GUIDELINES FOR THE REUSE OF GRAY WATER

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Wastewater Branch
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STATE OF HAWAII, DEPARTMENT OF HEALTH
GUIDELINES FOR THE REUSE OF GRAY WATER

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Foreword

The Department of Health has supported water reuse provided public health is not compromised. The Hawaii Legislature has urged the Department of Health to develop gray water recycling guidelines in House Resolution 290 of the twenty-fourth Legislature in 2008 and House Concurrent Resolutions 266 of the twenty-fifth Legislature in 2009. In response, the Department of Health has developed these guidelines, which are intended to provide homeowners of single family dwellings with enough information to decide if a gray water system is right for them.

As of April 2009, all four counties in the state are waiving the portions of the Uniform Plumbing Code (UPC) to allow the use of washing machine wastewater to be used for subsurface irrigation. These waivers apply only to areas not serviced by a publicly owned sewer system. The Department of Health will be the regulatory agency responsible for the gray water systems located in areas not serviced by publicly owned sewer systems. The Counties will retain regulatory responsibility for the areas serviced by their sewer systems.

These guidelines may be modified as necessary to reflect changes in regulations, standards, or otherwise.

I. Introduction

These guidelines were prepared as an informational source for homeowners, land users, contractors, and engineers on the use of gray water in Hawaii.

These guidelines are in conformance with Chapter 16, Gray Water Systems, of the 2006 Uniform Plumbing Code (UPC). In 2007, the Hawaii Legislature enacted Part II of Chapter 107, Hawaii Revised Statutes to establish the State Building Code. As of this writing, the State Building Code Council is in the process of adopting a uniform set of statewide building codes. The state building codes include the 2006 edition of the Uniform Plumbing Code.

With water reuse gaining popularity, people increasingly consider gray water from their residences as a resource to be separated from the wastewater stream and reused in their landscapes. Such reuse of gray water reduces the amount of wastewater entering sewers or individual wastewater systems (IWS)[1], reduces demands to use potable water for other residential uses like irrigation, and helps preserve limited water supplies for essential uses like human consumption. These guidelines discuss using gray water resources simply and legally, at the same time protecting your family's health, your neighborhood, and the environment.

[1] Individual wastewater system (IWS) means a facility which is used and designed to receive and dispose of no more than one thousand gallons per day of domestic wastewater. Each IWS includes all connected plumbing, treatment (if any), and disposal components that could, if not connected, serve as separate systems. Septic tank systems and cesspools are examples of IWSs. Households are connected to either an IWS or sewer system.

II. What is Gray water?

Residential wastewater can be divided into blackwater and gray water. The State of Hawaii, Department of Health, Wastewater Branch defines **blackwater** as wastewater discharged from:

- Toilets and urinals; and
- Food preparation sinks (kitchen sinks)

Blackwater from toilets and urinals and kitchen sinks should never be reused for irrigation because of the high risk of contamination by bacteria, viruses, and other pathogens. Blackwater contains relatively higher concentrations of nitrogen, organic matter, and pathogens than gray water.

The Department of Health defines **gray water** as wastewater discharged from:

- Showers and bathtubs;
- Hand-washing lavatories;
- Wastewater that has not contacted toilet waste;
- Sinks (not used for disposal of hazardous, toxic materials, food preparation, or food disposal) and
- Clothes-washing machines (excluding wash water with human excreta e.g., diapers).

Gray water from sinks, tub/shower drains, and clothes washers are estimated to be 50 to 80 percent of the total residential wastewater generated. This wastewater stream may be reused to meet part of the fresh water demand for landscaping. Diverting this wastewater stream to a subsurface irrigation

system also reduces the amount of wastewater entering the individual wastewater system (IWS). Although this wastewater stream contains detergents, soaps, and solvents, some of the constituents of these cleaning agents are considered fertilizer for plants. Phosphorous, nitrogen, and potassium are some of the compounds found in gray water that many plants need to survive.

Generally, most of the gray water and the nutrients in it will be used by plants, and the dynamics of the soil will break down the other contaminants. The potential to harm the environment is dependent upon the constituents in the gray water, the type of soil being watered, and the geological characteristics of the area.

III. Gray water Health and Safety Considerations

There are health risks and safety issues associated with gray water use. These health risks can be minimized and practically eliminated with some common sense. Many of the contaminants in gray water are harmful to your health. Bacteria can accumulate and grow in the gray water holding system. However, these are only harmful if the gray water is ingested or there is physical contact with the gray water, especially through skin abrasions.

Homeowners who irrigate their lawns with gray water need to understand the risks and safety issues associated with such use. They should know the constituents of their gray water as well as their potential affects on human, soil, plant and environmental health. For this reason, it is important to monitor the gray water distribution area and adjust gray water application

rates daily to ensure that ponding does not occur. Ponding can lead to runoff, ground water contamination, mosquito breeding, and plant disease.

As noted earlier, gray water is not the same from household to household. Gray water may contain fats, oils, grease, hair, lint, soaps, cleansers, fabric softeners, and other chemicals that people outside of the household may not have been exposed to. For this reason, gray water should not be exposed to people that do not live in the household where it was generated. In order to significantly reduce the potential of coming in contact with gray water, for both the residents and non-residents, the landscape must be irrigated by sub-surface methods.

The following are precautions that should be taken when using gray water:

- Never use spray irrigation to apply gray water. Application of gray water must be done by utilizing a subsurface system.
- Apply the gray water to areas that receive little or no pedestrian traffic.
- Avoid irrigating edible fruit and vegetable gardens where the consumed portion of the plant rests on the ground.
- Discourage children from playing in areas where gray water is regularly applied.
- Never use gray water to wash down driveways, patios or other impervious surfaces.
- Wear latex or surgical gloves when handling components of the system to perform maintenance activities, such as cleaning filters.
- If someone in the home comes down with a contagious sickness, it may be wise to divert gray water from the house to the IWS or sewer

system until that individual has recuperated. Otherwise, anyone coming into contact with the gray water could be exposed to disease-causing organisms.

- Water used to launder clothing soiled by pesticides or other toxic substances should not be discharged into a gray water system.
- As with any wastewater treatment system, regular operational and maintenance checks must be performed.
- If anyone becomes ill after exposure to gray water irrigation areas, discontinue using the gray water system until the source of the illness is determined.
- Monitor the gray water irrigation area and adjust the gray water application rates everyday to ensure that ponding does not occur.

IV. Characterizing Gray water

Not all gray water is the same. Several studies have confirmed that the amount of contaminants in the gray water mainly depends on the lifestyle and activities of the occupants. For instance, a study done in 2001 by the University of Arizona found that a home with two adults and a child had a significantly higher concentration of fecal coliform (microorganisms found in human waste) in the gray water than did a household of just two adults.

Gray water will have higher concentrations of chemicals from detergents and cleaners if chemically strong products are used in the home and if the products are used often. Also, any treatment of the gray water and the length of time it is stored before being used will influence the levels of suspended solids, nutrients, bacteria, viruses, and odor. Users of gray water

must realize and always be aware that certain activities may produce a waste stream that is inappropriate for gray water use.

Table 1 is a partial list of constituents and characteristics that may be present in gray water. The composition of gray water from each household depends on a number of variables including the following:

- Personal habits of the residents;
- Type and quantity of soaps, detergents, and cleaners used;
- Age and number of residents; and
- Length of time the gray water is stored before being used.

Table 1. Constituents of wastewater from different sources (Wright, 1996).

Water Sources	Bacteria	Bleach	Food Particles	Grease & Oil	Hair	High pH	Hot water	Nitrogen	Odor	Organic Matter	Phosphorus	Salinity	Soap	Sodium	Suspended Solids	Turbidity
Shower & bathtub	x			x	x		x		x				x		x	x
Sinks (other than kitchen)	x			x			x		x	x			x		x	x
Laundry		x		x		x	x	x		x	x	x	x	x	x	x

V. Acceptable Uses for Gray water

Gray water from residences may be reused to irrigate the landscape of the property that the gray water was generated from. The following conditions will apply when reusing gray water for irrigation:

- Never use spray irrigation to apply gray water. Application of gray water must be done by utilizing a subsurface system.
- Gray water should never be used to irrigate root crops, vegetables that will be eaten raw, or other crops where the consumed portion of the plant rests on the ground.
- Gray water should be used to irrigate established lawns and plants. Seedlings and barren areas where a potential for runoff and/or ponding exists should not be irrigated with gray water.

Gray water users should understand that whatever they wash down the drain will end up in the landscape. Gray water can contain high levels of chlorides, sodium, borax, and sulfates, and have a high pH (alkaline). Some plants cannot tolerate this type of gray water and over time, the soil could become less able to accept water because of the cumulative effects of gray water use.

VI. Effects of gray water on plants

North Carolina State University performed a study in 2004 to determine the effect gray water had on ornamental plants. The study found that the source of gray water used to irrigate the plants had a significant effect on the plant health. In the study, all plant species irrigated with water from kitchen sinks, which is not an approved source of gray water, died in the test. Conversely, the plants irrigated with laundry gray water all survived, with some plant species differing in size and physical appearance as compared to the control group which was irrigated with tap water.

Not all plants can grow in certain climates and soil types, thus, not all plants will thrive when irrigated with gray water. Gray water makes the soil more alkaline, so plants that grow best in acidic soils should not be irrigated with gray water. However, with the proper gray water distribution methods and plant selection, a lush landscape can be achieved. Table 2. list some of the plants that should do well with gray water irrigation. Table 3. list the local plants that are known to adopted to moist soils and tolerant to salinity and/or alkalinity.

Table 2. Examples of plants tolerant/not tolerant to gray water.

Plants that are gray water tolerant	Plants that are NOT gray water tolerant
agapanthus	azalea
arizona cypress	begonia
australian tea tree	bleeding hearts fern
bermuda grass	camellia
bougainvillea	crape myrtle
cottonwood	deodar cedar
fan and date palms	foxglove
honeysuckle	gardenia
ice plant	holly
Italian stone pine	hydrangea
juniper oleander	impatiens
olive	oxalis (wood sorrel)
oak	philodendron
purple hopseed bush	primrose
rose	rhododendron
rosemary	star jasmine
	violets

Table 3. Examples of local plants tolerant to gray water

Crops	**Native Hawaiian Plants**
banana	akia
coconut	akulikuli
guava	beach Naupaka
papaya [1]	Pohinahina
sugarcane	Pohuehue, beach morning glory
Ornamentals	
ginger	**Grasses**
heliconia	bermuda grass
ornamental taro	seashore paspalum
ti leaf	
wedelia	

1 - not tolerant to overwatering or high levels of pH.

Soaps, detergents, and cleaners to avoid

Gray water users should avoid the soaps, detergents, and cleaners containing the following ingredients:

- Bleaches (e.g., chlorox);
- Softeners;
- Whitening ingredients;
- Enzymatic powers;
- Borax;
- Peroxygen;
- Sodium perborate;
- Petroleum distillate; and
- Alkylbenzene sodium trypochlorite.

Alkalinity refers to the relative amounts of alkaline chemicals in a solution. Sodium, potassium, and calcium are alkaline chemicals; they often are combined with carbonates, sulfates, or chlorides. Plants do not tolerate high concentrations of alkali salts.

Boron is considered a plant micronutrient, required in only very, very small amounts. Most soils provide adequate amounts of this chemical. Concentrations only slightly higher than those considered beneficial can cause severe injury or death to plants.

Conductivity is a simple measure of the amount of dissolved chemicals in a solution. These chemicals can be beneficial or harmful. The higher the conductivity, the more dissolved salts and minerals are present. In general, the higher the concentration of dissolved salts and minerals in the water, the greater the potential for adverse affects on the environment and plant health.

Sodium can act as a plant poison by reducing the plant's ability to take up water from the soil. Too much sodium can destroy the structure of clay soils, making them slick and greasy by removing air spaces and thus preventing good drainage. Once a clay soil is damaged by sodium, it can be very difficult to restore it to a viable condition.

Phosphate is a plant food and is added to soil as a fertilizer. However, many forms of phosphate are not readily usable by plants and soils.

Chlorine in *bleach* and detergents is generally expended in the washing process. However, there are times when not all of the chlorine is used up during the washing process.

High levels of **sodium, boron**, and **chlorine** in the gray water can cause damage to the plants. Sodium inhibits water intake to the plant, and large amounts of chlorine can be toxic. Signs of excessive chlorine and sodium include leaf burn, yellowing leaves and twig die-back. Although plants require some boron for growth, too much boron can cause problems such as leaf tip and margin burn, leaf cupping, yellowing leaves, branch die-back, premature leaf drop and reduced growth. Naturally, by reducing the amount of sodium, chlorine and boron in the gray water, the potential for plant damage will also be reduced. Again, it is important to know what is contained in products that are used to clean, bathe, launder, and are otherwise washed down the drains.

One of the easiest strategies to reduce the sodium in the water is to choose soaps and detergents that do not contain sodium-rich fillers. These fillers are added to the soaps and detergents but do not affect the cleaning

effectiveness. Concentrated liquid detergents usually have lower sodium content as compared to regular detergents because the concentrated varieties do not contain fillers. Most household cleaning products contain chlorine - some more than others. Although most of the chlorine is expended during the cleaning process, its use should be kept to a minimum in order to prevent high concentrations of chlorine in the gray water system.

Irrigating with gray water can have long-term effects on the soil such as an increase in pH, or alkalinity, and an accumulation of sodium. Since most laundry detergents contain alkaline chemicals such as sodium, potassium, and calcium, adding these chemicals to the landscape can raise the pH level of the soil. Sodium can also damage the soil structure and over time, will inhibit the soil's ability to accept water. In order to prevent significant damage to the soil, gray water users should periodically measure the pH of the soil in the irrigated area. Alkaline soil will have a pH of 7.1 or higher. pH levels above 7.5 are considered high and should be reduced. Agricultural sulfur or any acidic fertilizer such as ammonium sulfate can be added to the soil to reduce the pH level. Mixing in organic matter such as compost or agricultural gypsum will help counteract the effects of sodium buildup and help restore the soil structure and water absorption rate.

Depending on the season and the size of the distribution area, the amount of gray water generated per day may not be enough to satisfy the water requirements of the landscape. One strategy that gray water users should employ is to use several distribution areas. By directing the gray water to one area, the other areas can recover for the effects of gray water use.

Additionally, plants generally do better if the soil is allowed to dry between watering.

VII. Gray water System General Requirements

For the safe and effective use of gray water, blackwater cannot come in contact with gray water. As such, the wastewater streams must be separated by using two separate wastewater piping systems within the dwelling. The two separate wastewater plumbing systems should then run into the appropriate disposal systems - county sewer system (CS) or individual wastewater treatment system (IWS) for the blackwater and the collection tank for the gray water. Figure 1 is a house diagram of separate blackwater and gray water plumbing systems.

