



PUBLIC UTILITIES

11.1 OVERVIEW

11.1.1 Introduction and Analysis

Public utilities are services regulated by government and provided in response to existing and prospective patterns of development. Changes in land use, population density, and development usually generate changes in the demand and supply of utilities.

This section is concerned with the planning aspects of the water, electricity, telecommunication, gas and sewerage systems. Planning for the location of utility facilities such as reservoirs and pumping stations, sewage treatment plants, and telecommunications, is an important aspect of the land planning process.

Changes in the intensity of land use greatly influence the quantitative design of utilities and services, particularly their design capacity. Furthermore, there may be distinctions in the quality and type of services offered for each utility as land use intensities vary. These distinctions also depend on local codes and ordinances, health and sanitary considerations, and practices followed by the utility companies.

11.1.2 Goals

- (a) Ensure that properly regulated, adequate, efficient and dependable public and private utility services are available to users.
- (b) Maximize efficiency and economy in the provision of public utility services.
- (c) Design public utility facilities to fit into their surroundings or concealed from public view.

11.1.3 Policies

- (a) Public utility facilities shall be designed to complement adjacent land uses and shall be operated to minimize pollution or disturbance.
- (b) Provide utilities and service facilities that minimize total cost to the public and effectively service the needs of the community.
- (c) Utility facilities shall be designed to minimize conflict with the natural environment and natural resources.

§11.2: Water

- (d) Improvement of existing utility services shall be encouraged to meet the needs of users.
- (e) Encourage the clustering of developments in order to reduce the cost of providing utilities.
- (f) Develop short and long range capital improvement programs and plans for public utilities within its jurisdiction that are consistent with the General Plan.
- (g) Water, sewerage, electricity, gas, and telecommunication services are treated individually in this section to clarify the factors that comprise the public utilities element.

11.2 WATER

11.2.1 Introduction And Analysis

The availability of water is crucial to any type of development, whether urban, rural, or agricultural. Land use allocation therefore must be closely related to water availability, including the quantity and quality of the water, and the adequacy of the transmission and distribution system.

Sources of water supply include ground water and surface water. The most common sources of water supply are springs, tunnels, streams, and deep wells.

The demand for water is directly related to population and industry usage is expressed as gallons per day (gpd) or million gallons per day (mgd). Demand does not represent domestic consumption alone, but also includes all agricultural, industrial and commercial uses, fire protection, and other uses. In some areas, however, non-domestic users are likely to create the major demand, and careful attention must therefore be given in any study of probable future water needs.

Sources of water for the Department of Water Supply's water system include surface water and groundwater, both of which must comply with the Federal Safe Drinking Water Act (SDWA). The U.S. Environmental Protection Agency through the State Department of Health administers regulation for this act.

The most common sources of surface water are streams, springs, and tunnels. Groundwater sources include either basal or high level aquifers.

Surface water or a groundwater source under the influence of surface water is required to be treated and quality monitored to ensure compliance with the SDWA, whereas groundwater need only be chlorinated. As such, the maintenance of surface water systems are much more expensive and labor intensive.

§11.2.1: Introduction And Analysis

The Federal SDWA regulates all public water systems. Regulation compliance is a major impact for the Department of Water Supply. Within the next seven years, the department will spend approximately \$20 million for compliance projects.

The Department of Water Supply operates and maintains twenty-three separate water systems in the County. In addition, the State operates an agricultural water system in Lalamilo and the Hamakua/Paauilo Irrigation District, and there are several agricultural and domestic water systems within the county that are privately owned, maintained and operated.

The State Department of Land and Natural Resources, Division of Land and Water Development also has the capacity to explore and develop new ground water sources. The County has in the past depended upon this agency for source development. The development of new sources requires the cooperation between State and County agencies in the delivery of municipal water systems.

The high rainfall areas between the 2,000 and 4,000-foot elevations on the windward side of the island and also on the western slope of Hualalai contribute the bulk of the water to the island's streams, springs and basal aquifer. Each type of source has its advantages and disadvantages. Surface water flows depend on weather conditions. During extremely dry weather conditions, the flow may drop below the required rate. During high rainfall periods the water may be turbid. Spring and tunnel sources are also susceptible to these problems but usually to a lesser degree. These high level intakes are generally located above the communities they serve and have the advantage of gravity flow. Deep well sources on the other hand are more dependable but higher operational expenses are incurred since electrical energy is required to lift the water. Since some wells are located in the lower sections, contamination from urban expansion is a possibility. Controlled land use would minimize this problem. Wells can also be contaminated by seawater intrusion if pumped at a high rate. One solution to improve systems presently served by only surface sources is to install a well in these systems, use the surface sources when available, and use the pump when the surface sources are deficient. This would minimize operational costs and upgrade systems so they are more dependable. Another solution is to construct large storage reservoirs. These, however, require high initial capital expenditures.

Many systems, though adequate to fulfill domestic needs, are inadequate for fire protection and do not meet the needs of current agricultural production. Such systems serving urban areas are proposed to be upgraded.

The present average water consumption for the County water system is approximately 22.35 mgd.

§11.2.2: Policies

In several subdivisions throughout the island, roof catchment is also the primary means of water supply and is supplemented by trucking during drought periods. These subdivisions were approved prior to the adoption of the Subdivision Control Code.

The exploration for new water sources will continue. It is anticipated that these new water sources and systems will further influence land development.

