

**SECTION III**  
**LEACHATE MANAGEMENT PLAN**

**LEACHATE MANAGEMENT PLAN  
WEST HAWAII SANITARY LANDFILL  
WAIKOLOA, HAWAII**



**PREPARED BY  
WASTE MANAGEMENT OF HAWAII, INC.  
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# **1 LEACHATE MANAGEMENT PLAN DESCRIPTION**

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## **1.1 Introduction**

Waste Management of Hawaii (WMH) has prepared this Leachate Management Plan to establish standard operating and maintenance procedures for leachate generated at the West Hawai'i Sanitary Landfill (WHSL).

## **1.2 Objectives**

The objectives of this Leachate Management Plan are:

- To outline the existing Leachate Collection and Removal System (LCRS) and current site conditions at the WHSL;
- To establish standard operating and maintenance procedures for the collection, handling, storage, monitoring, and disposal of leachate.

## **1.3 Regulatory Requirements**

Pursuant to RCRA Subtitle D regulations 40 CFR §258.40, and HAR Title 11, Chapter 58.1 municipal solid waste (MSW) landfills are to be constructed:

- §258.40 (a)(2) "With a composite liner and a leachate collection system that is designed and constructed to maintain less than 30-cm depth of leachate over the liner."

## 2 GENERAL SITE INFORMATION

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### 2.1 Site Description

The WHSL covers a total area of approximately 300 acres. The permitted waste footprint, which covers approximately 150 acres, is roughly square and is divided into a series of smaller waste disposal cells (see Figures 1 and 2). Waste disposal began in the northern portion of the permitted waste footprint (Cell No. 1) and has since extended toward the east and south.

### 2.2 Landfill Structures and Surroundings

The administration building and scale house are located on the northwest portion of the site, just south of the entrance to the site. A maintenance shop and fueling area are located south of the administration building. Due to the lack of county or private water systems in the vicinity of the WHSL, a pumping station and water tank located in the northeast portion of the site provide non-potable water for fire protection, dust control, and other operating requirements (Figure 2).

The WHSL is surrounded on all sides by rugged, open terrain characteristic of recent lava flows. The Queen Kaahumanu Highway is approximately 0.6 miles west of the WHSL, near the 79-mile marker. The nearest residential area is located approximately 1.25 miles west of the WHSL adjacent to Keawaiki Bay. The Waikoloa Beach Resort and Mauna Lani Resort are located approximately 1.5 miles northwest of the WHSL.

### 2.3 Site Geology

The site is situated on the historic basaltic lava flow of 1859 from Mauna Loa and is deposited with little ash cover. Basaltic boulders, cobbles, and gravel (clinker) cover the ground with localized exposures of very hard basaltic rock formation. There are sparse areas of vegetation (grasses and kiawe trees), however the site is generally barren and rocky.

The geology beneath the landfill consists largely of hard, gray vesicular basalt (fractured bluerock). Thin intermittent layers of reddish gray basalt fragments (clinker) lie widely spaced between the dense bluerock layers. Lava tubes, holes, and large cracks are known to exist in the region.

Previous geotechnical field explorations encountered a surface layer, 1.5 to 6.5 feet in thickness, of loose to medium-dense gravel and cobble-sized basalt fragments (clinker). Dense to very dense volcanic basalt were encountered below the clinker layer to maximum depths explored (approximately 40 feet) (Geolabs-Hawai'i, 1992).

### 2.4 Site Hydrogeology

The northern portion of the WHSL is underlain by the Anaehoomalu Aquifer System, which is part of the Northwest Mauna Loa Aquifer Sector. The southern portion of the WHSL is underlain by the Kiholo Aquifer System, which is part of the Hualalai Aquifer Sector. Both aquifer systems are described as basal water, unconfined in volcanic flanks. This status of

the groundwater under the WHSL is described as currently and/or potentially used for drinking water with a low salinity (250-1,000 mg/L CL-), irreplaceable and highly vulnerable to contamination (Mink and Lau, 1993).