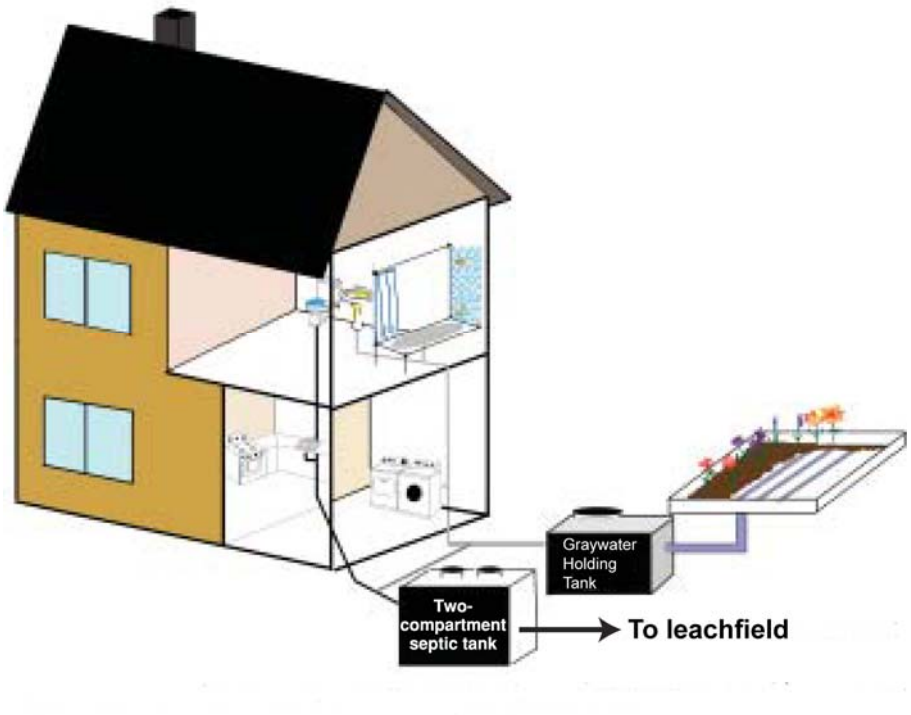


Figure 1. House diagram of separate blackwater and gray water plumbing systems.

Black water can be treated with an individual wastewater system or diverted to an available sewer system. Once separated, gray water can be diverted for reuse, such as for landscape irrigation, or it can be directed to an IWS/CS.

Diverted plumbing systems require separate management of blackwater and gray water sources. Because gray water systems may be used seasonally, it may need periodic maintenance, or may be abandoned in the future, a diversion valve should be placed in the gray water collection line at the point where it leaves the residence (Fig.2).

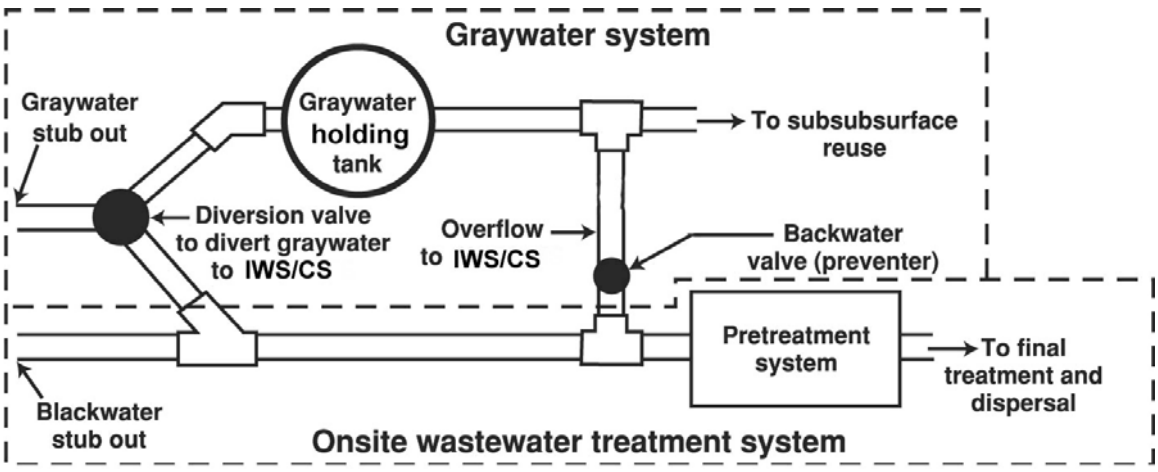


Figure 2. Diverted gray water plumbing system

This diversion valves allows gray water flow to be directed to the gray water system or to be directed to the IWS/CS. If a residence is connected to the county sewer, the diversion valve will direct gray water either to the gray water system or to the county sewer system.

Overflow from the gray water system must be diverted to the IWS/CS and a backwater valve must be installed. A backwater valve allows water to flow

one way to the IWS/CS but prevents blackwater from backing up into the gray water system. Water flowing to the desired direction has enough pressure to lift the flap of the backwater valve and pass through it, but blackwater flowing the wrong way forces the flap to stay closed.

Gray water can be collected, treated, stored and reused. The type of wastewater treatment system chosen depends on the constituents present in the gray water and on the level of treatment desired. In some cases, a holding tank with a gravity-fed pipe to the distribution system may be adequate.

VIII. Gray Water System Design Consideration

Gray Water Yields

The amount of gray water a house-hold generates depends on the number of occupants, their ages, their lifestyle characteristics, and their water use patterns and on the potential gray water sources to be fed into the system. The total amount of gray water produced varies from site to site and must be estimated as part of system-design processes. Please refer to Appendix A Gray Water System Design, for estimating the gray water discharge.

Gray Water Collection and Holding

Gray water contains organic matter, and if it is stored, it will quickly turn septic, generate offensive odors, and promote growth of pathogenic micro-organisms. Thus, it is critical to size the gray water holding tank appropriately so that it does not hold gray water for extended periods of

time. Generally, to keep gray water fresh, it should be stored for less than one day.

The gray water must be collected in an approved holding tank that meets the following criterion:

- Is labeled clearly as “non-potable water”;
- Restricts access, especially to children;
- Eliminates habitat for mosquitoes and other vectors;
- Accessible for cleaning; and
- Meets construction requirements of Appendix A – Gray Water System Design

The holding tank capacity must be adequate for the estimated gray water production, expected holding time, and application rate. The gray water holding tank should hold about one day’s production volume to limit gray water detention time in the tank to less than a day and to collect gross solids on the tank bottom. Inlet and outlet pipes can be close together to allow fairly direct flow between them. An effluent screen should be placed in the outlet piping to collect debris that might otherwise exit the holding tank with the discharged gray water and clog the irrigation piping.

Gray Water Subsurface Distribution

Gray water reuse should be distributed strictly below the soil surface to minimize potential health risks and odor. Provided below is a list of approved reuse application of gray water.

- Gray water must be applied via subsurface irrigation. Distribution of gray water using a spray irrigation system is prohibited.
- Edible root crops should not be irrigated with gray water.
- Use gray water for well-established plants rather than for seedlings.
- Gray water usually is slightly alkaline, so avoid using it to water plants that thrive in acidic soils.
- To prevent salt accumulation, distribute gray water over a large surface area and rotate distribution from one area to another.
- Select reuse applications appropriate for the amount of water to be generated in the system.

An example of a subsurface distribution system includes gray water dosed to a gravel bed or trench underlying a flowerbed (Fig. 3); water not taken up by plants then percolates through the soil profile. The soil provides water treatment through physical (filtration), chemical (absorption and transformation) and biological (degradation and predation).

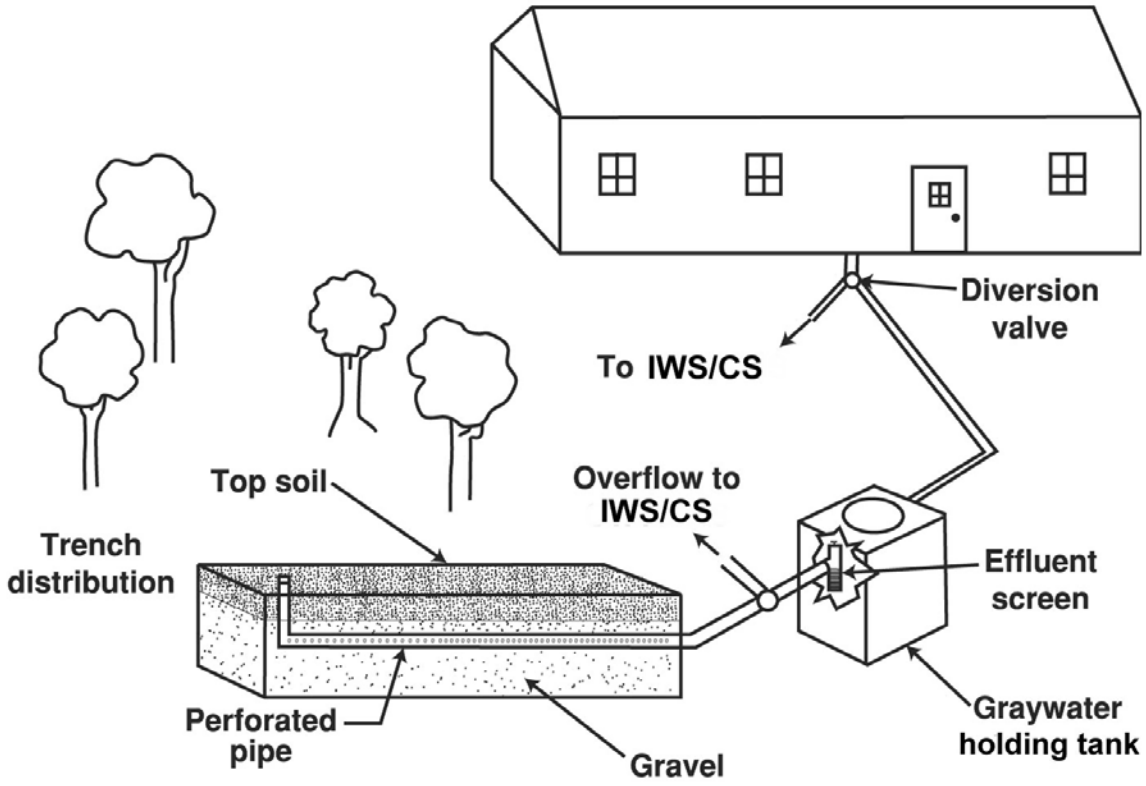


Figure 3 –Gray water system with gravity distribution through a gravel media trench.

Gray water systems equipped with pumps can disperse water through a pressurized subsurface drip system to irrigate trees, flowerbeds, and planter boxes. It is important to know how much water will be available for reuse, so that the irrigation system can be sized accordingly. Reuse system design also should consider typical supplemental water requirements of plants, especially during peak water-use months. Gray water reuse alone may not be sufficient to meet plant peak-water needs for high-water-use lawns, but it may provide enough water for small flower beds and planter boxes.

An in-line filter should be installed to remove any particulate matter that might clog discharge pipes or irrigation emitters. The filter type needed depends upon the amount of gray water to be filtered and types of contaminates expected. Regardless of what filter type is used, it should be cleaned periodically in order to prevent it from clogging or reducing flow to irrigation fields. Automatic backwashing filters are available and can limit clogging risks.

If the distribution system size is based on irrigation requirements, distribution areas must be designed to meet summer-month water requirements for landscape plants. During winter (or in lower-water-use months), gray water must be diverted to an IWS/CS to prevent over saturating the soil, resulting in less treatment of the gray water.

Sizing the distribution system based on soil-absorption requirements may not meet plant requirements during peak-water-use months. However, such sizing should follow requirements covered under Appendix A. Gray Water System Design.

Gray Water System Design Approval

For households with an IWS, the Counties have regulatory jurisdiction of the gray water system from within the building and extending to five feet from the building. The Department of Health has regulatory jurisdiction of the gray water system beginning from five feet away from the building. As such, gray water system designs for households with an IWS must be submitted to the County and the Department of Health for approval. The plans and specification must be certified by a licensed engineer or certified

irrigation designer. Prior to using a gray water system, the licensed engineer or certified irrigation designer shall perform a final inspection and testing of the gray water system. The Department of Health will issue an approval to use after it receives the inspection report and as-built drawings of the gray water system from the licensed engineer or certified irrigation designer.

For households connected to a county sewer system, the Counties have regulatory jurisdiction for all wastewater systems. As such, gray water system designs for households connected to a county sewer system only need to be submitted to the County for approval. The plans and specification must be certified by a licensed engineer or certified irrigation designer.

IX. Maintaining a Gray water System

To keep gray water systems working properly, all treatment and reuse systems require some level of attention to their operation and maintenance. The system designer should provide specific guidelines for maintaining your system. Some general guidelines follow:

- Clean the effluent screen at least annually. Remove the screen and spray residuals off into a large bucket. The residuals and wash-water collected in the bucket should be handled and processed as blackwater.
- Remove accumulated solids from the holding tank. Contact a wastewater pumper to pump out the solids. Remove solids when they

occupy about 25 percent of the tank's depth or about every 3 to 5 years.

- The gray water system may not be needed during the entire year. During seasons it is not used, set the diversion valve to direct flow to the IWS/CS.
- If the gray water system is pressurized, periodic maintenance and replacement is necessary.
- The end caps of the irrigation lines should be removable to allow periodic cleaning and removal of built-up solids.

Appendix A

GRAY WATER SYSTEM DESIGN
As amended from the Uniform Plumbing Code Chapter 16

A.1. Gray Water Systems - General

(A) The provisions of this appendix shall apply to the construction, alteration, and repair of gray water systems for underground landscape irrigation. Installations shall be allowed only in single-family dwellings or as allowed by the Authority Having Jurisdiction[2]. The system shall have no connection to any potable water system and shall not result in any surfacing of the gray water. Except as otherwise provided for in this appendix, the provisions contained herein shall be applicable to gray water installation.

(B) The type of system shall be determined on the basis of location, soil type, and groundwater level, and shall be designed to accept all gray water connected to the system from the residential building. The system, except as otherwise approved, shall consist of a holding tank or tanks that discharge into subsurface irrigation fields.

(C) No gray water system or part thereof shall be located on any lot other than the lot that is the site of the building or structure that discharges the gray water, nor shall any gray water system or part thereof be located at

[2] Authority Having Jurisdiction means the State or County agency that has regulatory jurisdiction. For dwellings connected to a publicly owned sewer system, the Authority Having Jurisdiction would be the County. The Department of Health Wastewater Branch would be the Authority Having Jurisdiction for all others.

any point having less than the minimum distances indicated in Table A-1.

(D) No permit or approval for any gray water system shall be issued until a plot plan with appropriate data or design plans satisfactory to the Authority Having Jurisdiction has been submitted and approved for use. When there is insufficient lot area or inappropriate soil conditions for adequate absorption of the gray water, as determined by the Authority Having Jurisdiction, no gray water system shall be permitted.

(E) No permit or approval shall be issued for a gray water system on any property in a geologically sensitive area as determined by the Authority Having Jurisdiction.

(F) Private sewage disposal systems existing or to be constructed on the premises shall comply with Appendix K of the Uniform Plumbing Code. In addition, appropriate clearances from the gray water systems shall be maintained as provided in Table A-1. The capacity of the private sewage disposal system, including required future areas, shall not be decreased or otherwise affected by the existence or proposed installation of a gray water system servicing the premises.

A.2. Definition

Gray water is untreated household waste water that has not come into contact with toilet waste. Gray water includes used water from bathtubs, showers, and bathroom wash basins, and water from clothes-washers and

laundry tubs. It shall not include wastewater from kitchen sinks or dishwashers.