11.2.2 Policies

- (a) Water system improvements shall correlate with the County's desired land use development pattern.
- (b) All water systems shall be designed and built to Department of Water Supply standards.
- (c) Improve and replace inadequate systems.
- (d) Water sources shall be adequately protected to prevent depletion and contamination from natural and man-made occurrences or events.
- (e) Water system improvements should be first installed in areas that have established needs and characteristics, such as occupied dwellings, agricultural operations and other uses, or in areas adjacent to them if there is need for urban expansion.
- (f) A coordinated effort by County, State and private interests shall be developed to identify sources of additional water supply and be implemented to ensure the development of sufficient quantities of water for existing and future needs of high growth areas and agricultural production.
- (g) The fire prevention systems shall be coordinated with water distribution systems in order to ensure water supplies for fire protection purposes.
- (h) Develop and adopt standards for individual water catchment units.
- (i) Cooperate with the State Department of Health to develop standards and/or guidelines for the construction and use of rainwater catchment systems to minimize the intrusion of any chemical and microbiological contaminants.
- (j) Cooperate with appropriate State and Federal agencies and the private sector to develop, improve and expand agricultural water systems in appropriate areas on the island.
- (k) Promote the use of ground water sources to meet State Department of Health water quality standards.
- (l) Continue to participate in the United States Geological Survey's exploratory well drilling program.
- (m) Seek State and Federal funds to assist in financing projects to bring the County into compliance with the Safe Drinking Water Act.

- (n) Develop and adopt a water master plan that will consider water yield, present and future demand, alternative sources of water, guidelines and policies for the issuing of water commitments.
- (o) Expand programs to provide for agricultural irrigation water.

11.2.3 Standard

- (a) Public and private water systems shall meet the requirements of the Department of Water Supply and the Subdivision Control Code.

11.2.4 Districts

The following is an analysis by district for water systems. The brief analysis of each district is intended to bring into focus the relationship of the district to the County as a whole.

11.2.4.1 PUNA

11.2.4.1.1 Profile

Currently, there are four major water systems in the district: Olaa-Mt. View, Pahoia, Kapoho, and Kalapana. The total average consumption of these systems is 1.2 mgd.

The Olaa-Mt. View water system consists of eleven service areas and extends along the Volcano Road from the former Puna Sugar Company mill to the Olaa Reservation Lots and along the Keaau-Pahoia Road to the vicinity of Kaloli Drive. Water for this system is supplied by three deep wells. Two of the wells are located at the former Puna Sugar Co. mill site and the third is near Olaa, between Keaau and Kurtistown. The average consumption of this system is about 0.82 mgd. Olaa Well C, the primary source for this system, has a maximum pump capacity of 2.0 mgd. Olaa Wells A and B have capacities of 1.6 mgd and 0.72 mgd, respectively.

The Pahoia water system, located in the geographic center of the lower Puna region, extends from Keonepoko Homesteads down along portions of the Kapoho and Pohoiki Roads to Kapoho. The present average consumption is 0.40 mgd.

The Kalapana Water System extends from the Keauohana Forest Reserve along Highway 13 down to the Kaimu Beach intersection and continues in a southwesterly direction along Highway 13, ending in the vicinity of Kaimu. The water for the Kalapana system is supplied by two deep wells at Keauhana with maximum pump capacities of 0.38 mgd and 0.50 mgd.

The Hawaiian Beaches subdivision located in Waiakahiula is served by a privately owned water system. The developer had constructed this non-dedicable system.

§11.2.4.2: SOUTH HILO

The Glenwood and Volcano areas are presently not serviced by any public water system. Many of these areas still depend on roof catchment systems.

11.2.4.1.2 Courses of Action

- (a) Continue to improve inadequate water system facilities.
- (b) Water source investigation and exploration should be continued in order to provide service for anticipated needs.
- (c) Investigate additional groundwater sources in the Oloo area.
- (d) Investigate alternative means to finance the extension of water systems to subdivisions that rely on catchment.

11.2.4.2 SOUTH HILO

11.2.4.2.1 Profile

The Hilo Water System extends as far as Alae Point to the north, Panaewa Agricultural Park to the south, Keaukaha to the east, and Kaumana and Waiakea Uka to the west. The Hilo Water System is supplied with water from both surface and groundwater sources. The sources are:

- 1 Oloo Flume Source: This spring source flow capacity ranges from a low of less than 1.0 mgd to a high of about 11.0 mgd depending on climatic conditions.
- 2 Panaewa Well: Water from this source is pumped from the basal aquifer with three pumps; one, with a 2.2 mgd capacity and two each with a capacity of 3.1 mgd.
- 3 Piihonua Well: This source has a capacity of 3.0 mgd. From this location, water may be pumped up to higher elevations during dry weather conditions. Water from this source is pumped from the basal aquifer with two pumps; both with a maximum pumping capacity of 2,100 gallons per minute or 3.0 mgd.

These three sources supply Hilo, which presently consumes an average of approximately 6.0 mgd. When the surface sources are low, more water is used from the Panaewa and Piihonua Wells. These three sources have a total normal capacity of over 20 mgd.

The Papaikou water system serves Papaikou Village, Puueopaku, Paukaa and Kalaoa. This system is served by two perched water sources, Kaieie and Papaikou intakes and a well source located just above Papaikou Village. Kaieie is the most dependable surface source while the Papaikou intake source is inconsistent. The present average consumption is about 0.23 mgd.

