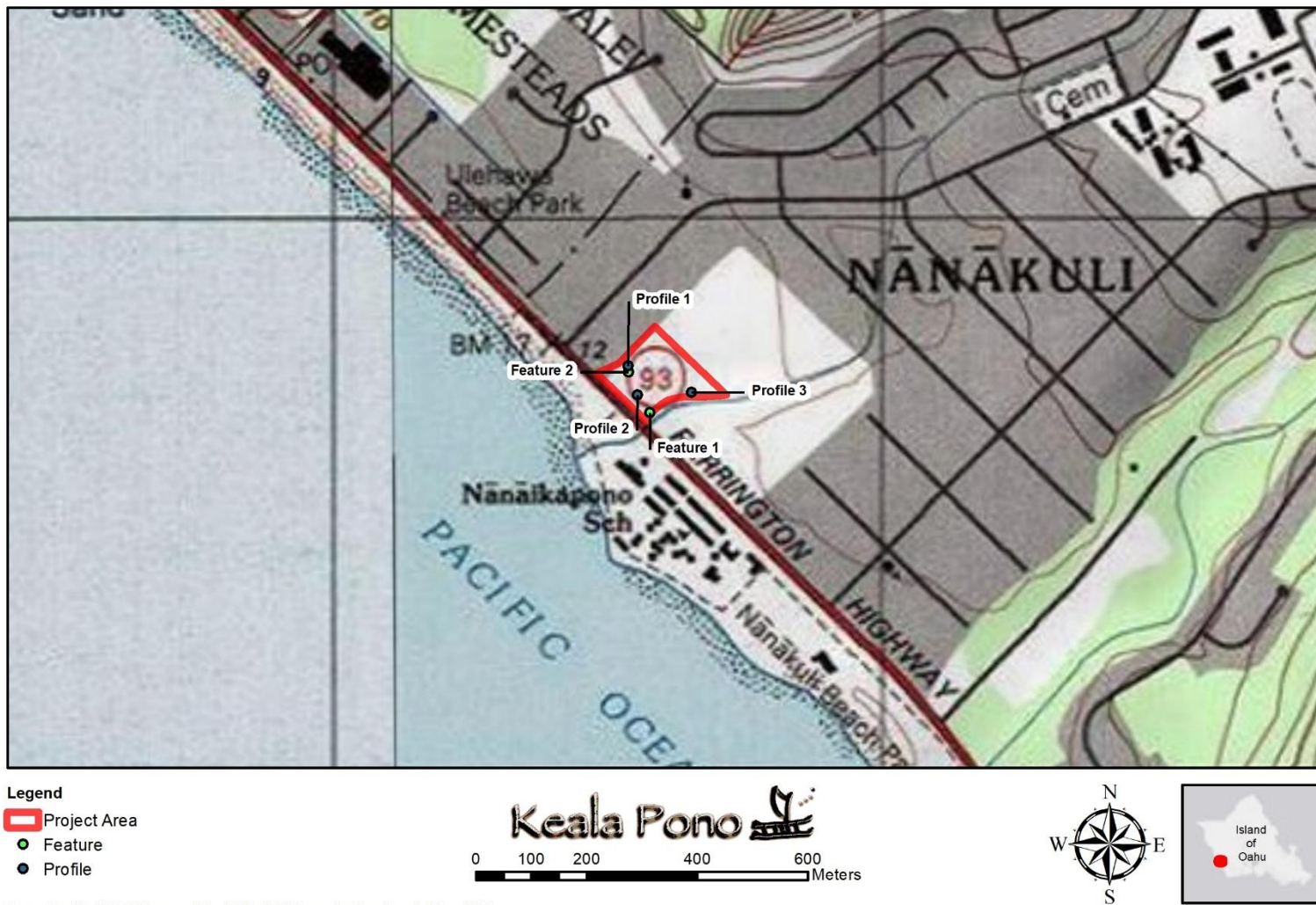


Figure 14. Location of features and profiles on a 7.5 minute USGS quadrangle map.

Table 3. Soil Descriptions

Profile	Layer	Depth (cmbs)	Color	Description	Interpretation
1	I	0-25	7.5YR 3/3	Sandy clay loam; 50% coral cobbles and gravel; smooth, very abrupt boundary.	Fill
	II	25-150+	10YR 8/3	Solid coral; base of excavation.	Coral Shelf
2	I	0-18	7.5YR 3/3	Sandy clay loam; 30% coral cobbles and gravel; smooth, very abrupt boundary.	Fill
	II	18-22	10YR 6/3	Medium to coarse sand; 30% coral cobbles and gravel; smooth, very abrupt boundary.	Fill
	III	22-30	7.5YR 3/3	Silty clay; 20% coral cobbles and gravel; smooth, very abrupt boundary.	Fill
	IV	30-86+	10YR 8/3	Solid coral; base of excavation.	Coral Shelf
3	I	0-20	7.5YR 3/4	Sandy clay loam; 25% coral cobbles and gravel; smooth, very abrupt boundary.	Fill
	II	20-30	2.5YR 3/4	Silty clay; 5% coral cobbles and gravel; smooth, very abrupt boundary.	Fill
	III	30-200+	10YR 8/3	Solid coral; base of excavation.	Coral Shelf

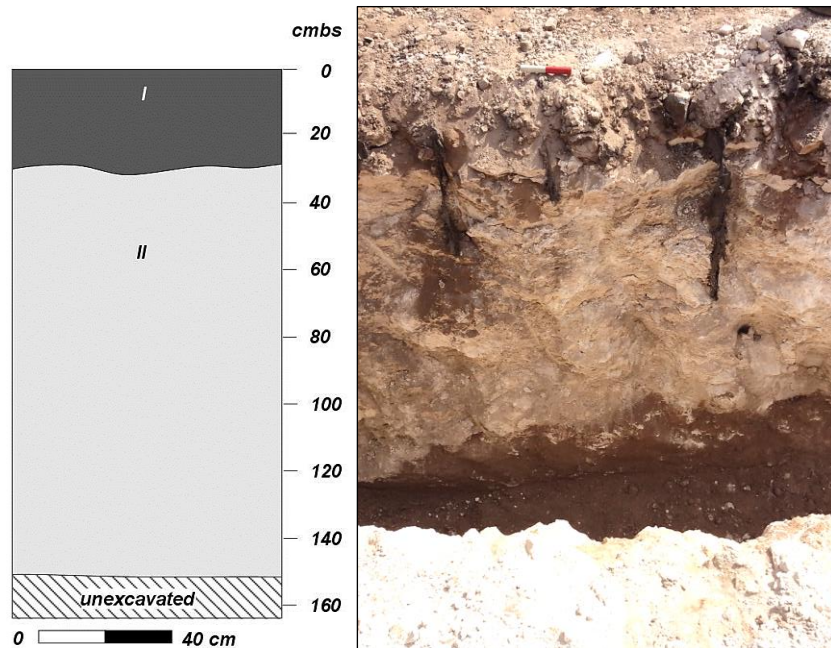


Figure 15. Profile 1, northeast face profile drawing and photo.

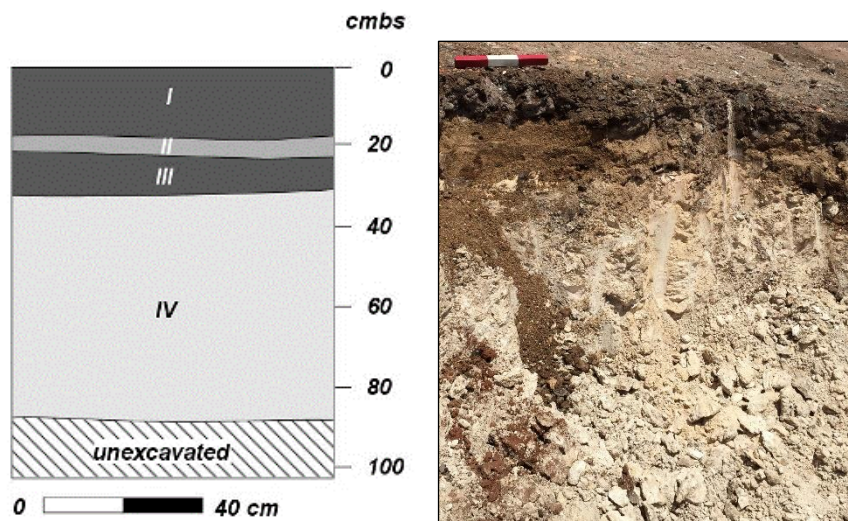


Figure 16. Profile 2, northwest face profile drawing and photo.

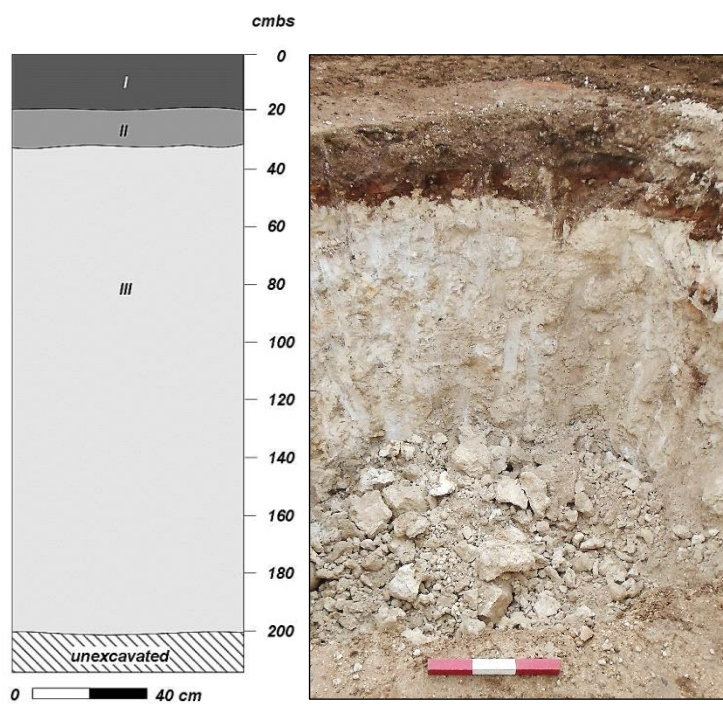


Figure 17. Profile 3, southeast face profile drawing and photo.



Figure 18. SIHP 50-80-07-7677, Camp Andrews pillars, protected during construction. Orientation is to the west.

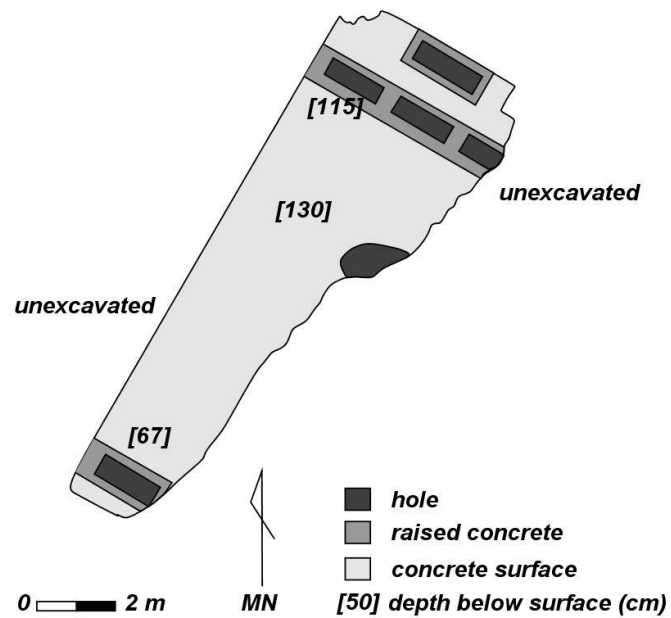


Figure 19. Feature 1, septic tank, plan view drawing.



Figure 20. Exposing of Feature 1, septic tank. Orientation is to the east.



Figure 21. Metal cover over rectangular openings of the Feature 1 septic tank. Orientation is to the south.



Figure 22. Feature 1 septic tank interior. Orientation is to the north.



Figure 23. Feature 1 septic tank after removal of concrete cap. Orientation is to the south.

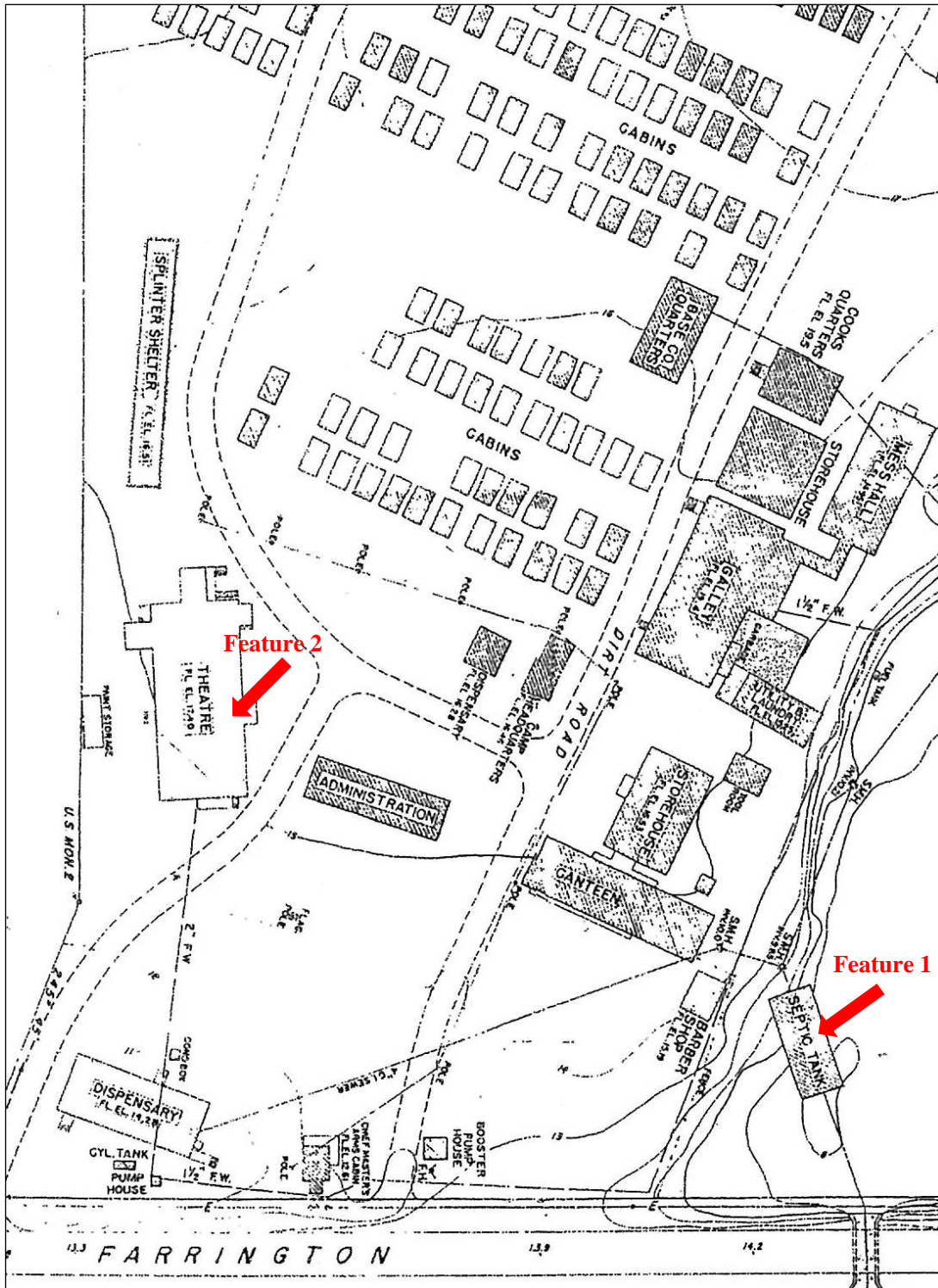


Figure 24. Portion of a “1942 general layout and services map of Camp Andrews” (from McDermott et al. 2001:44). Note that the original map could not be located and no other information on the map was provided in the referenced report. The approximate locations of Features 1 and 2 are shown in red.

Feature 2 is a concrete structure with a metal pipe in the center (Figure 25). The feature is located on the northwestern side of the project site where the new parking lot was constructed (see Figure 13). The concrete portion of the feature measured 56 cm square, and the metal pipe was roughly 12 cm in diameter. The area around the feature was excavated to 1.5 m below grade, and the concrete was exposed to 64 cm high (Figures 25 and 26). The length of pipe extended 79 cm higher than the concrete.

Through archaeological monitoring of its demolition, the feature appeared to consist of a very loosely formed concrete and coral aggregate matrix which served to protect and hold up the vertical standing metal pipe (Figure 28). It was noted by the contractor that the feature was similar to other features at nearby Ma‘ili Elementary School (five found at that location). These were old pump wells that extended down to the water table. The structure is situated at the approximate location of the theatre in the 1942 Camp Andrews map (see Figure 24).

Laboratory Analyses

During archaeological monitoring for the Nānākuli Library, a large number of artifacts were recovered and analyzed. Of special concern was how these artifacts might relate to the remains of Camp Andrews (SIHP 50-80-07-5946), a World War II-era military ‘rest and recreation’ facility known to have once occupied the area (McElroy et al. 2014). Those artifacts that were sufficiently old – produced or in use at least 50 years before present – and of a portable and diagnostic nature were collected and given accession numbers, as recorded in Appendix B of this report. This collection consisted of 314 individual specimens (referring to animal bones) and artifacts, some of which were grouped together in the accessioning process because they clearly derived from a single animal or object at the time of deposition.

Cultural material was recovered from across the site, with the highest concentration (278 specimens and artifacts, including 185 bone fragments that likely came from a single animal) found in a cement septic tank dating to at least 1942, during the site’s tenure as Camp Andrews (see Figure 24). This septic tank feature was located in the southern corner of the site, not far from an existing canal. Site-wide, only 89 of the 314 specimens and artifacts were recovered whole, the rest were fragmentary. A similar proportion of fragmentary to whole artifacts occurred in the septic tank (Figure 29). However, this number is heavily skewed by the 185 fragments of bone that came from the same individual animal.

All specimens and artifacts not recovered from the sealed context of the septic tank were either found on the surface during construction work or were recovered during the course of subsurface excavations for utilities and site drainage. With this in mind, the collection as a whole is compared with material recovered from the septic tank alone, to determine whether site-wide artifact patterning differed greatly from what was evident in the septic tank assemblage. The nature of the septic tank assemblage will be dealt with in greater detail in the discussion section of these laboratory results. It should be noted here that the fill of this feature, given the age and nature of datable artifacts, likely constituted a secondary cultural deposit (c.f. Renfrew and Bahn 2012) – consisting of objects dumped in the septic tank after it had ceased functioning as part of Camp Andrews’ onsite sewage system.

The whole assemblage includes 107 whole and fragmentary pieces of glass, six ceramic sherds, two non-ceramic fired clay objects (bricks), five metal objects, seven plastic or rubber items, and 187 faunal specimens of bone and tooth (see Appendix B). The subset recovered from the septic tank includes all the same material categories, in the following quantities: 79 whole and fragmentary pieces of glass, only one ceramic sherd, both (two) non-ceramic fired clay objects (bricks), three

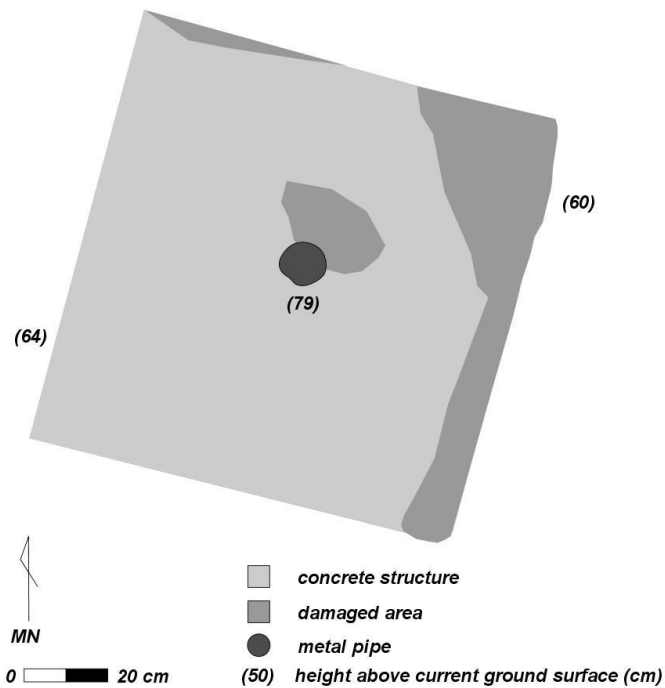


Figure 25. Feature 2, possible pump well, plan view drawing.