A.3. Permit or Approval

It shall be unlawful for any person to construct, install, or alter, or cause to be constructed, installed, or altered any gray water system in a building or on a premise without first obtaining a permit or approval to do such work from the Authority Having Jurisdiction.

A.4. Drawings and Specifications

The Authority Having Jurisdiction may require any or all of the following information to be included with or in the plot plan before a permit or approval is issued for a gray water system, or at any time during the construction thereof:

(A) Plot plan drawn to scale and completely dimensioned, showing lot lines and structures, direction and approximate slope of surface, location of all present or proposed retaining walls, drainage channels, water supply lines, wells, paved areas and structures on the plot, number of bedrooms and plumbing fixtures in each structure, location of private sewage disposal system or building sewer connecting to the county sewer, and location of the proposed gray water system.

(B) Details of construction necessary to ensure compliance with the requirements of this chapter, together with a full description of the

complete installation, including installation methods, construction, and materials as required by the Authority Having Jurisdiction.

(C) A log of soil formations and groundwater level as determined by test holes dug in proximity to any proposed irrigation area, together with a statement of water absorption characteristics of the soil at the proposed site as determined by approved percolation tests.

Exception: The Authority Having Jurisdiction may allow the use of Table A-2 in lieu of percolation tests.

A.5. Inspection and Testing

(A) Inspection

(1) All applicable provisions of this appendix and of Section 103.5 of the Uniform Plumbing Code shall be complied with.

(2) System components shall be properly identified as to manufacturer.

(3) Holding tanks shall be installed on dry, level, well-compacted soil if underground, or on a level three (3) inch concrete slab if aboveground.

(4) Holding tanks shall be anchored against overturning.

(5) If a design is predicated on soil tests, the irrigation field shall be installed at the same location and depth as the tested area.

(6) Installation shall conform with the equipment and installation methods identified in the approved plans.

(B) Testing

(1) Holding tanks shall be filled with water to the overflow line prior to and during inspection. All seams and joints shall be left exposed, and the tank shall remain watertight.

(2) A flow test shall be performed through the system to the point of gray water irrigation. All lines and components shall be watertight.

A.6. Procedure for Estimating Gray Water Discharge

(A) The number of occupants of each dwelling unit shall be calculated as follows:

First bedroom: 2

Each additional bedroom: 1

(B) The estimated gray water flows for each occupant shall be calculated as follows:

Showers, bathtubs, and washbasins: 25 GPD

Laundry: 15 GPD

(C) The total number of occupants shall be multiplied by the applicable estimated gray water discharge as provided above, and the type of fixtures connected to the gray water system.

Example 1: Single-family dwelling; three bedrooms with showers, bathtubs, washbasins; and laundry facilities all connected to the gray water system:

Total number of occupants = 2 + 1 + 1 = 4
Estimated gray water flow = 4x (25+15) = 160 GPD

Example 2: Single-family dwelling; four bedrooms with only the clothes washer connected to the gray water system:

Total number of occupants = 2+1+1+1=5
Estimated gray water flow = 5 x 15 = 75 GPD

A.7. Required Area of Subsurface Irrigation Fields (See Figure A-5)

The Authority Having Jurisdiction may require that each valved zone shall have a minimum effective irrigation area in square feet as determined by Table A-2 for the type of soil found in the excavation, based upon a calculation of estimated gray water discharge pursuant to Section A.7. of this appendix, or the size of the holding tank, whichever is larger. The area of the irrigation field shall be equal to the aggregate length of the perforated pipe sections within the valved zone multiplied the width of the proposed irrigation field. Each proposed gray water system shall include at least three

(3) valved zones, and each zone shall be in compliance with the provisions of the section. No excavation for an irrigation field shall extend within three (3) vertical feet of the highest known seasonal groundwater, nor to a depth where gray water may contaminate the groundwater or ocean water. The applicant shall supply evidence of groundwater depth to the satisfaction of the Authority Having Jurisdiction.

A.8. Determination of Maximum Absorption Capacity

(A) Wherever practicable, irrigation field size shall be computed from Table A-2 or by water demand based on evapotranspiration (ET) data.

(B) In order to determine the absorption quantities of questionable soils other than those listed in Table A-2, the proposed site may be subjected to percolation tests acceptable to the Authority Having Jurisdiction.

(C) When a percolation test is required, no gray water system shall be permitted if the test shows the absorption capacity of the soil is not acceptable as determined by the Authority Having Jurisdiction or is less than eighty-three hundredths (0.83) gallons per square foot or more than five and twelve hundredths (5.12) gallons per square foot of leaching area per twenty-four (24) hours.

(D) The following formula can be used to estimate the square footage of landscape to be irrigated based on ET data:

$$LA = \frac{GW}{\quad}$$

ETx PF x 0.62

Where: GW = estimated gray water produced (gallons per week)

LA = landscaped area (ft^2)

ET = evapotranspiration (inches per day)

PF = plant factor, based on climate and type of plants

0.62 = conversion factor (from inches of ET to gallons per week)

A.9. Holding Tank Construction (See Figures A-1, A-2, A-3, and A-4.)

(A) Plans for all holding tanks shall be submitted to the Authority Having Jurisdiction for approval. Such plans shall show all dimensions, structural calculations, bracings, and such other pertinent data as may be required. A minimum capacity of fifty (50) gallons is required.

(B) Holding tanks shall be constructed of solid, durable materials not subject to excessive corrosion or decay and shall be watertight.

(C) Each holding tank shall be vented as required by Chapter 9 of the Uniform Plumbing Code and shall have a locking, gasketed access opening or approved equivalent to allow for inspection and cleaning.

(D) Each holding tank shall have its rated capacity permanently marked on the unit. In addition, a sign stating GRAY WATER IRRIGATION SYSTEM, DANGER - UNSAFE WATER shall be permanently marked on the holding tank.

(E) Each holding tank installed aboveground shall have an emergency drain separate from that connecting the tank with the irrigation fields and an overflow drain. The emergency and overflow drains shall have permanent connections to the building drain or building sewer, upstream of septic tanks, if any. The overflow drain shall not be equipped with a shutoff valve.

(F) The overflow and emergency drainpipes shall not be less in size than the inlet pipe. The vent size shall be determined based on the total gray water fixture units as outlined in Table 7-5 of the Uniform Building Code. Unions or equally effective fittings shall be provided for all piping connected to the holding tank.

(G) Each holding tank shall be structurally designed to withstand all anticipated earth or other loads. All holding tank covers shall be capable of supporting an earth load of not less than three hundred (300) pounds per square foot when the tank is designed for underground installation.

(H) If a holding tank is installed underground, the system must be designed so that the tank overflow will gravity drain to the existing sewer line or septic tank. The tank shall be protected against sewer line backflow by a backwater valve.

(I) Materials

(1) Holding tanks shall be steel, protected from corrosion, both externally and internally by an approved coating or other acceptable means; shall meet nationally recognized standards for the intended use; and shall be approved by the Authority Having Jurisdiction.

(2) Holding tanks constructed of alternate material may be approved by the Authority Having Jurisdiction, provided they comply with approved applicable standards.

A.10. Valves and Piping (See Figures 16-1, 16-2, 16-3, and 16-4.)

Gray water piping discharging into the holding tank or having a direct connection to sanitary drain or sewer piping shall be downstream of an approved water seal type trap(s). If no such trap(s) exists, an approved vented running trap shall be installed upstream of the connection to protect the building from any possible waste or sewer gases. All gray water piping shall be marked or have a continuous tape marked with the words DANGER - UNSAFE WATER. All valves, including the three-way valve, shall be readily accessible and approved by the Authority Having Jurisdiction. A backwater valve installed pursuant to this code shall be provided on all holding tank drain connections to the sanitary drain or sewer piping.

A.11. Irrigation Field Construction (See Figure A-5.)

The Authority Having Jurisdiction may permit subsurface drip irrigation, mini-leach field or other equivalent irrigation methods which discharge gray water in a manner which ensures that the gray water does not surface. Design Standards for subsurface drip irrigation systems and mini-leach field irrigation systems are as follows:

(A) Standards for a subsurface drip irrigation system:

(1) Minimum 140 mesh (115 micron) filter with a capacity of twenty-five (25) gallons per minute, or equivalent, filtration, sized appropriately to maintain the filtration rate, shall be used. The filter back-wash and flush discharge shall be caught, contained, and disposed of to the sewer system, septic tank, or with approval of the Authority Having Jurisdiction, a separate mini-leach field sized to accept all the back wash and flush discharge water. Filter backwash water and flush water shall not be used for any purpose. Sanitary procedures shall be followed when handling filter back-wash and flush discharge of gray water.

(2) Emitters shall have a minimum flow path of 1,200 microns and shall have a coefficient of manufacturing variation (Cv) of no more than seven (7) percent. Irrigation system design shall be such that the emitter flow variation shall not exceed plus or minus ten (10) percent. Emitters shall be recommended by the manufacture for subsurface use and gray water use, and shall have demonstrated resistance to root intrusion.

(3) Each irrigation zone shall be designed to include no less than the number of emitters specified in Table A-3, or through a procedure designated by the Authority Having Jurisdiction. Minimum spacing between emitters is fourteen (14) inches in any direction.

(4) The system design shall provide user controls, such as valves, switches, timers, and other controllers as appropriate, to rotate the distribution of gray water between irrigation zones.

(5) All drip irrigation supply lines shall be polyethylene tubing or PVC class 200 pipe or better and schedule 40 fittings. All joints shall be properly solvent-cemented, inspected and pressure tested at forty (40) pounds per square inch (psi), and shown to be drip tight for five (5) minutes, before burial. All supply lines will be buried at least eight (8) inches deep. Drip feeder lines can be poly or flexible PVC tubing and shall be covered to a minimum depth of nine (9) inches.

(6) Where pressure at the discharge side of the pump exceeds twenty (20) psi, a pressure reducing valve able to maintain downstream pressure no greater than twenty (20) psi shall be installed downstream from the pump and before any emission device.

(7) Each irrigation zone shall include a flush valve/anti-siphon valve to prevent back siphonage of water and soil.

(B) Standards for a mini-leach field system:

(1) Perforated sections shall be a minimum three (3) inch diameter and shall be constructed of perforated high-density polyethylene pipe, perforated ABS pipe, perforated PVC pipe, or other approved materials, provided that sufficient openings are available for distribution of the gray water in to the trench area. Material, construction, and perforation of the pipe shall be in compliance with the appropriate absorption fields drainage piping standards and shall be approved by the Authority Having Jurisdiction.

(2) Filter material, clean stone, gravel, slag, or similar filter material acceptable to the Authority Having Jurisdiction, varying in size from three quarter (3/4) inch to two and one-half (2-1/2) inch shall be placed in the trench to the depth and grade required by this section. The perforated section shall be laid on the filter material in an approved manner. The perforated section shall then be covered with filter material to the minimum depth required by this section. The filter material shall then be covered with untreated building paper, straw, or similar porous material to prevent closure of voids with earth backfill. No earth backfill shall be placed over the filter material cover until after inspection and acceptance.

(C) Irrigation fields shall be constructed as follows:

	Minimum	Maximum
Number of drain lines per valved zone	1	
Length of each perforated line		100 ft.
Bottom width of trench	12 in.	18 in.
Spacing of lines, center to center	4 ft.	
Depth of earth cover of lines	10 in.	
Depth of filter material cover of lines	2 in.	
Depth of filter material beneath lines	3 in.	
Grade of perforated lines	level	3in./100 ft.

(D) When necessary on sloping ground to prevent excessive line slopes, irrigation lines shall be stepped. The lines between each horizontal leaching section shall be made with approved watertight joints and installed on natural or unfilled ground.

A.12. Special Provisions

(A) Other collection and distribution systems such as laundry only gray water systems may be approved by the local Authority Having Jurisdiction.

(B) Nothing contained in this chapter shall be construed to prevent the Authority Having Jurisdiction from requiring compliance with higher requirements than those contained herein, where such higher requirements are essential to maintain a safe and sanitary condition.

Table A-1: Minimum Horizontal Clearances

Minimum Horizontal Clearance (ft)		
	Holding Tank	**Irrigation Field**
Building structures [1, 2]	5	5
Property line	5	5
Water supply wells [3]	50	1,000
Streams, lakes, ocean [3, 4]	50	50
Sewage pits/Cesspools	5	5
Irrigation field [5]	5	5
Septic tank	0	5
On-site domestic water line	5	5
Pressurized public water main [6]	10	10

1 - Including porches and steps, whether covered or uncovered, breezeways, roofed porte cocheres, roofed patios, carports, covered walks, covered driveways, and similar structures or appurtenances.

2 - The distance may be reduced to zero feet for aboveground tanks when first approved by the Authority Having Jurisdiction.

3 - Where special hazards are involved, the distance required shall be increased as may be directed the Authority Having Jurisdiction.

4 - These minimum clear horizontal distances shall also apply between the irrigation field and the ocean mean high-tide line.

5 - Plus two (2) feet for each additional foot of depth in excess of one (1) foot below the bottom of the drain line.

6 - For parallel construction/for crossings, approval by the Authority Having Jurisdiction shall be required.

