

Transit-Oriented Community Street Systems

- Design circulation systems within residential communities and commercial centers to emphasize connections between north-south and east-west streets and accessibility from residential streets to bus routes, parks, schools, and commercial centers.
- Design circulation systems to facilitate bicycle and pedestrian travel, to increase transit use, and to reduce dependence on automobile travel (see Chapter 3, Sections 3.9 and 3.10, for more detailed planning principles and guidelines for circulation in residential communities and commercial centers).
- **Adequate Access and Services** - Before zoning approval is given by the City Council for new residential and commercial development in 'Ewa, the Department of Transportation Services, Department of Planning and Permitting, and State Department of Transportation, as appropriate, should:
 - Report if adequate transportation access and services can be provided with existing facilities and systems; and
 - If adequate capacity cannot be provided by existing facilities, recommend conditions that should be included as part of the zone change approval in order to assure adequacy, including timing of any necessary improvements.
- **Reduction in Automobile Use** - Reduce reliance on the private passenger vehicle by:
 - Providing circulation systems with separated pedestrian and bicycle paths and convenient routes for public transit service;
 - Designing street systems in new development areas which reduce the length of dead end streets and provide for smaller blocks in order to facilitate bus routes, provide better access for emergency and utility vehicles and encourage walking and biking;
 - Providing supporting facilities and amenities for pedestrian, bicycle, and public transit use, including the use of bike trails, and the provision of bicycle racks at commercial centers, bicycle storage facilities at employment centers and bus shelters at bus stops; and

- Allowing and encouraging medium-density and high-traffic land uses along the Council-identified rapid-transit corridor, especially within a quarter-mile of centers of the transit nodes.

Roadways

- Develop the roads listed in the **'Ewa Highway Master Plan** and the **O'ahu Regional Transportation Plan** to meet the development anticipated by 2035.
- Develop additional east-west and north-south roadways to enhance movement between the various parts of the 'Ewa region and to provide improved access to activity centers such as the proposed Kalaeloa Regional Park and the Hoakalei marina.
- Design the extension of the Kualaka'i Parkway south of Kapolei Parkway into Kalaeloa to minimize adverse impacts on historic railway operations and historic resources at the 'Ewa Marine Corps Air Field.

Transit

- Increase transit service in 'Ewa to enhance circulation within 'Ewa and between 'Ewa and the adjacent Wai'anae and Central O'ahu areas and to provide suitable service for peak-hour commuting.
- Provide sites for transportation centers and park-and-ride facilities as new communities are developed.
- Develop a rapid transit corridor connecting the City of Kapolei with the Primary Urban Center to provide both a shuttle service between Kapolei West, the City of Kapolei, Kalaeloa, DHHL East Kapolei, the University of Hawai'i West O'ahu Campus (UH WOC), Ho'opili, and Waipahū, and an express commuter service to and from the Primary Urban Center.
- Set aside land in the City of Kapolei and along the rapid transit corridor for future rapid transit stations and park-and-ride facilities.
- Establish a commuter ferry service to downtown Honolulu from Hoakalei Marina if such service is found to be feasible and if sufficient financing can be obtained to construct improvements needed to provide such service from the Marina.

Bikeway System

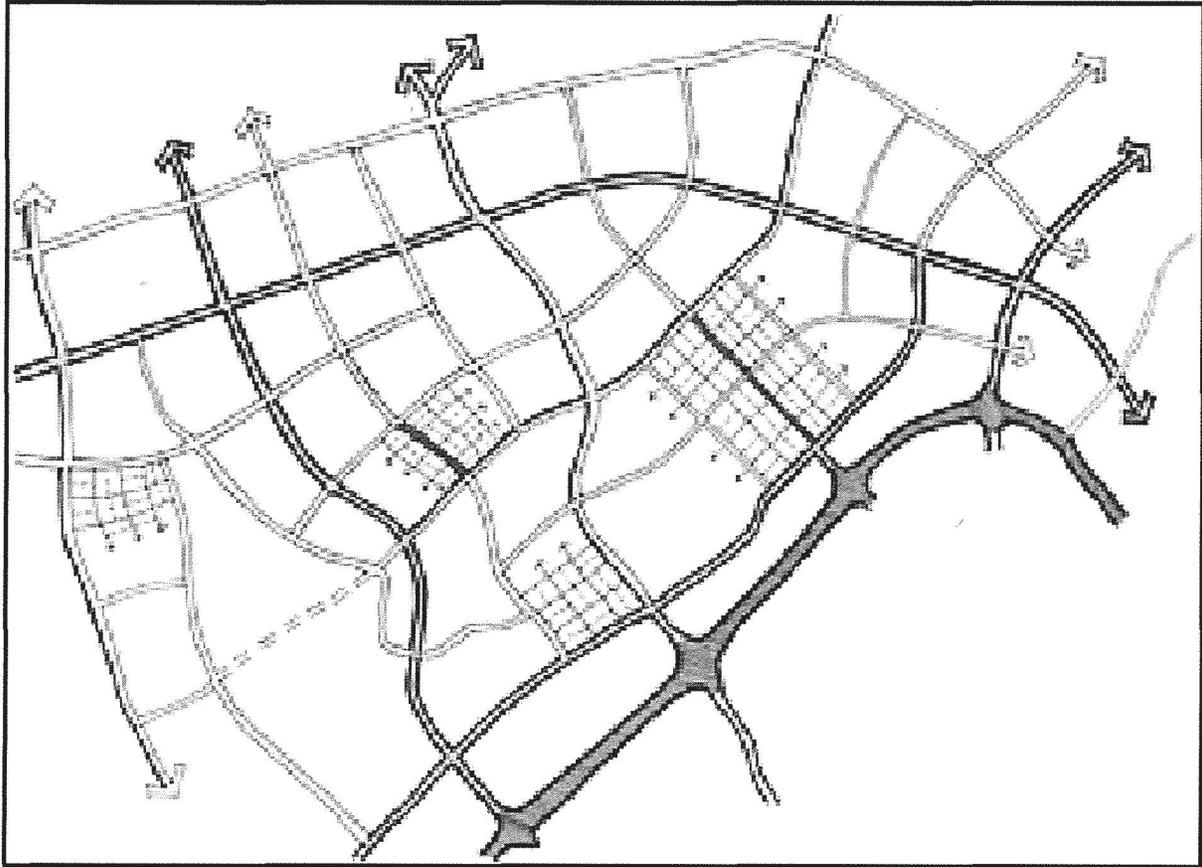
- Develop major bike paths along the OR&L right-of-way, Kapolei Parkway, the Kualaka'i Parkway, and Fort Weaver Road.
- Incorporate bikeways into other major roadways.
- Develop an extensive network of bike lanes within the City of Kapolei and the Villages of Kapolei.