Figure 26. Feature 2, possible pump well remnant. Note that the original ground surface was much higher here and the feature was completely buried before construction of the library. Orientation is to the north.



Figure 27. Feature 2, possible pump well remnant. Orientation is to the north.

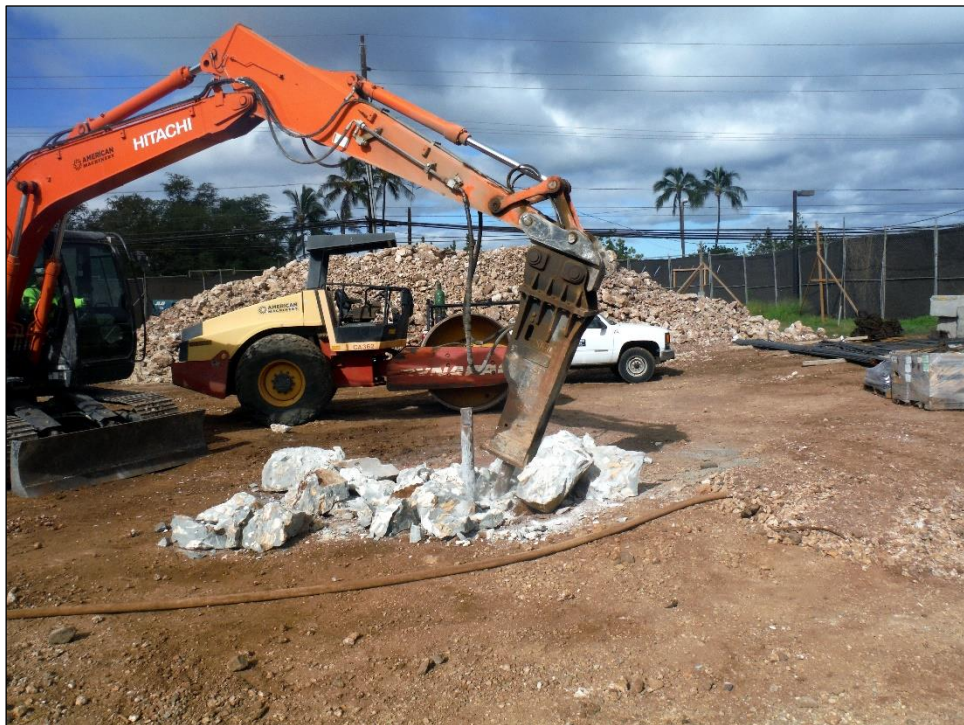


Figure 28. Demolition of Feature 2, possible pump well remnant. Orientation is to the southwest.

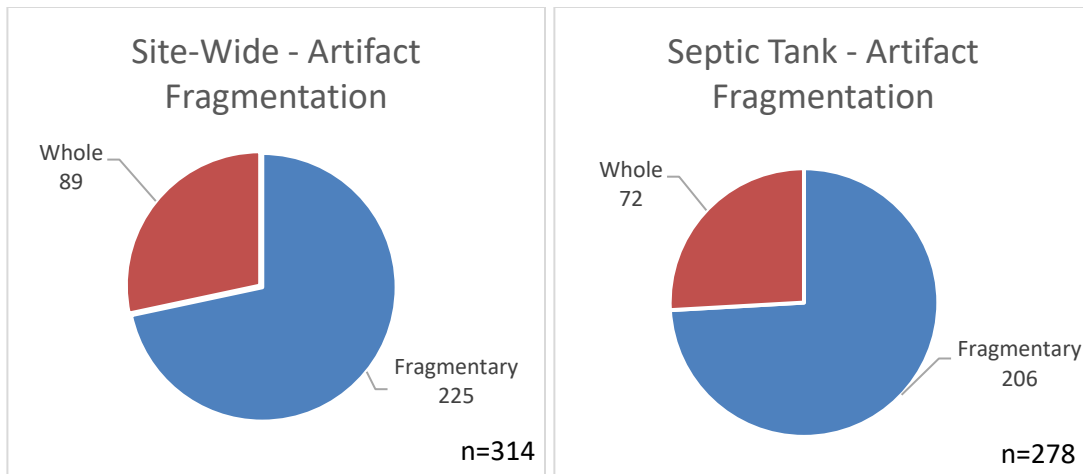


Figure 29. Charts showing site-wide and septic tank artifact fragmentation.

metal objects, all but one (six) of the plastic or rubber items, and all 187 faunal specimens of bone and tooth. Dates for objects in the site-wide assemblage range from possibly as early as the 1830s (Acc. 92), though this date is from a ceramic type that is still in production today, to as late as the 1970s (Acc. 134), a date again based on a regionally-specific style of porcelain decoration developed at this time but still in use today. The earliest reliable date for an artifact from the site, narrowed down to within a decade of definite production, was 1925–1931 [Honolulu Dairymen’s Assoc. milk bottles, Acc. 72 (Figure 30), 100 (Figure 31)]; the latest date was 1968 (“stubby” beer bottle, Acc. 56).

Glass Analysis

All terminology used here to describe glass artifacts and determine their dates has been taken from *The Parks Canada Glass Glossary* (Jones and Sullivan 1989), in tandem with the *IMACS User’s Guide* (IMACS 1992a) maintained by the Department of Anthropology at the University of Utah and the “Historic Glass Bottle Identification & Information Website” (Lindsey 2017h) maintained by Bill Lindsey. For bottles particular to Hawai‘i, *The Handbook of Hawaiian Machine Made Soda Bottles* (Millar 1986) was consulted.

Of the 107 glass artifacts recovered site-wide: three were tableware (possibly from a single glass dish), four were toys (marbles), and 98 were container glass (a bottle stopper, bottles, jars, jugs), with only two items unidentifiable to general use-type. The 79 glass artifacts from the septic tank included: 76 pieces of container glass (bottles, jars, jugs) and one toy (marble), with those same two pieces unidentifiable to general use-type. Whether looking at the site in general, or the septic tank in particular, the glass artifacts in the collection were overwhelmingly recovered whole – 72% whole from the site overall (n=107), 80% whole from the septic tank (n=79) (Figure 32). Those glass artifacts for which place of production could be determined originated from as far away as Japan, the Philippines, and possibly Europe, and the breadth of the mainland United States. That none were made in Hawai‘i attests to the islands’ continued reliance on imported glass, as true in the 20th century as it had been in the 19th century (Elliott and Gould 1988:6). Interestingly, while none of the glass bottles were manufactured in Hawai‘i, many of them were filled in the islands.



Figure 30. Glass milk bottle, 1925–1931, Acc. 72.



Figure 31. Glass milk bottle detail, 1925–1931, Acc. 100.

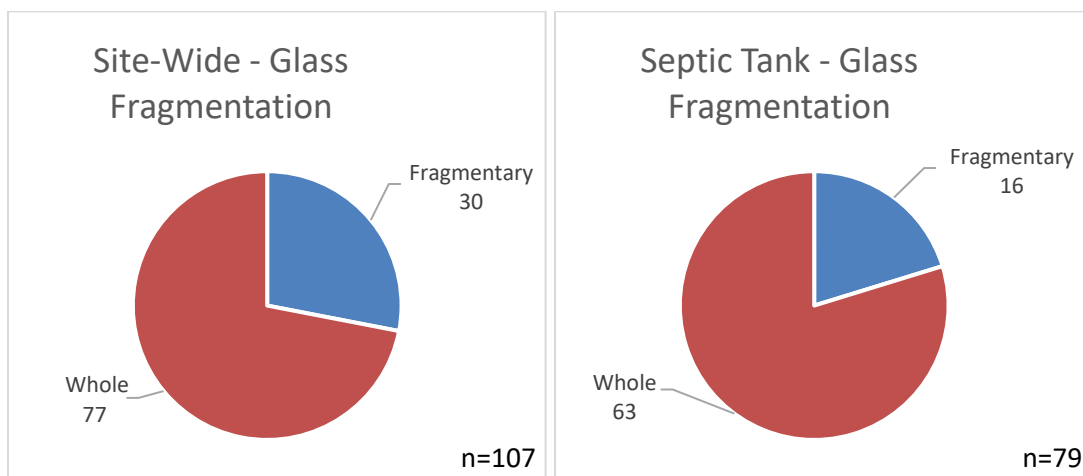


Figure 32. Charts showing site-wide and septic tank glass fragmentation.

Dating Bottles: Mold Seams, Finishes, and Manufacturer's Marks

There have been three major technological innovations in the manufacture of container glass – which will hereafter be used interchangeably with the term “bottle” – that are key to dating such artifacts. The free-blowing of glass, using a blowpipe alone, has a history that goes back into deep antiquity, making such vessels difficult to date with great certainty. Its popularity gradually tapered off as newer methods provided more standardized bottle shapes and sizes. In the United States, free-blown utilitarian bottles generally pre-date 1860. From ca. 1650, the mold-blowing of bottles was introduced to the industry. This method involved glass being blown into a square one-piece mold that gave the bottle its body shape, while its finish (lip and bore) was shaped by hand. Later datable developments in mold technology include: 1730s – the first use of dip molds in making cylindrical English ‘wine’ bottles (bulge of seam around shoulder, no embossed label); 1750 – introduction of a 2-piece hinged mold (seams down opposite sides/corners run below finish to cross the base on the diagonal, embossed label on sides of body); 1822 – invention of the 3-piece Ricketts mold (seams down opposite sides from below finish to seam encircling shoulder, embossed labels on shoulder/base only); 1840s – 3-piece post molds introduced (seams down opposite sides of body from below finish to circular seam on base) [e.g., Acc. 76, 107 (Figure 33)]; ca. 1850 – 3-piece cup-bottom mold introduced (seams down opposite sides of body from below finish to seam encircling heel) [e.g., Acc. 75 (see Figure 33), 89, 90, 102, 106 (see Figure 33), 117 (Figure 34)]; 1870s – ‘turn-molds’ introduced for making ‘seamless’ cylindrical bottles (highly polished, perfectly circular in horizontal cross-section) (Jones and Sullivan 1989; Lindsey 2017f; IMACS 1992a).

The glassmaking industry experienced profound change as automation was introduced. Automation got its start with the development of the semi-automatic press-and-blow machines, used from 1889 onward (sometimes broken seams on opposite sides of body run all the way up and over the finish; both cup mold and post mold seams on base from 2-part process) [e.g., Acc. 64, 65 (Figure 35), 74 (Figure 36), 117 (seams on lip) (see Figure 34); Acc. 21, 108, 123 (two sets of mold seams on base and heel) (see Figure 33)]. By 1904 the Owens fully automatic bottle machine had been patented (feathered circular suction scar on base). Other automatic bottle machines were used from the late 1910s through the 1940s to make wider-mouthed bottles and jars commonly used for milk and fruit (smooth, circular valve mark on center of base) [e.g., Acc. 72 (see Figure 30), 100 (see Figure 31), 106 (see Figure 33)]. By 1920, use of machines had completely replaced older methods of glass bottle manufacture in North America, removing the human glassblower from the bottle-making equation entirely (Jones and Sullivan 1989; Lindsey 2017f; Lindsey 2017c). Machine-made glass bottles dating from ca. 1920 onward are also generally of a more uniform thickness, without the internal bubbling seen in the earliest products of automation (IMACS 1992a).

The dating of glass bottles from the mold-blown era (pre-1920) is further aided by a series of innovations in how bottles were finished, that is how their lips were formed using hand tools. Prior to 1828, bottles were finished by using simple tools to manipulate glass at the end of the neck to form variously shaped lips. Sometimes a band of glass was added at or just below the lip to create a ‘laid-on ring’ or ‘string rim.’ Whatever shape these finishes took, they were generally asymmetrical and of irregular thickness. Around 1828 a lipping tool was introduced that created more regular and symmetrical finishes, in a variety of forms, by uniformly shaping glass applied to the bottle neck. Such ‘applied finishes’ (side seam abutting base of finish, slop-over just below finish) were common between 1830 and 1885. Finishes began being tooled from the glass of the bottle itself, without any addition of glass, starting with smaller bottles in the late 1860s. By the mid-1880s even larger sized bottles featured these ‘tooled finishes’ (side seam ends well before finish where horizontal burnishing is present), again in a variety of shapes. Various types of finish and specific closures were developed or popularized at known dates throughout the mold-blown era: 1840s – internal threading for screw-in stopper; 1850s – “club sauce;” 1870 – “Codd’s ball stopper;” 1879 – “Hutchinson spring



Figure 33. Glass bottle fragments, left to right: Acc. 75 (Coca-Cola, 1917–1959), Acc. 106 (Heinz, 1931–1956), Acc. 107 (unidentified, 1954–2000s), Acc. 123 (unidentified, 1938–ca. 1980).

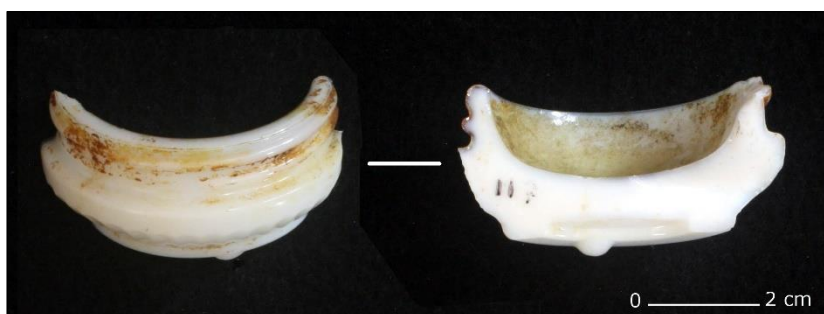


Figure 34. Cosmetic jar, post-1889, Acc. 117.



Figure 35. Glass alcohol bottle fragment, post-1889, Acc. 65.



Figure 36. Glass soda bottle fragment, post-1892, Acc. 74.

stopper” with ‘blob’ finish; 1890s – narrow-mouthed external threading (e.g., Acc. 64, 73); 1892 “crown cap” sealed with the now-ubiquitous metal bottle cap [e.g., Acc. 74 (see Figure 36)]; 1920 – PRIOF finish patented to enable crown caps to be more easily opened; 1930s – plastic screw caps popularized (e.g., Acc. 73, 125); and many more (Jones and Sullivan 1989; Lindsey 2017b; IMACS 1992a; Digger Odell 2008).

Automatic bottle machines formed bottles in their entirety, from base to finish (body seams run all the way up and over the finish). The standardizations made possible by machine-making saw the decline of the cork stopper, except for wine and liquor, in favor of screw caps and crown finishes from 1930 onward (Jones and Sullivan 1989; Lindsey 2017b).

Manufacturer marks located on the base and/or heel of mold-blown and machine-made bottles enable, when present, the pinpointing of a bottle’s date of production. Variations in company names or logos, as well as plant and date codes, can narrow dates down to the exact year a bottle rolled off the assembly line (Lindsey 2017g). The Ricketts & Co. Glassworks, the same that had patented the 3-piece mold, was among the first to emboss bottle bases with their company name in the 1820s. By the 1850s these maker’s marks could move from the resting point to the center of a mold-blown bottle’s base. This was possible because the recently developed snap-case could hold a bottle for finishing without marring its base, as the previously used pontil rod inevitably had (Lindsey 2017f). While some glass bottle makers were including the rare date code on bottles in the latter half of the 19th century, date codes only became the norm on soda and milk bottles around 1930 [e.g., Acc. 53 (Figure 37)]. By 1934, federal law in the U.S. required date codes on liquor bottles. Subtle changes in the glass company names and logos, as well as manufacturing date codes, on bottle bases further refine the dating of bottles from the 1940s onward [for Anchor Hocking Glass Corp. Acc. 31, 35, 48, 101, 123, (see Figure 33); Brockway Glass Co. Acc. 49; Foster-Forbes Glass Co. Acc. 57, 79; Glass Containers Corp. Acc. 5, 10, 51; Hazel-Atlas Glass Co. Acc. 89; Illinois-Pacific Glass Corp. Acc. 72 (see Figure 30), 100 (see Figure 31); Maywood Glass Co. Acc. 81; National Glass Works Acc. 124, 9; Northwestern Glass Co. Acc. 2, 4, 7, 14, 15, 19, 26, 27, 29, 44, 50, 56, 70; Owens-Illinois Acc. 3, 11, 13, 16, 17, 18, 22, 24, 25, 28, 30, 38, 39, 40, 42 (Figure 38), 45–47, 52–55, 58–60, 67, 68, 78, 80, 96–99, 106 (see Figure 33), 107 (see Figure 33), 125; La Fabrica de Cerveza de San Miguel Acc. 43, 94 (Figure 39); Thatcher Glass Mfg. Co. Acc. 1] (Lindsey 2017g; Lockhart and Hoenig 2016; Lockhart et al. 2013a, 2013b, 2015a, 2015b, 2016a, 2016c, 2017; SMYPC 2016; Whitten n.d.).



Figure 37. Glass Coca-Cola bottles, Acc. 53 (left; 1947), Acc. 126 (right; 1963).



Figure 38. Mrs. Butterworth's Syrup bottle, 1961–2000, Acc. 42.



Figure 39. San Miguel beer bottle, post-1938, Acc. 94.

Innovations in bottle labeling technology are datable, as well: 1650s – individuals and taverns began having their names/monograms/dates stamped into glass seals affixed to the bodies of ‘wine’ bottles (applied glass blob impressed with design from intaglio seal to create embossing while glass is still hot); 1750 – bottle bodies themselves became embossable with the introduction of the 2-piece mold; 1822 – the Ricketts mold allowed for the embossing of bottle shoulders; 1868 – plate molds made it possible to emboss interchangeable labels, representing unique bottle contents, onto the bodies of standardized bottles (seam around embossed label on side of body); 1934 – applied color labels (ACL) were introduced in designs specific to given brand names (bottle contents labeled with baked-on enamel) [e.g., Acc. 3, 9, 12, 32, 40, 41, 60, 67, 69 (Figure 40), 81, 86 (Figure 41), 110, 118 (see Figure 41), 124, 126 (see Figure 37), 127, 128 (see Figure 40)] (Hume 1969; Jones and Sullivan 1989). The carefully researched evolutions in form and decoration (labeling) of bottles used by specific bottling companies for particular contents (household products, medicines, sodas, beers, milk bottles, etc.) can also be used to pin down a date range for the production of a bottle [for Primo Acc. 24, 96; Olympia Brewing Co. Acc. 19; Mrs. Butterworth’s Syrup Acc. 42 (see Figure 38); Aji-No-Moto Acc. 124; Canada Dry Acc. 3, 9, 60; Coca-Cola Acc. 12, 32, 41, 53 (see Figure 37), 75 (see Figure 33), 84, 88, 126 (see Figure 37), 127; Diamond Head Beverages Acc. 69, 128 (see Figure 40); Kist Acc. 86 (see Figure 41), 118 (see Figure 41); OK Acc. 67; Pepsi Acc. 40, 110; Royal Crown Acc. 81] (Sudick 2008; Flynn 2004; Pinnacle Foods Inc. 2018; Anonymous 1999; Ajinomoto Co., Inc. 2018; Lockhart and Porter 2010; Lockhart 2010; Millar 1986).

Other datable features that appear on bottles include: 1933–1964 – the embossing of a statement to the effect that “Federal Law Prohibits the Sale or Reuse of this Bottle” on liquor bottles, as mandated by post-prohibition legislation in the U.S. (Lindsey 2017d); 1938 – beer bottles marked as non-returnable/non-refillable [e.g., Acc. 1, 2, 4, 5, 7, 10, 13–19, 22, 24, 26–29, 38, 39, 44, 51, 52, 54–59, 68, 70, 78–80, 94 (see Figure 39), 96]; 1940 – “No Deposit – No Return” appearing on soda bottles [e.g., Acc. 6] (Antiquities Section of the Utah Division of State History 2015). In Hawai‘i, designation of the bottling location with certain abbreviations can also be used to date bottles: pre-1898 – H.I. (Hawaiian Islands) or S.I. (Sandwich Islands); ca. 1898–1959 – H.T. or T.H. (Territory of Hawaii) [e.g., Acc. 72 (see Figure 30), 100 (see Figure 31)] (Elliott and Gould 1988). Particular colors of glass can be highly diagnostic as well, given known dates for the invention of the chemical of methods that produced them: 1880–1924 – amethyst (purple) from the addition of manganese; and 1914–1930s – honey/wheat (pale amber) from the addition of selenium. Other colors became more popular for particular bottle forms at given periods: 1890 – milk (opaque white) glass became more popular for cosmetics bottles and jars [e.g., Acc. 117 (see Figure 34)]; 1890 – cobalt (blue) became more popular for medicine bottles (Acc. 90, 108) (Jones and Sullivan 1989; IMACS 1992a).