Table A-2: Design Criteria of Six Typical Soils

Type of Soil	Minimum irrigation area per 100 gal (ft^2)	Maximum absorption capacity of the soil in a 24-hour period (gal/ft^2)
Coarse sand or gravel	20	5.0
Fine sand	25	4.0
Sandy loam	40	2.5
Sandy clay	60	1.7
Clay with considerable sand or gravel	90	1.1
Clay with small amounts of sand or gravel	120	0.8

Table A-3: Subsurface Drip Design Criteria for Six Typical Soils

Type of Soil	Maximum Emitter Discharge (gal/day)	Minimum Number of Emitters per gpd of Gray water Production
Sand	1.8	0.6
Sandy loam	1.4	0.7
Loam	1.2	0.9
Clay loam	0.9	1.1
Silty clay	0.6	1.6
Clay	0.5	2.0

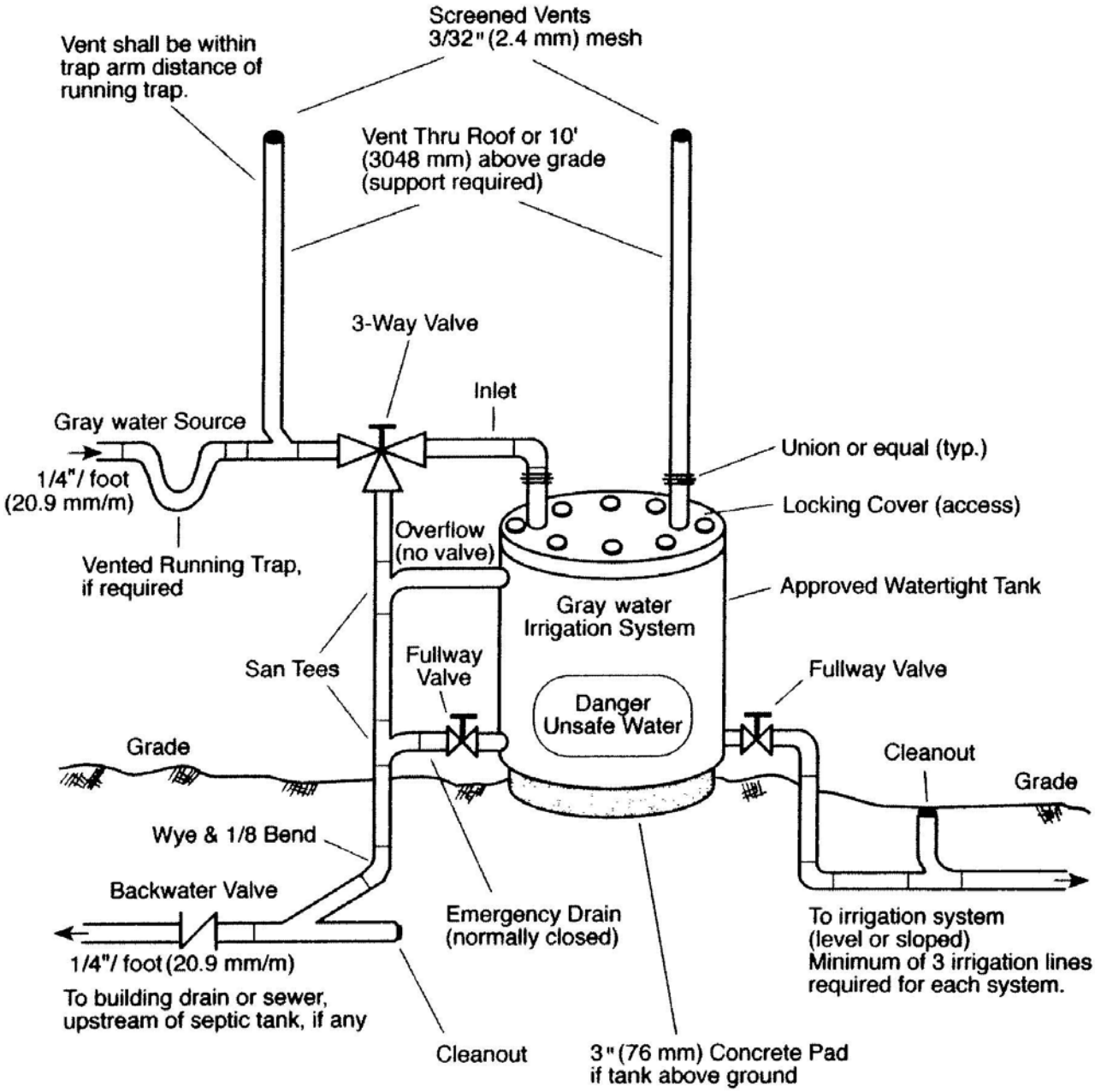


Figure A-1. Gravity System

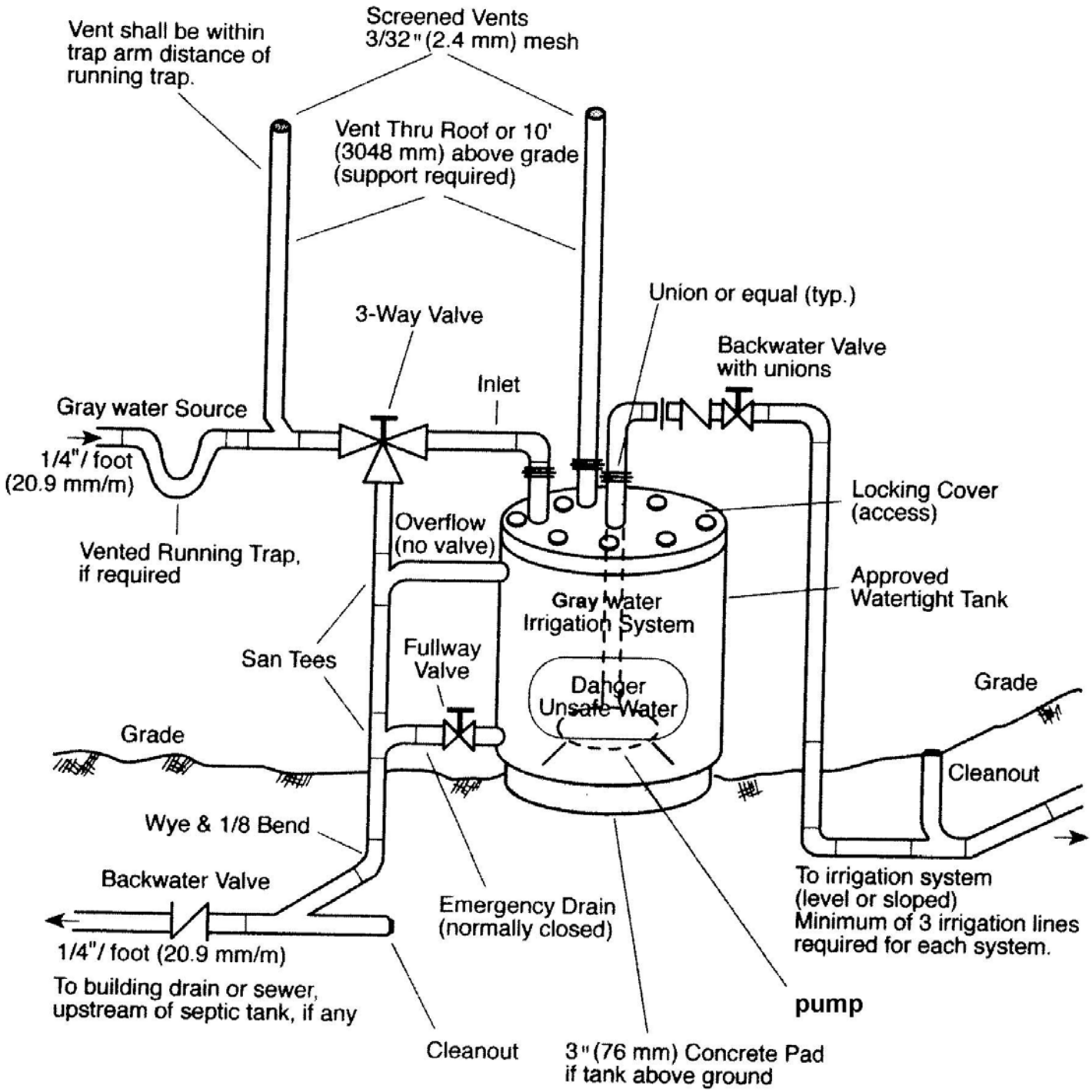


Figure A-2. Pumped System

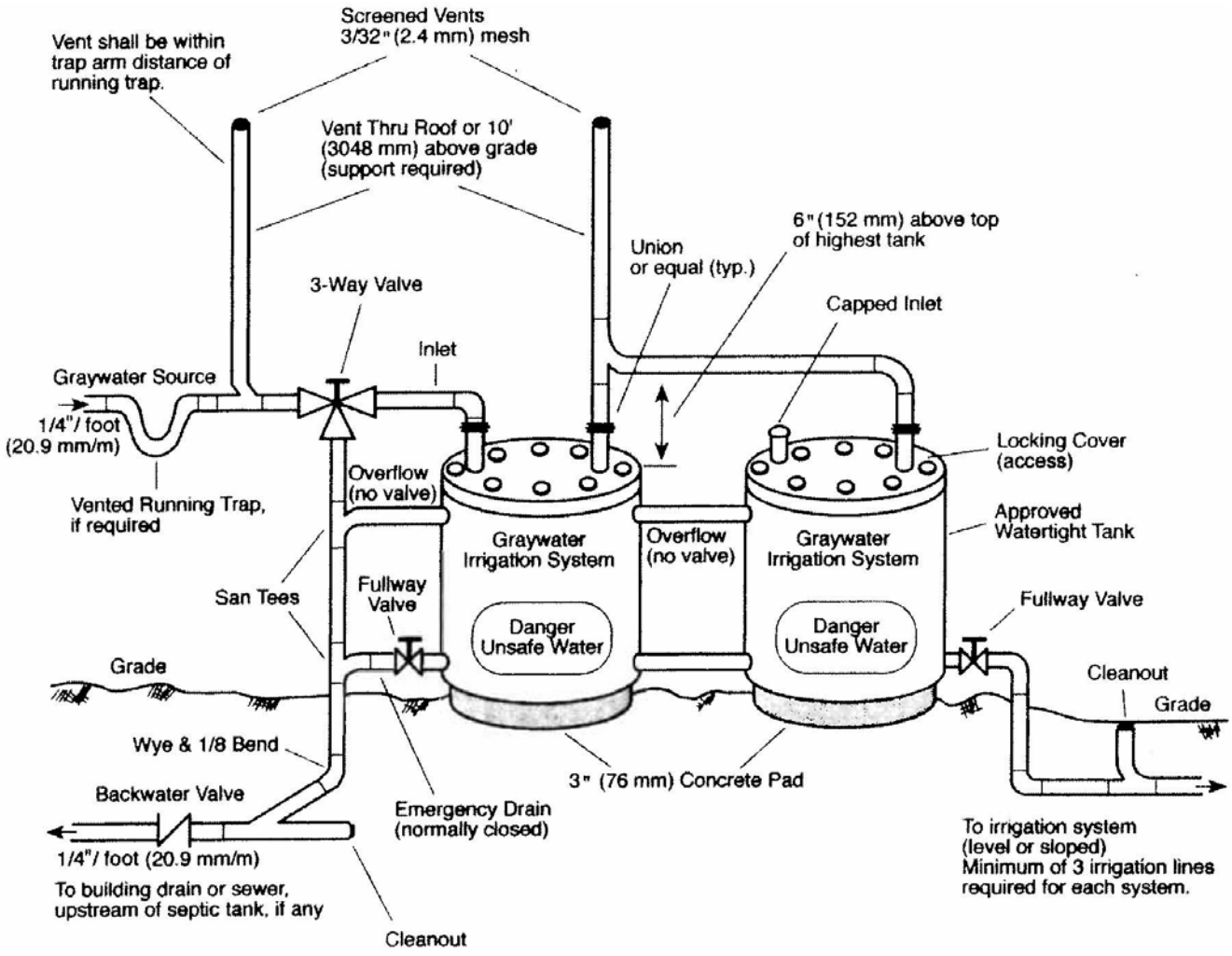


Figure A-3. Multi-tank System

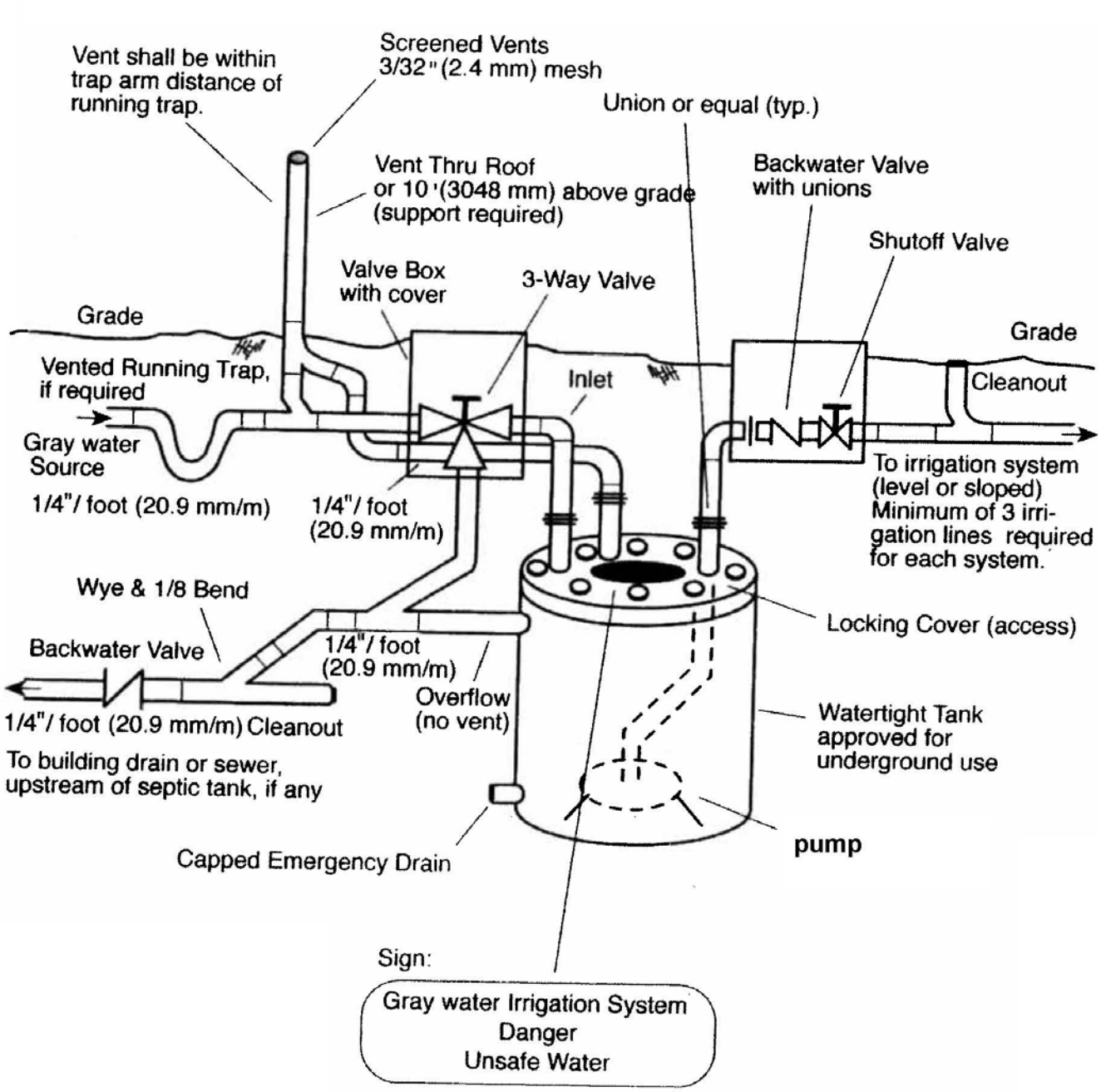
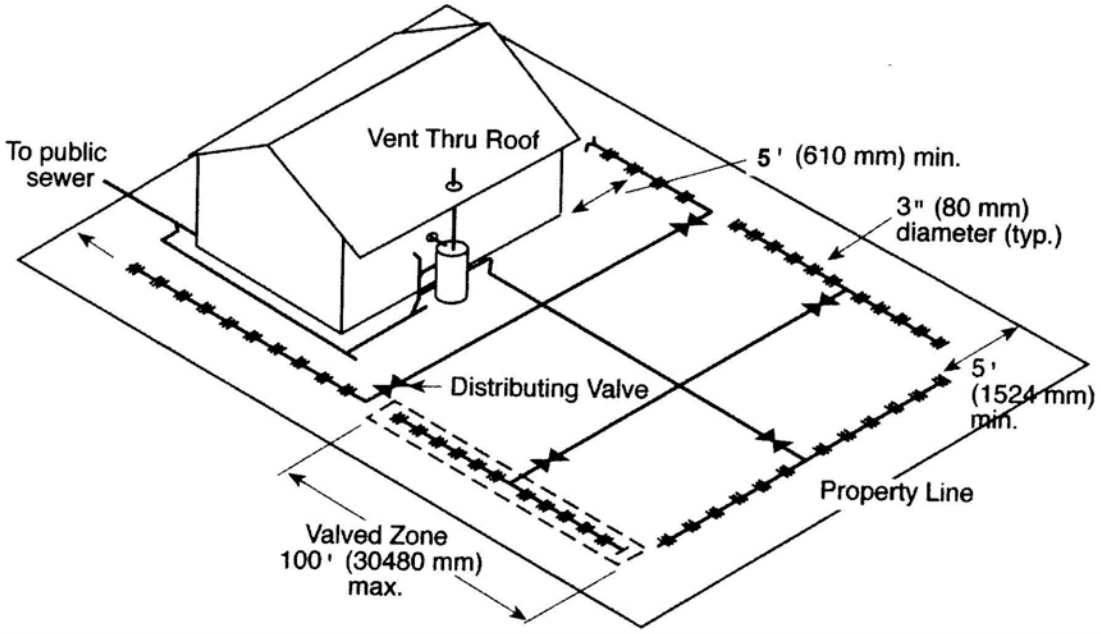


Figure A-4. Underground, Pumped System



Note: Each valved zone shall have a minimum effective absorption/irrigation area in square feet predicated on the estimated graywater discharge in gallons per day and on the type of soil found in the area. The area of the field shall be equal to the aggregate length of perforated pipe sections within the valved zone times the width of the proposed field.