Groundwater beneath the WHSL site is encountered at depths ranging from approximately 150 feet to 230 feet below ground surface (bgs) (0.5 to 2.5 ft above mean sea level [msl]), and occurs within fractured basalt and clinker. Historical water level data indicate that groundwater flow has generally been directed toward the west-southwest, indicating that the groundwater discharges to the ocean in the vicinity of Pueo and Keawaiki Bays. The hydraulic gradient is very gentle (generally less than 0.0005 feet per foot), and estimated groundwater flow velocities are on the order of 2 to 3 feet per day (RUST, 1997). Water levels observed in the monitoring wells at the WHSL fluctuate moderately due to tidal effects, however the predominate groundwater flow at the site is to the southwest (WMI, 2002).

### 3 SUPPORTING DOCUMENTS

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This Leachate Management Plan is part of the WHSL Site Operations Manual and should be used as the primary document for leachate management at the facility. There are also several other documents that support this Plan, which include, but are not limited to the following:

- CQA reports and as-builts (record documents) for MSW Cell 1 through 9A;
- *WHSL Groundwater and Leachate Monitoring Plan*;
- Leachate Pump Specifications and operation manuals;
- The *Waste Management Groundwater, Surface Water, and Leachate Sampling Guide* (Waste Management, 2004).

## 4 LEACHATE GENERATION

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Leachate is generated when water percolates through or comes in contact with refuse. This percolation can occur when precipitation infiltrates directly into the waste, or when moisture in the refuse (whether present when landfilled or generated after landfilling as a product of bio-decomposition) drains out.

Leachate generation is minimized by using the following best management practices (BMPs) at the WHSL:

- Maintaining positive drainage on top of the landfill to minimize infiltration. Runoff from covered areas of the landfill is directed away from the active cells. Precipitation that comes in contact with waste is treated as leachate.
- Maintaining surface water drainage around the perimeter of the landfill to prevent surface water run-on into the active disposal area.

## **5 LEACHATE COLLECTION AND REMOVAL SYSTEM**

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All disposal areas at the WHSL are equipped with a bottom and side slope composite liner and leachate collection and removal system (LCRS) meeting Federal (Subtitle D equivalent) and State requirements (HAR 11-58.1-14). A description of the liner systems that are in place at the WHSL are detailed in Section II (*WHSL Operations Plan - Section 3.0 Landfill Construction*) of this Site Operations Manual.

The LCRS in the MSW cells consists of a drainage gravel layer on the cell floor, perforated HDPE (or other approved materials) pipes, leachate collection sumps, riser pipes (horizontal), sump pumps, discharge pipes, pump sensors and controls, and storage tanks. Subtitle D regulations require that leachate not be allowed to accumulate above the landfill bottom liner to a depth of more than 1 foot outside of the leachate collection sumps.

### **5.1 Leachate Collection Sumps**

There are currently three leachate collection sumps at the WHSL; R-1, R-2, and R-3. R-1 is located in MSW Cell 1 and collects leachate from MSW Cells 1 through 7. The R-2 sump is located in MSW Cell 3 and collects leachate from MSW Cells 3 through 7. The R-3 sump is located in Cell 8A. R-3 collects leachate from Cells 8A and 9A and may collect leachate from Cells 10 through 15 once the cells are constructed. See attached Figure 1 for leachate sump locations.

### **5.2 Leachate Maintenance Levels**

The WHSL is actively extracting leachate from the collection system. The current extraction program in place at the WHSL maintains the site's leachate levels in compliance (below the maximum allowable levels) with Federal and State regulations, which require that leachate not be allowed to accumulate on the landfill bottom liner to a depth of more than 1 foot, not including that contained in collection sumps. See attached Table 1 for leachate sump / riser elevations.

#### **5.2.1 Leachate Sump Pump Systems**

In January 2008, fully automatic leachate pumping systems and instrumentation (automatic pumps, flow meters, pressure transducers and backup bubbler systems) were installed in the R-1, R-2, and R-3 sumps. Each leachate pump system was designed by QED Environmental Systems and installed by Pacific Electromechanical Inc. and Big Island Mechanical Inc.

The pump systems utilize submersible pneumatic leachate pumps, a submersible pressure transducer, and a bubbler system. The bubbler system is used to monitor the leachate levels (in inches) in the sumps. The bubbler provides the primary level information while the transducers will be activated at a later date. The pump controls are configured to automatically start and stop the pump at set leachate levels. Leachate is pumped down to as close to the riser base plate as possible without causing air intrusion into the pump.