Pepeekeo is served by a deep well. Present consumption is about 0.16 mgd.

§11.2.4.3: NORTH HILO

The Honomu system, dedicated to the County by the former Pepeekeo Sugar Co., has an average daily consumption of 0.06 mgd. This system obtains its water supply from Kolekole Stream above Akaka Falls.

The Wailea-Hakalau system is a low capacity system comprised of one well and one storage tank together with connecting lines and limited distribution facilities. Currently, 95 customers consume about 0.028 mgd.

11.2.4.2.2 Courses of Action

- (a) Continue to implement water system maintenance and improvement programs in order to provide the city with a dependable and consistently safe drinking water supply.
- (b) Investigate groundwater sources in the upper Waiakea Uka, Kaieie Mauka, Kulaimano, Saddle Road, and Honomu areas.
- (c) Further investigate future ground water resources.
- (d) Replace existing surface sources with groundwater sources to meet State Department of Health standards.

11.2.4.3 NORTH HILO

11.2.4.3.1 Profile

Domestic water is available in the built-up areas of the North Hilo district. The private and public systems provide a wide range of levels of service.

The Laupahoehoe system obtains its water from high level springs in Manowaiopae and Kuwaikahi Gulches and two deep wells with Well No. 1 outfitted with a 0.14 mgd pumping unit and Well No. 2 with a 0.43 mgd pumping unit. None of the spring sources are dependable during dry weather. The present average daily consumption is 0.11 mgd.

The Ookala system is currently serviced by the Ookala Well.

11.2.4.3.2 Courses of Action

- (a) Replace old, substandard, or deteriorating lines and storage facilities.
- (b) Develop a standby well for the Ookala system.

11.2.4.4 HAMAKUA

11.2.4.4.1 Profile

Domestic water is available in all of the urban areas of the district. Some of the existing lines, however, are small and would be inadequate for a denser population.

§11.2.4.5: NORTH KOHALA

The service area of the Hamakua Water System extends from Ahualoa to Pohakea. Except for the town of Honokaa, the major portion of the system serves a scattered and dispersed population in the Ahualoa, Kalopa, Kaapahu, Pohakea, Paauhau and Paauilo Homesteads. The Hamakua system obtains its water from the high level streams in the Kohala Mountains and the Haina deep well. Over fifty-five per cent of the 0.63 mgd used by the Hamakua system is used in Honokaa.

The Paauilo system, although presently connected to the Hamakua system, has an additional source. The capacity of the Paauilo deep well is 0.43mgd and the service area extends from Paauilo Village to Kaa. The present average daily consumption is 0.10 mgd.

11.2.4.4.2 Courses of Action

- (a) Continue to coordinate programs with State and Federal agencies to develop a well at Kukuihaele and Honokaa Hospital to the standards of the Department of Water Supply.
- (b) Replace old, sub-standard, or deteriorating lines and storage facilities.
- (c) Investigate groundwater sources in the Honokaa and Kukuihaele areas.

11.2.4.5 NORTH KOHALA

11.2.4.5.1 Profile

The North Kohala District obtains water primarily from two wells and a spring.

The Hawi Wells No. 1 and 2 serve the following areas: Kaauhuhu, Hawi-Kokoiki, Kynnersley-Kapaau, and Halaula. The average consumption for this system is 0.30 mgd.

The Makapala-Keokea water system source is from the Murphy Tunnel owned by Chalon International of Hawaii. Present consumption is 0.0281 mgd.

11.2.4.5.2 Courses of Action

- (a) Pursue a ground water source for the Makapala-Keokea water system.
- (b) Explore further sources for future needs.
- (c) Improve and replace inadequate distribution mains and storage facilities.
- (d) Encourage efforts to improve the Kohala ditch system and its use for agricultural purposes.

11.2.4.6 SOUTH KOHALA

11.2.4.6.1 Profile

The South Kohala District acquires its water from the Waimea and Lalamilo systems. The present average daily consumption of both systems is 3.9 mgd.

The Waimea system primarily services the Waimea and Puukapu area. The source feeding the Waimea System is the Waikoloa and the Kohakohau Streams. Flow from the streams varies greatly with the weather. During extended drought periods, the supply is not sufficient to meet demands. Presently, the system has five reservoirs with a total capacity of 162.5 million gallons. The Waimea-Puukapu system uses an average of 0.91mgd.

Two exploratory wells tapping high level ground water were drilled in South Kohala. An exploratory well was drilled at the Department of Water Supply treatment plant site to support the Parker Ranch 20/20 development plan. The second exploratory well was drilled at the Department of Water Supply's Waiaka tank site.

In addition, the high level aquifer has been tapped for agricultural emergencies at the State Department of Agriculture's' Puukapu well, and there is a private well at the Waimea Country Club.

The Lalamilo system obtains its water from six deep wells at the 1,200-foot elevation. The area of service for the Lalamilo system extends from Kawaihae to Mauna Lani. The present average daily consumption is 3.0 mgd.

The Waikoloa Development Company developed its own water system to serve the needs of Waikoloa Village and the Waikoloa Beach Resort. The water system is in private ownership.

11.2.4.6.2 Courses of Action

- (a) Seek alternative sources of water for the Lalamilo system.
- (b) Improve and replace inadequate distribution mains and steel tanks.
- (c) Continue to seek additional groundwater sources for the Waimea System.