All of these features were called on in determining the earliest possible date of production of each of the 98 container (bottle) glass vessels or vessel fragments that were accessioned. These results were then sorted by quarter century to reveal trends in the use of glass bottles on both a site-wide scale and in terms of those deposited in the septic tank before it was completely sealed with earth. Tables 4 and 5 and Figures 41 and 42 show a clear trend with the number of items spiking dramatically in the 1950–1968 period. This would be expected, as the septic tank, where most of the bottles were found, was constructed before 1942, when the site was built up as Camp Andrews. Note that for bottles with a date range, rather than a precise date, the earliest date for the item was used.



Figure 40. Glass Diamond Head Beverages soda bottles, Acc. 69 (left; 1960), Acc. 128 (right; 1966).



Figure 41. Kist soda glass bottle fragments, 1940s–1950s, Acc. 86 (left), Acc. 118 (right).

Table 4. Dates for all Glass Bottles (n=107)

Date	Number of Items
pre-1900	8
1900–1924	3
1925–1949	27
1950–1968	61
Unidentified	8

Table 5. Dates for Glass Bottles from Septic Tank (n=79)

Date	Number of Items
pre-1900	5
1900–1924	3
1925–1949	16
1950–1968	51
Unidentified	4

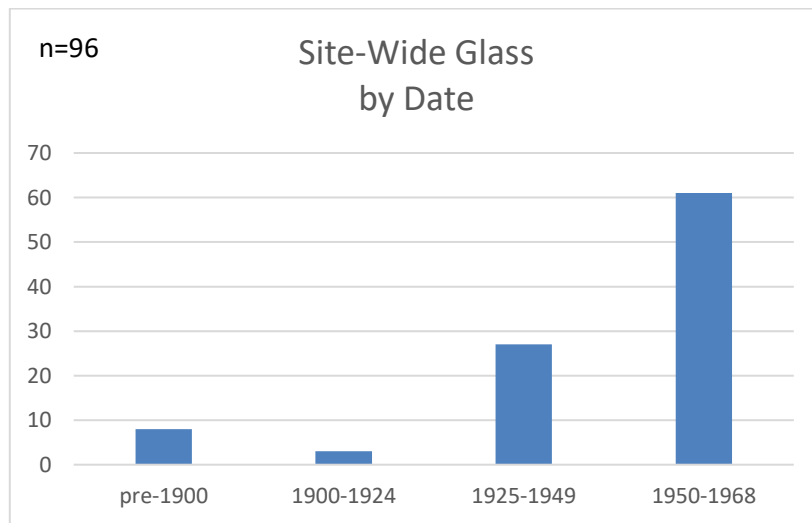


Figure 42. Graph showing total number of glass items that could be dated.

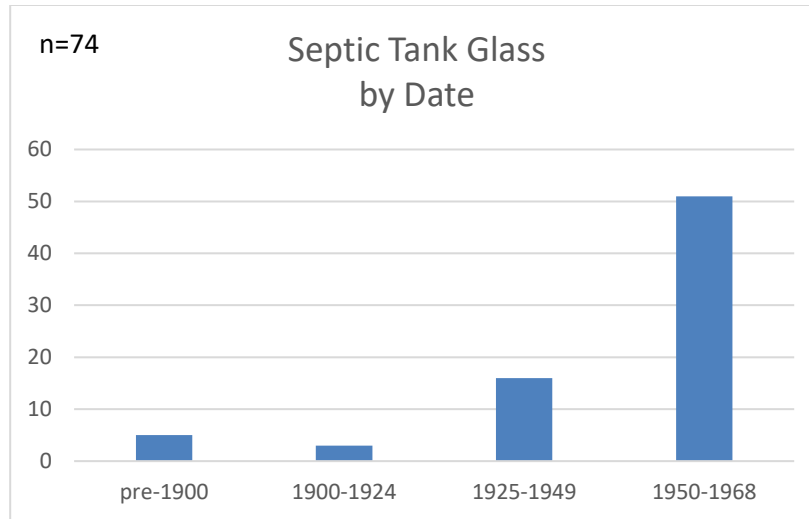


Figure 43. Graph showing number of glass items from the septic tank that could be dated.

Bottle Use: Form, Function, Decoration

The technological changes in glassmaking outlined above were driven by a desire for greater standardization in the capacity and shape of glass bottles, to better reflect the nature and quantity of their contents, as well as increase efficiency in bottle production (Jones and Sullivan 1989:22). Such standardization reflected the growing commodification of the world, with goods increasingly flowing from producer to consumer through tightly regulated and taxed national and international markets (Johnson 1996:187–196). While the evolution of mouth-blown molds could insure the ever-more consistent shaping and embellishing of bottle exteriors, it was not until the advent of machine manufacture that internal bottle capacities could be said to be truly uniform from one bottle to another (Jones 1986).

Patent medicines, sold as curatives on the basis of their unique and secretive compositions, were among the first contents for which uniquely shaped bottles were made, as marketing ploys in the 18th century (Griffenhagen and Bogard 1999:72). Undifferentiated olive green “wine” bottles were the standard container used to ship, store, and serve all sorts of alcoholic beverages (wine, beer, cider, spirits) wherever the English had a trade or colonial presence from the late-17th century. By the mid-18th century, English glassmakers were differentiating between squatter beer-style and taller wine-style cylindrical bottles (Jones 1986). As the 19th century progressed, and the use of multi-part molds expanded, bottle forms multiplied and were increasingly tied to specific contents, with both bottle and contents produced in relatively small batches. Bottle form (including finish shape), as well as glass color, was often dictated by the nature of the contents and their use: thicker walled bottles were employed when intended for repeated reuse, like those filled with beer and soda [e.g., Acc. 75 (see Figure 33)]; cylindrical brown bottles could handle the carbonation and keep damaging sunlight away from beer (e.g., Acc. 22); crown caps were developed to keep a tight seal on carbonated sodas and beers [e.g., Acc. 74 (see Figure 36), 78]; the “wine or brandy” finish was suited to use on liquor or spirit bottles that were commonly resealed with a cork stopper between uses [e.g., Acc. 65 (see Figure 35)]. Trends in the association of glass color with content – including the use of cobalt glass for medicine bottles (e.g., Acc. 90) and opaque white for cosmetics [e.g., Acc. 117 (see Figure 34)] – continued through the transition to machine production, although the aqua glass of earlier soda

water bottles gradually gave way to truly clear glass in many (though not all) soda bottles (Lindsey 2017a, 2017d, 2017e; Jones and Sullivan 1989; IMACS 1992a).

The machine-making of bottles actually led to a reduction in the variety of bottle forms being produced. The expense of bottle-making equipment could only be justified on bulk orders of the type being placed by drink bottlers and food processes with a large enough market to drive an automation of bottling now possible with bottles of a truly standard capacity. While types of content continued to be associated with particular bottle colors and shapes, variations in design reflected marketing decisions as companies sought brand differentiation in the world of mass-consumption that accompanied all of this automation [e.g., Acc. 42 (see Figure 38), 126 (see Figure 37), 128 (see Figure 40), 110] (Miller and Sullivan 2000).

Given these historical trends, it was determined that glass color and vessel shape (including finish type) could be used to reliably identify container glass down to at least the general categories of bottle type, related to bottle content, outlined on the “Bottle Typing (Typology) & Diagnostic Shapes” page of the BLM/SHA website. These types included: liquor/spirits, wine, beer & ale, soda (plain and flavored non-alcoholic carbonated beverages), medicinal, food, household, and unidentifiable (Lindsey 2017d). A typological breakdown of the container glass portion of the collection is presented below. The content of certain bottles could be narrowed down even further based on their decoration (labeling) or shape [e.g., Acc. 49, 106 (see Figure 33), 42 (see Figure 38), 102, 124, 75 (see Figure 33), 69 (see Figure 40), 118 (see Figure 41), 67, 110, 81]. Tables 6 and 7 illustrate functional types of glass, while Figures 43 and 44 show the contents of the glass bottles.

- One of the container-related artifacts was a glass bottle stopper (Acc. 119).
- 39 bottles contained beer, making this the most common bottle use-type. These included:
 - 2 Primo Beer (Acc. 24, 96) (Sudick 2008)
 - 2 San Miguel [Acc. 43, 94 (see Figure 39)] (San Miguel Corporation 2016; Anonymous n.d.; SMYPC 2016)
 - 1 Lucky Premium Beer (Acc. 22) (Flynn 2010)
 - 1 Olympia Brewing Co. (Acc. 19) (Flynn 2004)
 - 33 beer bottles, identified as such on the basis of glass color and shape, that could not be further identified (Acc. 1, 2, 4, 5, 7, 10, 13–18, 26–29, 38, 39, 44, 51, 52, 54–59, 68, 70, 78–80, 89) (IMACS 1992a)
- 23 bottles were used for soda – generally plain or flavored non-alcoholic carbonated beverages. These included:
 - 3 Canada Dry (Acc. 3, 9, 60) (Lockhart 2010:453–466)
 - 9 Coca-Cola bottles [Acc. 12, 32, 41, 53 (see Figure 37), 75 (see Figure 33), 84, 88, 126 (see Figure 37), 127] (Lockhart and Porter 2010)
 - 2 Diamond Head Beverages [Acc. 69, 128 (see Figure 40)] (Millar 1986)
 - 2 Kist (Citrus Products Co.) [Acc. 86, 118 (see Figure 41)] (Millar 1986)
 - 1 OK Beverages (Acc. 67) (Millar 1986)
 - 2 Pepsi Cola (Acc. 40, 110) (Lockhart 2010:54–55, 269–279)
 - 1 Royal Crown Cola (Acc. 81) (Lockhart 2010:55–56, 389–428)
 - 3 soda bottles, identified as such on the basis of glass color and shape, that could not be further identified (Acc. 6, 76, 74 (see Figure 36) (IMACS 1992a)

- 1 liquor/spirits (distilled alcohol) bottle, identified as such on the basis of glass color and shape, that could not be further identified [Acc. 65 (see Figure 35)] (IMACS 1992a)
- 19 food bottles and jars:
 - 2 milk bottles – both from the Honolulu Dairyman’s Association [Acc. 72 (see Figure 30), 100 (see Figure 31)] (Meadow Gold 2016)
 - 11 baby food jars (Acc. 11, 23, 25, 30, 31, 45, 46, 47, 48, 49, 97) (Bentley 2014:72)
 - 3 condiment bottles – one each of Mrs. Butterworth’s Syrup [Acc. 42 (see Figure 38)], Tabasco Sauce (Acc. 102), and an unknown Heinz Co. product [Acc. 106 (see Figure 33)] (Anonymous 1999; Pinnacle Foods Inc. 2018; Orser and Babson 1990; Lockhart et al. 2016b)
 - 2 seasoning jars – one each of Aji-No-Moto [Acc. 124] and McCormick Gourmet Spices (Acc. 98) (Ajinomoto Co., Inc. 2018; McCormick & Company, Inc. n.d.)
 - 1 food bottle that could not be further identified [Acc. 107 (see Figure 33)]
- 3 household or medicine bottles:
 - 1 ointment, identified as such on the basis of glass color and shape [Acc. 117 (see Figure 34)] (IMACS 1992a)
 - 1 Phillip’s Milk of Magnesia (Acc. 90) (Chow 2012)
 - 1 household or medicinal bottle, identified as such on the basis of glass color and shape, that could not be further identified (Acc. 108)
- 12 of the glass container artifacts could not be narrowed down as to their use any further than their general shape (Jones and Sullivan 1989:71–73), because of their heavy fragmentation. These included:
 - 4 bottles – containers with a narrow mouth and well-defined neck (Acc. 64, 82, 99, 125)
 - 2 jars – containers that have a wide mouth that connects directly to the vessel body, with no or very little discernable neck (Acc. 21, 50)
 - 3 jugs – containers that have a short neck and narrow mouth, with a small handle (or two) attached where the finish and shoulder meet (Acc. 20, 73, 104)
- 3 undifferentiated containers were also recovered [Acc. 35, 87, 123 (see Figure 33)]

Table 6. Functional Type for All Glass (n=107)

Functional Category	Further Identification	Number of Items
Toy	Marble	4
Tableware	Plate / Dish	3
Container – Bottle Stopper	Unidentified	1
Container – Bottle, Jar, Jug	Unidentified	12
Container – Bottle	Spirit / Liquor	1
Container – Bottle	Beer	39
Container – Bottle	Soda	23
Container – Jar, Bottle	Food - Milk, Baby Food, Condiments, Seasonings	19
Container – Jar, Bottle	Household / Medicinal	3
Unidentified	Unidentified	2

Table 7. Functional Type Glass from Septic Tank (n=79)

Functional Category	Further Identification	Number of Items
Toy	Marble	1
Tableware	Plate / Dish	0
Container – Bottle Stopper	Unidentified	0
Container – Bottle, Jar, Jug	Unidentified	8
Container – Bottle	Spirit / Liquor	1
Container – Bottle	Beer	37
Container – Bottle	Soda	18
Container – Jar, Bottle	Food -Baby Food, Condiment	11
Container – Jar, Bottle	Medicinal	1
Unidentified	Unidentified	2

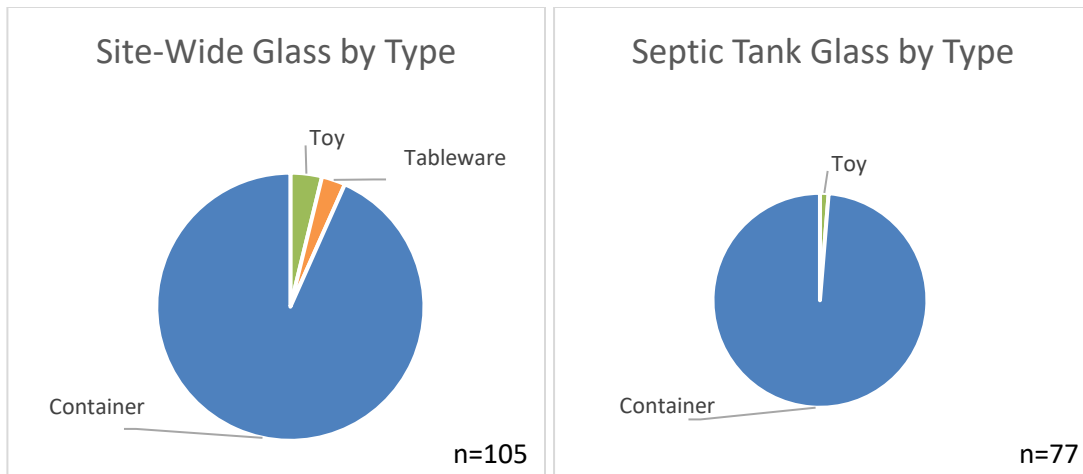


Figure 44. Charts showing site-wide and septic tank glass of identifiable type.

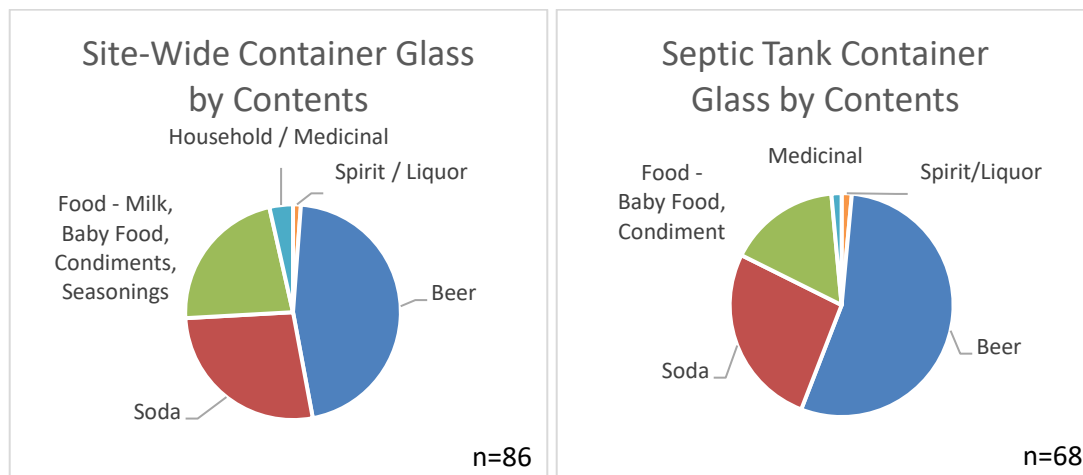


Figure 45. Charts showing site-wide and septic tank glass with identified contents.

The Movement of Bottles: Where They Were Made and Where They Were Filled

When considering how bottles moved around in the past, two pieces of retrievable information need to be considered independently. The first is, where was the bottle itself produced? The second is, where was the bottle filled (i.e., its contents “bottled”)? Whether or not these questions can be answered depends entirely on what information the bottle itself contains (Schulz and Allen 2016).

For some glass manufacturers (e.g., Owens-Illinois), more specific information on glass plant locations can be gleaned from plant codes included in the maker’s marks embossed on bottle bases (Lockhart and Hoenig 2016). For other glass manufacturers, previous research can at least narrow down the location of bottle production to country, and possibly region within that country, based on just the maker’s marks (Lindsey 2017g; Lockhart and Hoenig 2016; Lockhart et al. 2013a, 2013b, 2015a, 2015b, 2016a, 2016c, 2017; SMYPC 2016; Whitten n.d.).

Tables 8 and 9 and Figure 46 illustrate the origin of the bottles in the assemblage. The production location for many of the 98 glass containers represented in the collection could not be determined (n=36). Of those where this information could be ascertained, most (n=54) came from the U.S. mainland (i.e., the continental U.S.), with regional breakdowns as follows:

- 7 items could only be confirmed to have been produced on the U.S. mainland in general, either because of limited information about bottle production history for a given company, or the existence of production plants in more than one region [Acc. 1, 31, 49, 53 (see Figure 37), 57, 79, 123 (see Figure 33)]
- 42 bottles were determined to have been produced on the west coast of the continental U.S. – in Seattle, WA, Portland, OR, Oakland, CA, Los Angeles, CA, and California in general [Acc. 2, 4, 5, 7, 10, 13–19, 22, 24, 26–29, 35, 38–40, 44, 50–52, 54–56, 58–60, 67, 68, 70, 72 (see Figure 30), 78, 80, 81, 96, 100 (see Figure 31), 107 (see Figure 33)]
- 3 bottles were made in the U.S. Midwest – in Illinois and Oklahoma [Acc. 42 (see Figure 38), 89, 99]
- 2 bottles were manufactured in the eastern U.S. – in Pennsylvania and West Virginia (Acc. 3, 48)

For non-U.S. bottles:

- 6 bottles were manufactured in the Asia Pacific region – 4 in Japan, a country which had developed a glass bottle manufacturing industry alongside the beer brewing industry (later expanding to include soda bottles) introduced during the Meiji period (1868–1912) [Acc. 69 (see Figure 40), 126 (see Figure 37), 127, 128 (see Figure 40)] (Ross 2009); 2 in the Asia-Pacific region in general, where the Philippines-based brewer La Fabrica de Cerveza de San Miguel had established glass plants to supply bottles for its beers [Acc. 43, 94 (see Figure 39)] (SMYPC 2016)
- 2 bottles came from Europe, specifically England (Acc. 9, 124)

Table 8. Origin of All Glass Bottles (n=98)

Origin	Number of Items
Asia-Pacific	6
U.S. Mainland	7
U.S. Mainland - West Coast	42
U.S. Mainland - Midwest	3
U.S. Mainland - East	2
Europe	2
Unidentified	36

Table 9. Origin of Glass Bottles from Septic Tank (n=76)

Origin	Number of Items
Asia-Pacific	2
U.S. Mainland	6
U.S. Mainland - West Coast	38
U.S. Mainland - Midwest	2
U.S. Mainland - East	2
Europe	1
Unidentified	25

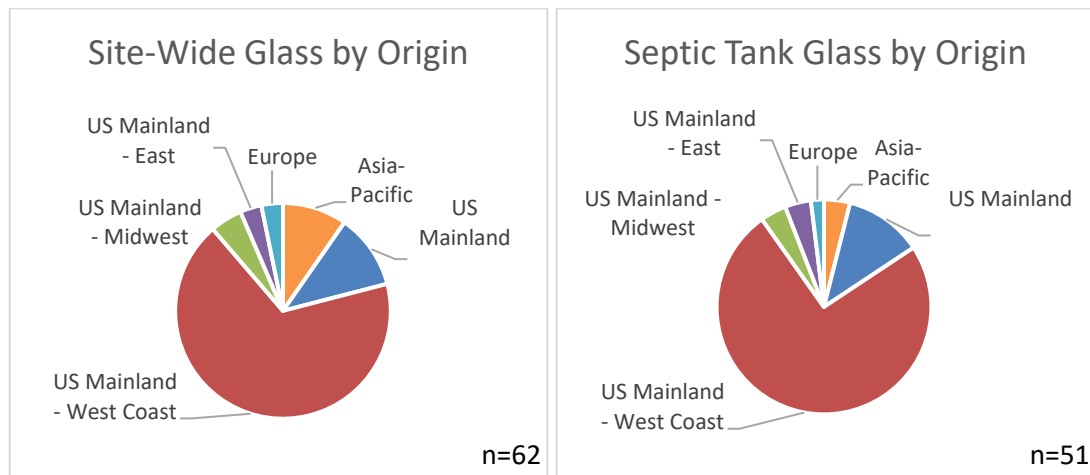


Figure 46. Charts showing site-wide and septic tank bottle glass origin.