4.1.7 GUIDELINES

The following guidelines suggest how the general policies for transportation system development in 'Ewa should be implemented.

- **Community-Level Street Standards** - Revise standards for public streets within residential communities and commercial centers to support and improve pedestrian and bicycle travel and on-street parking. While average motor vehicle speed may be reduced, safety and enjoyment for pedestrians and bicyclists would be increased and greater efficiency in land use, reduced construction costs, and improved street function may also be achieved.
- Design the street network to provide multiple options for reaching major amenities such as the Main Street/Village Center shops, schools, parks and community facilities, without needing to access an arterial boulevard.
- Consider view corridors to the mountains, open space, and other local and regional landmarks in the arrangement of streets, commercial centers, and shared spaces within both residential and mixed use districts.
- Provide a circulation network master plan for 'Ewa that is comprised of a loose "grid" of arterials at 1/2-1 mile intervals, collector streets at 1/4 mile intervals and connector roads between individual developments at regular intervals between collectors, where permitted by terrain. See Exhibit 4.2.
- Connect existing adjacent neighborhoods to new streets, bike ways, paths, and trails.
- Use traffic calming measures to slow traffic making short cuts and support a desirable living environment.

Exhibit 4.2
Street Network



- Use multiple connecting streets within and between residential neighborhoods to knit neighborhoods together, not form barriers.
- Use streets, bikeways, and walkways to create a unifying circulation network that provides convenient routes throughout the community.
- Establish specific connectivity standards (minimum intersection frequency, maximum dead end length, number of dwellings or buildings on a cul-de-sac, and minimum street spacing) for each zoning district.

4.2 WATER ALLOCATION AND SYSTEM DEVELOPMENT

In 1987, the State enacted the State Water Code in order to protect, control, and regulate the use of the State's water resources for the benefits of its people. Under the

Code, the City is responsible for preparing the water use and development plan for the City and County of Honolulu.

This plan, called the **O‘ahu Water Management Plan (OWMP)**, is prepared by the Board of Water Supply with the assistance of the State Commission on Water Resource Management and the Department of Planning and Permitting, and approved by the City Council following extensive public review and comment. The goal of the **OWMP** is to provide guidance for the sustainable management and use of O‘ahu's valuable and finite surface and ground water resources in meeting demands consistent with the City land use plan. The current **OWMP** was adopted by the State Commission on Water Resources and the City Council in 1990.

The Board of Water Supply (BWS) has begun the development of eight district-wide Watershed Management Plans for each of the eight Development Plan and Sustainable Communities Plan areas. The **Wai‘anae Watershed Management Plan**, and **Ko‘olau Loa Watershed Management Plan** are the first two plans to be prepared. They will be followed by plans for the North Shore and Ko‘olau Poko, and then ‘Ewa, Central O‘ahu, the Primary Urban Center, and East Honolulu. When completed, the eight Watershed Management Plans will be used to update the **O‘ahu Water Management Plan**.

Water Reclamation - Under the City's agreement through a Consent Decree with the U.S. Environmental Protection Agency and the State Department of Health, the City established a water reclamation facility at Honouliuli Wastewater Treatment Plant (WTP) to recover nonpotable water for beneficial uses such as irrigating parks and golf courses, providing water for industrial cleaning, and for making steam used in oil processing.

Construction of the secondary treatment unit at the Honouliuli WTP was completed in 1996. The facility is capable of providing 13 million gallons per day (mgd) of non-disinfected secondary treated reclaimed water (R-3 quality). The R-3 quality water receives further treatment known as tertiary treatment at the Honouliuli Water Recycling Facility (WRF) which produces two grades of recycled water: R-1 for irrigation and RO (Reverse Osmosis) demineralized water for industrial uses. The WRF can process up to 12 mgd which is distributed to customers throughout ‘Ewa through separate lines for

each grade of water. The Board of Water Supply is planning expansion of the distribution system, in conjunction with expansion of both the Honouliuli WTP and WRF, to provide over 26 mgd of nonpotable water for use in 'Ewa.

Desalination Project - Following the success of a small State of Hawai'i sponsored pilot project, the Board of Water Supply is planning to construct an initial 5 mgd desalination plant on a 20-acre parcel at Kalaeloa. Capacity of the plant could be increased to 15 mgd in future phases. The plant is expected to have an operational life of 30 to 50 years.