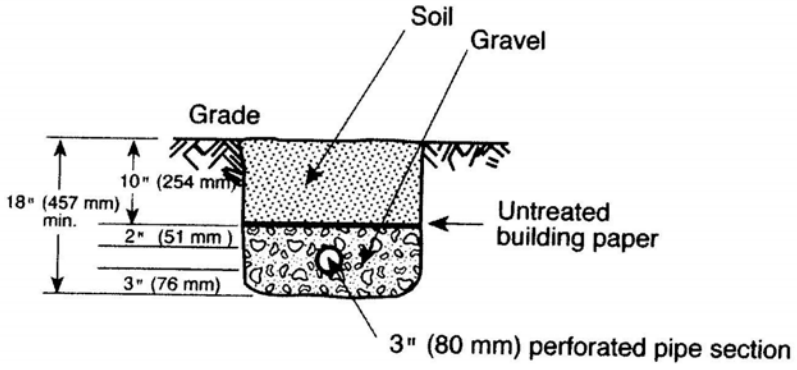


Figure A-5. Typical Irrigation Layout

Appendix B

WASHING MACHINE WATER REUSE

Of all the gray water sources in a typical household, the easiest and probably the most common source to tap into is the clothes washing machine. Washers generate 10 to 50 gallons of gray water per load and depending on the number of loads, this amount should be sufficient for most landscaping. Using the gray water from the washer is a popular practice because the washer has a built-in pump which eliminates the need for a storage tank and gray water pump for the subsurface irrigation system.

Another reason irrigating with gray water from the washer is popular is the ease in diverting the gray water from the washer to the irrigation system. As illustrated in figure B.1. below, a 3-way valve is installed on the drain pipe of the washer. The 3-way valve allows the washer gray water to flow to either the irrigation system or to the IWS/sewer system. All washer gray water systems need the 3-way valve so that the gray water can be diverted to the IWS/sewer system during rainy days or when laundering articles soiled with undesirable substances such as oils, pesticides, and other chemicals.

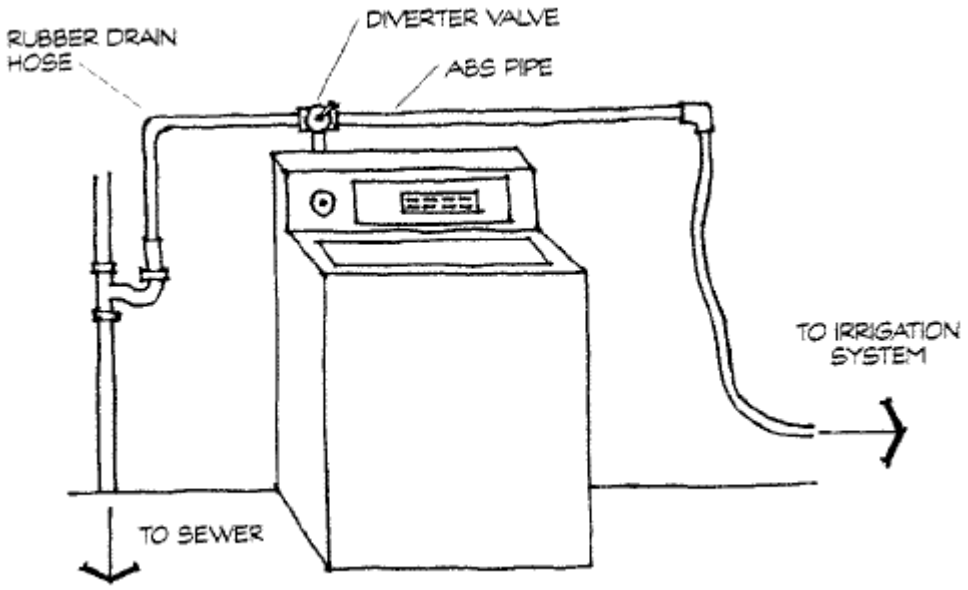


Figure B.1. 3-way valve for washer gray water.

Gray water from the washer is still untreated wastewater and may contain pathogens and bacteria. Surface application of the gray water may cause illness to humans and animals that come into contact with the irrigated area. As such, all gray water systems must irrigate the landscape by subsurface means. Also, because the gray water is in the subsurface, water is not lost to evaporation, overspray, or run-off. Drip emitters are not recommended because of the amount of particles and lint from the washer gray water. Additionally, the washer pump cannot provide the constant water pressure required for the drip emitter to work properly.

As with any gray water irrigation system, the gray water should not break through the landscape surface and run-off the property or pond. Irrigating on rainy days should be avoided as the gray water may leech into the storm

water run-off and enter stream, lakes, and reservoirs. Vegetables meant to be eaten raw and root crops should not be irrigated with gray water.

Appendix C

EXAMPLE DESIGN CALCULATIONS

Calculating Gray Water Volume

To estimate the volume of gray water generated in a household follow the steps below:

First calculate the number of occupants of a home as follows:

2 persons for first bedroom

1 person per additional bedroom

Next, calculate each person's daily gray water flow allocation as follows:

Showers, bathtubs, and washbasins: 25 gallons per day

Laundry: 15 gallons per day

The total number of occupants shall be multiplied by the applicable estimated gray water flow allocation as provided above, and the type of fixtures connected to the gray water system.

Example 1:

Single-family dwelling; three bedrooms with showers, Bathtubs, washbasins; and laundry facilities all connected to the gray water system:

Total number of occupants = 2 + 1 + 1 = 4

Estimated gray water flow = 4x (25+15) = **160 gallons per day**

Example 2:

Single-family dwelling; four bedrooms with only the clothes washer connected to the gray water system:

Total number of occupants = 2+1+1+1 = 5

Estimated gray water flow = 5 x 15 = **75 gallons per day**

Sizing a Gray Water Tank

Gray water tanks must be designed to provide at least 24 hour combined retention for the daily flow of the gray water

Example 1:

Using the result from Example 1 above, the gray water flow = 160 gallons per day. Therefore, the capacity of tank that is required is:

= 160 gallons per day + 24 hour combined retention (i.e. double the daily flow)

= 160 gallons per day x 2

= **320 gallons tank capacity**

Example 2:

Using the result from Example 2 above, the gray water flow = 75 gallons per day. Therefore, the capacity of tank that is required is:

= 75 gallons per day + 24 hour combined retention (i.e. double the daily flow)

= 75 gallons per day x 2

= **150 gallons tank capacity**

Sizing the Irrigation Area

Gray water irrigation systems are sized on whether they use subsurface mini leachfield or drip irrigation methods. Systems are sized based on the capability of the soil to receive the gray water, water demand based on evapotranspiration (ET) data and the estimated gray water flow.

Example 1:

Example of calculating irrigation area of a subsurface mini leachfield using soil data on Appendix A, Table A-2

Gray water volume = 160 gallons per day

Soil type: Sandy clay

From Table A-2, the minimum irrigation area required for sandy clay is:

Sandy clay = 90 ft^2 per 100 gallons

The area required is calculated as follows:

Gray water volume (gallons per day) x 90 ft^2/100 gallons

= 160 gallons per day x 90 ft^2/100 gallons

= 160 gallons per day x 0.90 ft^2/gallon

= **144 ft^2**

Example 2:

Example of calculating irrigation area of a subsurface mini leachfield using percolation rate and Table 1.

Gray water volume = 160 gallons per day

Percolation rate = 10 min/inch

Using the table of Appendix D, the required absorption area (ft^2/gal) for a percolation rate of 10 min/inch:

0.825 ft^2/gal.

Therefore, the absorption area required is calculated as follows:

= Gray water volume (gallons per day) x 0.825 ft^2/gal

= 160 gallons per day x 0.825 ft^2/gal

= **132 ft^2**

Example 3:

Example of calculating irrigation area of a drip irrigation system using ET data provided in Appendix E.

The single family dwelling is located in Haleiwa, Hawaii and the gray water volume is 160 gallons per day.

Below is the equation that can be used to calculate required landscaping area:

$$LA = \frac{GW}{ET \times PF \times 0.62}$$

Where: GW = estimated gray water produced (gallons per week)

LA = landscaped area (ft^2)

ET = evapotranspiration (inches per day)

PF = plant factor, based on climate and type of plants typically 1.0

0.62 = conversion factor (from inches of ET to gallons per week)

Based on the pan evaporation data provided in Appendix E, the pan evaporation for Haleiwa is 63.7 inches per year. Using the correction factor of 0.8, the ET value is:

ET = pan evaporation value x correction factor

= 63.7 * 0.8

= 51.0 inches per year

Use the following equation to convert to inches per day:

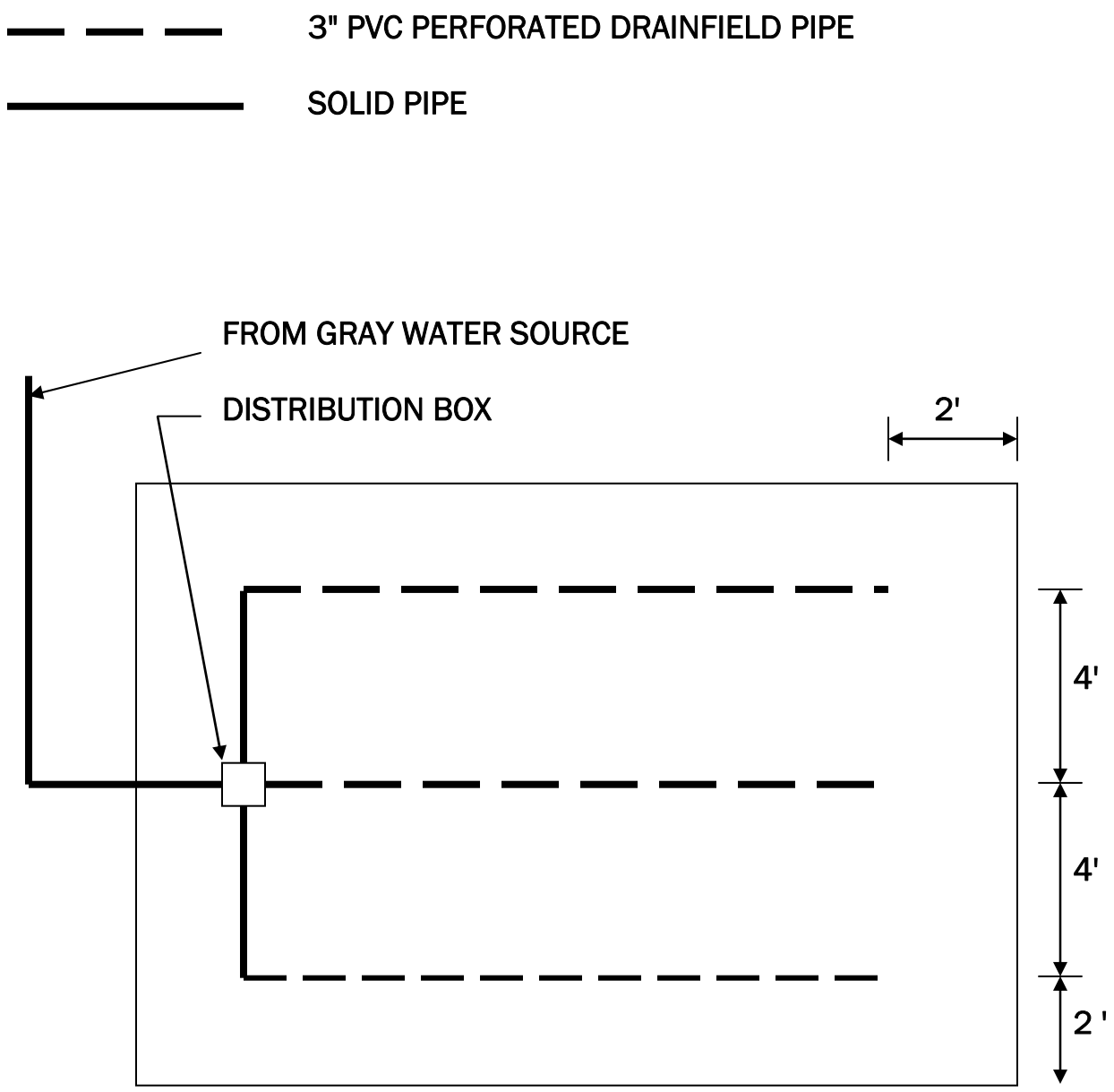
$$\frac{\text{51.0 inches per year}}{\text{364 days in a year}} = \text{0.14 inches per day}$$

Therefore, the required landscaping area can be calculated as follows:

$$LA = \frac{\text{160 gallons}}{\text{0.14 in. per day x 1 x 0.62}}$$

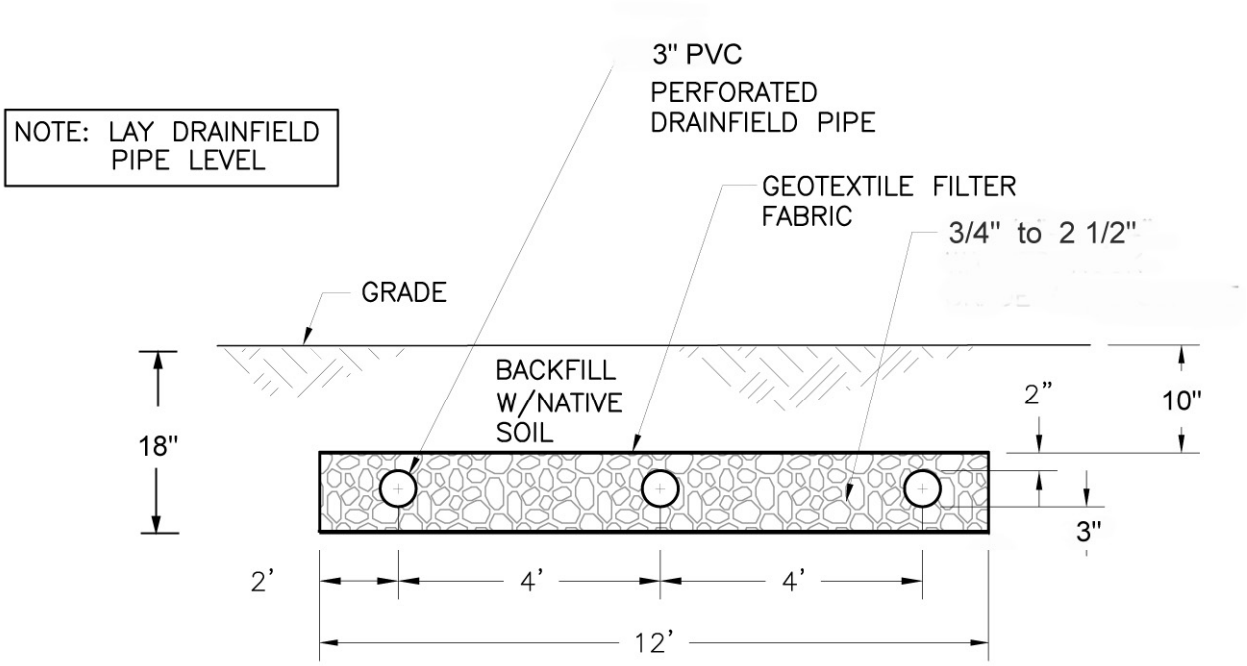
$$= \textbf{1,842 ft}^2$$

NOTE: This equation for calculation landscape area <u>does not</u> apply to the designs involving IWS with ET systems, recycled water systems, and gray water systems that are used in conjunction with composite toilets. Rainfall data will be required to be factored in for the calculation of these types of systems.