### 5.2.2 Pump Settings

The leachate level in the sump will rise until it reaches the user specified "pump on" level, which will start the pump. The pump will then continue to run until the "pump off" level has been reached. Pump flow rates between these points are specified by the user (see below) in the level/flow rate array.

LEACHATE SUMP	PUMP START LEVEL	PUMP STOP LEVEL
R-1	54"	48"
R-2	66"	60"
R-3	48"	36"

## 6 LEACHATE STORAGE & DISPOSAL

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Leachate that is pumped out of the sumps is temporarily stored in 3,000 gallon tanks situated adjacent to each of the sump riser pipes (R-1, R-2, and R-3). The tanks are located within the lined area of the landfill, which provides secondary containment. There are currently three (3) 3,000-gallon storage tanks on-site at the WHSL that are dedicated to the temporary storage of leachate.

The leachate holding tanks are equipped with a level controls that will warn operation personnel when the tank is nearing capacity. Personnel pump leachate from the tanks and spray it over the lined portion of the landfill, where it acts as dust control, or evaporates into the MSW and underlying landfill liner system. The operation personnel measure and record the quantity (gallons) of leachate pumped out of the storage tanks. These quantities are maintained on the WHSL monthly leachate log and are kept on-site as part of the WHSL Operating Record/Files.

## 7 RESPONSIBILITIES

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**WHSL Site Manager:** Has overall responsibility for implementation of this Plan and all operational activities related to leachate management. The Site Manager manages and interfaces with outside contractors and treatment facilities, schedules the necessary tank trucks required to manage leachate, and ensures that observed deficiencies are corrected and documented in a timely manner.

**WMH Environmental Protection Manager:** Works with the Site Manager to ensure that leachate levels in the sumps are maintained and kept in compliance with permit and regulatory requirements. Coordinates the monitoring, sampling, and analytical testing of leachate and ensures that the required reports are submitted to the Hawai'i Department of Health (DOH). The Environmental Protection Manager is the point of contact for regulatory agencies and handles permit compliance issues and notifications to the DOH, as necessary.

The leachate riser pump systems are monitored at least 2-3 times per week. Leachate data such as bubbler height levels (depth, in inches, in the sumps); total flow; gallons pumped and transported off-site, and any comments or observations noted (faults, storage tank okay / full, etc) are recorded on a monthly leachate log and are kept on-site as part of the WHSL Operating Record/Files.

An outside electrical contractor handles any repairs or maintenance activities that need to be performed on the leachate pump systems or associated equipment.

## 8 LEACHATE MONITORING & SAMPLING

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Leachate is sampled on an annual basis at the WHSL, in conjunction with the site's groundwater monitoring program. WHSL groundwater and leachate monitoring activities are conducted pursuant to the *WHSL Groundwater and Leachate Monitoring Plan* (located in Section VI of this Site Operations Manual) and WM's Groundwater, Surface Water and Leachate Sampling Guide (Waste Management, 2004), which complies with Code of Federal Regulations (CFR), Solid Waste Disposal Facility Criteria (and its revisions) in 40 CFR Part 258 (Subtitle D) and Hawai'i Administrative Rules (HAR) Title 11, Chapter 58.1. Please refer to the *WHSL Groundwater and Leachate Monitoring Plan* (located Section VI of this Site Operations Manual), which describes the WHSL leachate monitoring system, including, but not limited to: leachate monitoring locations, monitoring parameters, data evaluation methods, and sampling and analytical procedures.