The Board of Water Supply evaluated the water development needs of the existing and new residential and commercial (including retail, office, resort, recreational, and industrial) development likely by 2035, as a result of implementation of the **'Ewa Development Plan**.

- The Board of Water Supply forecasts that 27 mgd of **potable** (or drinkable) water will be needed in 'Ewa by 2035 to meet projected growth in residential and commercial demand from the 14.9 mgd needed in 2000.

- In addition, long-term demand for **nonpotable** water for
 - Existing and new urban irrigation and other urban purposes is estimated to be approximately 21 mgd; and
 - The 3,000 acres of agricultural land in 'Ewa protected from development by this plan could be as much as 10 mgd (based on estimates from the **State Agricultural Water Use and Development Plan**).

Potable water system infrastructure has been master planned by the Board of Water Supply to accommodate 'Ewa's planned growth. Ultimately, potable water demands of the remaining lands within the Community Growth Boundary should be met by desalination or additional groundwater sources in Central O'ahu if sustainable yield is determined available.

The demand for nonpotable water for urban irrigation and other urban purposes and for agricultural irrigation for lands over the 'Ewa Plain nonpotable aquifer; will be met with a combination of recycled water, brackish caprock water, and brackish basal water. Infrastructure providing R-1 recycled water connects the Campbell Industrial Park with

Fort Weaver Road, and brackish water systems exist in several developments. Demineralized recycled water is also provided by the Board of Water Supply to refineries and power plants in Campbell Industrial Park for industrial purposes. The demand for nonpotable water for agricultural irrigation of lands over the Pearl Harbor potable water aquifer should be met with low chloride irrigation water such as the Wai'ahole Ditch or freshwater wells.

As shown in Table 4.2, the Board of Water Supply has identified potential sources of potable and nonpotable water to meet the projected demand in 'Ewa through 2035. These sources will be pursued as part of the Board's development and operation of a diversified and integrated island-wide water system.

Strategies in the Watershed Management Plan promote on-going groundwater source development coupled with efforts to increase water delivery efficiency, water conservation, and continued development of alternative sources of water, such as recycled and brackish water and desalination.

The remainder of the section provides general policies and guidelines for water allocation and water system development in 'Ewa.

4.2.1 GENERAL POLICIES

Adequacy of Water Supply

- Before zoning approval is given for new residential or commercial development in 'Ewa, the Board of Water Supply should:
 - Report if adequate potable and nonpotable water is available; and
 - If adequate potable and nonpotable water is not available, recommend conditions that should be included as part of the zone change approval in order to assure adequacy.
- Confirm adequacy of existing capacity at the time of land subdivision or building permit applications for existing lots.

TABLE 4.2 POTENTIAL SOURCES OF POTABLE AND NONPOTABLE WATER FOR 'EWA		
POTABLE GROUNDWATER RESOURCES		
GROUND WATER SOURCE		Estimated Source Yield (mgd)
1. Kunia Wells III ⁽¹⁾		3.00
2. Waipahū Wells IV ⁽¹⁾		3.00
3. Honouliuli Wells ⁽²⁾		1.62
4. 'Ewa Shaft		10.00
5. Additional Central O'ahu Wells ⁽³⁾		
Total		17.62
ALTERNATIVE WATER RESOURCES		
	Available Resource (mgd)	
SOURCE	Minimum Estimate	Maximum Estimate
POTABLE		
1. Kalaeloa Seawater Desalination Plant	5.00	15.00
2. Kapolei Brackish Desalination Plant	0.20	0.50
Total Potable	5.20	15.50
NONPOTABLE		
3. 'Ewa Caprock ⁽⁴⁾	8.70	9.00
4. Brackish Basal Water ⁽⁵⁾	4.00	5.00
5. Recycled Water ⁽⁶⁾	12.00	12.00
6. Waiāhole Ditch ('Ewa only) ⁽⁷⁾	4.73	6.00
Total Nonpotable	29.43	32.00
NOTES:		
mgd = million gallons per day mg/l = milligram per liter		
⁽¹⁾ Portion of the source will supply water for Wai'anae's growth.		
⁽²⁾ Of the 6.72 mgd permitted use, 1.62 mgd remains available for new development.		
⁽³⁾ Unpermitted sustainable yield is available but hydro-geologic analysis must be conducted.		
⁽⁴⁾ Minimum is existing use July 2005. Maximum was 1996 proposed sustainable yield. 'Ewa caprock is now managed by a chloride limit of 1,000 mg/l.		
⁽⁵⁾ Based on existing brackish basal sources, EP-2 (1mgd), EP-5&6 (2mgd), EP-10 (1-2 mgd).		
⁽⁶⁾ Expansion of recycled water supply beyond 12 mgd is possible but not planned at this time..		
⁽⁷⁾ Minimum estimate is Campbell Estate 3.98 mgd and Pu'u Makakilo 0.75 mgd allocation. Max adds possible unpermitted water.		
Allocation of groundwater sources require the approval of the State Commission on Water Resource Management (CWRM).		
Source:		
	Honolulu Board of Water Supply, 2008, <u>Watershed Management Plan</u>	
	CWRM Database 2005	

Water Use Efficiency and Conservation

- Require developments to conserve water resources by implementing water conservation measures, such as low flow plumbing fixtures, drought tolerant landscaping, sub-metering and efficient irrigation systems with soil moisture sensors. Such requirements shall be determined during review of building permit applications. Encourage owners of existing plumbing systems to conduct regular water audits and effect repairs to reduce water loss.
- **Dual Water Lines** - Require developments with large landscaped areas (such as golf courses, parks, or schools), roadway landscaping, and industrial processes to have dual water lines to allow conservation of potable water and use of nonpotable water for irrigation and other appropriate uses. Such requirements shall be determined during review of project water master plans for new developments and approval of zoning applications and construction plans.
- **Development and Allocation of Potable and Nonpotable Water** - The State Commission on Water Resource Management has authority in all matters regarding administration of the State Water Code. By City Charter, the Board of Water Supply has the authority to manage, control and operate the water systems of the City, and therefore should coordinate the development and allocation of potable and nonpotable water sources and systems intended for municipal use on O‘ahu as guided by the City's land use plans and the OWMP.