The location where a bottle was filled (or a drink “bottled”) can only be determined when a bottle’s label is present and contains pertinent information. Fortunately, noting the content’s bottling location was common practice on both embossed and ACL soda bottles in the 20th century. Sometimes – as with beers, milk, medicines, and sauces – this information can also be established from previously researched company histories (Sudick 2008; Flynn 2004, 2010; San Miguel Corporation 2016; Ajinomoto Co., Inc. 2018; Chow 2012; Orser and Babson 1990). Data for bottling location is presented in Tables 10 and 11 and Figure 47.

Bottling location for the bulk of pre-1969 glass bottles could not be determined (n=84) because either the artifact was too fragmentary, no label (or not enough of the label) remained, or its contents were of a type (non-beverage) where bottling location was not generally recorded on the label. Of those where bottling location could be determined (n=14), bottles had been filled as follows:

- 7 bottles (the majority) in Hawai‘i itself. These included:
 - Diamond Head Beverages [Acc. 69 (see Figure 40), 128 (see Figure 40)]
 - Primo beer (Acc. 24, 96)

- Honolulu Dairymen's Association milk [Acc. 72 (see Figure 30), 100 (see Figure 31)]
 - Coca-Cola [Acc. 75 (see Figure 33)]
- 4 bottles in the U.S. mainland – Phillip's Milk of Magnesia (Acc. 90); tabasco sauce in Louisiana (Acc. 102); Lucky beer in the western U.S. (Acc. 22); and Olympia Brewing Co. beer in Washington State (Acc. 19)
- 3 in the Asia-Pacific region – 1 in Japan, with the MSG seasoning Aji-No-Moto (Acc. 124); 2 in the region in general, with San Miguel beer [Acc. 43, 94 (see Figure 39)]

Table 10. Bottling Location for all Glass Bottles (n=98)

Bottling Location	Number of Items
Asia-Pacific	3
Hawai'i	7
U.S. Mainland	4
Unidentified	84

Table 11. Bottling Location for Glass Bottles from Septic Tank (n=76)

Bottling Location	Number of Items
Asia-Pacific	1
Hawai'i	3
U.S. Mainland	3
Unidentified	69

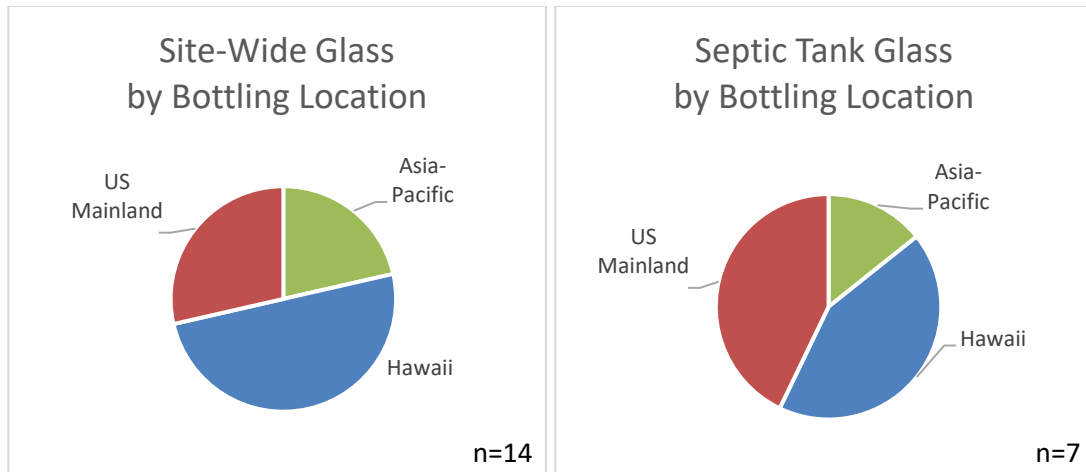


Figure 47. Charts showing site-wide and septic tank bottling location.

Knapped Glass

One item of note is Acc. 85 (Figures 47 and 48), a glass fragment that has been reworked. This piece appears to be “solarized” glass, or glass that was originally made clear with a chemical additive and changed color with exposure to the sun. The item is thicker than typical bottle glass and may have originally had an industrial purpose such as a spotlight; or may have been a very thick container. It is a corner piece so it is not likely to be window glass; for analysis purposes the artifact was classified above along with the container glass as a possible thick container. The artifact has visible bulbs of percussion, flake scars, and ridges. It is thinner at the distal end, suggesting an unfinished awl, cutting tool, or arrowhead. This object might indicate traditional use of historic materials (cf. Flexner and Morgan 2013) or may be the product of a bored or homesick soldier knapping glass into a familiar form; alternatively the artifact may indicate improvising to make a cutting or hole-punching implement when other tools were not available.

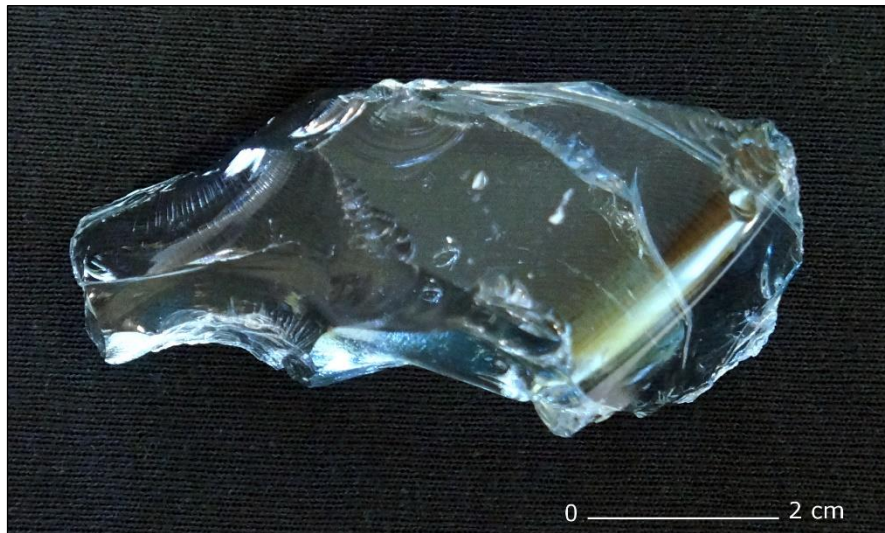


Figure 48. Knapped glass, ventral surface, date undetermined, Acc. 85.

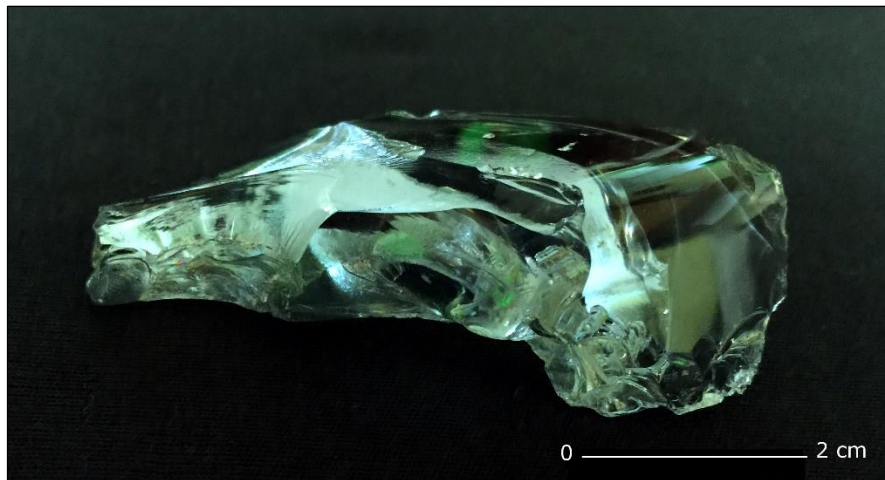


Figure 49. Knapped glass, side, date undetermined, Acc. 85.

Other Glass

Three fragments of glass tableware, possibly representing a single opaque white dish or deep plate, were recovered from the site (outside of the context of the septic tank) (Acc. 101, 103, 105). The one fragment with any trace of a maker's mark on it indicates that this piece of tableware was produced by Anchor Hocking Glass Corp. somewhere on the U.S. mainland. The Hocking Glass Co. of Lancaster, OH, which had merged with the Anchor Cap & Closure Corp. in 1937 to form Anchor Hocking Glass Corp., had been making such opaque white ('milk') glass novelties and tableware since their early days in the first decade of the 20th century. This same fragment was the only datable piece of tableware, as that specific maker's mark (an Anchor-H Monogram) was only used for a certain period, 1938–ca. 1980 (Lockhart et al. 2013a).

Four intact glass toy marbles were recovered from the site, only one from the septic tank context. All four were within 0.3 cm of each other in diameter (1.4 cm – 1.7 cm), and all were of the 'cats-eye' variety, with colorful multi-vaned streaks injected into the center of the glass itself. One was light blue, with a three-vaned tri-color (blue, green, white) cats-eye at its core [Acc. 112 (Figure 50)]. One was clear, with a four-vaned wide yellow cats-eye in the center [Acc. 113 (see Figure 50)]. Another was clear, with three white vanes and one yellow vane constituting its cats-eye [Acc. 114 (see Figure 50)]. The last was clear, with a simple green cats-eye at its core [Acc. 91 (see Figure 50)]. The color of the glass bodies of the marbles indicates that three were made in the U.S. (those that were clear glass), while the blue-bodied marble was from outside the U.S. Such marbles were ubiquitous in 20th century America, and their appearance changed little over time from their introduction in the 1930s, making them difficult to date with any accuracy (Inkspot Antiques and Collectibles 2018).



Figure 50. Glass marbles, ca. post-1930s, left to right: Acc. 91, Acc. 112, Acc. 113, Acc. 114.

Ceramic Analysis

All general terminology used here to describe ceramic artifacts has been taken from *The Archaeologist's Fieldwork Companion* (Kipfer 2007), in tandem with the IMACS User's Guide (1992b) maintained by the Department of Anthropology at the University of Utah. For Meiji Period (1868–1912) and later Japanese export ceramics, found in this collection, three works were especially helpful – Richard L. Wilson's *Inside Japanese Ceramics* (1995), Douglas E. Ross's article on "Late-Nineteenth- and Early-Twentieth-Century Japanese Domestic Wares from British Columbia," published in *Ceramics in America* (2012), and an Anthropology master's thesis out of the University of Idaho titled "Connections and Distinctions: Historical Archaeological Analysis of

Japanese Ceramics Recovered from Three Issei Communities in the American West, 1903–1942” (Campbell 2017).

Much archaeologically-driven work has been done in the last 50 years on the history of European and European-descended ceramic industries from the 16th through 19th centuries, establishing firm criteria for identifying and dating artifacts from these traditions. In the early years of historical and post-medieval archaeology, Chinese ceramics only entered into discussions as exports brought to Europe and the Americas through colonial trading companies. Attention was then paid to the effect, albeit profound, that these porcelains had on developments in European and European- descended ceramic industries. Japan was of concern only in as much as the decorative motifs and stylistic choices of its potters influenced the late-19th century Aesthetic movement popular among the wealthy in Britain and America. In both cases, Asian ceramics were thought of as exotic status symbols that Europeans and their colonial descendants used to show off to one another through their possession and use (Barker and Majewski 2006; IMACS 1992b).

As late as 2006 it could be said – by forerunners in the field of historical archaeological ceramics studies – that Asian ceramics had been understudied in everything from developments in their industries to their use around the world, particularly for the 19th and 20th centuries (Barker and Majewski 2006:230). It was only in 1980 that historical archaeologists began publishing on the Chinese diaspora in America, and Asian ceramics began to be examined more deeply and systematically (Wegars 1993:xxiv; Ross 2014). Since then, much has been written, but debate continues, as so much more attention has been paid to Chinese porcelains than to their Japanese counterparts. Chinese forms – rice bowls, tea cups, spoons, and food/drink/sauce jars – and decorative types – including overpainted Famille Rose, Famille Verte, and Imari; blue on white Bamboo and Double Happiness; polychrome Four Seasons; and the pale green celadon glaze – have been catalogued much more extensively and have entered the archaeological consciousness to a greater extent (Choy 2014; IMACS 1992b; DAACS 2016). This has been corrected, to some degree, by those very recent papers on Japanese ceramics mentioned earlier (Ross 2012; Campbell 2017). This progress is reflected in the fact that the 1992 IMACS User’s Guide only includes “Overseas Chinese Ceramics,” whereas the 2016 DAACS Cataloging Manual: Ceramics has an entry specifically on “Porcelain, Japanese,” which even references transfer printing (IMACS 1992b; DAACS 2016:58). All of this means that there is less detailed and reliable information available for the comparative identification of late-19th and 20th century Japanese, and to some extent Chinese, ceramics than there is for European wares.

One of the discontinuities between how archaeologists approach European and Asian ceramics is how they categorize vessel forms for the sake of analysis. Historical archaeologists working from the Atlantic-oriented, European-derived tradition that dominates the Eastern U.S. break historic ceramics into “Teaware,” “Tableware,” and “Utilitarian,” based on where and for what purpose a vessel was used (tea-taking, eating, cooking) (DAACS 2016:12). Those who work in the Western U.S., where immigration from across the Pacific was greater and sites can often be related directly to specific Asian diasporas, consider tea cups to be a “Tableware.” Their system is premised more on the refinement of the ceramic – fine porcelain versus coarse utilitarian ware (IMACS 1992b:5). The latter system was adopted in classifying ceramic vessels within the Punchbowl collection.

The Nānākuli Library assemblage contains only six ceramic artifacts. The only intact piece was a ceramic electrical insulator (Acc. 122); all of the artifacts representing ceramic vessels were fragmentary (n=5).

Dating Ceramics

The fact that late-19th and early-20th century Japanese ceramics are relatively under-researched made dating these ceramic artifacts more difficult. They become more securely datable with the advent of mass-produced Japanese stencil wares (*katagami*), characterized by a broken-line border between decorative fields, which were produced from the 1870s through ca. 1920. This was largely replaced by transfer printing (*dôban*), which was carried over from the Japanese textile industry in 1888, but still bore Asian motifs [e.g., Acc. 109 (Figure 51), 120 (see Figure 51)] (Ross 2012). The development of a wax resist method in Japanese ceramics, where a slightly indented lighter pattern was picked out of a darker background [e.g., Acc. 95 (see Figure 51)], was not developed until the 1970s (Wilson 1995:118). Whether Asian or European-American in origin, hand-painting is not diagnostic of age. Transfer printing began in Europe in the 1780s and continued to be popular into the 19th century [e.g., Acc. 92 (see Figure 51)], being surpassed in popularity in America, though not replaced entirely, by molded “ironstone” wares that bore little colored decoration from the 1850s onward (Barker and Majewski 2006:216). In the absence of decoration, maker’s marks could be used to date ceramics [e.g., Acc. 121 (see Figure 51)] (Fisher 2009).

Ceramics in the assemblage that were datable were manufactured from as early as 1888 to the 1970s, based on decorative techniques.

Typing Ceramics

The assemblage contains five fragments of tableware vessels. Of those five tableware fragments, the following vessel forms were observed:

- 3 bowls (large curved vessels) [Acc. 95, 109, 120 (see Figure 51)]
- 1 cup (small curved vessel) for tea or sake [Acc. 121 (see Figure 51)]
- 1 curved vessel (too small a fragment to discern size) [Acc. 92 (see Figure 51)]

Sourcing Ceramics

The likely origin (place of production) of these artifacts was determined either by researching their maker’s marks or through a combination of vessel form and the method/content of surface decoration.



Figure 51. Ceramic sherds, left to right: Acc. 92 (Euro-American curved vessel, post-1830s), Acc. 95 (Japanese bowl, post-1970s), Acc. 109 (Japanese bowl, post-1888), Acc. 120 (Japanese bowl, post-1888), 121 (Japanese tea/sake cup, post-1908).

Of those ceramic tableware artifacts where origin could be determined, most (n=4) were Japanese [Acc. 95 (see Figure 51), 109 (see Figure 51), 120 (see Figure 51), 121 (see Figure 51)]. One fragment was of indeterminate Euro-American origin, identified by its paste as ‘whiteware’ and design motifs as transfer printed [Acc. 92 (see Figure 51)].

Euro-American Earthenwares

European ceramic production was driven by a series of innovations that brought the product of its kilns closer to those of China, and to some extent Japan. Course earthenware, with a clear glaze over an orangey-red body, was among the oldest ceramic types in Europe and its colonies, going back to the 16th and 17th centuries. At the same time, various European potters were coating this course earthenware in a tin-enamel glaze that gave it a white appearance that could be painted in imitation of distant wares. Refined white-bodied wares were developed from the 1740s onward, first creamware, then blue-tinted pearlware, and finally whiteware from about 1830 [e.g., Acc. 92 (see Figure 51)]. Transfer ware was the major innovation in decoration, first being introduced in the 1780s. The heavy-duty earthenware known as ironstone, which became popular in America from the 1850s, was better suited for long-distance travel and shipment to America’s inland west. On the other end of the refined earthenware spectrum was “bone china” (so called because of the addition of calcined bone to the paste), the closest Europeans came for a long time (from the 1790s through to the 20th century) to producing true porcelain (Barker and Majewski 2006).

The one Euro-American ceramic fragment in this collection represented a piece of whiteware, decorated with blue-on-white transfer printing, that was too fragmentary to determine vessel form [Acc. 92 (see Figure 51)].

Asian Wares

While the differences in European paste types are profound, differences in Asian ceramic pastes can be very difficult to discern. The same typology does not apply at all to Japanese ceramics, which had porcelain (white), half-porcelain (greyish-white), and stoneware (buff/orange). As no Asian stonewares or other utilitarian wares were noted in the collection, all of the Asian ceramics will be considered porcelain for the purposes of this analysis (Campbell 2017:18). Differences in Asian ware types are thus based more on decoration than paste.

Differentiating Chinese and Japanese ceramics is a difficult and not uncontested endeavor. Even the well laid out DAACS Cataloging Manual: Ceramics, exhibits some chronological and geographical confusion in discussing Japanese porcelains and Imari-wares (DAACS 2016). The polychrome Imari-style, monochrome sometsuke (blue on white), and celadon (pale green) wares of Tokugawa Japan (1603–1868) were the Japanese take on Ming Period (1368–1644) Chinese porcelains (Munsterberg 1998:132; Ross 2012). These similarities led many historical archaeologists to assume all Asian wares (i.e., porcelains with decorations depicting Asian motifs) recovered from late-19th century overseas Chinese sites to be Chinese in origin. Closer analysis of the chemical composition of the pigments and glazes used on these ceramics has revealed that some were more likely to have been produced in Japan, where artificial cobalt had been introduced into the ceramic industry at the dawn of the Meiji Period (1868–1912). Japanese sometsuke from the late-19th century onward was thus more brilliant than Chinese blue on white ceramics. The Japanese were also producing transfer wares – a decorative technology of which there is no evidence in the Chinese ceramic industry until much later in the 20th century (Stenger 1993; Ross 2012). Katagami appears to have been a decorative technique that created a distinct visual style unique to Japanese porcelain. Certain vessel forms, like teacups with vertical sides, were also unique to Japanese porcelains, as distinct from Chinese vessels (Campbell 2017; Ross 2012).

Of the three pieces of Japanese porcelain that bore decoration, only two distinct decorative methods were represented. These included:

- 2 *dôban* (transfer printed), one overglaze brown and gray on white [Acc. 109 (see Figure 51)] and one underglaze blue and green floral on white [Acc. 120 (see Figure 51)]
- 1 wax resist [Acc. 95 (see Figure 51)]

These Japanese porcelain fragments all represented curved vessels, three of them larger bowls [Acc. 95 (see Figure 51), 109 (see Figure 51), 120 (see Figure 51)] and one a much smaller tea or sake cup [Acc. 121 (see Figure 51)].