11.2.4.7 NORTH AND SOUTH KONA

11.2.4.7.1 Profile

The Kona system can be divided into the North Kona and South Kona systems. Although the two systems are connected, the line dividing the two systems runs along the Honalo ahupua'a. These systems are interconnected to transport water from one system to the other. This is done only during emergencies and on a very limited basis.

§11.2.4.7: NORTH AND SOUTH KONA

Four wells and one shaft at Kahaluu and one well each at Holualoa, Keahuolu, Kalaoa, Honokohau and Hualalai supply the North Kona system. The Kahaluu wells provide the bulk of the water for the North Kona system with a total capacity of 14.9 mgd. The estimated safety capacity based on the largest pump on standby, however, 12.9 mgd. The present average water usage is about 8.5 mgd.

The four deep wells at Kahaluu and the Holualoa Wells service the upper service area along Mamalahoa Highway from Honalo to Waiaha. Demand in the area averages 0.6 mgd. The Keahuolu and Honokohau wells supply water along Mamalahoa Highway from Waiaha to Kalaoa and along Palani Road from Mamalahoa Highway to Kealakehe. Demand in these areas average 0.8 mgd. The Hualalai and Kalaoa wells supplement the subdivisions in Kaloko, Kalaoa and Kona Palisades with an additional 0.4 mgd.

The Kahaluu Shaft services the lower service area along the Queen Kaahumanu Highway from Keauhou to the Kona International Airport at Keahole. Demand in this area averages 5.7 million gallons per day, the highest consumption rate in Kona.

The South Kona system is supplied by three wells at Keei and a well at Halekii, with a total capacity of 5.0 mgd and a safe capacity of 3.0 mgd. The average usage 0.97 mgd. This system serves the area from Honalo to the Hookena Beach Road junction.

11.2.4.7.2 Courses of Action (North Kona)

- (a) Continue to pursue groundwater source investigation, exploration and development in areas that would provide for anticipated growth and an efficient and economic system operation.
- (b) Continue to evaluate growth conditions to coordinate improvements as required to the existing water system in accordance with the North Kona Water System Master Plan.
- (c) Explore and develop a well in Waiaha.

11.2.4.7.3 Courses of Action (South Kona)

- (a) Continue to pursue groundwater source investigation, exploration and development in areas that would provide for anticipated growth and an efficient and economic system operation.
- (b) Continue to evaluate growth conditions to coordinate improvements as required to the existing water system in accordance with the South Kona Water System Master Plan.

11.2.4.8 KA'U

11.2.4.8.1 Profile

The water source for the Pahala area is Alili Tunnel and a deep well source. The present average consumption of the Pahala system is 0.23 mgd.

The sources supplying Waiohinu, Naalehu and South Point are Haao Springs, Mountain House Tunnel Spring and a deep well in Naalehu. The water from the Mountain House Tunnel is piped to Haao Spring and distributed to South Point, Waiohinu, and Naalehu on separate lines.

The Department of Water Supply has a license with the State that allows the department to obtain water from the Mountain House Tunnel.

The Waiohinu system receives its water supply from an 8-inch line from Haao Springs. Presently, the average consumption is 0.12 mgd.

The Naalehu system receives its water supply from the Waiohinu system. The former sugar plantation has dedicated the system within Naalehu Village to the County. The Naalehu deep well with a capacity of 0.54 mgd supplements the system. The average water consumption is 0.08 mgd.

The present average consumption on the South Point system is 75,730 gallons per day. The Ka'u area has several large subdivisions still dependent on individual roof catchment.

11.2.4.8.2 Courses of Action

- (a) Provide additional water system improvements for the currently serviced areas of Naalehu, Waiohinu, and Pahala.
- (b) Pursue groundwater source investigation, exploration and well development at Ocean View, Pahala, and Waiohinu.
- (c) Continue to evaluate growth conditions to coordinate improvements as required to the existing water system.
- (d) Investigate alternative means to finance the extension of water systems to subdivisions that rely on catchment.

11.3 TELECOMMUNICATIONS

11.3.1 Introduction and Analysis

The telephone is an essential means of voice communication for the majority of residents in Hawaii County. However, over the last decade, the County has seen an acceleration in the development of telecommunication technology and a transformation of the telecommunications industry. In addition to traditional phone communication, the telecommunications industry now includes technologies such as wireless cellular and digital mobile phones, the internet and world wide web.

During the last decade, wireless telecommunications has experienced a dramatic decrease in cost and a phenomenal increase in availability. Changes in technology and competition in the industry have made wireless communication more affordable to the general public.

The wired infrastructure that was once used to connect a telephone to the phone system has evolved to include the world wide web and internet. The world wide web and internet uses the telephone infrastructure to transfer digital data from one computer to another. Thus, everything from simple text messages to high level banking and commerce transactions can be conducted almost instantaneously. In the near future, the changes in technology and the wireless industry may make wireless access to the internet more widely affordable and/or available.

As of August 7, 1998, the entire island of Hawaii had 100 per cent digital switching. Digital switching is significant because it enables the existing telephone infrastructure to accommodate high-speed data transfers and access to many of the latest telecommunications services and features.

Currently, every region on the island has access to phone service. In 1998, the last rural areas restricted to party line service were upgraded with additional telephone cables allowing single line services islandwide.