Use of Nonpotable Water

- Develop an adequate supply of nonpotable water for irrigation and other suitable uses on the ‘Ewa Plain in order to conserve the supply of potable water and to take advantage of dual water systems constructed by ‘Ewa developers.
 - The Pearl Harbor aquifer is the most cost effective and accessible water resource of potable quality on O‘ahu, and it is needed to support the existing and future domestic potable water uses described in the development plans.
 - To minimize the risk of impacts to our precious potable water sources, the use of recycled water reclaimed from wastewater effluent and

- brackish waters as nonpotable irrigation sources in the coastal caprock area such as the 'Ewa Plain should be given high priority.
- Significant demand exists for nonpotable water for golf courses, landscape irrigation, and industrial uses on the 'Ewa Plain.
 - In addition to the compatibility of the source to the demand in the area, the infrastructure to distribute the recycled water in that area is being planned and developed by the Board of Water Supply.
 - Recycled water from the Honouliuli Water Recycling Facility and brackish water should, therefore, be used to meet demand in the 'Ewa Plain where there are no adverse consequences to the drinking water resources.
- Require nonpotable water used for irrigation above Pearl Harbor aquifer to be low in chlorides and total dissolved solids to protect the quality of drinking water withdrawn from wells located down-gradient of the application. Experiences with increasing chloride, nitrate, and pesticide contamination of groundwater indicate that activities on the surface of the land can have a detrimental effect on the quality of drinking water.
 - **Use of Wai'ahole Ditch Water** - Request that the State Commission on Water Resource Management consider all sources of water in making allocations. A sufficient amount of water is needed to meet the diversified agricultural needs for 'Ewa and Central O'ahu along with providing for high quality recharge of the Pearl Harbor aquifer. A number of potential sources are identified in Table 4.2, including: caprock, surface water, spring waters, Wai'ahole Ditch Water, and recycled water recovered from wastewater effluent. The amount of water available and the potential use of each of these sources vary according to location.

Alternative Water Supplies

- Where practical, develop alternative water supplies using new technologies in water reclamation, membrane and distillation desalination and deep ocean water applications to ensure adequate supply for planned uses.
- Encourage use of technologies conserving water and using renewable energy that could support alternative water supplies, such as seawater air

conditioning, photovoltaics, efficient plumbing and lighting fixtures, wave energy, and bio-fuels.

4.3 WASTEWATER TREATMENT

The City's **West Māhala Bay Wastewater Facilities Plan** (2001) provides estimates that treatment/disposal capacity at the Honouliuli WTP will need to be increased from existing capacity for primary treatment of 38 mgd to almost 51 mgd by 2020 to meet projected population and economic growth in 'Ewa and Central O'ahu resulting from implementation of the Development Plans. In addition, the capacity of specific sewer lines and pump stations will need to be increased.

As noted above, the City is meeting its commitment to the U.S. Environmental Protection Agency and the State Department of Health to reclaim and use, islandwide, up to 10 mgd of recycled water recovered from wastewater effluent.

The remainder of the section provides general policies for wastewater system development in 'Ewa.

4.3.1 GENERAL POLICIES

- Require all wastewater produced by new developments in 'Ewa to be connected to a regional or municipal sewer service system.
- Where feasible, use recycled water recovered from wastewater effluent for irrigation and other uses below the Underground Injection Control (UIC) line of the State Department of Health and the "No-Pass" Line of the Board of Water Supply.
- Locate wastewater treatment plants in areas shown as planned for industrial use and away from residential areas shown on the Urban Land Use Map in Appendix A. Existing treatment plants are shown on the Urban Land Use Map and the Public Facilities Map in Appendix A.
- Use a City review and approval process, which provides adequate public notice and input, complete technical analysis of the project by the Department of Planning and Permitting, and approval by the City Council, for any major new private wastewater treatment plant. Other system

elements, such as pump stations and mains, should not require such comprehensive review and policy approval.

4.4 ELECTRICAL POWER DEVELOPMENT

The Hawaiian Electric Company (HECO) forecasts that increased demand, the need for different types of generation to help reliably integrate additional renewable energy from intermittent sources, and the possible retirement of the Honolulu Power Plant from service will create a need for additional island-wide power generation capacity by 2025. Potential sites in 'Ewa for additional generating units include Campbell Industrial Park and Kahe Point.

In May 2007, the State Public Utilities Commission approved HECO's proposal to build a 110-megawatt generating plant adjacent to the company's Barber's Point Tank Farm in Campbell Industrial Park. The new generator is planned to come on line in 2009.

HECO has a number of renewable energy initiatives and activities including rebates to help homeowners install rooftop solar water heating systems, funding for biofuels crop research, and support for installations of photovoltaic systems with net energy metering. (Net energy metering allows the owner of the photovoltaic system to receive credit for the export of surplus energy into the island-wide grid.)

The remainder of the section provides general policies for electrical power development in 'Ewa.