**TABLE**

**WEST HAWAII SANITARY LANDFILL  
LEACHATE SUMP / RISER ELEVATIONS**

**R-1 (Cell 1)**

Top of Riser Elevation	173'
Ground Surface Elevation	170'
Liner Elevation at Top of Sump	137'
Bottom of Sump Elevation	133'
Compliance Elevation	138'
Compliance Depth	5' or 60"

**R-2 (Cell 3)**

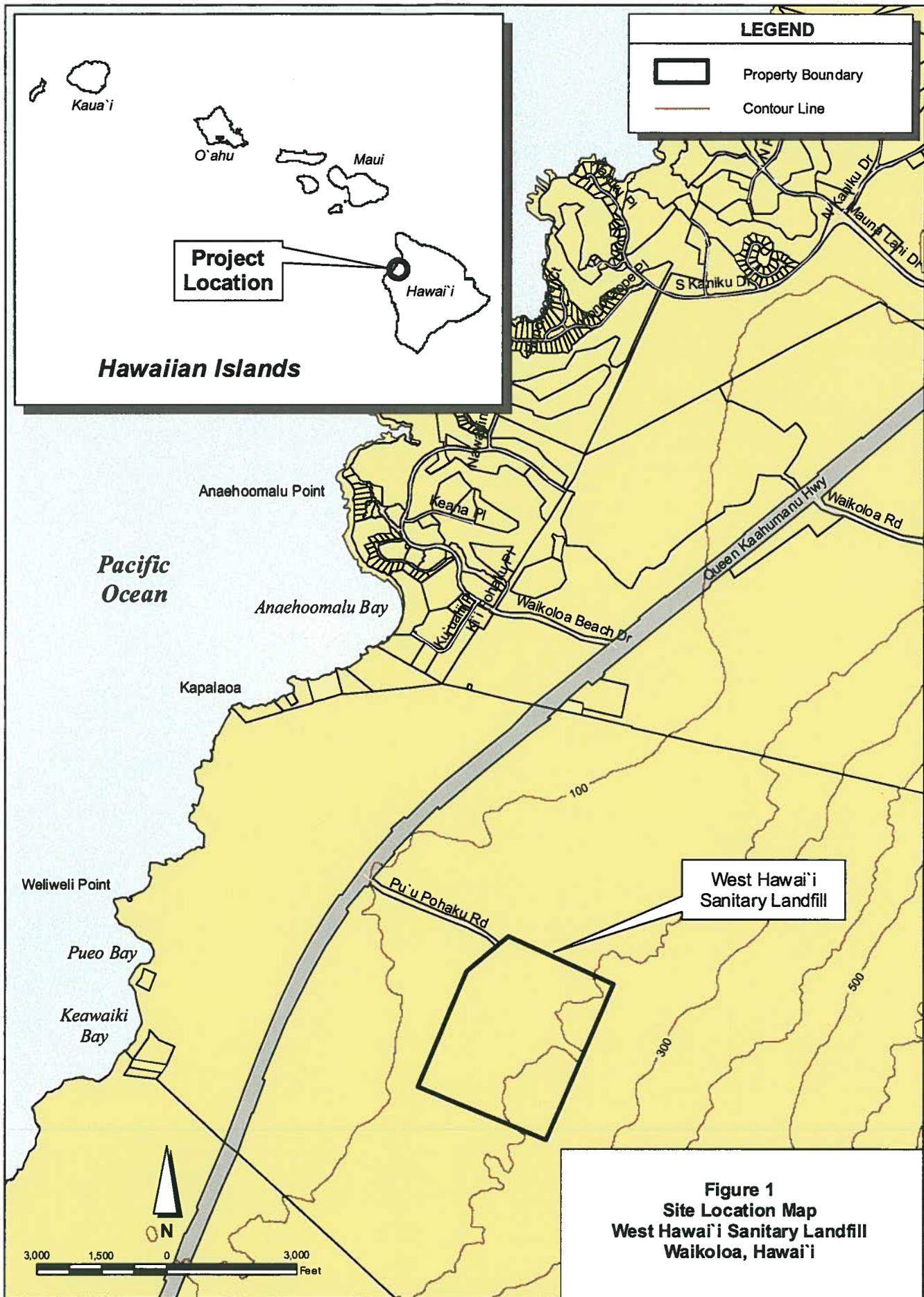
Top of Riser Elevation	183'
Ground Surface Elevation	180'
Liner Elevation at Top of Sump	150'
Bottom of Sump Elevation	146'
Compliance Elevation	151'
Compliance Depth	5' or 60"