Advances in fiber optic technology provide the backbone for the island's high-capacity broadband requirements and the necessary services for specialized users such as the telescopes atop Mauna Kea. Furthermore, frame relay, Asynchronous Transfer Mode (ATM) and internet services are transmitted via Verizon Hawaii's fiber optic network. Currently, high speed internet connections such as Digital Subscriber Lines (DSL) are only available in certain areas on the island. However, these services are bound to expand.

Advances in telecommunications are not without cost or concerns. One such concern is the construction and location of telecommunication towers. Telecommunication towers are the physical structures to which antennas are attached to facilitate wireless

communication. Because of the need for a clear line-of-site, telecommunication towers are usually located in areas with minimum obstructions between the tower and its area of service. Line-of-site refers to the imaginary line between a mobile phone antenna and a telecommunication tower. If there are impediments between the mobile phone antenna and the telecommunication tower, there may be signal degradation or signal loss. For example, the loss of line-of-sight occurs when a person uses a mobile phone while driving through a tunnel. Most often, communication is lost or unclear. The line-of-sight requirement often necessitates the conspicuous location of many telecommunication towers. Consequently, the telecommunication tower is usually much taller than the surrounding structures or vegetation and may negatively impact the scenic nature of a given area.

Currently there are over 95,000 switched telephone connections in service on the island. The State Public Utilities Commission regulates telephone service statewide.

11.3.2 Policies

- (a) Encourage underground telephone lines where they are economically and technically feasible.
- (b) Work with the telecommunications industry to increase the availability of emergency telephones throughout the island.
- (c) Develop standards for the construction of wireless telecommunication facilities.
- (d) Work closely with the telephone company to provide all users with efficient service.

11.3.3 Standard

- (a) In the development and placement of telephone facilities, such as lines, telecommunications and cellular towers, poles, and substations, the design of the facilities shall consider the existing environment, and scenic view and vistas shall be considered and preserved where possible.

11.4 ELECTRICITY

11.4.1 Introduction and Analysis

The Hawaii Electric Light Company, Inc. (HELCO), supplies electricity for the County. Peak electrical demand in 1999 was 170.2 megawatts (MW). HELCO's power generation system presently has a total firm capacity of 260.4 megawatts. HELCO purchases a total of 112 megawatts of firm power from three privately-owned companies--Hilo Coast Power Company (coal at 22 megawatts), Hamakua Energy Partners (60 megawatts) and Puna Geothermal Venture (geothermal at 30 megawatts). The balance of 148.4 megawatts is produced by HELCO-owned steam units, diesel units,

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and gas turbines. These power plants are located at Keahole, North Kona; Waimea, South Kohala; Waiakea Peninsula and Kanoelehua, South Hilo; and Keaau, Puna.

HELCO owns four hydroelectric units and a windfarm that provide energy to the system. HELCO also purchases energy from an independent power producer with a capacity of about 11 megawatts of hydropower. All hydro units are run-of-the-river and are on the Wailuku River. The Lalamilo Windfarm is located west of Waimea.

There are two levels of transmission voltages to transfer power between areas on the Big Island. The main transmission voltage is 69kV. HELCO has four 69kV cross-island transmission lines. One line is the northern line connecting the Kanoelehua substation to West Hawaii via the Waimea substation along highway 19 following the Hamakua coastline. Two lines connect the Kaumana substation to the Keamuku substation along the Saddle Road. The fourth is the southern line connecting the Kanoelehua substation to West Hawaii via the Kealia substation along Highway 11 through the Puna and Ka'u Districts. The other transmission voltage is 13.8kV that includes three tie-lines in Hilo connecting the Shipman and Kanoelehua power plants. HELCO uses 34.5kV as a subtransmission voltage and three lines are used to service the Puna, Ka'u and North Kohala areas.

The existing distribution system consists of several different voltage levels: 2.4kV, 4.16kV, 7.2kV, 12.47kV and 13.8kV. The distribution system basically consists of overhead polelines and underground systems. Because of the vastness of the Big Island, the majority of the distribution system consists of overhead pole lines. Underground systems have been used more extensively in West Hawaii in the newer subdivisions and developments. HELCO currently operates major switching stations (used to transfer the flow of power between different transmission circuits) at critical locations around the island. These transmission switching stations provide greater system flexibility and increase system reliability in supplying power to the various distribution substations and eventually, to customers. Distribution substations, which transform voltages to distribution voltages, are also located island-wide in proximity to communities and other developments.

The Big Island has a potential to use more alternative energy in the form of geothermal, hydro, wind, solar thermal and photovoltaic systems. These sources have been included in HELCO's Intergrated Resource Planning (IRP) process. The goal of integrated resource planning is the identification of the resources or the mix of resources for meeting near and long term consumer energy needs in an efficient and reliable manner at the lowest reasonable cost including the need and timing of any new generation and new cross-island transmission lines. As identified in the IRP process, HELCO is planning to expand its generation facilities at Keahole, North Kona. The added generation at Keahole will improve the system voltage level in West Hawaii, improve system reliability and allow for the retirement of older generators in East and West

Hawaii. Because of the planned addition at Keahole, additional cross-island transmission lines can be deferred.

The LCO's long term plans include the eventual conversion of distribution circuits to 12.47kV where necessary. Therefore, any new distribution improvement or line extension will be designed for 12.47kV.