Other Ceramics

One shorted-out white porcelain electrical insulator (with wire attached) was recovered (outside of the septic tank context). It was of the ‘donut’ variety produced in the U.S. from 1927 onward (Acc. 122). Markings indicate that it was a Standard Porcelain 20, Solid Knob No. 20 made by Porcelain Products Inc. of Carey, Ohio (Tod 1977).

Rubber/Plastic Artifact Analysis

Seven rubber or plastic artifacts were accessioned. These include a variety of household items, such as:

- 1 small vulcanized rubber tire on a metal rim, of the type used for a household wheelbarrow or wagon (Acc. 66). Vulcanized rubber was first used for tires in 1888 (Harp 2016:14).
- 1 bowling ball, weighing 15.8 lbs. (probably originally 16 lbs.), with six different finger holes already plugged with wood and three re-drilled (two passing through old plugs), no damage to bridge necessitating this re-drilling [Acc. 33 (Figure 52)]. The original holes appear to be nearly the same distance apart, but were originally larger. The ball is made from hard rubber, thus it was likely manufactured between 1905 and the 1970s (Chetwynd 2011:37–38). It is visually similar to the Brunswick Mineralite Orange Swirl (or Flame) bowling ball (WorthPoint Corporation 2018).
- 3 fragments of a soft plastic (vinyl) baby doll, including its head (with painted white eyes with black pupils) and arms (Acc. 83). Baby dolls of this sort, in this material, became popular from the 1950s onward (Scott 2010:88).
- 1 “Johnson and Johnson Tek Nylon” yellow plastic and nylon toothbrush [Acc. 62 (Figure 53)]. The DuPont company began making nylon toothbrushes in 1938, but this technology was exclusive to another brand until 1940, when Johnson and Johnson began making them (Segrave 2010:31).
- 1 melamine plate fragment, with narrow foot and polychrome decoration (yellow with faint turquoise and black stripes) on upper face (Acc. 111). Melamine was popularized from the 1950s onward (Pickert 2008).



Figure 52. Rubber bowling ball, 1905–1970, Acc. 33.



Figure 53. Plastic toothbrush, post-1940, Acc. 62.

Metal Artifact Analysis

Where it could be determined, the five metal artifacts from this collection ranged in date from 1925–1970. These are described below.

- 3 pieces of flatware:
 - 1 stainless steel spoon embossed with a maple leaf decoration on the handle, and stamped with “STAINLESS STEEL JAPAN” [Acc. 63 (Figure 54)]. The U.S. importation of such Japanese flatware took off in the 1950s, following World War II (Lifshey 1973:317).
 - 1 heavily corroded fork engraved with “United” and shield logo on top of handle near end [Acc. 115 (see Figure 54)]. Visually similar to United Airlines logo and plated silverware from the late 1950s and early 1960s (History of All Logos 2010).
 - 1 heavily corroded plated butter knife [Acc. 116 (see Figure 54)]. This technique for plating flatware was developed and first used ca. 1925 (Lifshey 1973:315).
- 1 large steel hook with a ring at the end, probably intended for towing or lifting (Acc. 34)
- 1 heavily corroded unidentifiable round metal object with a square depression on one face (Acc. 77)

Fired Clay Artifact Analysis

Two fire-resistant bricks were recovered from the site [Acc. 36 (Figure 55), 37 (see Figure 55)]. Both had traces of mortar and metallic corrosion on them, and were marked “A.P. GREEN” “TEXAMO.” From this mark it can be discerned that they were made by the A.P. Green Fire Brick Company in Sulphur Springs, TX sometime between 1910 and 2002 (the dates the facility was active) (Erwin 2010:8).

Analysis of Faunal Remains

A total of 187 fragments of animal bone and tooth were recovered over the course of monitoring. They were all found within the context of the sealed septic tank feature. They included:

- 185 fragments of sea turtle (Acc. 61), possibly from a single animal, including: 60 rib fragments (from at least 3 ribs), 3 fragments (from 2 complete articulated peripheral bones) from the outer edge of the carapace, 88 flat carapace fragments with no diagnostic features, 5 flat carapace edge fragments with no sutures, 10 flat carapace edge fragments with sutures (making 3 articulated pairs), and 19 flat carapace fragments with sutures (making 1 articulated pair) (Wyneken 2001)
- 1 tooth fragment from a molar (cheek tooth) belonging to an ungulate (grass-eating mammal with multi-chambered stomach) (Acc. 8) (Sisson 1914)
- 1 right humerus of a cat-sized mammal (Acc. 93) (Gilbert 1990)



Figure 54. Metal flatware, ca. 1910–2002, left to right: Acc. 63 (ca. post-1950s), Acc. 115 (1950s–1960s), Acc. 116 (post-1925).



Figure 55. Clay bricks, ca. 1910–2002, Acc. 37 (top), Acc. 36 (bottom).

Laboratory Analysis Discussion

While archaeological material was recovered from across the project area, the bulk of the artifacts and specimens (89%) came from the septic tank feature in the southern corner of the site that is known to date to at least the World War II-era (ca. 1942). These numbers are heavily skewed by the inclusion of 185 bone fragments, likely deriving from a single sea turtle, among the assemblage recovered from the septic tank feature. If the faunal assemblage is removed from consideration, a solid majority of artifacts (72%, or 91 of 127) were still recovered from the septic tank feature. The dating, types, and frequency of artifacts recovered from the septic tank were generally similar to those recovered from the site overall (see Figures 41–46). These materials likely represent small-scale dumping activity taking place on the site from its tenure as Camp Andrews through the early 1970s. The whole accessioned assemblage includes 314 items: 107 whole and fragmentary pieces of glass, six ceramic sherds, five metal objects, seven rubber or plastic items, two fired clay bricks, and 187 faunal specimens of bone and tooth. Dates for objects in the assemblage range from possibly the 1830s (small whiteware sherd with transfer print decoration) to as late as the 1970s (Japanese porcelain fragment decorated using wax resist technique).

The glass assemblages of both the overall site and septic tank were both dominated by container glass – including bottles, jars, and jugs. Glass toys were recovered from both assemblages, while glass tableware was only found outside of the septic tank context. Still, 92% of (or 98 of 107) glass artifacts site-wide were container glass, while 96% of (or 76 of 79) glass artifacts from the septic tank were container glass. The glass recovered site-wide dated from as early as 1868 to 1968, while the oldest fragment of glass from the septic tank dated no earlier than 1880. In both assemblages, the number of items peaked in the 1950–1968 period. Of the site-wide container glass for which contents were identifiable (n=86), 47% were alcohol (beer/ale, liquor/spirits) bottles, 27% were soda bottles, 22% were food (milk, baby food, condiments, and seasonings) bottles and jars, and just 4% were household or medicinal bottles. Among the septic tank container glass assemblage (n=68), 55% were alcohol (beer/ale, liquor/spirits) bottles, 26% were soda bottles, 16% were food (baby food and condiment) bottles and jars, and a mere 1% medicinal bottles.

Origin of glass bottles site-wide was dominated by the U.S. West Coast (68%) and other parts of the U.S. (19%), while 13% of the bottles came from outside the U.S. – 3% from Europe and 10% from the Asia-Pacific region. The breakdown of bottle origin was similar for the septic tank: with an overwhelming 75% from the U.S. West Coast, another 20% from other parts of the U.S., and only 6% from outside the U.S., including 2% from Europe and 4% from the Asia-Pacific region. Overall, site-wide container glass was dominated by bottles filled in Hawai‘i (50%), with the U.S. mainland (29%) and the Asia-Pacific region (21%) constituting the remainder of the collection. Within the septic tank container glass assemblage, Hawai‘i (43%) and the U.S. mainland (43%) each constituted an equal share of the bottling location total, with the remaining 14% taken up by items bottled in the Asia-Pacific region.

One item of interest was a glass fragment that had been worked. The piece was clearly knapped, although its function is uncertain.

Only six ceramic sherds were recovered from the site overall, one from the septic tank context, although each could be assigned a date of earliest possible production and place of origin. These ranged from as early as the 1830s to no earlier than the 1970s. Four of the fragments were of Japanese origin, one was of a Euro-American type, and one was made in the U.S. Five of these fragments represented tableware – including three larger curved vessels (bowls) and one smaller curved vessel (tea or sake cup). One ceramic artifact was a porcelain ‘donut’ electrical insulator. There were too few artifacts of this material type to discern patterns in the data.

Five metal objects were recovered from the site overall, three from the septic tank context. Two were relatively undiagnostic pieces, including a metal hook. The remaining three metal artifacts (one from the septic tank) were pieces of flatware (a knife, fork, and spoon) dated to between 1925 and 1970, one produced in Japan. One was stainless steel, while the other two were plated metal.

Seven rubber or plastic artifacts were recovered, including: a small vulcanized rubber tire (likely from a wheelbarrow or wagon), a hard rubber bowling ball, the head and arms of a vinyl baby doll, a plastic and nylon toothbrush, and a fragment of decorated melamine plate. All of these items could be assigned an earliest date of production, based on their material constituents, which ranged from 1888 to the 1950s. Two artifacts also yielded dates after which their popularity waned, both being in the 1970s. The bowling ball and toothbrush were the only two objects whose origin could be determined, both having been produced in the U.S.

Two fire-resistant bricks were also recovered, both made by the same company in the U.S. sometime between 1910 and 2002.

The most notable aspect of the faunal assemblage were the remains of a sea turtle, with carapace and rib fragments recovered. These likely represent food remains. Sea turtle is a common food item in the Pacific, although the use of sea turtle as a food source declined in Hawai'i in the 1970s when it became illegal to hunt them.

The collected materials likely represent small-scale dumping activity taking place on the site from its tenure as Camp Andrews through the early 1970s. This dumping activity peaked from 1950–1968, after the camp's heyday. Despite the fact that the former Camp Andrews had been transferred to the State of Hawai'i in 1962 (Young 2013), artifacts dating to between 1963 and 1968 (the cut-off for archaeological consideration of artifacts) account for 20% of (or 25 out of 127) all non-faunal artifacts recovered site-wide, and 23% of (or 21 out of 91) non-faunal artifacts recovered from the septic tank feature. The proportion of artifacts from this short time (20–23%) is more than expected for a period of six years that represented just 14% of the time for which tight dates could be attributed to artifacts (1925–1968). From the artifacts recovered and the nature of the septic tank feature, it appears that the septic tank remained open to the air after the standing structures of Camp Andrews, which it had serviced, had been demolished sometime after 1952 (Young 2013). The septic tank must have been sealed when the area was repurposed through re-surfacing early in the 1970s, putting an end to its use as an informal dump.

Certain patterns in the artifacts recovered from the project area indicate how the site was used in the past. They shed light on how the area was used beyond what is known about its history as a World War II-era recreation facility, as most of the items recovered date to after Camp Andrews' heyday in the 1940s. The limited variety of artifacts and their depositional context would indicate that the septic tank functioned as a dump for things used and consumed in its immediate vicinity. This included far more glass bottles, jars, and jugs (i.e., container glass) than any other type of glass (i.e., toys). While beer was the predominant bottle type, sodas, and baby food were also prevalent in both the septic tank and site-wide. This indicates that family-like groups (adults and children) were consuming food and drink here in the past.

Unlike the septic tank, the site in general also yielded large fragments of glass and ceramic tableware, which would have been portable enough to bring to the site for use during recreational dining. Metal dining utensils were also found in both the septic tank and site-wide, potentially also used for dining on-site.

A number of objects related to play and recreation were also found in the septic tank, including a bowling ball, baby doll parts, and one of four marbles (the other three were found elsewhere on the site). The doll and marbles also point to the presence of children here in the past.

The toothbrush found in the septic tank relates to personal hygiene, and was old enough, portable enough, and small enough to have possibly been deposited in the septic tank during its use in the Camp Andrews period.

The few industrial artifacts found – two bricks, a ceramic electrical insulator, small tire, and metal hook – could all have been deposited when the camp was being demolished. All were found within the septic tank, aside from the insulator.

The general absence of building material rubble, and complete lack of flat window glass, attests to the minimalist camp nature of the recreational facilities previously located in the project area (Criminger n.d.; Young 2013; Young 2016).

Summary of Results

In sum, library construction work in Nānākuli was monitored on a portion of TMK: (1) 8-9-002:065, located on the leeward side of O‘ahu. All monitoring was conducted in the single, contiguous parcel that constituted the project area. Excavations occurred across the site, including: the digging of drywells for drainage; trenching for water lines, sewer lines, and drainage lines; grading; and the digging of structure foundations.

Stratigraphy was relatively uniform throughout the project area, generally consisting of fill above solid coral. Two buried concrete structures were encountered. The largest (Feature 1) is a septic tank, while the smaller structure is thought to be a pipe well remnant (Feature 2). Both features may be associated with the former Camp Andrews, SIHP 50-80-07-5946. A variety of historic material was collected from the excavations, particularly within the septic tank, which appears to have been used as a dump after it was abandoned. Analysis of collections from within the septic tank feature and elsewhere in the project site indicates similar trends of artifact discard across both areas.

The artifact assemblage consists mainly of glass and animal bone, although rubber, plastic, metal, ceramic, and brick items are also represented. Glass includes containers (bottles, jars, jugs), tableware, and toys; while the majority of bone was likely from a single sea turtle. Container glass contents consist mostly of alcohol, soda, and food, with a few household or medicinal items also found. Most of the datable cultural material was from the time period of 1950–1968, after the camp’s heyday.

SUMMARY AND CONCLUSION

In summary, archaeological monitoring was conducted for ground disturbing activity associated with construction of the Nānākuli Library on TMK: (1) 8-9-002:065 (por.) in Nānākuli Ahupua‘a, Wai‘anae District, on the island of O‘ahu. Located in the current project area are the remains of the former Camp Andrews, a military recreation area dating to the 1940s. SIHP 50-80-07-7677, consisting of two coral pillars that once marked the entrance to the camp were preserved in place. Camp Andrews as a whole has been previously designated as SIHP 50-80-07-5946. Two new features of this site were identified during archaeological monitoring. They are a large septic tank and a possible pump well remnant. These features were dismantled and/or infilled and are no longer visible on the surface. Stratigraphy was relatively uniform throughout the project area, generally consisting of fill above solid coral.

A wide variety of historic material was recovered during monitoring, particularly from the septic tank excavations. This consists mainly of glass and animal bone, although rubber, plastic, metal, ceramic, and brick items were also collected. Glass includes containers (bottles, jars, jugs), tableware, and toys; while the majority of bone was likely from a single sea turtle. Most of the datable cultural material was from the time period of 1950–1968, after the heyday of Camp Andrews. It appears that the septic tank feature functioned as a dumping area after it was no longer in use by the camp.

GLOSSARY

ahupua‘a	Traditional Hawaiian land division usually extending from the uplands to the sea.
‘āina	Land.
‘āpana	Piece, slice, section, part, land segment, lot, district.
heiau	Place of worship and ritual in traditional Hawai‘i.
‘ili	Land division, next in importance to ahupua‘a and usually a subdivision of an ahupua‘a.
inoa	Name, title, or namesake.
koa haole	The small tree <i>Leucaena glauca</i> , historically-introduced to Hawai‘i.
kula	Plain, field, open country, pasture, land with no water rights.
kuleana	Right, title, property, portion, responsibility, jurisdiction, authority, interest, claim, ownership.
Māhele	The 1848 division of land.
makai	Toward the sea.
mauka	Inland, upland, toward the mountain.
mele	Song, chant, or poem.
midden	A heap or stratum of refuse normally found on the site of an ancient settlement. In Hawai‘i, the term generally refers to food remains, whether or not they appear as a heap or stratum.
moku	District, island.
mo‘olelo	A story, myth, history, tradition, legend, or record.
muliwai	River mouth, estuary, or pool near the mouth of a stream, enlarged by ocean water left there at high tide.
‘ōlelo no‘eau	Proverb, wise saying, traditional saying.
oli	Chant.
‘opihi	Limpets, four types of which are endemic to Hawai‘i: <i>Cellana exarata</i> (‘opihi makaiauli), <i>C. sandwicensis</i> (‘opihi alinalina), <i>C. talcosa</i> (‘opihi ko‘ele), and <i>C. melanostoma</i> (no Hawaiian name). ‘Opihi are a prized food in Hawai‘i and considered a rare treat today.

pre-contact	Prior to A.D. 1778 and the first written records of the Hawaiian Islands made by Captain James Cook and his crew.
pu‘u	Hill, mound, peak.
‘uala	The sweet potato, or <i>Ipomoea batatas</i> , a Polynesian introduction.
‘ulu	The Polynesian-introduced tree <i>Artocarpus altilis</i> , or breadfruit.
wauke	The paper mulberry, or <i>Broussonetia papyrifera</i> , which was made into tapa cloth in traditional Hawai‘i.

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APPENDIX A: SHPD REVIEW LETTERS FOR TMK: (1) 8-9-00:065

November 13, 2001

Mr. David Shideler, O`ahu Office Manager
Cultural Surveys Hawaii, Inc.
733 N. Kalaheo Avenue
Kailua, Hawaii 96734

LOG NO: 28574
DOC NO: 0111SC09

Dear Mr. Shideler:

SUBJECT: Chapter 6E-8 Historic Preservation Review of a Draft Report Documenting
the Results of an Archaeological Inventory Survey at the Proposed Nanakuli
IV Elementary School Site
Nanakuli, Wai`anae, O`ahu
TMK: (1)-8-9-002: 065

Thank you for the submission of a draft report documenting the results of an archaeological inventory survey at a proposed elementary school site in Nanakuli, O`ahu (McDermott et al. 2001. *Archaeological Inventory Survey of the Proposed 15-Acre Nanakuli IV Elementary School Site [A Portion of the Former Camp Andrews], Nanakuli Ahupua`a, Wai`anae, District, Island of O`ahu* [TMK: 8-9-02:65 Cultural Surveys Hawaii ms.]).

The historical background section is good and contains valuable oral historical information. The section on previous archaeological work in the area is acceptable, and provides adequate data for hypothesizing likely settlement patterns in the project area.

We believe that the fieldwork was adequate, covering the 15-acre school parcel through a combination of pedestrian survey and excavation work in 17 sinkholes. A total of two significant historic sites were found. Site 5946 comprises the former Camp Andrews installation. Site No. 5947 consists of traditional Native Hawaiian cultural deposits, including human burials, and pre-human palaeontological deposits found in the sinkholes on the property. Stratigraphic, palaeoenvironmental, and radiocarbon data indicate that the sinkhole deposits (both cultural and palaeontological) have undergone mixing, probably due to a combination of surface sheet wash, aeolian deposition, and bioturbation. Nonetheless, important cultural and palaeontological remains – especially the bones of a number of extinct, endemic avifauna – were recovered from a number of the sinkholes.

The skeletal remains of at least three humans were found during the survey. One burial (representing the remains of one adult individual) was found and left *in situ* in Sink #2. Fragmentary portions of at least two individuals (a newborn infant and a 2-3 year-old child) were recovered from midden deposits in Sink #9. All remains are believed to be those of Native Hawaiians, based on contextual evidence. Estimated time since death in all cases is greater than 50 years.

Mr. David Shideler, O`ahu Office Manager
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We agree with the significance evaluations proposed. Site 5946 was deemed significant for its potential to yield information on Hawaii's history. Site 5947 was deemed significant for its potential to yield information on Hawaii's past, and for traditional cultural importance to an ethnic group.

No mitigation work is recommended for Site 5946 and we concur with this recommendation; sufficient information was gathered during the inventory survey. Site-5947 is recommended to undergo mitigation, including preparation of a burial treatment plan, an archaeological data recovery plan, and an archaeological monitoring plan. We generally concur with these recommendations, but have specific, recommended revisions to them, particularly with respect to which sinkholes merit data recovery. Our recommended changes are listed in the following Attachment.

Revisions may be submitted on separate pages for inclusion with the report copy on file at our office. When we receive the revisions, we anticipate accepting the report as final.

The next steps in the historic preservation review process will be the preparation of an archaeological data recovery plan for further excavations in some of the sinkholes, an archaeological monitoring plan, and a burial treatment plan. Please consult with our Burial Programs staff on the preparation of the burial treatment plan.

As always, if you disagree with any comments made here or have questions, please contact our review staff as soon as possible so the concerns may be resolved. Should you have any questions on archaeology, please feel free to contact Sara Collins at 692-8026. Should you have any questions on burial matters, please feel free to contact Kai Markell at 587-0008.