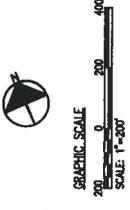
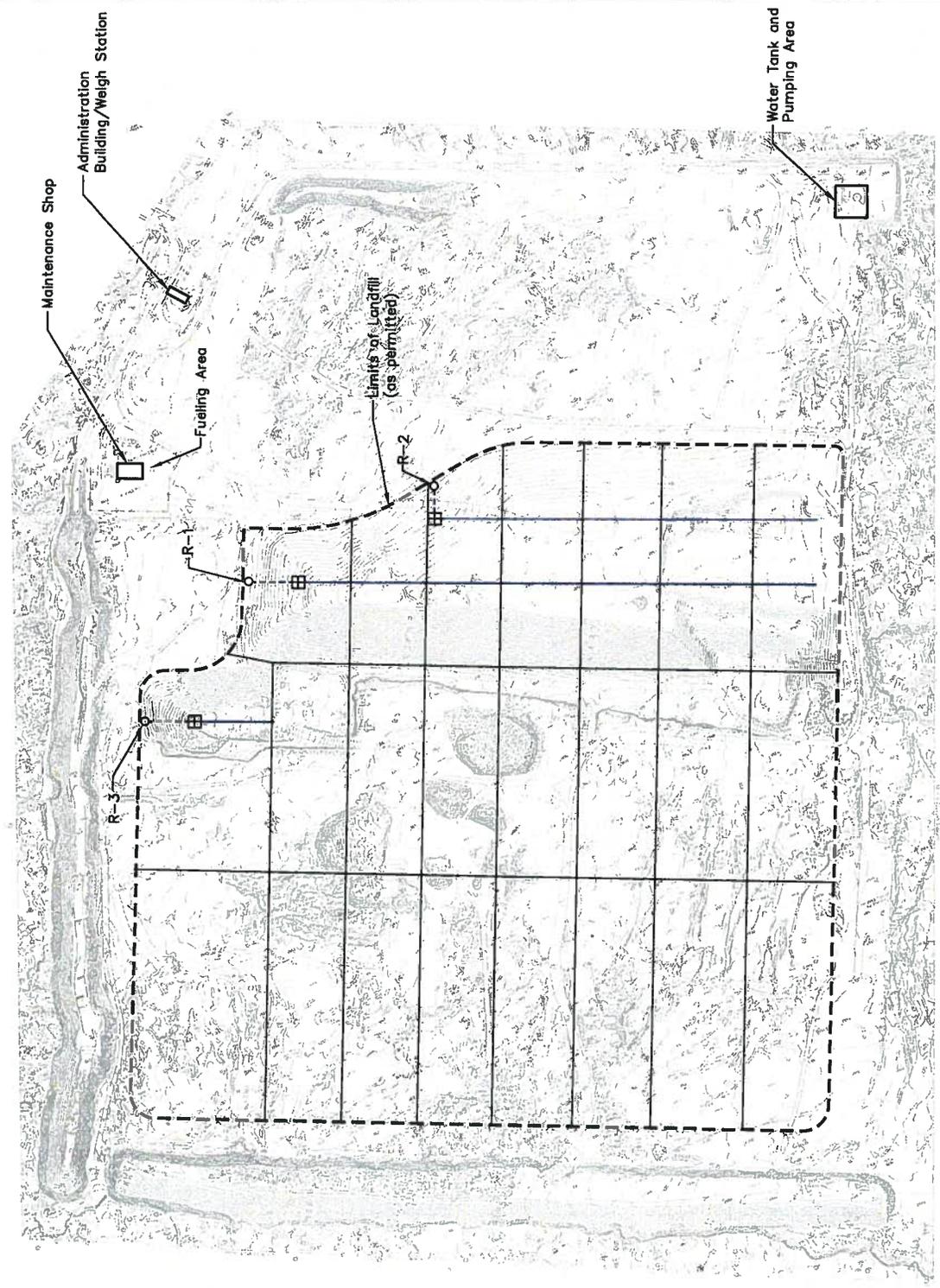
**R-3 (Cell 8A)**

Top of Riser Elevation	177.5'
Ground Surface Elevation	174.5
Liner Elevation at Top of Sump	131
Bottom of Sump Elevation	127'
Compliance Elevation	132'
Compliance Depth	5' or 60"