SUBSURFACE MINI LEACHFIELD LAYOUT

NOT TO SCALE



LEACHFIELD CROSS SECTION

NOT TO SCALE

Appendix D

REQUIRED ABSORPTION AREA BASED ON PERCOLATION RATES

Percolation Rate (min/inch) Less than or equal to	Required Absorption Area ft^2/gal	Percolation Rate (min/inch) Less than or equal to	Required Absorption Area ft2/gal
1	0.350	31	1.265
2	0.425	32	1.285
3	0.500	33	1.300
4	0.575	34	1.315
5	0.625	35	1.335
6	0.665	36	1.350
7	0.705	37	1.365
8	0.745	38	1.385
9	0.785	39	1.400
10	0.825	40	1.415
11	0.850	41	1.435
12	0.875	42	1.450
13	0.900	43	1.465
14	0.925	44	1.485
15	0.950	45	1.500
16	0.970	46	1.510
17	0.990	47	1.520
18	1.010	48	1.530
19	1.030	49	1.540
20	1.050	50	1.550
21	1.070	51	1.560
22	1.090	52	1.570
23	1.110	53	1.580
24	1.130	54	1.590
25	1.150	55	1.600
26	1.170	56	1.610
27	1.190	57	1.620
28	1.210	58	1.630
29	1.230	59	1.640
30	1.250	60	1.650

Appendix E

PAN EVAPORATION MAPS

The maps contained herein are to be used to estimate the pan evaporation value. The pan evaporation value is needed to estimate the evapotranspiration (ET) values. ET values are needed to appropriately estimate the square footage area needed for a gray water irrigation system.

Irrigation field designers may either interpolate pan evaporation values from the general area map or use the pan evaporation station value from a pan evaporation station if the property is in close proximity to the station.

To convert the pan evaporation values to ET values, the pan evaporation values need to be multiplied by a correction factor. For the purposes of sizing a gray water irrigation field, a correction factor of 0.8 should be used.

ET = pan evaporation * 0.8

Reference for the pan evaporation maps:
Ekern, P.C., and J.H. Chang. 1985. Pan evaporation: State of Hawaii, 1893-1983. Report R74, Division of Water and Land Development, Department of Land and Natural Resources, State of Hawaii, Honolulu. 172 p.