11.4.2 Policies

- (a) Power distribution shall be placed underground when and where practical. Encourage developers of new urban areas to place utilities underground.
- (b) Route selection for high voltage transmission lines should include consideration for setbacks from major thoroughfares and residential areas. Where feasible, delineate energy corridors for such high voltage transmission lines.
- (c) Continue to advise the electrical utility companies on the future revisions of their comprehensive Integrated Resource Plans.
- (d) Conform to safety standards as established by appropriate regulatory authorities.

11.4.3 Standards

- (a) There shall be minimal obstruction of scenic views and vistas by electrical facilities.
- (b) Facilities such as substations shall mitigate and minimize any aesthetic impacts to surrounding properties and scenic vistas.

11.5 GAS

11.5.1 Introduction and Analysis

Propane gas is widely used on the island of Hawaii. In some rural areas of the County, gas is the only source of power. Gas consumption on the Big Island rose from 3 million therms in 1969 to 8 million therms by 1998.

The Public Utilities Commission regulates 67 miles of gas mains and service lines on the Big Island. These lines serve approximately 1,600 customers and are located mainly in Hilo.

In addition, approximately 9,300 customers throughout the County are provided gas service by tank or cylinder. The Public Utilities Commission does not regulate this type of service. Major liquid propane gas substations on the island of Hawaii are located in Hilo, Kailua-Kona, Waimea, and Ka'u.

§11.5.2: Policy

Propane gas is used in both residential and commercial facilities. The primary uses for propane are water heating, cooking, and the drying of clothes. Other uses of propane include fuel for vehicles, emergency back-up electric generation, and decorative lighting. Residential customers are normally provided a 124-gallon tank.

11.5.2 Policy

- (a) Gas storage facilities shall be located to minimize danger to commercial and residential areas.

11.5.3 Standard

- (a) County ordinances shall reflect appropriate safety standards for gas facilities.

11.6 SEWER

11.6.1 Introduction and Analysis

Adequate sewer disposal systems are vital to safeguard public health and preserve the environment. An adequate system is one that minimizes contamination of both the ground water supply and the coastal waters, beaches and waterborne recreational areas and is not a visual and odor nuisance.

About 77 per cent of the County's population is served by cesspools. There is an increasing need to create a better system than individual cesspools, particularly in highly urbanized and shoreline areas. This is due to the possible pollution of ground water as well as cesspool seepage into coastal waters. More stringent pollution controls, especially in water quality standards, are being imposed by regulatory agencies. The State Department of Health (DOH) intends to promulgate rules that will prohibit cesspools in the County of Hawaii.

The problem of sewage disposal is discussed in more detail in a completed study of sewerage for all urbanized and urbanizing areas in the County of Hawaii. Portions of that study are incorporated in this report.

Hawaii County presently operates municipal sewerage in Hilo, Papaikou, Kapehu, Pepeekeo and Kealakehe. The remaining communities are served by private wastewater treatment facilities or individual facilities such as cesspools or septic tanks.

It is difficult to measure the adequacy or inadequacy of cesspools in a given area. Many factors, such as density of population, porous condition of the soil, underground geologic structure, and rainfall levels, have to be taken into account to determine the effects of cesspools. In some areas, they may be effective and in other areas, they may not. In August 1991, the State Department of Health adopted rules that require the use

§11.6.1: Introduction and Analysis

of septic systems in the most critical wastewater disposal areas. Critical wastewater disposal areas are areas around the island where cesspools are permitted. Sewerage disposal system designs must be examined with the particular area in mind. However, it is important to note that the critical wastewater disposal areas may be eliminated in the near future when the State Department of Health implements the prohibition of cesspools.

Of critical importance in an examination of sewerage disposal for a community is the cost of the system, including construction and operation costs. These costs vary with the characteristics of each area.

Land development plans for resort-residential complexes located in shoreline areas pose a potential water quality problem for adjacent near shore waters. Adequate treatment facilities are essential prerequisites for development.

The Safe Drinking Water Act of 1974 (PL 93-523) legislated the protection of all aquifers or portions of aquifers currently serving as drinking water sources and any other aquifer capable of yielding consumable water. This mandate was based on a national concern for the quality of the ground water and the increasing evidence of contamination of this valuable resource.

In 1976, the State Legislature enacted Act 84, Relating to Safe Drinking Water, which requires the State Department of Health to establish an underground injection control program in order to protect the quality of the State's underground sources of drinking water. Because of the importance of ground water as a source of municipal water supplies, the underground injection control program is considered a beneficial approach in the identification of aquifer that should be protected from subsurface disposal of wastewater through injection wells.

The protection of these aquifers is established by designating areas now being used or will be used in the future for drinking water supply. The Underground Sources of Drinking Water (USDW) will be protected from pollution by prohibiting the construction of new injection wells that may pollute the USDW. Injection wells are allowed in exempted areas. The boundary lines between the USDW and the exempted areas have been developed. Under Chapter 62, "Wastewater Systems", the DOH adopted a 1,000-foot setback of wastewater systems from all public drinking water wells and springs.

In compliance with the Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500), the State Department of Health and the County of Hawaii jointly prepared the "Water Quality Management Plan for the County of Hawaii" in 1978 and subsequently updated the plan in 1980. In 1979, the County Council adopted the plan through resolution to serve as the planning guide for development of regional waste treatment systems and the control of non-point source of pollution. To implement the

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management plan, the County has prepared facility plans for various areas on the island. Facility Plans are plans developed by the County to satisfy a requirement for the application of loans from the State to develop wastewater treatment facilities. The facility plans identify problems, potential solutions and costs.