4.4.1 GENERAL POLICIES

- Analyze and approve system improvements -- such as development of a new power generating plant and/or major new transmission lines -- based on islandwide studies and siting evaluations.
- Give strong consideration to placing any new transmission lines underground where possible under criteria specified in State law.
- Locate electrical power plants in areas shown as planned for Industrial use and away from residential areas shown on the Urban Land Use Map

in Appendix A. Existing power plants are shown on the Urban Land Use Map and Public Facilities Map in Appendix A. Other system elements, such as sub-stations and transmission lines, are not shown on the map and should be reviewed and approved administratively.

- Consider any proposed major new electrical power plant through a City review and approval process which provides public notification and opportunity to comment and public agency analysis of impacts and mitigations.

4.5 SOLID WASTE HANDLING AND DISPOSAL

Two major solid waste handling and disposal facilities are located in 'Ewa:

- The H-Power plant at Campbell Industrial Park is operating at maximum capacity, receiving over 600,000 tons of solid waste each year. A new boiler now under construction will boost the processing capacity up to 900,000 tons per year and provide a significant reduction of material sent to the landfill for disposal.
- The Waimānalo Gulch Sanitary Landfill, located between the proposed Makaīwa Hills residential development and Kahe Valley, is the major active waste disposal site on Oahu.

To comply with a 2003 State Land Use Commission order setting 2008 as the limit for Waimānalo Gulch Landfill operations, a special Advisory Committee was convened to locate new landfill sites. In its December 2003 report, the Advisory Committee recommended four sites for consideration, including Makaīwa Gulch. In December 2004, the City Council adopted Resolution 04-348 which:

- a. required the City to develop alternative technologies and extract the maximum recyclable materials, energy, and alternative products to minimize the waste placed in landfills in order “to effectively eliminate, to the extent possible, the need for a landfill by 2008;”
- b. selected the Waimanalo Gulch site as the site for the City’s landfill; and
- c. requested the City administration to immediately contact the Planning Commission, the State Department of Health, and the State Land Use

Commission to satisfy any necessary requirements for continued use of Waimānalo Gulch as the City's landfill site.

In May 2008, the State Land Use Commission approved an extension of the Waimānalo Gulch Sanitary Landfill land use permit until November 2009.

The Final Environmental Impact Statement (EIS) for proposed expansion of the Landfill by 93 acres was accepted in October 2008. In September 2009, the LUC approved a new Special Use Permit to allow the expansion, but required that after July 31, 2012, only ash and residue from the City's H-Power plant can be deposited in the Landfill. Approval from the Department of Health will also be required before the landfill footprint can be expanded.

In 2009, the City reached agreement on a contract to ship 100,000 tons of waste per year from Kalaeloa Barbers Point Harbor to the Mainland in order to reduce the amount of waste being disposed at the Waimānalo Gulch Landfill. However, the City has cancelled the contract since permit problems and lawsuits have prevented any shipments, and the intent for entering into the contract was to fill the gap until a third boiler was added at the H-Power Plant, which is expected in late 2011.

The **Integrated Solid Waste Management Plan** was updated in 2008 and, following a public hearing and a 60-day public comment period, was submitted to Council for approval.

The remainder of the section provides general policies for solid waste handling and disposal in 'Ewa.

4.5.1 GENERAL POLICIES

- Do not develop the Makaīwa Gulch area identified by the Mayor's Advisory Committee in December 2003 as a landfill. It is in an area planned for residential use and is adjacent to the Ko Olina Resort, which plays an important role in job creation for 'Ewa.
- Analyze and approve siting and/or expansion of sanitary landfills based on island-wide studies and siting evaluations.

- For master-planned communities, plan, in consultation with the Department of Environmental Services, for how solid waste will be handled, to include estimates of solid waste to be generated by the communities, provisions for collection of solid waste, and provisions for and encouragement of recycling.

4.6 DRAINAGE SYSTEMS

Low-lying parts of the 'Ewa Plain are subject to flooding during intense rainstorms. Flood control has typically been provided for urbanized areas through the development of concrete-lined channels to convey storm waters to the ocean. Discharge of stormwater to the ocean, however, is a major source of non-point source pollution of nearshore waters, negatively affecting coral growth, fish populations and use of the shoreline for swimming, surfing, and other types of ocean recreation.

The federal government has initiated a major program to reduce non-point-source pollution, mandating response by the State and the counties. In general, the City requires all residential, commercial, public facilities, and transportation development and redevelopment projects to address storm water quality through the use of best management practices in accordance with the City's Rules Relating to Storm Drainage Standards. In many watersheds, however, undeveloped mountain areas generate a disproportionately large share of the total storm flow, and no party appears to be responsible for mitigating the environmental impact.

Concrete-lined drainage channels can have other negative environmental impacts, including disruption of lateral shoreline access, beach erosion, down drift of channel mouths, and visual blight.

Drainage improvements are planned for:

- A major new system to drain Makaīwa Hills, Kapolei Business Park, and the industrial areas closest to the Barbers Point Deep Draft Harbor;
- Expansion of the channel at the western edge of Kalaeloa to provide additional capacity for the City of Kapolei;

- A system to drain the West Loch Drainage Basin, serving ‘Ewa by Gentry and Ho‘opili; and
- A system to drain the Kalo‘i Gulch Drainage Basin.

The **Makaīwa Hills system** may have detention basins mauka of the H-1 Freeway and a concrete-lined channel to convey storm waters to an ocean outlet just south of Kalaeloa Barbers Point Harbor. It is being planned by Kapolei Property Development LLC (KPD). KPD is also planning to expand the **existing channel on the western boundary of Kalaeloa**.