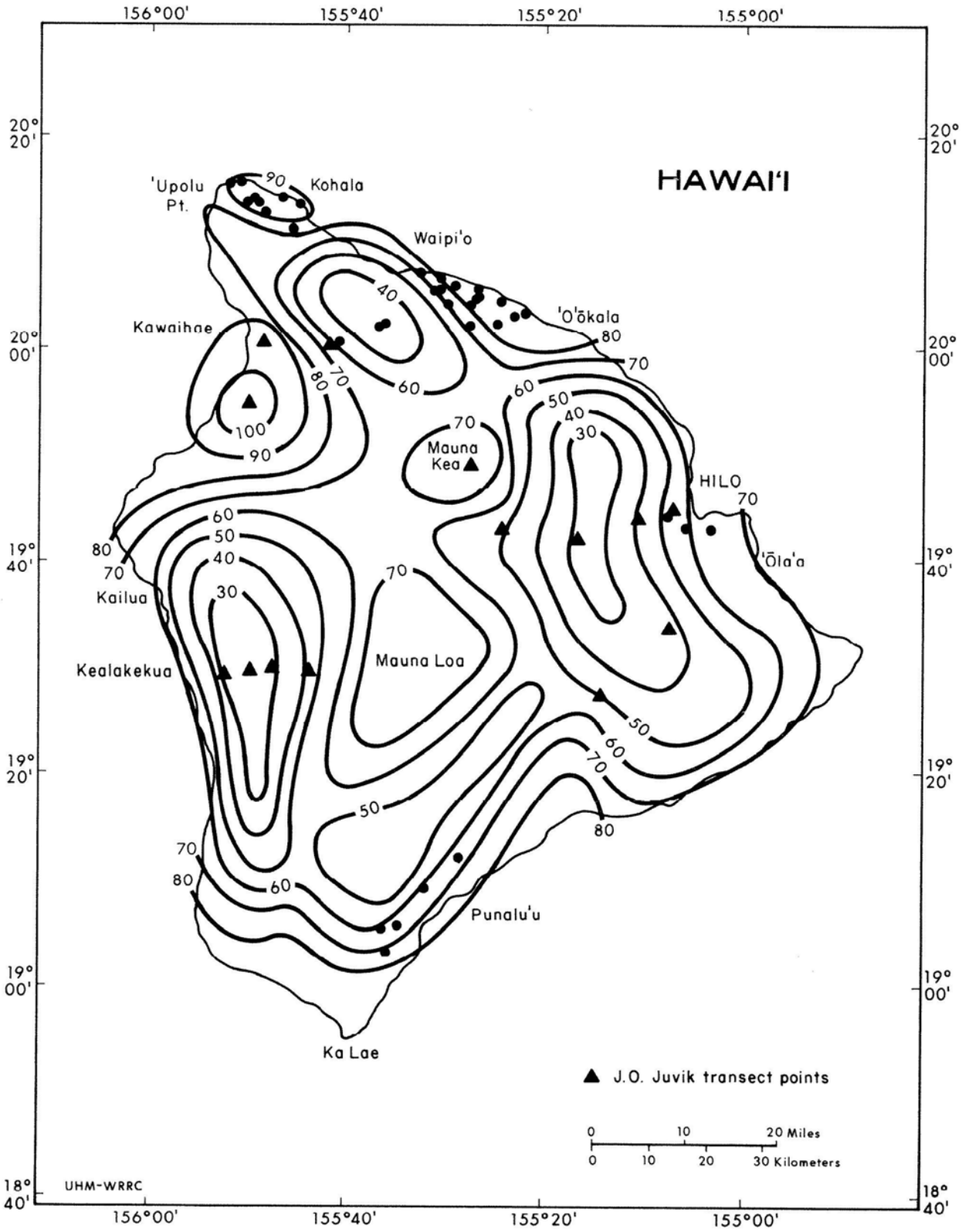


Figure C.1. General Area Pan Evaporation Values for Hawaii Island

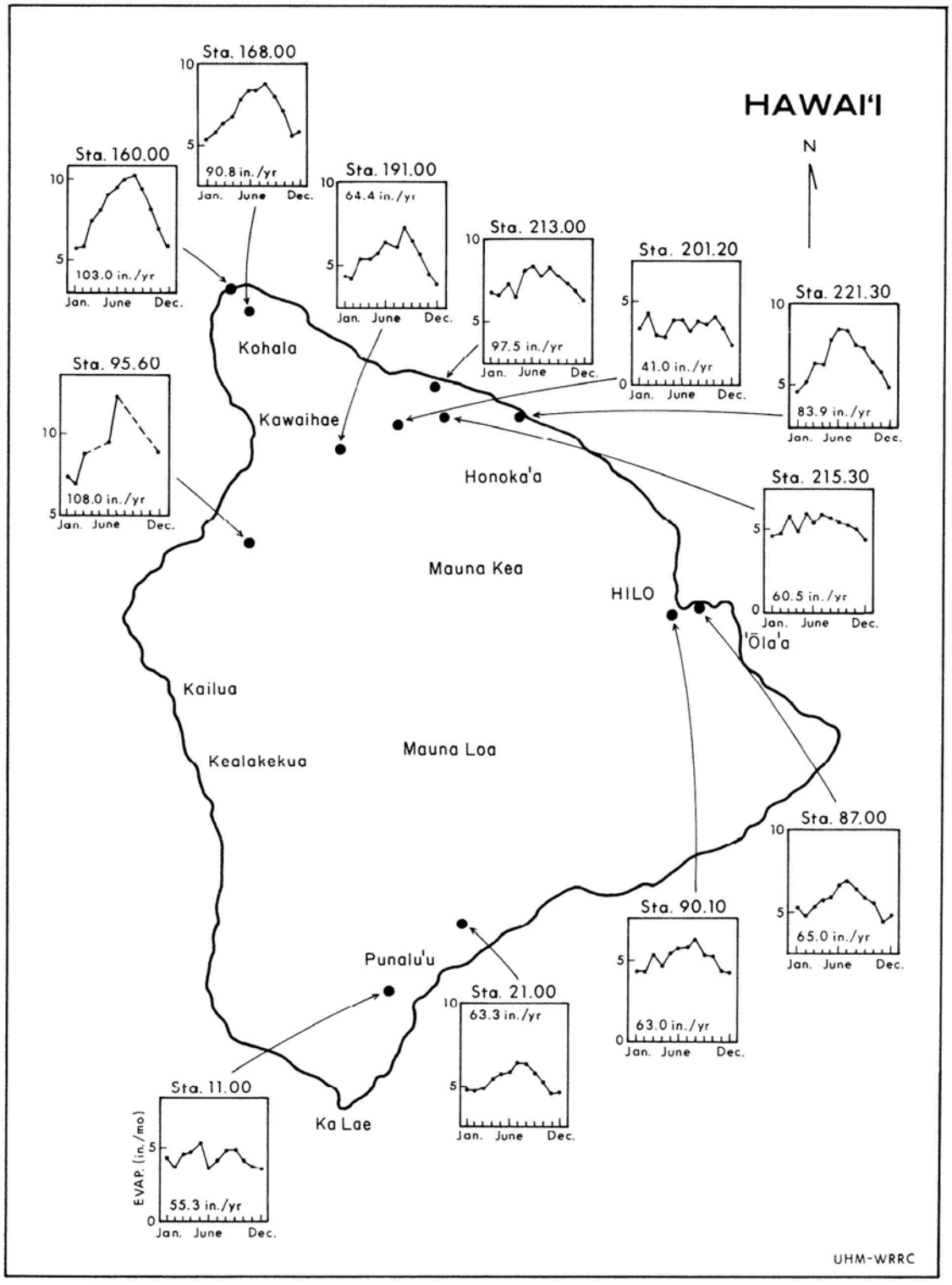


Figure C.2. Pan Evaporation Station Data for Hawaii Island

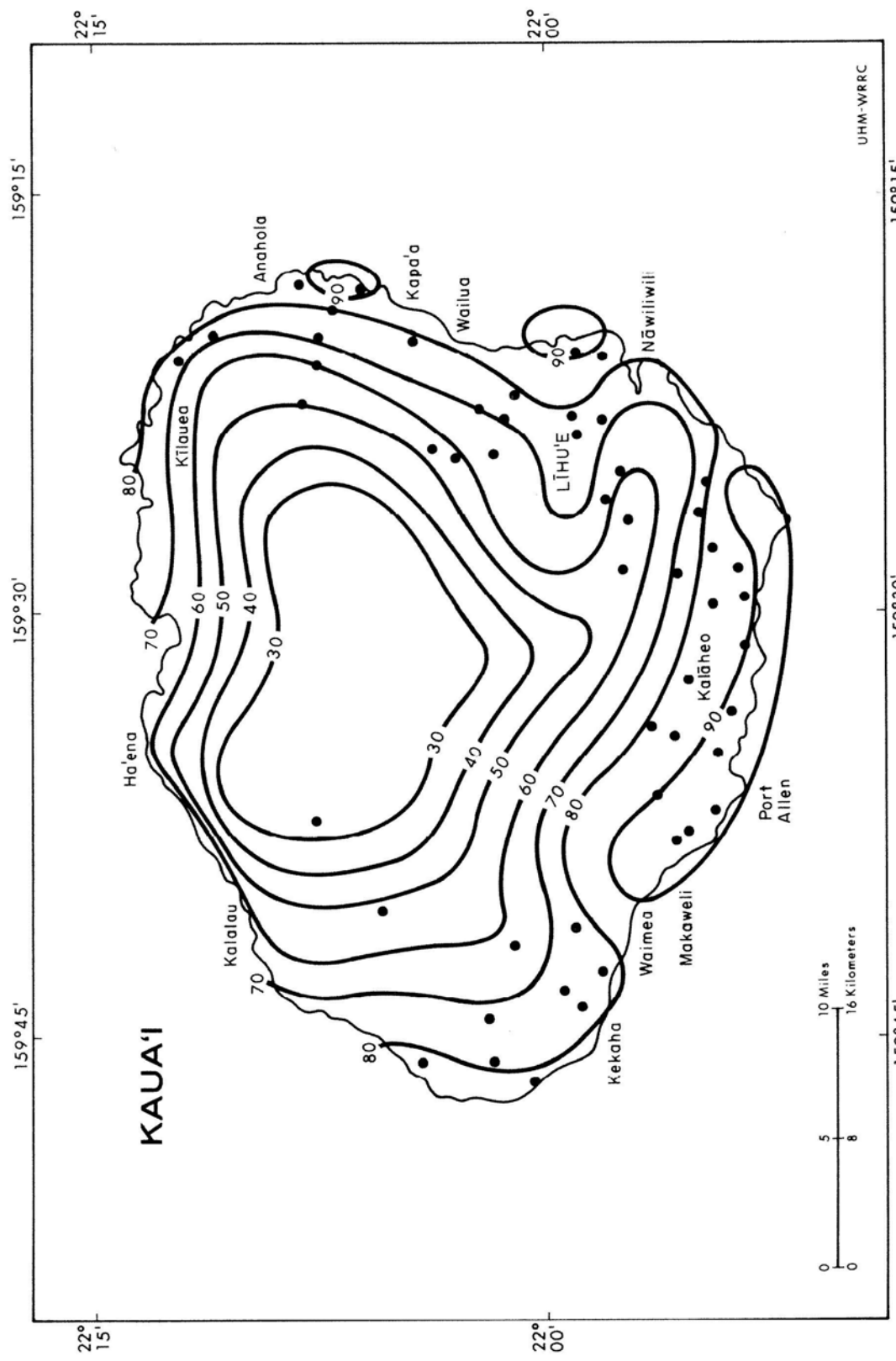


Figure C.3. General Area Pan Evaporation Values for Kauai

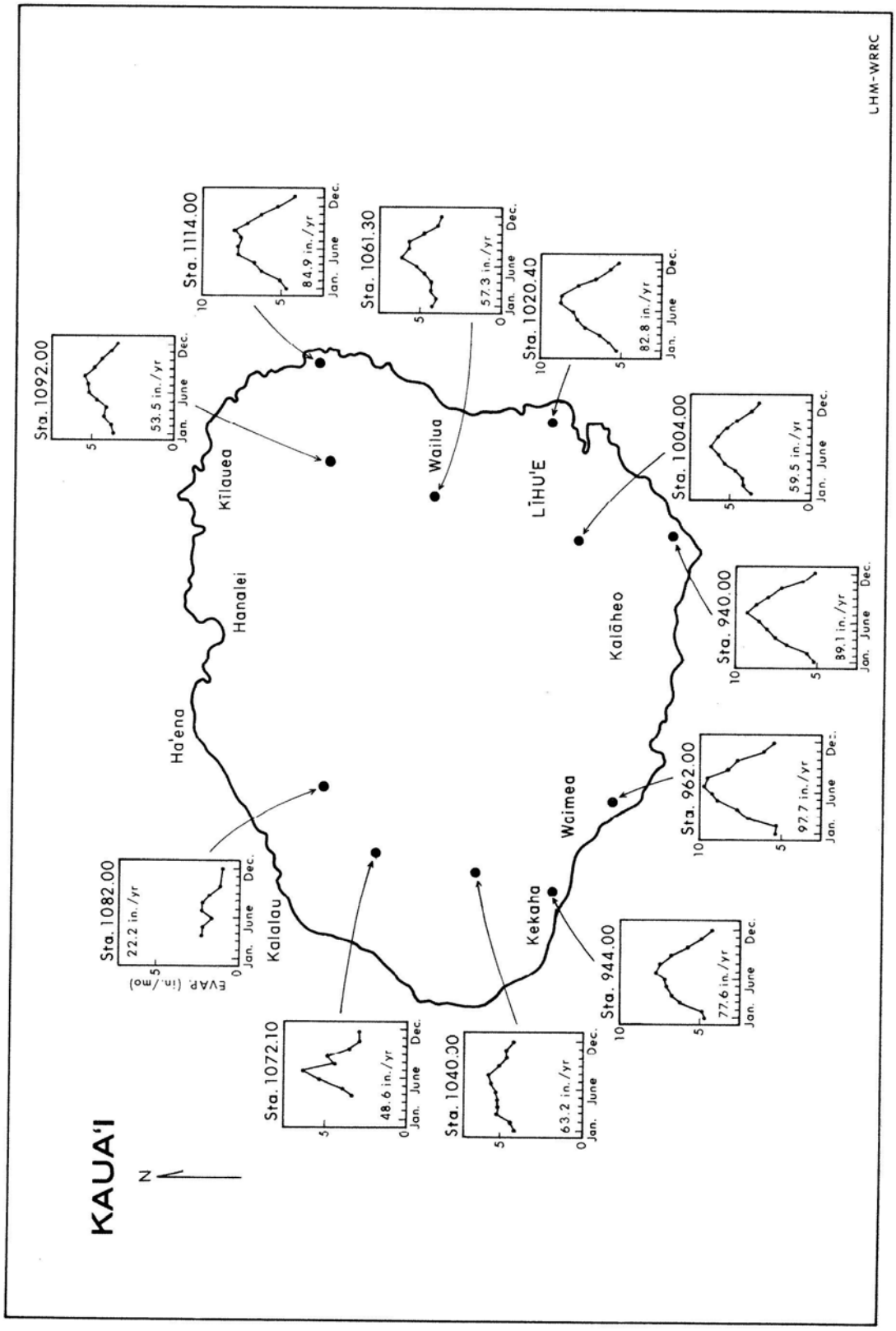


Figure C.4. Pan Evaporation Station Data for Kauai

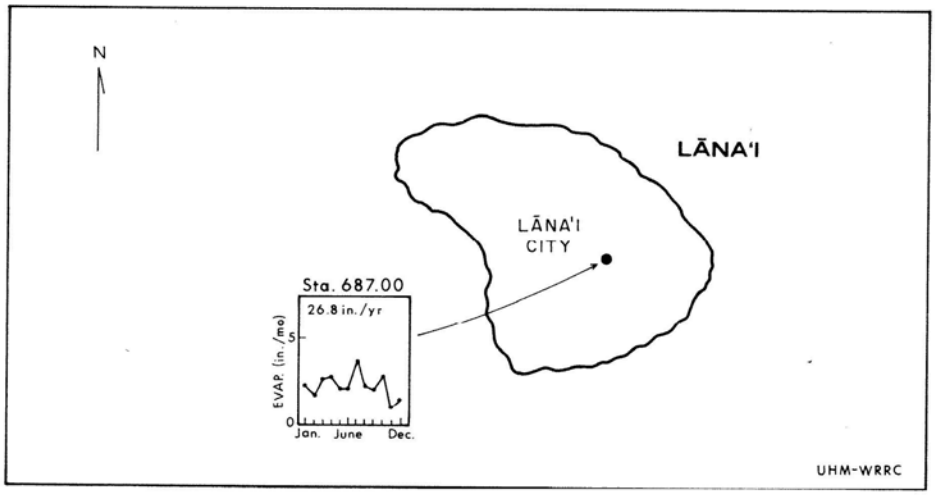


Figure C.5. Pan Evaporation Station Data for Lanai

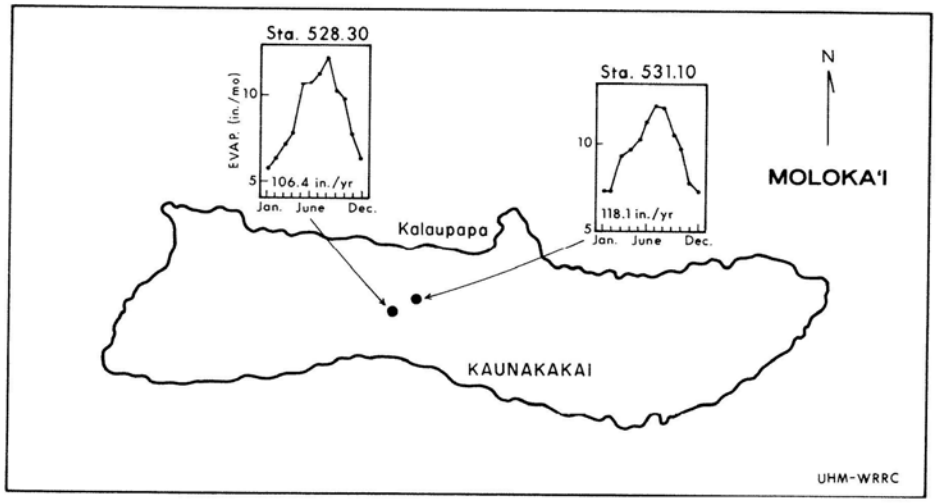


Figure C.6. Pan Evaporation Station Data for Molokai

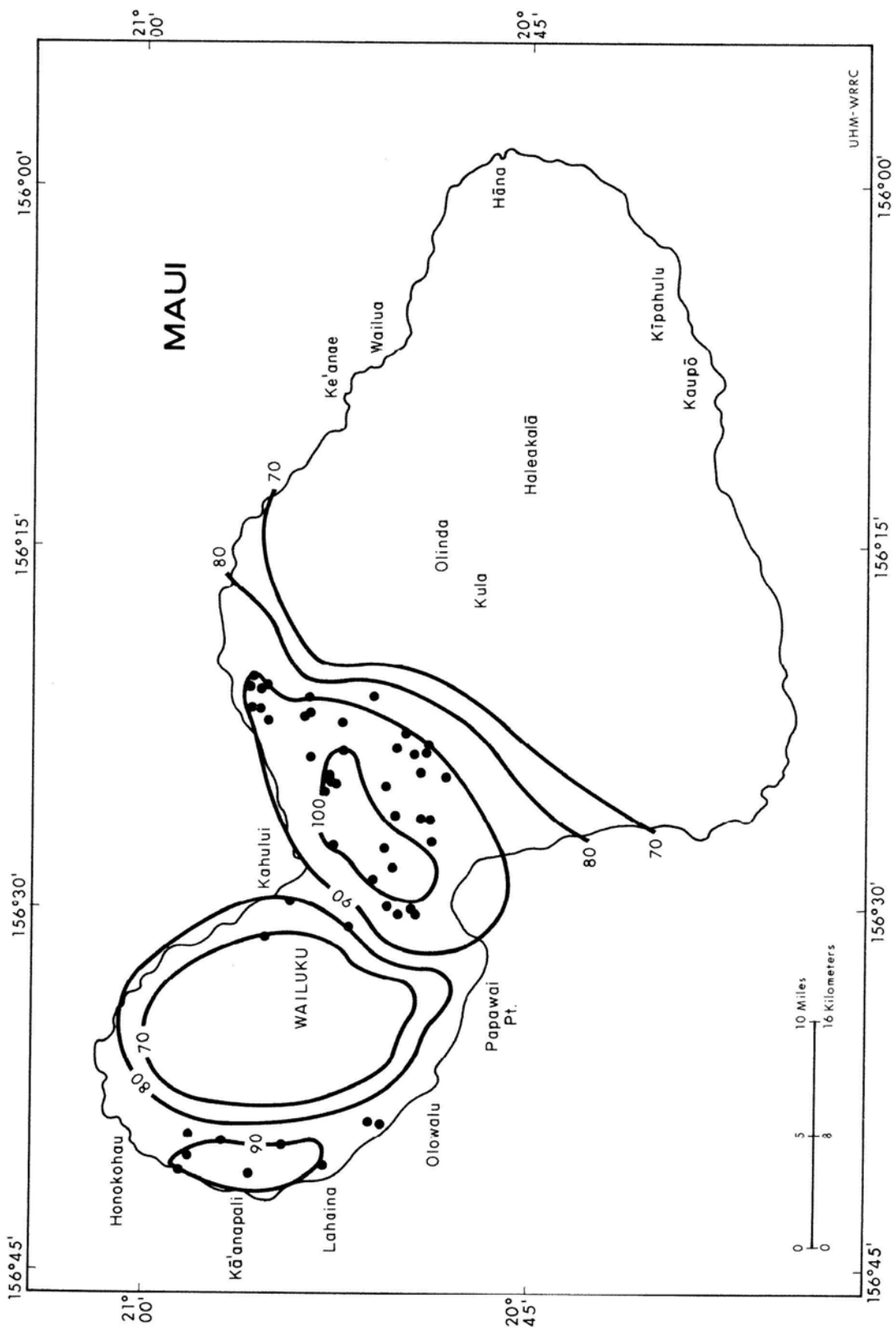


Figure C.7. General Area Pan Evaporation Values for Maui

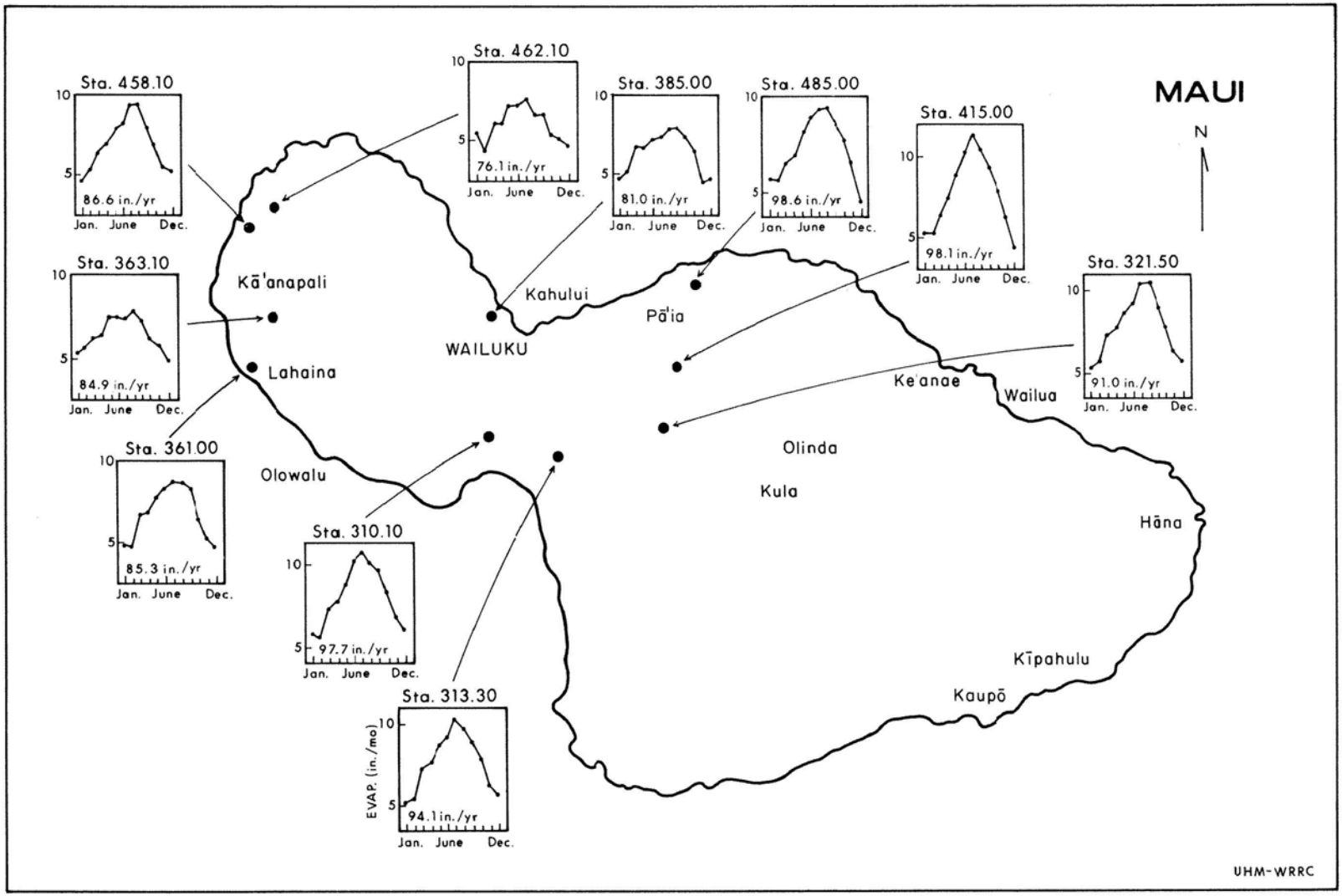


Figure C.8. Pan Evaporation Station Data for Maui

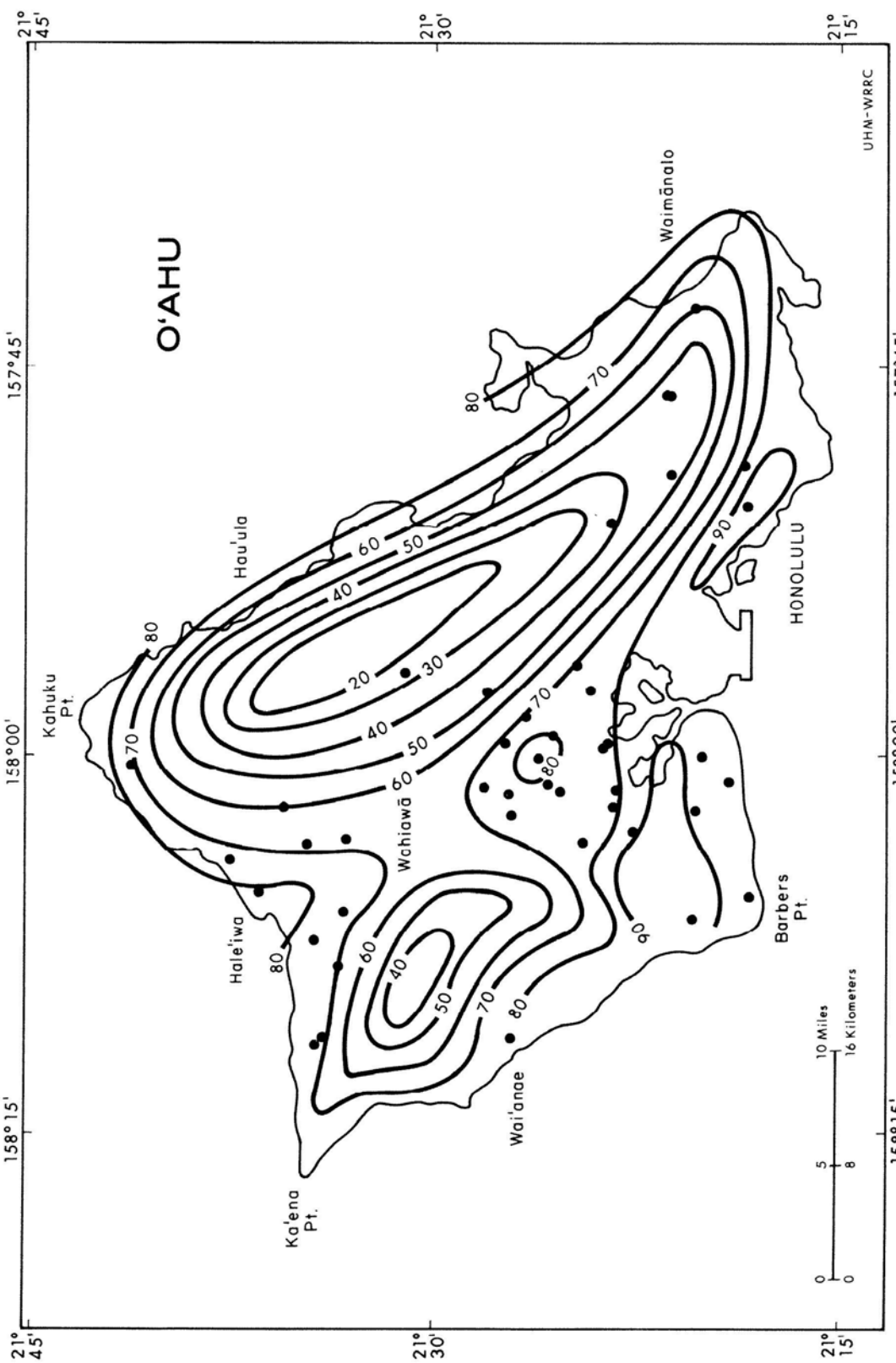


Figure C.9. General Area Pan Evaporation Values for Oahu

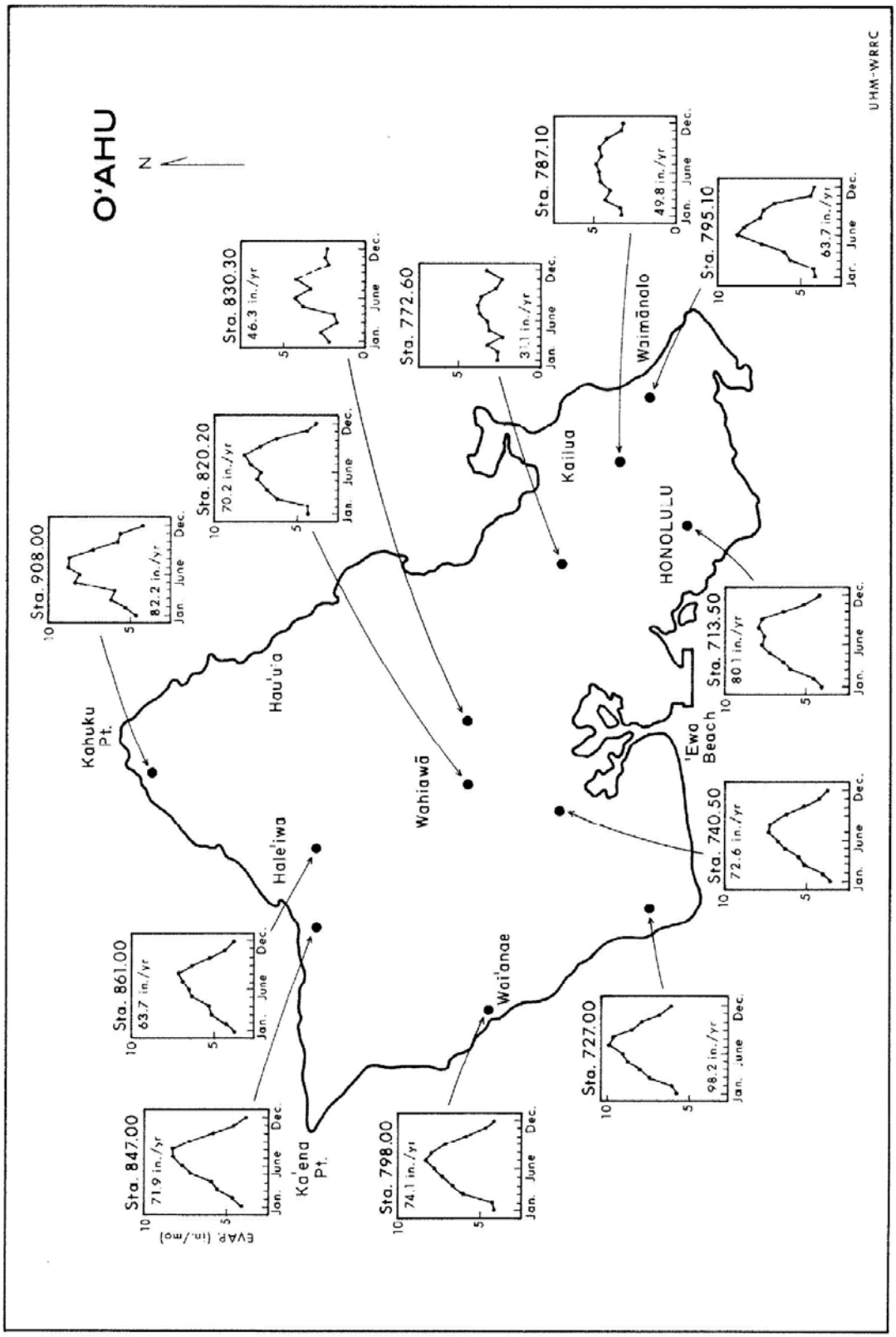


Figure C.10. Pan Evaporation Station Data for Oahu

Appendix F

GRAY WATER COMMITTEE MEMBERS

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Appendix G
WAIVER LETTERS FROM THE COUNTIES

The County of Hawaii and the City and County of Honolulu agreed to waive portions of the Uniform Plumbing Code (UPC) to allow the use of washing machine wastewater to be used for subsurface irrigation. The Counties of Kauai and Maui will acknowledge approved gray water systems as legitimate disposal systems. The waivers and acknowledgements apply only to areas not serviced by a publicly owned sewer system.

Under agreements with the four Counties, the Department will be the regulatory agency responsible for the gray water systems located in areas not serviced by the county sewer system. The Department's regulatory responsibility begins five feet from the exterior of the building and ends at the endpoint of the gray water disposal system. The Department will also have the oversight responsibilities of design approval, building permit approval, approval to use gray water systems once the system has been constructed, and periodic inspections. All of the Counties will retain regulatory responsibility for the areas serviced by their sewer systems.

DEPARTMENT OF PUBLIC WORKS – BUILDING DIVISION

COUNTY OF HAWAI'I – 101 Pauahi Street, Suite 7 – Hilo, Hawai'i 96720
Hilo Office (808) 961-8331 • Fax (808) 961-8410 Kona Office (808) 327-3520 • Fax (808) 327-3509

April 13, 2009

Laurence K. Lau
Deputy Director for Environmental Health
State Of Hawaii
Department of Health
P.O. Box 3378
Honolulu, Hawai'i 96801

RE: Request for Waiver from the Uniform Plumbing Code
General Regulations, Section 304.0

Dear Mr. Lau:

We hereby grant the Department of Health a waiver as requested in your March 17, 2009 letter to allow the use of washing machine laundry wash water to be used in conjunction with a gray water system located in non-public sewer areas, subject to the following:

- Regulation of the gray water will be under the jurisdiction of the State Department of Health.
- State Department of Health will review and approve gray disposal system for installation and construction for new construction as well as retrofitting of existing homes.

Should you have any further questions, please call me at 961-8331.

Sincerely,

BRIAN Y. KAJIKAWA, AIA
Building Chief

cc. Rodney Astrande, Supervising Plumbing Inspector
Joe Gary Nakao, Supervising Plumbing Inspector

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
PHONE: (808) 768-8000 • FAX: (808) 768-6041
DEPT. WEB SITE: www.honoluludpp.org • CITY WEB SITE: www.honolulu.gov

MUFI HANNEMANN
MAYOR

DAVID K. TANOUE
DIRECTOR

ROBERT M. SUMITOMO
DEPUTY DIRECTOR

09 APR -6

2009/ELOG-699
B09-45 (TH)

March 31, 2009

Mr. Laurence K. Lau
Deputy Director for Environmental Health
Department of Health
State of Hawaii
P. O. Box 3378
Honolulu, Hawaii 96801

Attention: Tomas See, Wastewater Branch

Dear Mr. Lau:

Subject: Request for Waiver from the Uniform Plumbing Code
General Regulations, Section 304.0
Use of Graywater System for Non-Public Sewered Areas

Thank you for your letter dated March 17, 2009, requesting a waiver to allow the use of washing machine laundry wash water in non-public sewered areas to be used in conjunction with a graywater system to be approved by the Department of Health.