In 1985, the State Legislature enacted Act 282, Relating to Environmental Quality, which reassigns the County, effective July 1, 1987 or upon receipt of State funds, to assume complete administration and implementation for the regulation of sewerage and wastewater treatment system programs.

11.6.2 Policies

- (a) The "Sewerage Study for All Urban and Urbanizing Areas of the County of Hawaii, State of Hawaii," December 1970, and the "Water Quality Management Plan for the County of Hawaii," December 1980, shall be updated and used as guides for the general planning of sewerage disposal systems.
- (b) Private systems shall be installed by land developers for major resort and other developments along shorelines and sensitive higher inland areas, except where connection to nearby treatment facilities is feasible and compatible with the County's long-range plans, and in conformance with State and County requirements.
- (c) Immediate steps should be taken to designate treatment plant sites, sewerage pump station sites, and sewer easements according to the facility plans to facilitate their acquisition.
- (d) Continue to seek State and Federal funds to finance the construction of proposed sewer systems and improve existing systems.
- (e) Plans for wastewater reclamation and reuse for irrigation and biosolids composting (remaining solids from the treatment of wastewater is processed into a reusable organic material) shall be utilized where feasible and needed.
- (f) Require major developments to connect to existing sewer treatment facilities or build their own.

11.6.3 Standards

- (a) Incorporate sewage works standards proposed in the "Sewerage Study for All Urban and Urbanizing Areas of the County of Hawaii" and the "Water Quality Management Plan for the County of Hawaii."
- (b) Sewerage systems shall be designed for a particular area, depending on topography, geology, density of population, costs, and other considerations of the specific area.
- (c) There shall be a minimum of visual and odor pollution emanating from sewerage treatment facilities.

- (d) Applicable standards and regulations of the State Department of Health, Chapter 23 "Underground Injection Control."
- (e) Applicable standards and regulations of the State Department of Health, Chapter 54 "Water Quality Standards."
- (f) Applicable standards and regulations of the State Department of Health, Chapter 55 "Water Pollution Control."
- (g) Applicable standards and regulations of the State Department of Health, Chapter 62, HRS, "Wastewater Systems."
- (h) Applicable standards and regulations of Chapter 342, HRS; Act 282, Session Laws of Hawaii 1985; and Act 302, Session Laws of Hawaii 1986, Relating to Environmental Quality.
- (i) All wastewater disposal systems shall conform to the applicable provisions of Chapter 11-62, Hawaii Administrative Rules for the Department of Health to ensure proper treatment and disposal of wastewater and to prevent further contamination of waterways, underground water sources, and the coastal waters.

11.6.4 Districts

The district analysis was conducted on a planning area basis rather than by judicial districts.

11.6.4.1 PUNA

11.6.4.1.1 Profile

The Puna district is characterized by many small towns, largest of which are Keaau and Pahoā, and large non-conforming subdivisions.

At present, most residents in the Puna district are served by individual sewerage systems. The use of cesspools and individual household aerobic treatment units will probably be continued until such time as increased population distribution and densities make it economically feasible to install municipal sewerage systems.

Residences near the coastal areas are much more vulnerable to unsatisfactory results with individual disposal systems because of the relative proximity of the groundwater table to the ground surface. The close proximity of the groundwater table reduces the efficiency of individual disposal systems because there is less filtration that can occur before the effluent reaches the ground water. This reduced efficiency may also affect the quality of nearshore waters due to the reduced filtration.

11.6.4.1.2 Courses of Action

- (a) The use of cesspools shall be discontinued in the coastal areas where cesspools do not function satisfactorily to meet water quality standards. Individual household

§11.6.4.2: SOUTH HILO

aerobic treatment units approved by the State Health Department and the County of Hawaii could be utilized in these areas. Future sewerage systems for the Puna area would then naturally commence with service to the lower coastal areas.

- (b) Coordinate with W.H. Shipman Ltd. in the planning and development of a sewerage system for the Keaau area.

11.6.4.2 SOUTH HILO

11.6.4.2.1 Profile

The basic concepts of the Hilo regional wastewater management system are described in detail in the "Facilities Plan for the Hilo District, South Hilo, Hawaii (February 1980)."

Hilo is designated as an urban sewerage planning area. The County of Hawaii owns, operates, and maintains a sewerage system located on the Puna side of the Hilo International Airport. At present, the system consists of a 5.0 million gallons per day (mgd) secondary sewage treatment plant with an ocean outfall effluent disposal and a collection system of sewage pump stations, force mains, and gravity lines.

The existing municipal wastewater treatment facility in Pepeekeo has a design capacity of 500,000 gallons per day.

The Papaikou-Paukaa sewerage system consists of a 0.35 mgd secondary wastewater treatment plant, collection and transmission lines, and an outfall to convey effluent to the shoreline for discharge.

11.6.4.2.2 Courses of Action

- (a) Encourage the State Department of Health to monitor the wastewater received to provide sufficient base line data regarding the need for any future extension or expansion of waste water collection systems.
- (b) Expand the existing sewer collection system to all densely populated areas in and around Hilo.
- (c) Upgrade and/or rehabilitate aging sewer pump stations and collector sewers.