Aloha,

Don Hibbard, Administrator
State Historic Preservation Division

SC:jk

c: Mr. A. Van Horn Diamond, Chair, O`ahu Island Burial Council
Mr. Kai Markell, Burial Sites Program

ATTACHMENT
ARCHAEOLOGICAL INVENTORY SURVEY AT NANKULI IV
CULTURAL SURVEYS HAWAII

Inventory Findings, Site No. 50-80-07-5947

(1) Page 73, Paragraph 3: Although you don't say so explicitly, we assume that your last sentence implies that further investigation, in the form of data recovery excavations, is warranted at Sink #1.

(2) Pages 78-79: As discussed below, Sink #2 will not undergo data recovery excavations, per recommendation of the O'ahu Island Burial Council (OIBC).

(3) Page 88, Paragraph 1: We do not concur with your determination that no further work is warranted at Sink #5. Judging from our review of Dr. Ziegler's findings (Appendix A) and the plan map provided here (Figure 28), we believe that it is likely additional, significant deposits – particularly palaeontological ones – still exist within the sinkhole. Consequently, data recovery work would be the preferred method of recovering such remains.

(4) Page 96, Paragraph 1: We do not concur with your determination that no further work is warranted at Sink #8. Judging from our review of Dr. Ziegler's findings (Appendix A) and the plan map provided here (Figure 33), we believe that it is likely additional, significant deposits – particularly palaeontological ones – still exist within the sinkhole. Consequently, data recovery work would be the preferred method of recovering such remains.

(5) Pages 96-103: Judging from our review of Dr. Ziegler's findings (Appendix A) and the plan map provided here (Figure 34), we believe that it is likely additional, significant deposits – particularly palaeontological ones – still exist within the sinkhole. Consequently, data recovery work would be the preferred method of recovering such remains.

Mitigation Commitments

Recommendations, Site 50-80-07-5947: Data Recovery

(1) As you know, the OIBC, at its regular meeting on October 10, 2001, recommended that no further excavations, including data recovery, be carried out within Sink #2. Subsequent to that meeting, the Department of Accounting and General Services (DAGS) proposed to use Sink #2 as the reinterment site for the entire school project area, leaving *in situ* the one burial, and reintering any other human remains from the subject parcel within that sink. It seems likely that the OIBC will concur with this additional step at its next meeting on November 14, 2001. Consequently, you will need to revise this section so as to omit any plans for data recovery work at Sink #2.

(2) Judging from the data presented in the report, it appears that four sinks may yet contain sufficient deposits for data recovery work. Contrary to some of the recommendations made in the report text, we believe that data recovery is warranted at Sinks #1, 5, 8, and 9, provided deposits are present and accessible. We base our recommendations in part on the findings made during Dr. Ziegler's analyses of faunal bones (Appendix A) from these sinks which clearly indicate that significant avifauna remains are present. Assuming that sufficient deposits are still present, we would recommend that one 1m² be excavated in Sinks 1, 5, and 8; Sink #9 may be able to accommodate a unit measuring 1m by 2m or 1m by 1.5m in size. We are quite willing to discuss these recommendations and revise them in light of your staff's field experiences on the subject parcel.



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE
MANAGEMENT
CONSERVATION AND RESOURCES
ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS

December 7, 2001

Mr. David Shideler, O`ahu Office Manager
Cultural Surveys Hawaii, Inc.
733 Kalaheo Avenue
Kailua, Hawaii 96734

LOG NO: 28696 ✓
DOC NO: 0111SC25

Dear Mr. Shideler:

SUBJECT: Chapter 6E-8 Historic Preservation Review of Revisions Made to an
Archaeological Inventory Survey Report for the Proposed 15-Acre
Nanakuli IV Elementary School Construction
Nanakuli, Wai`anae, O`ahu
TMK: (1)-8-9-002:065

Thank you for the prompt submission of recommended revisions to this archaeological inventory survey report, which were submitted November 15, 2001 (McDermott et al. 2001. *Archaeological Inventory Survey of the Proposed 15-Acre Nanakuli IV Elementary School Site [A Portion of the Former Camp Andrews], Nanakuli Ahupua`a, Wai`anae District, Island of O`ahu [TMK: 8-9-02:65]*). These revisions respond to our review letter of November 2001 (Log: 28,574; Doc: 0111SC09).

The revisions have been made acceptably, and we find the inventory survey report to be acceptable.

Pursuant to more recent discussion among Sara Collins of our staff, you, and Matt McDermott, we recommend that the following steps be taken with regard to further mitigation work, including archaeological data recovery and monitoring. We note that these recommendations are predicated on the determination made by the Department of Accounting and General Services (DAGS) to carry out construction-related activities on TMK: (1)-8-9-002:065, Lot C – currently the property of the Department of Hawaiian Homelands.

- (1) Data recovery excavations will take place within Sinks 5 and 9. In Sink 5, further data recovery work shall include the taking of column samples in order to acquire additional palaeontological and palaeoenvironmental data. In Sink 9, further data recovery fieldwork shall include the excavation of approximately

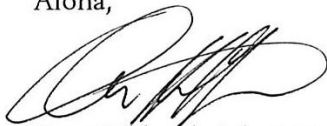
1.0 to 1.5 square meters of remaining deposits. With regard to both Sinks 5 and 9, data recovery work shall include laboratory analyses of recovered deposits and AMS dating of radiocarbon samples. A report of findings made during data recovery shall be submitted to the State Historic Preservation Division for review and approval.

- (2) In developing the mitigation plan, the Department of Land Natural Resources has agreed that the Native Hawaiian burial found in Sink 2 can safely be preserved in place within a reinforced concrete ring, as depicted in Option B of the Kober, Hansen, Mitchell Architects' proposal.
- (3) Archaeological monitoring shall be conducted on-site by a qualified archaeologist during all ground-disturbing activities, including the construction of the reinterment facility at Sink 2. Prior to beginning any ground disturbance, an acceptable archaeological monitoring plan shall be submitted to the State Historic Preservation Division for review and approval.

We believe that if these mitigation steps are fulfilled, then construction of the proposed Nanakuli IV Elementary School will have "no adverse effect" on significant historic sites.

Should you have any questions about archaeology, please feel free to contact Sara Collins at 692-8026. Should you have any questions about burial matters, please feel free to contact Kai Markell at 587-0008.

Aloha,



Don Hibbard, Administrator
State Historic Preservation Division

SC:jk

- c Mr. A. Van Horn Diamond, Chair, O`ahu Island Burial Council
 Mr. Kai Markell, Burial Sites Program



LINDA LINGLE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE HISTORIC PRESERVATION DIVISION
601 KAMOKILA BOULEVARD, ROOM 555
KAPOLEI, HAWAII 96707

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KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

December 22, 2008

Mr. David Shideler
Cultural Surveys Hawaii
P. O. Box 1114
Kailua, Hawai'i 96734

LOG NO: 2008.5716
DOC NO: 0812WT77
Archaeology

Dear Mr. Shideler:

**SUBJECT: Chapter 6E-42 Historic Preservation Review –
FINAL Data Recovery Report for Site 50-80-07-5947, Nānākuli Ahupua'a,
Wai'anae District, O'ahu, Hawai'i
TMK: (1) 8-9-002: 065, 071, & 089**

Thank you for providing the opportunity for us to review the aforementioned Final Archaeological Data Recovery report (DRR) we received on December 12, 2008.

Data recovery efforts concentrated on mitigating impacts to an historic property by the construction of the Nānākuli IV Elementary School, Nānākuli Public Library and the new Leeward Head Start Program on a 15 acre parcel. Two sites were recorded during the inventory survey phase of this project; SIHP 50-80-07-5946, a remnant of WWII Camp Andrews, and SIHP 50-80-07-5947, 17 sinkhole features. Both were deemed eligible for the State and National Registers of Historic Places, though only features 1, 4, and 12 on Site 5947 were investigated during data recovery efforts. No further work was recommended for Site 50-80-07-5946.

This work produced Native Hawaiian artifacts, paleontological remains in the form of extinct avian fauna, and a human burial.

The Data Recovery Report meets the minimum requirements, and is accepted as compliance with 6E-42 and Hawaii Administrative Rules (HAR) §13-13-278 *Rules Governing Standards for Archaeological Data Recovery Studies and Reports*.

Please call Wendy Tolleson at (808) 692-8024 if you have any questions or concerns regarding this letter.

Aloha,

Nancy McMahon, Deputy SHPO/State Archaeologist
and Historic Preservation Manager

DAVID Y. IGE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE HISTORIC PRESERVATION DIVISION
601 KAMOKILA BOULEVARD, ROOM 555
KAPOLEI, HAWAII 96707

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BOARD OF LAND AND NATURAL RESOURCES
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FIRST DEPUTY

WILLIAM M. TAM
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KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

December 1, 2014

Windy McElroy, Ph.D.
Keala Pono Archaeological Consulting
47-724D Ahuimianu Loop
Kaneohe, Hawaii 96744

LOG NO: 2014.04655
DOC NO: 1412SL02
Archaeology

Dear Dr. McElroy:

Subject: **Chapter 6E-8 Historic Preservation Review –
Archaeological Monitoring Plan for the Proposed Nānākuli Library
Nānākuli Ahupua'a, Wai'anae District, Island of O'ahu
TMK: (1) 8-9-002:065 por.**

Thank you for the opportunity to review this revised plan titled *Archaeological Monitoring Plan for the Proposed Nānākuli Library, Nānākuli Ahupua'a, Wai'anae District, Island of O'ahu, Hawai'i, TMK: (1) 8-9-002:065 (por.)* (McElroy et al., October 2014). We received this submittal on October 16, 2014. The plan was prepared for CDS International on behalf of the State of Hawaii. The proposed project involves the construction of a new 18,000 square foot public library.

The project area totals 3.675 acres of a 15-acre property owned by the State of Hawaii. It is located on the *mauka* (inland) side of Farrington Highway, which serves as the western property boundary. A canal borders the parcel on the south, and Nānāikapono Elementary School and its driveway are on the north and east. An archaeological inventory survey (AIS) completed for the entire 15 acres (McDermott et al. 2001) was reviewed and accepted by SHPD on December 7, 2001 (Log No. 28696, Doc. No. 0111SC25). The AIS newly-identified two historic properties, a sinkhole complex (Site 50-80-07-5947) and the former Camp Andrews installation (Site 50-80-07-5946).

Site 5947 is a traditional Hawaiian cultural deposit including human burials and pre-human paleontological remains within a sinkhole. The data recovery conducted for Site 5947 (Shideler et al. 2008) was reviewed and accepted by December 22, 2008 (Log No. 2008.5716, Doc. No. 0812WT77). No further work was recommended for Site 5946, which is located within the current project area. During community consultation for the current project, the two mortared coral pillars that marked the entrance of the Camp Andrews were recommended for preservation and were designated as Site 50-80-07-7677 (SHPD, Site Inventory of Historic Properties (SIHP), August 14, 2014).

The archaeological monitoring plan provides adequate discussion of the project, physical setting, cultural and historical background, previous archaeological studies, and the monitoring provisions. Also presented are the interim protection measures that will be implemented for Site 7677. A 10-ft. buffer zone will be established around Site 7677 using construction fencing and/or other high visibility material. No ground disturbing work will be allowed within the buffer zone. A preservation plan detailing the long term preservation measures for Site 7677 and any other significant sites identified during monitoring will be completed following construction. This plan will be completed within four months following the end of the archaeological monitoring fieldwork.

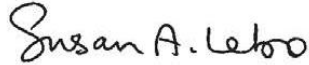
The revisions adequately address the issues and concerns raised in our earlier correspondence (October 6, 2014; Log No. 2014.03779, Doc. No. 1410SL07). The archaeological monitoring plans meets the requirements set forth in

Keala Pono
AMP Nanakuli Library
December 1, 2014
Page 2

Hawaii Administrative Rule (HAR) §13-279-4. It is accepted. Please send one hardcopy of the document, clearly marked FINAL, along with a copy of this review letter and a text-searchable PDF version on CD to the Kapolei SHPD office.

Please contact me at (808) 692-8019 or at Susan.A.Lebo@hawaii.gov if you have any questions or concerns regarding this letter.

Aloha,

A handwritten signature in black ink that reads "Susan A. Lebo". The signature is written in a cursive, flowing style.

Susan A. Lebo, PhD
Oahu Lead Archaeologist

APPENDIX B: CATALOG OF ACCESSIONED ARTIFACTS

Glass Artifacts

Acc.	Provenience	L/H (cm)	Di. (cm) Bore; Base	Contents-Company	Origin of Bottle; Bottling Location	Date	Glass Color	Glass Type	Fragment or Whole	Description
1	Septic	15.5	2.7; 5.9	Beer	US Mainland; —	1944–1985	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, missing label. Embossed "NO DEPOSIT" ★ (star) "NO RETURN" "NOT TO BE REFILLED" on shoulder. Maker's Mark: "168-I1A / 3 / MTC" embossed on base – Thatcher Glass Mfg. Co. No date code. Started making 'next generation beer bottles' in 1944. Stippled bands around shoulder and heel. Larger stippling encircling base.
2	Septic	16.0	2.7; 6.5	Beer	Seattle, WA; —	1965	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, missing label. Embossed "NO DEPOSIT NO RETURN" on shoulder; "NOT TO BE REFILLED" on heel, surrounded by stippling. Maker's Mark: "N ^W " "656" "65" "A 4" embossed on base – Northwestern Glass Co. Stippling encircling base.
3	Septic	20.5	2.7; 5.8	Soda - Canada Dry	Fairmont, WV; —	1948	Green	Container - Bottle	W	Whole green glass bottle, most of ACL missing. ACL red text on white shield with map lines "CANA... / ...RY". Maker's Mark: "C-94" "Duraglas (in script)" "3 / I (inside of intertwined) O and diamond / 48" "80" embossed over field of stippling covering base – Owens-Illinois.
4	Septic	16.0	2.7; 6.5	Beer	Seattle, WA; —	1965	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, partial paper label. Embossed "NO DEPOSIT NO RETURN" on shoulder, "NOT TO BE REFILLED" on heel. Lower righthand corner of paper label reads "...INGTON". Maker's Mark: "N ^W " "656" "65" "B7" embossed on base – Northwestern Glass Co. Faint stippled band around heel. Stippling encircling base.
5	Septic	16.0	2.7; 6.5	Beer	CA; —	1957	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, heavily degraded paper label. Embossed "NO DEPOSIT NO RETURN" on shoulder; "NOT TO BE REFILLED" (x2) on heel. Maker's Mark: "V / (angular intertwined) GC / 7" "10B" "4811" embossed on base – Glass Containers Corp. Stippled bands around shoulder and heel. Larger stippling encircling base.

Acc.	Provenience	L/H (cm)	Di. (cm) Bore; Base	Contents-Company	Origin of Bottle; Bottling Location	Date	Glass Color	Glass Type	Fragment or Whole	Description
6	Septic	7.7	2.7; 6.3	Soda	—; —	1940 -	Clear	Container - Bottle	W	Whole clear glass bottle, heavily patinated. Embossed: "NO DEPOSIT NO RETURN" on shoulder.
7	Septic	16.2	2.7; 6	Beer	Seattle, WA; —	1965	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, missing label. Embossed "NO DEPOSIT NO RETURN" on shoulder, "NOT TO BE REFILLED" (x2) on heel. Maker's Mark: "N-W" "657" "65" "C20" embossed on base – Northwestern Glass Co. Stippled bands around shoulder and heel. Larger stippling encircling base.
9	Septic	20.5	2.7; 5.8	Soda - Canada Dry	York, England; —	1964	Clear	Container - Bottle	W	Whole clear glass bottle. ACL white bands above white text "WHOLESOME" (x2) red text on white shield "WORLD FAMOUS" white text "DE..." on neck; red text in white shield surmounted by white crown "CANADA DRY" "BEVERAGES" (last word in script) white text "CONTENTS" on body front; white text "MANUFAC...U... / CANADA DR..." "BY / CANAD..." on body back. Maker's Mark: " 11 / N (inside of) diamond / Y" "64" embossed on base – National Glass Works, York, England. Entire surface stippled from mid-neck to heel. Larger stippling encircling base.
10	Septic	15.5	2.7; 5.9	Beer	CA;	1964	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, missing label. Embossed "NO DEPOSIT" star (★) "NO RETURN" on shoulder. Maker's Mark: "V / (angular intertwined) GC / 64" 42" "4809" embossed on base – Glass Containers Corporation. Stippled bands around shoulder and heel. Larger stippling encircling base.
11	Septic	7.3	5; 5.7	Food - Baby Food	—; —	1954–2000s	Clear	Container - Jar	W	Whole clear glass jar, missing label. Maker's Mark: "I (inside of) O" "9AZ" – Owens-Illinois. Possibly baby food jar, from shape.
12	Septic	20.0	2.7; 5.8	Soda - Coca-Cola	—; —	1963	Aqua green	Container - Bottle	W	Whole aqua green glass hobble-skirt bottle. ACL white "COCA-COLA" (x2) in script on body. Embossed "CONTENTS 6 1/2 FL OZS." "REG. U.S. PAT. OFF." on body. "63-11" embossed on skirt. Stippling encircling base.

Acc.	Provenience	L/H (cm)	Di. (cm) Bore; Base	Contents-Company	Origin of Bottle; Bottling Location	Date	Glass Color	Glass Type	Fragment or Whole	Description
13	Septic	15.0	2.7; 6	Beer	Oakland, CA; —	1954–2000s	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, unreadable paper label. Embossed "NO DEPOSIT" ★ (star) "NO RETURN" "NOT TO BE REFILLED" on shoulder. Maker's Mark: "20 / I (inside of) O / 0" "2E" "20075-GB" embossed on base – Owens-Illinois. GB – beverage container. Stippled band running around heel. Larger stippling encircling base.
14	Septic	16.0	2.7; 6	Beer	Seattle, WA; —	1965	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, label missing. Embossed "NO DEPOSIT NO RETURN" on shoulder, "NOT TO BE RETURNED" on heel. Maker's Mark: "N~W" "656" "65" "A 26" embossed on base – Northwestern Glass Co. Stippling encircling base.
15	Septic	16.3	2.7; 5.8	Beer	Seattle, WA; —	1965	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, unreadable label. Embossed "NO DEPOSIT NO RETURN" on shoulder, "NOT TO BE RETURNED" (x2) on heel. Label reads "CA..." in red "BLA... (in script)" in white on dark background on body – Carling's Black Label. Maker's Mark: "N~W" "657" "65" "C 28" embossed on base – Northwestern Glass Co. Stippled band running around shoulder and heel. Larger stippling encircling base.
16	Septic	15.0	2.7; 6	Beer	Oakland, CA; —	1954–2000s	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, label missing. Embossed "NO DEPOSIT" ★ (star) "NO RETURN" on shoulder. Makers Mark: "20 / I (inside of) O / 0" "8 • E" "20075-GB" embossed on base – Owens-Illinois. GB – beverage container. Stippled band running around heel. Larger stippling encircling base.
17	Septic	15.5	2.7; 6	Beer	Oakland, CA; —	1954–2000s	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, label missing. Embossed "NO DEPOSIT" ★ (star) "NO RETURN" "NOT TO BE REFILLED" on shoulder. Maker's Mark: "20 / I (inside of) O / 2" "5:CC" "11GB" embossed on base – Owens-Illinois. GB – beverage container. Stippled band running around shoulder and heel. Larger stippling encircling base.

Acc.	Provenience	L/H (cm)	Di. (cm) Bore; Base	Contents-Company	Origin of Bottle; Bottling Location	Date	Glass Color	Glass Type	Fragment or Whole	Description
18	Septic	15.0	2.7; 6.5	Beer	Oakland, CA; —	1954–2000s	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, label missing. Embossed "NO DEPOSIT" ★ (star) "NO RETURN" "NOT TO BE REFILLED" on shoulder. Maker's Mark: "20 / I (inside of) O / 1" "5BB" "20079-GB" embossed on base – Owens-Illinois. GB – beverage containers. Stippled band running around heel. Larger stippling encircling base.
19	Septic	16.0	2.7; 6	Beer-Olympia Brewing Co.	Seattle, WA; Tumwater, WA	1965	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, only partial paper label. Embossed "NO DEPOSIT NO RETURN" on shoulder, "NOT TO BE REFILLED" on heel. Black on yellow "Bottled by Olympia" on lower left corner, upside-down yellow horseshoe, red "S[T]U[BBY]" on paper label on body. Makers Mark: "N~W" "656" "65" "A7" embossed on base – Northwestern Glass Co. Olympia Brewing Company beer bottle, very popular brand in Pacific Northwest for half a century. Stippled band running around heel. Larger stippling encircling base.
20	Septic	8.0	3.7; —	—	—; —	1959	Clear	Container - Jug	F	Neck and handle fragment of clear glass jug. Embossed "DES. PAT. 184991" at base of neck. US Patent of April 28th, 1959 for Owens-Illinois. Patents is only for neck and handle.
21	Septic	11.4	5; 5.4	—	—; —	1889	Clear	Container - Jar	W	Whole clear glass jar, label missing. Maker's Mark: "4" "9" embossed on base. Machine-made with cup mold and post mold seams, from 2-part process of production.
22	Septic	16.0	2.7; 6.5	Beer-Lucky Beer	Oakland, CA; Western US Mainland	1965	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, label missing. Embossed "LUCKY Premium (in script) BEER" (x2) on shoulder, "NO DEPOSIT NO RETURN" on heel. Maker's Mark: Base "20 / I (inside of) O / 65" "20413-GB" 580" "NOT TO BE REFILLED" embossed on base – Owens-Illinois. GB – beverage containers. Lucky Lager Breweries operated in CA, WA, UT during this period. Stippled band running around shoulder and heel. Larger stippling encircling base.