We have no objections to granting this waiver for building permit applications for the above-referenced subject matter. We support the use of graywater in the effort to reduce the amount of potable water being used for irrigation.

Should you have any questions, please contact Mr. Timothy Hiu of our Building Division at 768-8120.

Very truly yours,

FOR David K. Tanoue, Director
Department of Planning and Permitting

cc: Customer Service Office
Mechanical Code Section

24026

BERNARD P. CARVALHO, JR.
MAYOR

GARY HEU
ADMINISTRATIVE ASSISTANT

DONALD M. FUJIMOTO
COUNTY ENGINEER
TELEPHONE 241-4992

EDMOND P.K. RENAUD
DEPUTY COUNTY ENGINEER
TELEPHONE 241-4992

AN EQUAL OPPORTUNITY EMPLOYER
COUNTY OF KAUA'I
DEPARTMENT OF PUBLIC WORKS
BUILDING DIVISION
4444 RICE STREET
MO'IKEHA BUILDING, SUITE 175
LIHU'E, KAUA'I, HAWAI'I 96766-1340

April 8, 2009

State of Hawaii
Department of Health
P. O. Box 3378
Honolulu, Hawai'i 96801
ATTENTION: Laurence K. Lau, Deputy Director for Environmental Health

SUBJECT: Request for waiver from the Uniform Plumbing Code
General Regulations, Section 304.0

Dear Mr. Lau:

This is in response to your March 17, 2009 letter requesting that the County of Kauai waive its requirements in the Uniform Plumbing Code (UPC) to allow gray water use in "non-public sewered areas."

We will accept a graywater system approved by the Department of Health" as being an "*approved private sewage disposal system"* as provided in Section 305.3 of the 2003 UPC, based on understanding that the State Department of Health regulates gray water systems as private sewage disposal systems.

If you have any further questions regarding this matter, please contact Walter Estenzo, Plumbing Inspectors Supervisor at (808) 241-4862.

Very truly yours,

DOUGLAS HAIGH
Chief, Building Division

cc: CE
DCE

24224

CHARMAINE TAVARES
Mayor

MILTON M. ARAKAWA, A.I.C.P.
Director

MICHAEL M. MIYAMOTO
Deputy Director

RALPH M. NAGAMINE, L.S., P.E.
Development Services Administration

CARY YAMASHITA, P.E.
Engineering Division

BRIAN HASHIRO, P.E.
Highways Division

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
DEVELOPMENT SERVICES ADMINISTRATION
250 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

April 9, 2009

09 APR 13 17:46

Laurence K. Lau
Deputy Director for Environmental Health
State of Hawaii
Department of Health
P. O. Box 3378
Honolulu, Hawaii 96801

Subject: Request for waiver from the Uniform Plumbing Code General Regulations, Section 304.0

Dear Mr. Lau:

This is in response to your March 17, 2009 letter requesting that the County of Maui waive its requirements in the Uniform Plumbing Code (UPC) to allow gray water use in "non-public sewered areas."

Although your letter specifically mentions UPC Section 304, the County of Maui has adopted and amended the 1991 UPC. The applicable provision in the 1991 UPC is Section 302 which provides that ***"All plumbing fixtures, drains, appurtenances and appliances, used to receive or discharge liquid wastes or sewerage, shall be connected properly to the drainage system of the building or premises, in accordance with the requirements of this Code."***

We will agree to recognize *"a graywater system that will be approved by the Department of Health"* as being an acceptable *"drainage system of the building or premises"* as provided in Section 302 of the 1991 UPC, subject to the following understanding:

1. The State Department of Health will regulate the disposal of gray water from a point five feet from the exterior wall of the house.

2. The State Department of Health will review and approve gray water disposal systems during the processing of:

   a. building permit applications for construction of new houses or

   b. plumbing permit applications for retrofit installations of gray water systems in existing houses.

3. The County of Maui will not be responsible for inspecting or approving the construction or installation of the gray water disposal system.

We request acknowledgment that DOH agrees to the above stated conditions.

If you have any further questions regarding this matter, please contact Kyle Ito, Acting Plumbing Inspectors Supervisor at (808) 270-7368.

Sincerely,

Ralph M. Nagamine
Development Services Administrator

RMN P:\DIVISION\PLUMBING\Gray Water Approval.wpd

c: Milton M. Arakawa, A.I.C.P., w/ 03/17/09 letter
Cheryl K. Okuma, Esq., w/ 03/17/09 letter