1. All elevations are listed in feet above mean sea level.

**FIGURES**



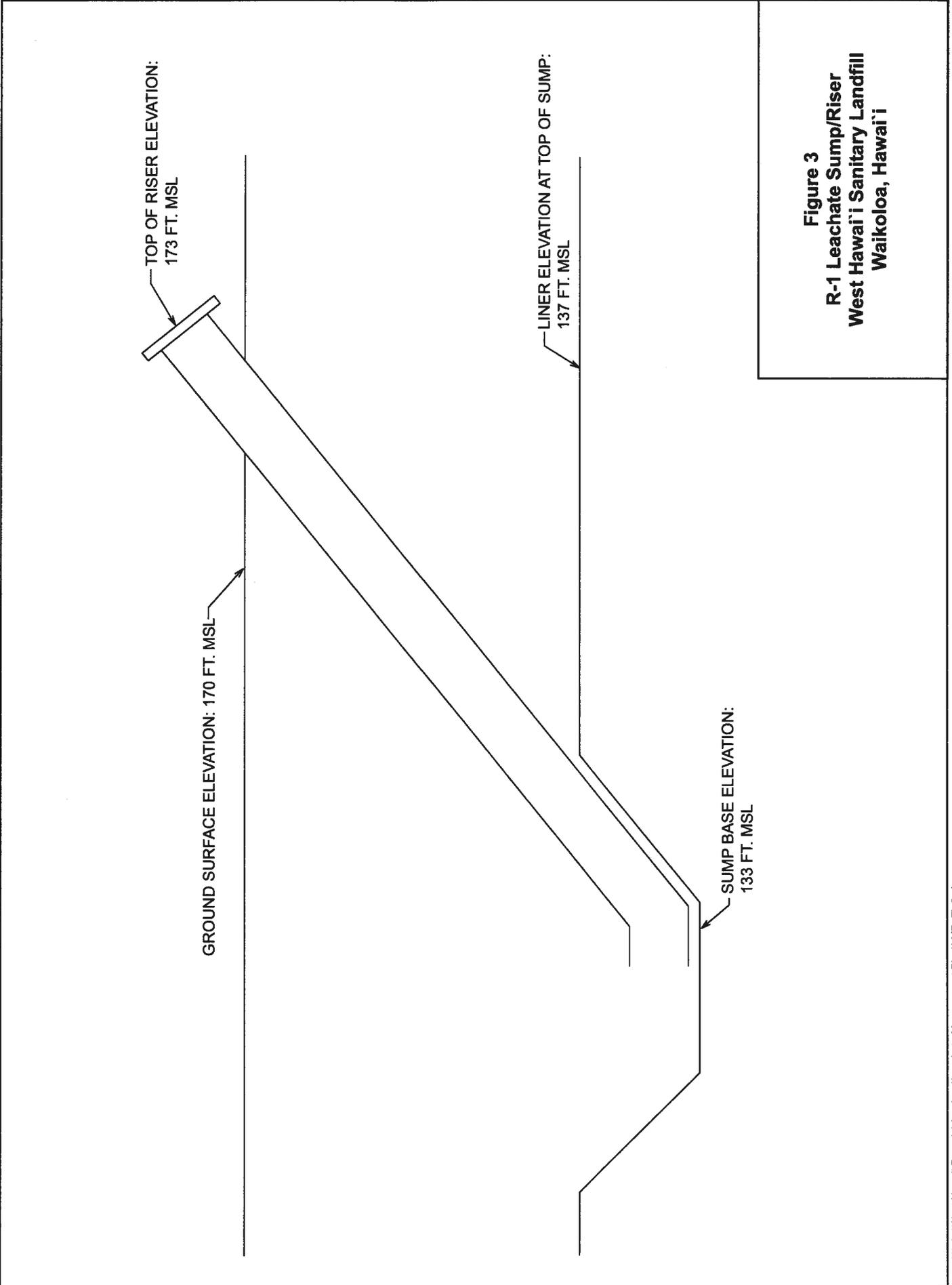


**LEGEND:**

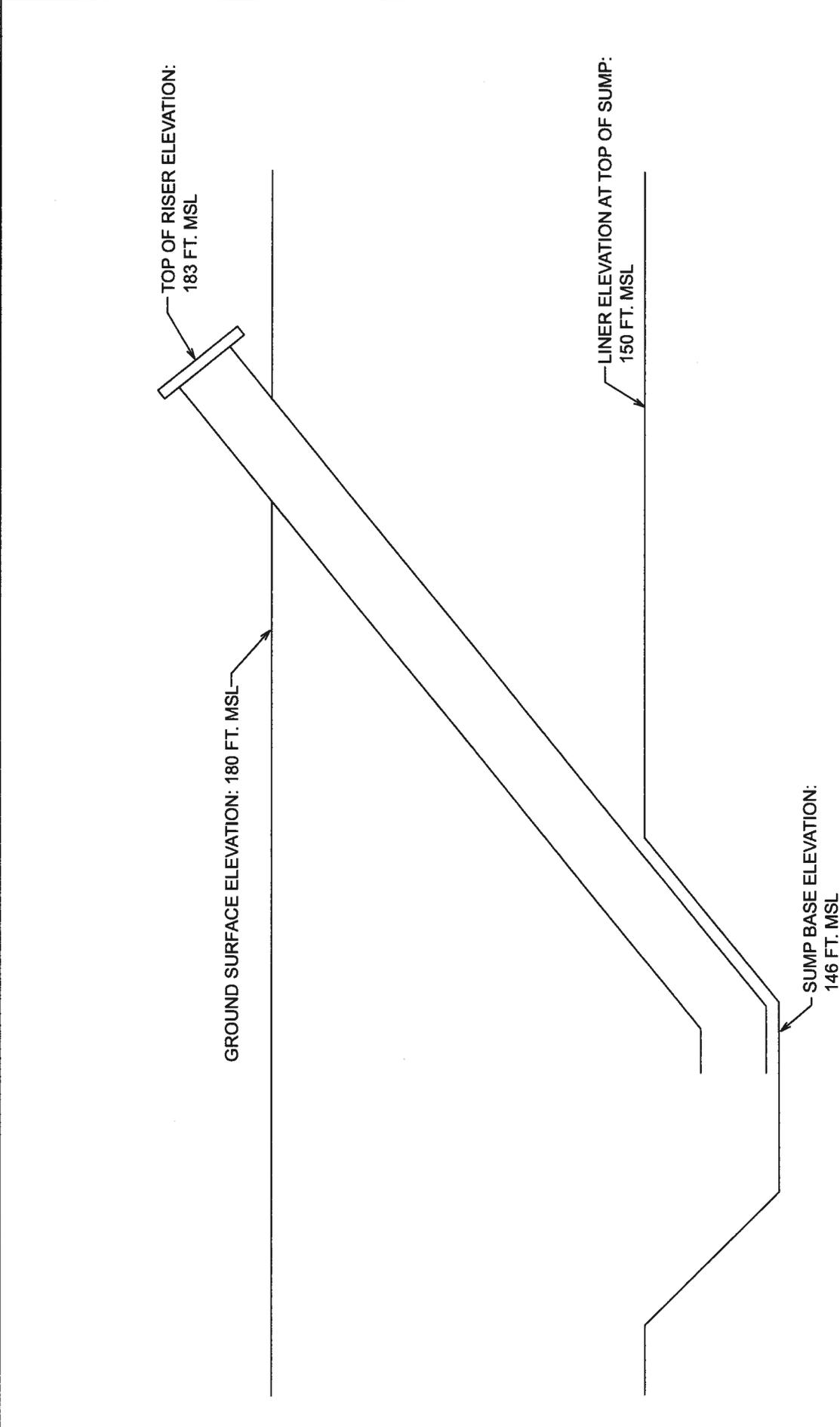
- Leachate riser pipe
- ⊞ Leachate sump
- - - Approximate location of leachate riser pipe
- Approximate location of leachate collection pipe

Note: Contours represent existing surface topography.