Acc.	Provenience	L/H (cm)	Di. (cm) Bore; Base	Contents-Company	Origin of Bottle; Bottling Location	Date	Glass Color	Glass Type	Fragment or Whole	Description
23	Septic	7.3	5; 5.4	Food - Baby Food	—; —	1960s	Clear	Container - Jar	W	Whole clear glass jar, label missing. No other bottle marks.
24	Septic	15.0	2.7; 6	Beer - Primo	Oakland, CA; HI	ca. 1961	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, heavily degraded paper label. Embossed "NO DEPOSIT" ★ (star) "NO RETURN" "NOT TO BE REFILLED" on shoulder. Label has wave pattern in white on dark background in corners, "[PRIM]O (in script)" "THE [HAWAII] BEER" in white on dark background on body – ca. 1961 label design. Maker's Mark: "20 / I (inside of) O / 0" "3 • C" 20075-GB" embossed on base – Owens-Illinois. Stippled band running around heel. Larger stippling encircling base.
25	Septic	7.3	5; 5.7	Food - Baby Food	—; —	1954–2000s	Clear	Container - Jar	W	Whole clear glass jar, label missing. Maker's Mark: "I (inside of) O" "21GU" embossed on base – Owens-Illinois.
26	Septic	16.0	2.7; 6	Beer	Seattle, WA; —	1965	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, label missing. Embossed "NO DEPOSIT NO RETURN" on shoulder, "NOT TO BE REFILLED" (x2) on heel. Paper label reads "CA..." in red "B..." in white on dark background – Carling's Black Label. Maker's Mark: "N-W" "657" "65" "C 19" embossed on base – Northwestern Glass Co. Stippled band running around shoulder and heel. Larger stippling encircling base.
27	Septic	16.2	2.7; 6	Beer	Seattle, WA; —	1964	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, label missing. Embossed "NO DEPOSIT NO RETURN" on shoulder, "NOT TO BE REFILLED" on heel. Maker's Mark: "N-W" "656" "64" "F22" embossed on base – Northwestern Glass Co. Stippled band running around heel. Larger stippling encircling base.

Acc.	Provenience	L/H (cm)	Di. (cm) Bore; Base	Contents-Company	Origin of Bottle; Bottling Location	Date	Glass Color	Glass Type	Fragment or Whole	Description
28	Septic	15.0	2.7; 6	Beer	Oakland, CA; —	1954-2000s	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, partial paper label. Embossed "NO DEPOSIT" ★ (star) "NO RETURN" "NOT TO BE REFILLED" on shoulder. Dark star on lighter background is only legible mark on label. Maker's Mark: "20 / I (inside of) O / 0" "5 • C" "20075-GB" embossed on base – Owens-Illinois. Stippled band running around heel. Larger stippling encircling base.
29	Septic	16.0	2.7; 6	Beer	Seattle, WA; —	1964	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, label missing. Embossed "NO DEPOSIT NO RETURN" on shoulder, "NOT TO BE REFILLED" on heel. Maker's Mark: "N~W" "656" "64" "F2" embossed on base – Northwestern Glass Co. Stippled band running around heel. Larger stippling encircling base.
30	Septic	7.3	5; 5.7	Food - Baby Food	—; —	1954-2000s	Clear	Container - Jar	W	Whole clear glass jar, label missing. Maker's Mark: "I (inside of) O" "17DD" embossed on base – Owens-Illinois.
31	Septic	7.3	5; 5.7	Food - Baby Food	US Mainland; —	1938-ca. 1980	Clear	Container - Jar	W	Whole clear glass jar, label missing. Maker's Mark: "(intertwined) Anchor-H" "4" "8" embossed on base – Anchor Hocking Glass Corp.
32	Septic	20.0	2.7; 5.7	Soda - Coca-Cola	—; —	1966	Aqua green	Container - Bottle	W	Whole aqua green glass hobble-skirt bottle, degraded label. ACL white "...-C...L" on body. Embossed "CONTENTS 6 1/2 FL. OZS." "REG. U.S. PAT. OFF." on body. Maker's Mark: "66-08" embossed on skirt. Stippling encircling base.
35	Septic	8.3	—; 8.3	—	Los Angeles, CA; —	1961	Aqua	Container	W	Aqua glass container base fragment. Maker's Mark: "3 / (intertwined) Anchor-H / 61" "10" embossed on base – Anchor Hocking Glass Corp. Stippling encircling base. Machine-made (off-center seam on base from 2-part process).

Acc.	Provenience	L/H (cm)	Di. (cm) Bore; Base	Contents-Company	Origin of Bottle; Bottling Location	Date	Glass Color	Glass Type	Fragment or Whole	Description
38	Septic	16.0	2.7; 6	Beer	Portland, OR; —	1954–2000s	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, label missing. Embossed "NO DEPOSIT NO RETURN" on shoulder, "NOT TO BE REFILLED" on heel. Maker's Mark: "21 / I (inside of) O / 5" "20365-GB" "1DD" embossed on base – Owens-Illinois. GB – beverage container. Stippling encircling base.
39	Septic	16.0	2.7; 6	Beer	Portland, OR; —	1954–2000s	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, traces of paper label. Embossed "NO DEPOSIT NO RETURN" on shoulder, "NOT TO BE REFILLED" on heel. Maker's Mark: "21/I (inside of) O / 5" "20365-GB" "20.CC" embossed on base – Owens-Illinois. GB – beverage container. Stippling encircling base.
40	Septic	22.4	2.7; 5.5	Soda - Pepsi	Oakland, CA; —	1964	Clear	Container - Bottle	W	Whole clear glass bottle. ACL red and white "PEP..." on shoulder. Embossed diagonal fluting from shoulder to just above heel ("swirl bottle"), "8 FL. OZ." on heel. Maker's Mark: "20 / I (inside of) O / 64" embossed on base – Owens-Illinois.
41	Septic	20.0	2.7; 5.8	Soda - Coca-Cola	—; —	1966	Aqua green	Container - Bottle	W	Whole aqua green glass hobble-skirt bottle. ACL white "COCA-COLA" (x2) in script on body. Embossed "CONTENTS 6 1/2 FL. OZS." "REG. U.S. PAT. OFF." on body. "66-03" embossed on skirt. Stippling encircling base.
42	Septic	21.2	2.7; 7.7	Food - Mrs. Butterworth's Syrup	Alton, IL; —	1961–2000	Brown	Container - Bottle	W	Whole brown glass bottle in shape of woman with hands folded. Maker's Mark: "7 / I (inside of) O / 4" (restamped date code) "12." embossed on base – Owens-Illinois. Mrs. Butterworth's Syrup. Stippling encircling base.
43	Septic	20.5	2.7; 6.2	Beer - San Miguel	Asia-Pacific; Asia-Pacific	1938	Brown	Container - Bottle	W	Whole brown glass long neck beer bottle, label missing. Maker's Mark: "1301" "4" "(intertwined) SM" embossed on bottle base – La Fabrica de Cerveza de San Miguel (beer brand from Philippines).

Acc.	Provenience	L/H (cm)	Di. (cm) Bore; Base	Contents-Company	Origin of Bottle; Bottling Location	Date	Glass Color	Glass Type	Fragment or Whole	Description
44	Septic	16.0	2.7; 6	Beer	Seattle, WA; —	1964	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, label missing. Embossed "NO DEPOSIT NO RETURN" on shoulder, "NOT TO BE REFILLED" on heel. Maker's Mark: "N-W" "656" "64" "F 9" embossed on base – Northwestern Glass Co. Stippled band running around heel. Larger stippling encircling base.
45	Septic	17.3	5; 5.7	Food - Baby Food	—; —	1954–2000s	Clear	Container - Jar	W	Whole clear glass jar, label missing. Maker's Mark: "I (inside of) O" "18DD" embossed on base – Owens-Illinois.
46	Septic	17.3	5; 5.7	Food - Baby Food	—; —	1954–2000s	Clear	Container - Jar	W	Whole clear glass jar, label missing. Maker's Mark: "I (inside of) O" "24AZ" embossed on base – Owens-Illinois.
47	Septic	17.3	5; 5.7	Food - Baby Food	—; —	1954–2000s	Clear	Container - Jar	W	Whole clear glass jar, label missing. Maker's Mark: "I (inside of) O" "23DD" embossed on base – Owens-Illinois.
48	Septic	17.3	5; 5.7	Food - Baby Food	Connells-ville, PA; —	1938–ca. 1980	Clear	Container - Jar	W	Whole clear glass jar, label missing. Maker's Mark: "5 / (intertwined) Anchor-H / 17" embossed on heel – Anchor Hocking Glass Corp.
49	Septic	17.3	5; 5.7	Food - Baby Food	US Mainland; —	1933–ca. 1980	Clear	Container - Jar	W	Whole clear glass jar, label missing. Maker's Mark: "B (inside) circle" "17" – Brockway Glass Co.
50	Septic	11.4	5.4; 6	—	Seattle, WA; —	1931–1960s	Clear	Container - Jar	W	Whole clear glass jar, label missing. Maker's Mark: "N-W" "317" "4" embossed on base – Northwestern Glass Co.
51	Septic	15.5	2.7; 6	Beer	CA; —	1934–ca. 1968	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, heavily degraded paper label. Embossed "NO DEPOSIT" ★ (star) "NO RETURN" "NOT TO BE REFILLED" on shoulder. Maker's Mark: "V" "(angular intertwined) GC" "3" "K38" "4809" – Glass Containers Corp. Stippled band running around shoulder and heel. Larger stippling encircling base.

Acc.	Provenience	L/H (cm)	Di. (cm) Bore; Base	Contents-Company	Origin of Bottle; Bottling Location	Date	Glass Color	Glass Type	Fragment or Whole	Description
52	Septic	15.0	2.7; 6	Beer	Oakland, CA; —	1954–2000s	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, heavily degraded paper label. Embossed "NO DEPOSIT" ★ (star) "NO RETURN" "NOT TO BE REFILLED" on shoulder. Maker's Mark: "20 / I (inside of) O / 0" "6C" "20075-GB" embossed on base – Owens-Illinois. GB – beverage container. Stippled band running around heel. Larger stippling encircling base.
53	Septic	20.0	2.7; 6	Soda - Coca-Cola	US Mainland; —	1947	Aqua green	Container - Bottle	W	Whole aqua green glass hobble-skirt bottle. Embossed Body "COCA-COLA" in script "TRADEMARK REGISTERED" "MIN CONTENTS 6-FL. OZS." (x2) on body. Maker's Mark: "5 / I (inside of intertwined) O and diamond / 47" embossed on skirt – Owens-Illinois.
54	Septic	15.0	2.7; 6.5	Beer	Oakland, CA; —	1954–2000s	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, partial paper label. Embossed "NO DEPOSIT" ★ (star) "NO RETURN" "NOT TO BE REFILLED" on shoulder. Maker's Mark: "20 / I (inside of) O / 1" "12AA" "20079 GB" embossed on base – Owens-Illinois. Stippled band running around heel. Larger stippling encircling base.
55	Septic	15.5	2.7; 6	Beer	Oakland, CA; —	1954–2000s	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, partial paper label. Embossed "NO DEPOSIT" ★ (star) "NO RETURN" "NOT TO BE REFILLED" on shoulder. Maker's Mark: Base "20 / I (inside of) O / 2" "9-AA" "12-GB" embossed on base – Owens-Illinois. GB – beverage containers. Stippled band running around shoulder and heel. Larger stippling encircling base.
56	Septic	16.3	2.7; 6	Beer	Seattle, WA; —	1968	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, label missing. Embossed "NO DEPOSIT NO RETURN" on shoulder, "NOT TO BE REFILLED" (x2) on heel. Maker's Mark: "N-W" "657" "68" "c 24" embossed on base – Northwestern Glass Co. Stippled band running around shoulder and heel. Larger stippling encircling base.


Acc.	Provenience	L/H (cm)	Di. (cm) Bore; Base	Contents-Company	Origin of Bottle; Bottling Location	Date	Glass Color	Glass Type	Fragment or Whole	Description
57	Septic	16.5	2.7; 6.7	Beer	US Mainland; —	1942–1983	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, label missing. Embossed "NO DEPOSIT" ★ (star) "NO RETURN" "NOT TO BE REFILLED" on shoulder. Maker's Mark: Base "13" "(stylized italic) FF (in a circle)" "1564" embossed on base – Foster-Forbes Glass Co. Entire neck, body, and base stippled.
58	Septic	15.7	—; 6	Beer	Portland, OR; —	1954–2000s	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle (chipped finish), label missing. Embossed "NO DEPOSIT NO RETURN" on shoulder, "NOT TO BE REFILLED" on heel. Maker's Mark: Base "21 / I (inside of) O / 5" "20365-GB" "7DD" embossed on base – Owens-Illinois. GB – beverage container. Stippling encircling base.
59	Septic	16.0	2.7; 6	Beer	Portland, OR; —	1954–2000s	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, label missing. Embossed "NO DEPOSIT NO RETURN" on shoulder, "NOT TO BE REFILLED" on heel. Maker's Mark: "21 / I (inside of) O / 5" "20365-GB" "177 CC" embossed on base – Owens-Illinois. Stippling encircling base.
60	Septic	20.5	2.7; 5.8	Soda - Canada Dry	Los Angeles, CA; —	1963	Green	Container - Bottle	W	Whole green glass bottle. ACL red text on white shield surmounted by crown "CANADA DRY" white text "[GINGER] ALE" above white chevron on neck, faint trace of chevron on opposite side of neck. Maker's Mark: " 23 / I (inside of) O / 63" "4 T" "DURAGLASS (in script)" "94-C" embossed over field of stippling covering base – Owens-Illinois.
64	Septic	19.8	3.7; —	—	—; —	1890s	Clear	Container - Bottle	F	Clear glass bottle neck/shoulder fragment. Embossed diamonds encircling neck. Threaded finish for screw-top, seam over lip. Rounded shoulder. Seams on opposite sides from shoulder to neck over lip – machine-made.

Acc.	Provenience	L/H (cm)	Di. (cm) Bore; Base	Contents-Company	Origin of Bottle; Bottling Location	Date	Glass Color	Glass Type	Fragment or Whole	Description
65	Septic	10.5	2.6; —	Spirit/Liquor	—; —	1889	Brown	Container - Bottle	F	Brown glass bottle neck/shoulder fragment. Machine-made down-tooled-shaped finish with string rim – "wine or brandy" finish. Completely smooth bore. Seams on opposite sides of neck and lip, one encircling neck just below rim.
67	Septic	21.5	—; 5.8	Soda - OK	Oakland, CA; —	1963	Clear	Container - Bottle	W	Whole clear glass bottle, broken off at upper neck. ACL partial white oval with clear "OK" on shoulder, partial white "O" on body. Maker's Mark: "7806-Q" "20 / I (inside of) O / 63" "2-G" "NET CONT. 10 OZ." embossed on base – Owens-Illinois. Embossed smooth band encircling shoulder and heel.
68	Septic	15.0	2.7; 6	Beer	Oakland, CA; —	1954–2000s	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, label missing. Embossed "NO DEPOSIT" ★ (star) "NO RETURN" "NOT TO BE REFILLED" on shoulder. Maker's Mark: "20 / I (inside of) O / 0" "10B" "20075-GB" embossed on base – Owens-Illinois. GB – beverage container. Stippled band running around heel. Larger stippling encircling base.
69	Septic	18.0	—; 5.7	Soda - Diamond Head Beverages	Japan; Honolulu	1960	Clear	Container - Bottle	W	Whole clear glass bottle, broken off at lower neck. ACL heavily degraded. Ghosting of [DIAMOND HEAD] [(profile of Diamond Head)] [BEVERAGES] logo on body front; "[DIAM]ON[D] [HEAD]" "[BEV]ER[AGE]S (in script)" "...NTS 7 FLUID...NC" "BOTTLED BY / [C]OCA-[C]OLA BOTTLIN[G] / OF HONOLULU, L..." on body back. Maker's Mark: "16 / T (inside of) oval / K" "60" "MADE IN JAPAN" "PROP. OF C.C. BOTT. CO. HON." Stippling texture covering neck, ends at raised ring encircling neck with short ridges extending down from it. Orange-peel textured bands of short ridged encircling upper and lower body.
70	Septic	16.5	2.7; 6	Beer	Seattle, WA; —	1966	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, label missing. Embossed "NOT TO BE REFILLED" on shoulder, "NO DEPOSIT" "NO RETURN" on heel. Maker's Mark: "656" "N-W" "66" "E 30" embossed on base – Northwestern Glass Co. Stippling encircling base.

Acc.	Provenience	L/H (cm)	Di. (cm) Bore; Base	Contents-Company	Origin of Bottle; Bottling Location	Date	Glass Color	Glass Type	Fragment or Whole	Description
71	Septic	4.2	— ; —	—	—; —	—	White	—	F	Opaque white glass base/heel fragment. Embossed "...T. OFF." "...E" on base.
72	Ground Surface	18.4	5.9; 6.8	Food - Milk (Honolulu Dairymen's Assoc.)	CA; Honolulu, T.H.	1925–1931	Clear	Container - Bottle	W	Whole clear glass milk bottle. Embossed "12 OZ" "HONOLULU DAIRYMEN'S ASSN." "HONOLULU TH" inside circle on body. Maker's Mark: "IPG (inside) triangle", "HD" "3-1" embossed on base – Illinois-Pacific Glass Corp. Cap seat finish (modified bore for closure). Valve mark in center of base.
73	Septic	8.4	4.4; —	—	—; —	1930s	Clear	Container - Jug	F	Clear glass jug neck/shoulder fragment, with handle. Black plastic screw cap attached. Seams running up opposite sides of neck and handle, over lip, and encircling where neck meets shoulder – machine-made. Continuous thread finish for screw-cap. Thick glass.
74	Septic	5.0	2.7; —	Soda	—; —	1892	Aqua	Container - Bottle	F	Aqua glass finish/neck fragment. Mold seams on opposite sides over lip – machine-made crown finish.
75	Septic	6.0	—; 6	Soda - Coca-Cola	—; Honolulu	1917–1959	Aqua green	Container - Bottle	F	Aqua green glass hobble-skirt bottle partial base and heel fragment. Maker's Mark: "...OLULU" "[T.]H." "...C" embossed on base. Mold seam running down heel, ends at seam encircling base – cup mold.
76	Septic	8.5	—; 8.5	Soda	—; —	1961	Aqua	Container - Bottle	F	Aqua glass bottle base fragment. Maker's Mark: "5" "61" "10" embossed on base. Stippling encircling base. Seam running down heel, ends on base at seam encircling base – post-mold.
78	Septic	16.5	2.7; 6.5	Beer	Oakland, CA; —	1948	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, label missing. Embossed "NO DEPOSIT" ★ (star) "NO RETURN" "NOT TO BE REFILLED" on shoulder. Maker's Mark: "20 / I (inside of intertwined) O and diamond / 48" "6c" "DURAGLAS (in script)" "I-WAY" "11-GB" embossed over stippling covering base – Owens-Illinois. GB – beverage containers. Stippling covering body (except where labels were affixed on front and back).