Drainage improvements in the **West Loch Drainage Basin** need to be constructed to handle storm water runoff from existing and proposed projects located in the basin. These projects include the City's West Loch residential project, Phase I of the ‘Ewa by Gentry residential project, and the proposed Ho‘opili master-planned community project.

The developer for Phase I of the ‘Ewa by Gentry East project had planned to construct a grass-lined drainage channel running immediately east of the project's boundary to terminate at a detention basin immediately makai of the Honouliuli National Wildlife Refuge. However, currently the developer is considering using a large retention pond to hold storm waters, in lieu of constructing the grass-lined channel.

The **Kalo‘i Gulch Drainage Basin** is one of the larger drainage basins in the region. It encompasses an area of approximately 7,140 acres, and has a peak design flow of approximately 11,500 cubic feet per second (cfs). Historically, the drainage pattern in this basin has flowed from the Wai‘anae Mountain Range above Makakilo through the Kalo‘i Gulch toward the ocean terminating at One‘ula Beach Park. Floodwaters typically spread out in sheet flows through the former sugarcane fields below Farrington Highway.

Prior to 2000, drainage flow through the Kalo‘i Gulch basin was constrained by the elevation of the OR&L right-of-way which formed a man-made barrier that impeded storm water runoff. However, this constriction was addressed by the construction of a new railroad bridge in 2000.

In the interim until an ocean outlet is constructed, the ‘Ewa Villages, ‘Ewa by Gentry, and Ocean Pointe projects handle drainage within their projects through use of golf courses. The golf courses provide detention of storm waters and meet the Department of Planning and Permitting drainage requirements for stormwater runoff.

Other development projects in the basin include the University of Hawai‘i West O‘ahu campus and associated residential and commercial development which has not yet received City approval for its drainage master plan, and the Department of Hawaiian Home Lands East Kapolei project whose drainage master plan has been approved.

The drainage system serving the **Villages of Kapolei**, which consists of golf course retention and disposal of storm water into large pits and a large ditch near the Kalaeloa boundary, may need to be augmented in the future.

Both the regional drainage system and the on-site drainage facilities for Kalaeloa need to be addressed during the redevelopment of **Kalaeloa**. The existing regional drainage channel and box culverts that discharge into the coral pit near the intersection of Fort Barrette Road and Franklin D. Roosevelt Road are inadequate to handle the runoff from the 100-year storm, according to the **Kalaeloa Master Plan**. In addition, the Master Plan notes that the Navy’s system of drywells, installed to handle runoff within Kalaeloa, do not conform to City standards.

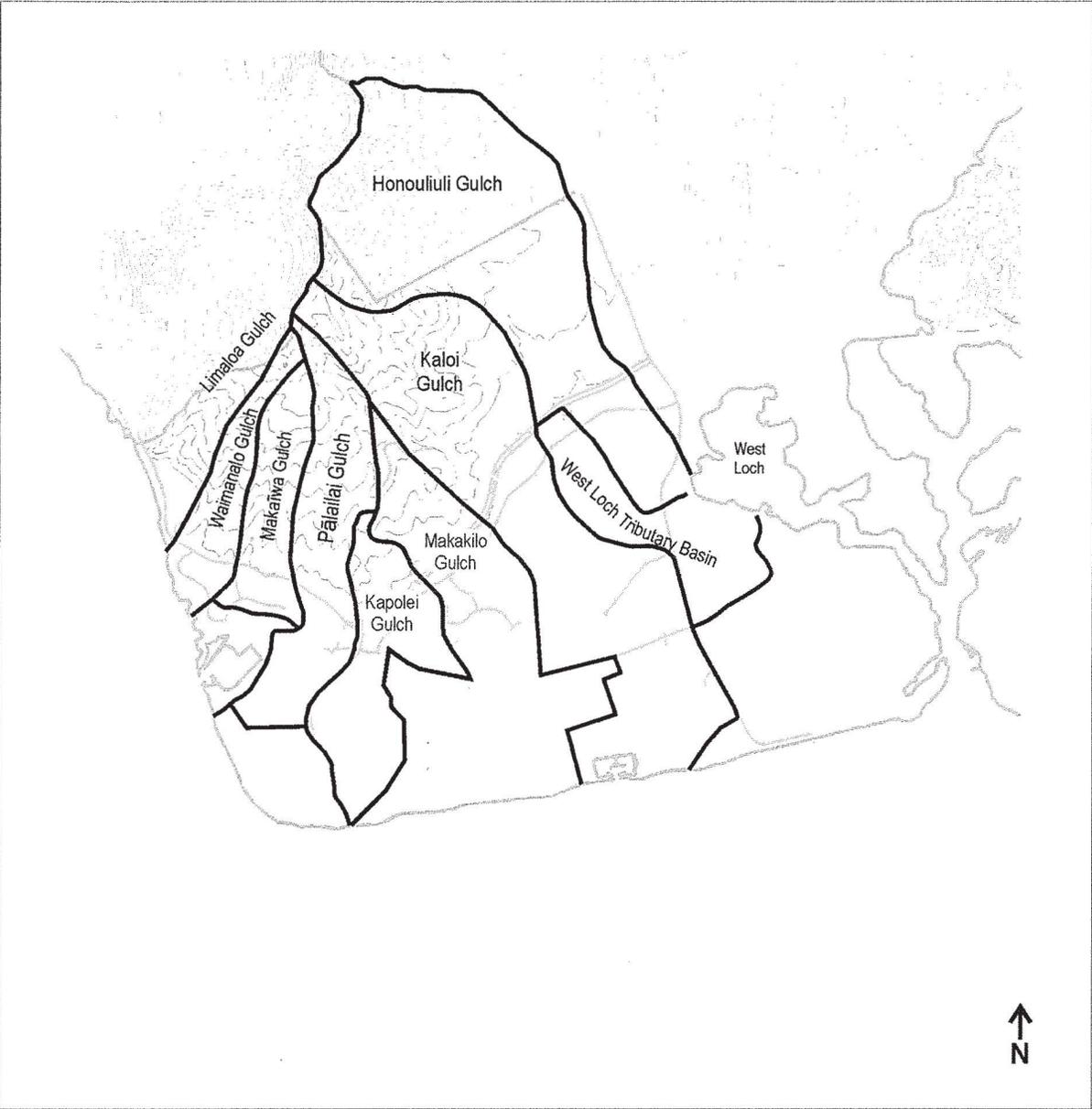
See Exhibit 4.3 for the location of ‘Ewa Drainage Basins.