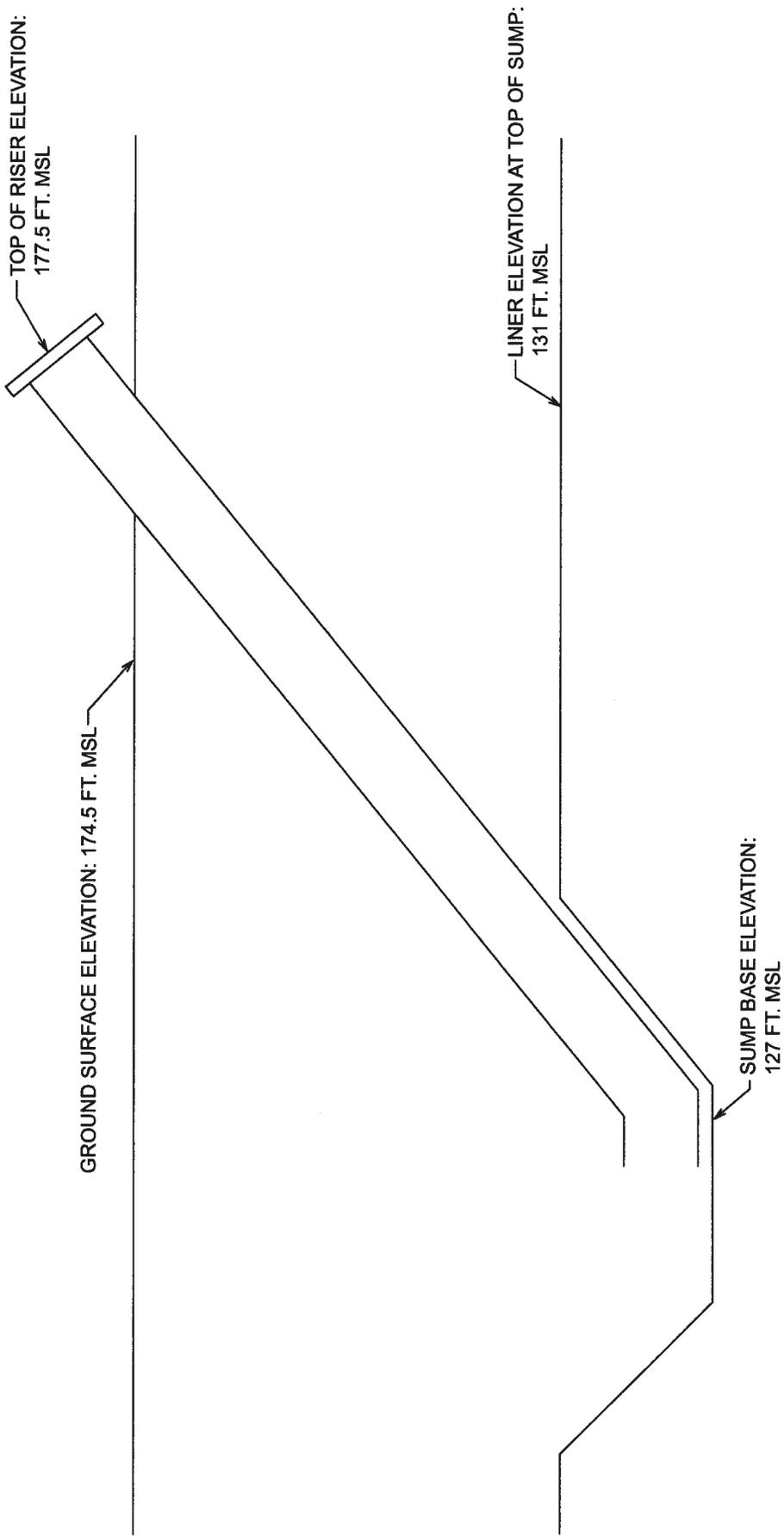
**Figure 2**  
**Leachate Collection and Removal System (L-CRS) Layout**  
**West Hawaii's Sanitary Landfill**  
**Waikoloa, Hawaii**



**Figure 3**  
**R-1 Leachate Sump/Riser**  
**West Hawai'i Sanitary Landfill**  
**Waikoloa, Hawai'i**



**Figure 4**  
**R-2 Leachate Sump/Riser**  
**West Hawai'i Sanitary Landfill**  
**Waikoloa, Hawai'i**



**Figure 5**  
**R-3 Leachate Sump/Riser**  
**West Hawai'i Sanitary Landfill**  
**Waikoloa, Hawai'i**