Acc.	Provenience	L/H (cm)	Di. (cm) Bore; Base	Contents-Company	Origin of Bottle; Bottling Location	Date	Glass Color	Glass Type	Fragment or Whole	Description
79	Septic	16.5	2.7; 6.5	Beer	US Mainland; —	1942–1983	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, label missing. Embossed "NO DEPOSIT" ★ (star) "NO RETURN" "NOT TO BE REFILLED" on shoulder. Maker's Mark: "5" "FF (cursive, letters joined within a circle)" "1564" embossed over orange-peel texture covering base – Foster-Forbes Glass Co. Stippling covering entire body.
80	Septic	15.0	2.7; 6	Beer	Oakland, CA; —	1954–2000s	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, heavily degraded paper label. Embossed "NOT TO BE REFILLED" "NO DEPOSIT" ★ (star) "NO RETURN" on shoulder. Maker's Mark: "20 / I (inside of) O / 0" "8 E" "20075 - GB" embossed on base – Owens-Illinois. GB – beverage container. Stippled band running around heel. Larger stippling encircling base.
81	Septic	24.3	2.7; 6.5	Soda - Royal Crown	Los Angeles, CA; —	1958–1959	Aqua	Container - Bottle	W	Whole aqua glass bottle. ACL ghosting of crown "12 FL. OZS." inside embossed diamond on one side of neck, "R" crown "C" inside embossed diamond on other side of neck; "RC" in red on white "ROYAL CROWN COLA" and crown in white on red inside embossed diamond on body front. Maker's Mark: "CONTENTS 12FL OZ" "1" "57" "M (abutting) G" embossed on base – Maywood Glass Co. Embossed ribbing running vertically from neck to heel of body.
82	Septic	3.7	—; —	—	—; —	—	Olive Green	Container - Bottle	F	Olive green glass bottle neck fragment.
84	Septic	4.0	—	Soda - Coca-Cola	—; —	pre-1957	Aqua green	Container - Bottle	F	Aqua green glass hobble-skirt bottle body fragment. Embossed "COC..." in script below fluting.
85	Septic	7.8	—; —	—	—; —	—	Pale blue-grey	—	F	Pale blue-green glass corner fragment. Square sided. Very thick glass.
86	Septic	7.0	—	Soda - Kist	—; —	1940s–1950s	Clear	Container - Bottle	F	Clear glass bottle body fragment. ACL white on red "CONTEN..." "KIS.." "REG. U.S. PAT..." on body.

Acc.	Provenience	L/H (cm)	Di. (cm) Bore; Base	Contents-Company	Origin of Bottle; Bottling Location	Date	Glass Color	Glass Type	Fragment or Whole	Description
87	Septic	4.5	— ; —	—	—; —	—	Clear	Container	F	Clear glass container heel/base fragment. Stippled heel, smooth base.
88	Septic	5.4	— ; —	Soda - Coca-Cola	—; —	pre-1957	Aqua green	Container - Bottle	F	Aqua green glass hobble-skirt bottle body fragment. Embossed "...A-COL..." "REG...." on body below fluting.
89	Septic	6.4	6	Beer	Blackwell, OK; —	1961	Brown	Container - Bottle	F	Brown glass bottle base fragment. Maker's Mark: "4108" "O / H (over) A / 61" "22" embossed on base – Hazel-Atlas Glass Co. Stippled band running around heel. Larger stippling encircling base. Cup mold.
90	Septic	7.2	—	Medicinal - Milk of Magnesia	—; US Mainland	1880	Cobalt blue	Container - Bottle	F	Cobalt blue glass bottle base/heel fragment. Maker's Marks: "14" "G" "GENUINE PHILLIPS" "MADE IN USA" embossed on base. Narrow band of ridges encircling base. Cup mold.
91	Septic	1.6	—	—	US Mainland; —	1930s	Clear	Toy - Marble	W	Clear glass marble, green catseye center.
94	S. Trench Waterline	19.8	2.7; 6.5	Beer - San Miguel	Asia-Pacific; Asia-Pacific	1938	Brown	Container - Bottle	W	Whole brown glass beer bottle, partial paper label. Blue, sliver, and red "SAN MIGU..." "CERVE..." "DARK..." "EXPER..." "SOTH..." "CONTEN...". Embossed "NOT TO BE REFILLED" "NO DEPOSIT" ★ (star) "NO RETURN" on shoulder. Maker's Mark: "35 KK" "10" 5" "(intertwined) SM" – La Fabrica de Cerveza de San Miguel (beer brand from Philippines).
96	Drywell	15.3	2.7; 6	Beer - Primo	Portland, OR; —	ca. 1965	Brown	Container - Bottle	W	Whole brown glass stubbie beer bottle, heavily degraded paper label. Embossed "NOT TO BE REFILLED" "NO DEPOSIT" ★ (star) "NO RETURN" on shoulder. Blue on white "PRIMO", blue chief's head in profile in circle, "HAWAIIAN BEER" "[ORIGINAL EXCLUSIVE FORMULA] (in script)" in blue on white. Maker's Mark: Base "21 / I (inside of) O / 6" "2-GG" "11GB" embossed on base – Owens-Illinois.

Acc.	Provenience	L/H (cm)	Di. (cm) Bore; Base	Contents-Company	Origin of Bottle; Bottling Location	Date	Glass Color	Glass Type	Fragment or Whole	Description
97	Drywell	7.4	4.9; 6	Food - Baby Food	—; —	1954–2000s	Clear	Container - Jar	W	Whole clear glass jar, label missing. Maker's Mark: "I (inside of) O" "24EZ" embossed on base – Owens-Illinois.
98	Dirt pile by trailer	11.0	3.7; 4	Food - Seasoning (McCormick Gourmet Spices)	—; —	1959–2000s	Clear	Container - Jar	W	Whole clear glass jar, label missing. Maker's Mark: Heel "I (inside of) O" "25" "28" embossed on heel. Triangular fluting at base gives base an octagonal shape. Continuous thread finish for screw-top – Owens-Illinois.
99	Dirt pile in SW corner	8.4	2.2; 4	—	Alton, IL; —	1954–2000s	Brown	Container - Bottle	W	Whole brown glass bottle, label missing. Maker's Mark: "7 / I (inside of) O / 2" "18" embossed on base. Stippling encircling base – Owens-Illinois.
100	N/E corner	18.4	5.9; 6.8	Food - Milk (Honolulu Dairymen's Assoc.)	CA; Honolulu, T.H.	1925–1931	Clear	Container - Bottle	W	Whole clear glass milk bottle. Embossed "12 OZ" "HONOLULU DAIRYMEN'S ASSN." "HONOLULU TH" inside circle on body. Maker's Mark: "IPG (inside) triangle", "HD" "3-1" embossed on base – Illinois-Pacific Glass Corp. Cap seat finish (modified bore for closure). Valve mark in center of base.
101	Sewerline to road. N-S @ connection near building	7.0	—	—	US Mainland; —	1938–ca. 1980	White	Tableware - Plate/Dish	F	White glass plate base fragment. Maker's Mark "[top of] Anchor ()" "...CHOR" "HOC..." embossed on base – Anchor Hocking Glass Corp. (See Acc. 103 & 105)
102	Sewerline to road. N-S @ connection near building	7.0	—; 4	Food - Sauce (Tabasco)	—; LA	1868	Clear	Container - Bottle	F	Clear glass bottle partial base/heel/body fragment. Maker's Mark: Base "McIL..." "TABA..." "NEW IBE..." "1" embossed on base – Tabasco, McIlhenny Co., New Iberia, LA. Cup mold.
103	Sewerline to road. N-S @ connection near building	7.8	—	—	—; —	—	White	Tableware - Dish/Bowl	F	White glass dish/bowl base/edge fragment. Scalloping on interior. (see Acc. 105)

Acc.	Provenience	L/H (cm)	Di. (cm) Bore; Base	Contents-Company	Origin of Bottle; Bottling Location	Date	Glass Color	Glass Type	Fragment or Whole	Description
104	Sewerline to road. N-S @ connection near building	6.0	—	—	—; —	—	Clear	Container - Jug	F	Clear glass jug fragment, handle attached. Seams on outside and inside of handle.
105	Sewerline to road. N-S @ connection near building	6.5	—	—	—; —	—	White	Tableware - Dish/Bowl	F	White glass dish/bowl base/edge fragment. Scalloping on interior. (see Acc. 103)
106	Sewerline to road. N-S @ connection near building	7.7	—	Food - Condiment (Heinz Co.)	—; —	1931–1966	Clear	Container - Bottle	F	Clear glass bottle base/heel fragment. Embossed ridges running vertically up from heel. Maker's Mark: "H J HEINZ CO" "426" "PATD" "I (inside of intertwined) O and diamond" embossed on base – Owens-Illinois. Octagonal base with 2 sides longer than rest. Heinz produced many different types of condiment as well as jelly. Cup mold. Valve mark.
107	Sewerline to road. N-S @ connection near building	8.2	—; 8	Food	Los Angeles, CA; —	1954–2000s	Clear	Container	F	Clear glass container base fragment. Maker's Mark: "23 / I (inside of) O / 6" "3A" "2169-E" embossed on base – Owens-Illinois. E – food container. Stippled band running around heel. Larger stippling encircling base. Post mold.
108	Waterline trench backdirt	3.5	—; 3.5	Household - Cosmetic; or Medicinal	—; —	—	Cobalt blue	Container	F	Cobalt blue glass container base fragment. Maker's Mark: "...RUB" "54" embossed on base. Machine-made with distorted post-mold seams on base from 2-part molding process.
110	Sewer trench backdirt; peripheral library	5.8	— ; —	Soda - Pepsi	—; —	1945	Clear	Container - Bottle	F	Clear glass bottle shoulder fragment. Embossed "PEPSI COLA" running from bottom to top between multidirectional crosshatching/basketweave on shoulder – 'wave' bottle . One small chip of red and white ACL.
112	Sewer trench backdirt; peripheral library	1.7	—	—	—; —	1930s	Light blue	Toy - Marble	W	Light blue glass marble, tri-color (blue, green, white) catseye center with three vanes.

Acc.	Provenience	L/H (cm)	Di. (cm) Bore; Base	Contents-Company	Origin of Bottle; Bottling Location	Date	Glass Color	Glass Type	Fragment or Whole	Description
113	Sewer trench backdirt; peripheral library	1.4	—	—	US Mainland; —	1930s	Clear	Toy - Marble	W	Clear glass marble, wide yellow catseye with four vanes in center.
114	Sewer trench backdirt; peripheral library	1.5	—	—	US Mainland; —	1930s	Clear	Toy - Marble	W	Clear glass marble, white catseye with four vanes in center (one vane yellow on one side).
117	Surface, entrance storage pile	5.5	5	Household - Cosmetic	—; —	1889	White	Container - Jar	F	Opaque white glass jar finish/body/ base fragment. External threading for screw-top. Fluting running vertically down body to heel. Small foot on resting point of base. For small amount of contents, like makeup or ointment. Seam down body from lip to other seam running around outside of foot – machine-made with cup mold.
118	Surface, entrance storage pile	3.8	— ; —	Soda - Kist	—; —	1940s – 1950s	Clear	Container - Bottle	F	Clear glass bottle body/heel/base fragment. ACL white on red "CO. CHIC..." above white stripe border. Stippling just above heel.
119	Surface, entrance storage pile	2.6	—	—	—; —	—	Aqua	Container - Bottle Stopper	F	Aqua glass bottle stopper. Stem broken, asymmetrical top. Hand-blown.
123		6.0	—; 6	—	US Mainland; —	1938–ca. 1980	Clear	Container	F	Clear glass container base/heel fragment. Maker's Mark: "(intertwined) Anchor-H" "18" embossed on base – Anchor Hocking Glass Corp. Machine-made post (off-center of base because of 2-part production process) and cup mold.
124		9.0	4.4; 5	Food - Seasoning (Aji-No-Moto)	York, England; Tokyo, Japan	1962	Clear	Container - Jar	W	Clear glass jar. ACL red "SUPER SEASONING" "...I-NO-M..." ghosting of "PURE MONOSODIUM GLUTAMATE" "MFD. BY AJINOMOTO CO. INC, TOKYO, JAPAN" on body – Aji-no-moto "cooking" bottle. Maker's Mark: "3 / N (inside of diamond / Y" – National Glass Works, York, England. Embossed graduated markings on one side, indents in lower body. Stippling encircling base.

Acc.	Provenience	L/H (cm)	Di. (cm) Bore; Base	Contents-Company	Origin of Bottle; Bottling Location	Date	Glass Color	Glass Type	Fragment or Whole	Description
125	Drain line trench backfill	8.5	2; 3.4	—	—; —	1954–2000s	Brown	Container - Bottle	W	Whole brown glass bottle, label missing. Brown plastic cap attached. Maker's Mark: "I (inside of) O" "17" embossed on base – Owens-Illinois.
126	drain line trench backfill	20.0	2.7; 6	Soda - Coca-Cola	Japan; —	1963	Aqua green	Container - Bottle	W	Whole aqua green glass hobble-skirt bottle. ACL white "COCA-COLA" (x2) on body. Embossed "REG US PAT OFF" "CONTENTS 6 1/2 FL OZ" on body. Maker's Mark: "63-05" embossed on heel, "TX (inside) O" embossed on base. Narrow band of ridging encircling base.
127	drain line trench backfill	20.0	2.7; 6	Soda - Coca-Cola	Japan; —	1966	Aqua green	Container - Bottle	W	Whole aqua green glass hobble-skirt bottle, chipped lip. ACL white "COCA-COLA" (x2) on body. Embossed "REG US PAT OFF" "CONTENTS 6 1/2 FL OZ" on body. Maker's Mark: "66-10" embossed on heel, "TX (inside) O" embossed on base. Stippling encircling base.
128	drain trench backfill on the NW corner	16.0	—; 6	Soda - Diamond Head Beverages	Japan; Honolulu	1966	Clear	Container - Bottle	F	Clear glass bottle shoulder/body/base fragment. ACL "DIAMOND HEAD" in white on shoulder, "D..." in green, waves in green on white diamond on body front; white "[D]IAMO[ND] [HEAD]" "BEV[ERAGES]" "CONTENT[S] 7 [FLUID OUN]..." "BOTTLED BY / COCA-COLA BOTTL[ING] CO. / OF HO[N]OLULU, [LTD]" on body. Maker's Mark: "PROP. OF C.C. BOTT. CO. HON. LTD." "MADE IN JAPAN" "TX (inside) O" "66" embossed on base. Stippling texture covering neck, ends at raised ring encircling neck with short ridges extending down from it. Orange-peel textured bands of short ridged encircling upper and lower body.

Faunal Remains

Acc.	Provenience	Identification	Material	Fragment or Whole	No. of Pieces	Description
8	Septic	Large Mammal, Ungulate	Tooth	F	1	Cheek tooth (molar) of ungulate (grass-eating mammal with multi-chambered stomach). (Sisson 1914, 136)
61	Septic	Sea Turtle	Bone – Carapace, Ribs, Peripheral Bones	F	185	60 rib frags. from at least 3 ribs. 3 frags. from 2 complete articulated peripheral bones (outer edge) of the carapace. Bones of carapace center: 88 flat frags. with no diagnostic features, 5 flat edge frags. with no sutures, 10 flat edge frags. with sutures (making 3 articulated pairs), 19 flat frags. with sutures (making 1 articulated pair).
93	Septic	Small Mammal	Bone, Humerus	W	1	Right humerus of cat-sized animal (Gilbert 1990, 292).

Plastic/Rubber Artifacts

Acc.	Provenience	Identification	Material	Place of Manufacture	Date of Manufacture	Fragment or Whole	No. of Pieces	Description
33	Septic	Household - Bowling ball	Rubber	USA	1905–1970s	W	1	15.8 lbs., would have originally been around 16 lbs., generally the greatest weight for bowling balls produced in the United States. 6 finger holes were plugged with wood and 3 redrilled (2 passing through old plugs), but not because the bridge was broken. Given to someone with a different finger span? Original holes appear to be nearly the same distance apart, but were originally larger. The ball is made from hard rubber, so likely manufactured between 1905 and the 1970s. Similar in appearance to Brunswick Mineralite Orange Flame bowling ball.
62	Septic	Household - Toothbrush	Plastic, Nylon	USA	1941 -	W	1	Yellow toothbrush. Embossed "Johnson and Johnson Tek Nylon". DuPont nylon toothbrushes were not made until 1938, but the manufacture was exclusive to another brand until late 1940.
66	Septic	Industrial - Small Tire	Vulcanized Rubber	Unknown	1888	W	1	Pneumatic vulcanized rubber tire on metal rim (Harp 2016, 14). Appears to be for a small conveyance, like a wheelbarrow or wagon.
83	Septic	Household - Baby Doll Head, Arms	Soft plastic (vinyl)	Unknown	1950s	F	3	Soft plastic; Small face, painted white eyes with black pupils; Includes moveable head and two arms.
111	Sewer trench backdirt; peripheral library	Household - Tableware Plate	Melamine	Unknown	1950s–1970s	F	1	Melamine plate with foot. White bottom with ridge. Top is polychrome, with the finish flaking away. Yellow with feint stripes, turquoise, separated by a black line.

Metal Artifacts

Acc.	Provenience	Identification	Material	Place of Manufacture	Date of Manufacture	Fragment or Whole	No. of Pieces	Description
34	Septic	Industrial - Metal Hook	Metal	Unknown	—	W	1	Object is a large steel hook with a ring at the end. Probably attached to thick chain and was used for towing and/or lifting.
63	Septic	Household – Flatware, Spoon	Stainless Steel	Japan	1950 -	W	1	Embossed floral decoration (maple leaves) on handle. "STAINLESS STEEL JAPAN" on handle. US importation of Japanese stainless steel flatware took off after World War II (ca. 1950).
77	Septic	Industrial – Metal Disk	Metal	Unknown	—	W	1	Round metal object. 4.7 cm diameter. Square depression on bottom.
115	Surface, entrance storage pile	Household – Flatware, Fork	Metal	Unknown	1936–1970 (1950s–1960s)	W	1	Heavily corroded, bent fork. "United" engraved on top of handle near the end, written from tines to base with slash line separating words from symbol (shield logo). Matched images of United Airlines plated silverware from the late '50s and early '60s.
116	Surface, entrance storage pile	Household – Flatware, Butter Knife	Plated metal	Unknown	1925	W	1	Heavily corroded. Some highly shiny (chrome) plating still remains. This technique for plating flatware developed ca. 1925 and applied to flatware.

Ceramic Artifacts

Acc.	Provenience	Identification	Material	Place of Manufacture	Date of Manufacture	Fragment or Whole	No. of Pieces	Description
92	Septic	Household – Tableware, Curved Vessel	Refined Earthenware	Euro-American	1830s	F	1	Blue on white glaze, transfer print on outside curved surface (Whiteware, transfer printed). Very small fragment: 1.6 cm x 1 cm, 4 cm thick. Table ware, possibly bowl/tea cup.
95	S. Trench Waterline	Household – Tableware, Bowl	Porcelain	Japan	1970s	F	1	Thick walled vessel base fragment, probably a large bowl based on thickness and foot circumference. Exterior is decorated with cobalt blue slip over white, with white pattern (exposing white background) picked out from blue with wax resist method.
109	Sewer trench backdirt; peripheral library	Household – Tableware, Bowl	Porcelain	Japan	1888	F	1	Brown and gray on white overglaze transfer print on outside of vessel. Uniformly thick sidewall fragment.
120	Surface, entrance storage pile	Household – Tableware, Bowl	Porcelain	Japan	1888	F	1	Fragment of wall portion of bowl, thinning towards one end. Polychrome transfer printed blue and green, floral pattern (flower and leaf) on blue-white background.
121	Surface, entrance storage pile	Household – Tableware, Tea/sake cup	Porcelain	Japan	1908 (second half 20 th c.)	F	1	Base fragment only. No visible decoration on solid white body. Black writing, Base: Cursive "Noritake", "Japan". Noritake began using the cursive Noritake mark in 1908.
122	SW Area 2	Industrial – Electrical Insulator	Porcelain	USA	1927	W	1	Whole 2" x 2" rounded porcelain insulator. Burnt on one side as if from short. Multi-strand steel cable twisted into groove. Embossed: "P. P.", "U. S. A. NO. 20". Standard Porcelain 20, Solid Knob No. 20 made by Porcelain Products Inc., Carey, Ohio, est. 1927. Produced following the National Electrical Code of 1897.

Brick Artifacts

Acc.	Provenience	Identification	Material	Place of Manufacture	Date of Manufacture	Fragment or Whole	No. of Pieces	Description
36	Septic	Industrial – Fire Resistant Brick	Clay	USA	1910–2002	W	1	23 cm x 10 cm x 6.4 cm. Engraved: "A. P. GREEN", "TEXAMO". Mortar remains. Line of metallic corrosion. Produced by A.P. Green Fire Brick Company (owned by Allen Percival Green) in Sulphur Springs, TX. (http://bricks.johnstonemedia.com/brick/details/75); Plant closed in 2002.
37	Septic	Industrial – Fire Resistant Brick	Clay	USA	1910–2002	W	1	20 cm x 10 cm x 6.4 cm. Broken on one end. Engraved: "A. P. GREEN", "TEXAMO". Mortar remains. Line of metallic corrosion. Produced by A. P. Green Fire Brick Company (owned by Allen Percival Green) in Sulphur Springs, TX. (http://bricks.johnstonemedia.com/brick/details/75); Plant closed in 2002.