The remainder of the section provides general policies and guidelines for drainage systems in ‘Ewa.

4.6.1 GENERAL POLICIES

- Design drainage systems to emphasize flood control and minimization of non-point source pollution and the retention and/or detention of storm water on-site and in appropriate open space and wetland areas.
- Use storm water as a potential irregular source of water for recharge of the aquifer that should be retained for absorption rather than quickly moved to coastal waters.

Exhibit 4.3
'Ewa Drainage Basins
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- Use natural and man-made vegetated drainageways and retention basins as the preferred solution to drainage problems wherever they could promote water recharge, help control non-point source pollutants, and provide passive recreation benefits. However, concrete-lined channels can be permitted, despite their potential adverse environmental impacts, if there is no other reasonable alternative to meet specific design challenges.

4.6.2 GUIDELINES

The following guidelines suggest how the general policies for drainage systems in ‘Ewa should be implemented.

- **Retention and Detention** - Employ methods of retaining or detaining storm water for gradual release as the preferred strategy for management of storm water. Where feasible, use any open space, including parking lots, landscaped areas, mini and community parks, and public and private golf courses, to detain or infiltrate storm water flows to reduce their volume and runoff rates and the amounts of sediments and pollutants transported.
- **Relation to the Regional Open Space Network** - To the extent possible, integrate planned improvements to the drainage system into the regional open space network by emphasizing the use of retention basins, creation of passive recreational areas, and recreational access for pedestrians and bicycles.
- **Preservation of Natural Gulches** – Preserve natural gulches on the slopes of the Wai‘anae Range foothills that are within the Community Growth Boundary as part of the open space network.

The following guidelines apply specifically to development within the Kalo‘i Gulch drainage basin.

- **Relation to the ‘Ewa Village Master Plan and Other Previously Approved Developments in the Basin** – Insure that solutions to handling drainage problems on lands above ‘Ewa Villages are compatible with the drainage design of the ‘Ewa Villages Master Plan and other

developments in the Kalo'i Gulch drainage basin which have already been approved. The 'Ewa Villages drainage design assumes that runoff will not exceed levels previously received from sugarcane fields north of the golf course, will enter the 'Ewa Villages golf course water retention areas through a number of dispersed channels, and will not be at velocities which would scour out the golf course water retention areas.

4.7 SCHOOL FACILITIES

Statewide, the State Department of Education (DOE) faces an enormous shortfall in funding to meet projected needs for new classrooms. Act 245, 2007, established a system for collecting school impact fees from new residential developments.

Developers are required to provide "their proportionate share of the land and the construction cost of new or expanded school facilities needed to serve new residential developments."

DOE is in the process of establishing the school impact districts required under the Act in order to collect land and money from developers. In January 2012, the Board of Education approved creation of a Leeward O'ahu Impact District that includes the Kapolei Complex and Campbell Complex areas in 'Ewa.

As shown in Table 4.3, the DOE has projected a need by 2030 for ten new elementary schools, three new intermediate schools, and two new high schools in 'Ewa. (Needs estimates could change if estimates of housing production and density or school operation policies and funding are revised.)

Conceptual locations of three new intermediate schools and two new high schools are shown on the Urban Land Use Map and the Public Facilities Map in Appendix A. Elementary schools are not mapped because their sites are of community rather than regional concern and should be determined as part of a master planning and design process. Sites have been reserved for all of the planned elementary schools, the three planned intermediate/middle schools, and one high school. (Minimum site size for elementary schools is 8 to 15 acres, for intermediate schools is 15 to 20 acres, and for high schools is 45 to 55 acres.)