11.6.4.3 NORTH HILO

11.6.4.3.1 Profile

The towns along the coast of the North Hilo district are small plantation towns characterized by populations of less than one thousand. For some of these towns, the population is expected to decline.

At present, most residents are served by individual cesspools. Kapehu Camp has been provided with a soil purification wastewater treatment system. Municipal sewerage

systems for the small towns would not be economically feasible for some time and there appear to be no problems at the present time.

11.6.4.3.2 Course of Action

- (a) Continue operation of the existing sewerage system at Kapehu.

11.6.4.4 HAMAKUA

11.6.4.4.1 Profile

Many small communities, largest of which are Honokaa and Paauilo, characterize the Hamakua district. There are no public sanitary sewer systems in the Hamakua area. Oxidation ponds (pond that acts as a settling pond where bacteria can break down the sewage as the liquid seeps and filters down through the earth) serve the towns of Honokaa, Paauilo, Paauhau and Haina and are presently adequate. Municipal sewage systems for the smaller towns would not be economically feasible for some time.

11.6.4.4.2 Course of Action

- (a) Investigate possible alternatives to eliminate the need for and continued use of the oxidation ponds.

11.6.4.5 NORTH KOHALA

11.6.4.5.1 Profile

The North Kohala district is characterized by many small communities with populations under one thousand. There are neither County-operated collection or treatment facilities in this district nor any plans for constructing a collection and treatment system. Domestic sewage disposal is via cesspools or other individual wastewater systems. Individual sewage treatment units in the North Kohala area are functioning adequately. Considering the density and distribution of the housing units and the relatively small population growth anticipated, individual household waste disposal units will continue to be utilized unless restricted by the DOH.

11.6.4.6 SOUTH KOHALA

11.6.4.6.1 Profile

Most residences in the Waimea area are now being served by cesspools. As the population is expected to increase, a municipal sewerage system should be made available. Parker Ranch has constructed a limited collection system and treatment plant to service its development needs.

Existing sewerage systems within the Kawaihae-Puako area consists mainly of domestic sewage disposal via cesspools and individual wastewater systems. However, resort

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developments operate their own private treatment facilities. Cesspool problems are generally located along the Puako residential lots where the groundwater table is near the surface.

11.6.4.6.2 Courses of Action

- (a) Construct a Waimea sewerage system to provide sewer service and wastewater treatment facilities with an ultimate treatment capacity adequate for foreseeable growth. Consider water reclamation or subsurface type disposal.
- (b) Construct a sewerage system in the Puako beach lot area to service flows by utilizing existing resort wastewater treatment facilities as a means of wastewater disposal.

11.6.4.7 NORTH KONA

11.6.4.7.1 Profile

The basic concepts of the North Kona regional wastewater management system are described in detail in "The Facility Plan for the Kailua-Kona Sewage System, Phase IV (Northern Zone), April 1981" and "Area wide Wastewater Management Plan for North Kona, December 1976 (w/1981 Supplement)."

Most residences in the North Kona area are serviced by individual sewerage systems. Kailua and Kealakehe are being serviced by a municipal sewerage system. The existing Kealakehe Sewage Treatment Plant has a design capacity of 5.31 mgd.

The Keauhou area sewerage system is a 1.8 mgd secondary sewage treatment plant at Heeia to serve the Keauhou-Kona resort community. This sewage treatment facility is projected to eventually handle 3.6 mgd when the final increment is completed. This facility is owned by Keauhou Community Services Inc., a subsidiary of Kamehameha Investment Corp. Because of the limited extent of the existing collection system, developments in unsewered areas are relying on cesspools and individual wastewater systems for sewage disposal. Due to the permeable nature of the lava strata that allows the raw sewage disposed in cesspools and effluent disposed in seepage pits to seep rapidly through the strata and contaminate groundwater and adjacent coastal waters, great precaution must be exercised in averting the contamination of the waters.

11.6.4.7.2 Courses of Action

- (a) Expand the existing sewer collection system.
- (b) Upgrade the Kealakehe Wastewater Treatment Plant to produce tertiary (R-1) quality effluent.

11.6.4.8 SOUTH KONA

11.6.4.8.1 Profile

Cesspools and individual wastewater systems are the primary on-site treatment system in the South Kona area. Several small on-site package plants are also used to service shopping centers, a hospital, and a park. They discharge treated effluent into seepage pits or injection wells.

11.6.4.8.2 Courses of Action

- (a) Continue to work with the Departments of Health and Land and Natural Resources to preserve the Class AA water quality of Kealakekua Bay.
- (b) Continue the current methods of wastewater disposal in unsewered areas in compliance with State and County requirements. This includes individual wastewater systems in low density developments and private wastewater treatment plants in high density developments.

11.6.4.9 KA'U

11.6.4.9.1 Profile

The Ka'u district is characterized by many small communities, largest of which are Naalehu and Ocean View. The County has no sewerage system in the Ka'u district. A private system exists for the Punalu'u Resort development at Punaluu, but most residents are served by individual waste disposal systems. The cesspools and septic systems presently in use in the Ka'u area apparently function adequately. Thus, considering the low density and wide distribution of the housing units and the relatively small population growth anticipated, the individual treatment units will continue to be utilized.

11.6.4.9.2 Course of Action

- (a) Work closely with landowners to insure the development of adequate sewerage treatment facilities.

§11.6.4.9: KA'U