TABLE 4.3 EXISTING AND PLANNED PUBLIC SCHOOLS IN THE 'EWA DEVELOPMENT PLAN AREA

School	FY 2011 Enrollment	Capacity	Site Reserved	Opening Date
Elementary Schools				
Campbell Complex				
'Ewa Beach Elementary	507	544	Existing	NA
'Ewa Elementary	1,003	798	Existing	NA
Holomua Elementary	1,382	1,264	Existing	NA
Iroquois Point Elementary	718	995	Existing	NA
Ka'imiloa Elementary	610	716	Existing	NA
Keone'ula Elementary	847	742	Existing	NA
Pōhākea Elementary	565	626	Existing	NA
Kapolei Complex				
Barbers Point Elementary	491	636	Existing	NA
Kapolei Elementary	1,043	1,233	Existing	NA
Makakilo Elementary	502	627	Existing	NA
Mauka Lani Elementary	563	702	Existing	NA
Total	8,231	8,883		
Planned				
Kapolei II Elementary (Mehana) ¹		400 to 750	X	2014
East Kapolei UH WOC I, II ^{2,3}		400 to 750	X	N.D.
East Kapolei DHHL ²		400 to 750	X	N.D.
East Kapolei Ho'opili I, II, III ²		1,200 to 2,250	X	N.D.
Makaīwa Hills ²		400 to 750	X	N.D.
Kapolei West ²		400 to 750	X	N.D.
Ko Olina ²		400 to 750	X	N.D.
Total		3,600 to 6,750		
Intermediate/Middle School				
'Ewa Makai Middle (Campbell Complex)	587	700	Existing	NA
'Ilima Intermediate (Campbell Complex)	777	1,330	Existing	NA
Kapolei Middle (Kapolei Complex)	1,424	1,744	Existing	NA
Total	2,788	3,774		
Planned				
East Kapolei Middle (DHHL) ²		500 to 1,000	X	N.D.
East Kapolei Middle (Ho'opili) ²		500 to 1,000	X	N.D.
West Kapolei Middle (Makaīwa Hills) ²		500 to 1,000	X	N.D.
Total		1,500 to 3,000		
High School				
Campbell High	2,639	2,022	Existing	NA
Kapolei High	2,107	1,841	Existing	NA
Total	4,746	3,863		
Planned				
East Kapolei High I (HHFDC land) ²		800 to 1,600		N.D.
East Kapolei High II (Ho'opili) ²		800 to 1,600	X	N.D.
Total		1,600 to 3,200		
NOTES:				
¹ Received appropriation for added design and construction funds in FY2012-2013.				
² No legislative appropriation				
³ Includes a UH WOC lab school.				
X Site Reserved				
NA Not Applicable				
N.D. Not Determined				
Source: State Department of Education Facilities Development Branch, 2011				

Private schools play an important role in Hawai'i with private school graduates averaging around 16 per cent of all graduates for the last 25 years. There were four private schools in 'Ewa with enrollment of almost 1,300 students in the fall of 2008 which, compared with public school enrollment in 'Ewa, is less than half what would be expected based on the statewide average.

The remainder of the section provides general policies and guidelines for school facilities development in 'Ewa.

4.7.1 GENERAL POLICIES

- **Project Review and Approval Assessment** - As new residential developments are reviewed as part of the project application review and approval process, request that the DOE report to the Department of Planning and Permitting whether the DOE will be able to provide adequate school facilities, either at existing schools or at new school sites, so that needs from the proposed development can be met.
- **Fair Share Provisions** - Require developers to comply with DOE school impact fees requirements and pay their fair share of all costs needed to provide adequate school facilities for the children living in their developments.

4.7.2 GUIDELINES

The following guidelines suggest how the general policies for schools facilities development in 'Ewa should be implemented.

- **Schools as Community Centers** - Because of the difficult financial problems for all sectors, new communities are likely to have fewer churches, private social halls, and recreation facilities. As a result, schools may have to assume important functions as cultural and recreational centers and as meeting facilities. Request that the State DOE design school facilities to facilitate community use during non-school hours and weekends.
- **Co-location with Parks** - Co-locate neighborhood or community parks with elementary and intermediate schools and coordinate design of

facilities with the State DOE when needless duplication of parking and of athletic, recreation, and meeting facilities can be avoided.

- **Shared Facilities** - Coordinate the development and use of athletic facilities such as swimming pools and gymnasiums with the DOE where such facilities would maximize use and reduce duplication of function.
- **Fair Share Contribution** - Support the State Department of Education's establishment of impact districts to obtain fair share requirements from developers of residential projects and enforce existing agreements to insure that adequate school facilities are in place at existing and new schools to meet the needs of residents.

4.8 PUBLIC SAFETY FACILITIES

Table 4.4 provides a listing of existing and planned public safety facilities in the 'Ewa Development Plan area.

To meet projected population and economic growth by 2035, the Fire Department estimates 'Ewa will need five new fire stations. They also plan to establish an island-wide training facility at Kalaeloa.

Because police operate primarily in the field and do not have a need for outlying stations, only one substation is projected by the Police Department to be needed to serve the 2035 population of 164,500. A new regional station was built in the City of Kapolei on donated land and became operational in 2001. Land has been offered for a substation in the proposed Ho'opili development.

The expected population growth and development of new communities and community facilities in 'Ewa will result in a need for additional emergency medical service facilities and response units. The State Department of Health has not identified how many new stand-alone emergency medical service facilities in 'Ewa will be needed to meet expected growth.

**TABLE 4.4 EXISTING AND PLANNED PUBLIC SAFETY FACILITIES
IN THE 'EWA DEVELOPMENT PLAN AREA**

Facilities	Site	Service Area	Service Date
Fire Stations			
'Ewa Beach ¹	'Ewa Beach	'Ewa by Gentry, Ocean Pointe, 'Ewa Beach, Iroquois Point	Existing
Makakilo	Makakilo	Makakilo, Ko Olina, Villages of Kapolei	Existing
Kapolei	Kapolei	Campbell Industrial Park, City of Kapolei, Kapolei Business Park	Existing
'Ewa Beach ²	Fort Weaver Road	'Ewa by Gentry, Ocean Pointe, 'Ewa Beach, Iroquois Point	2011
East Kapolei	DHHL East Kapolei	East Kapolei, Villages of Kapolei, UH West O'ahu, Tenney Village, Kalaeloa	2011
Kalaeloa	Old Federal Fire Station Site	Kalaeloa, 'Ewa, and Kapolei	N.D.
'Ewa Villages	Tenney Village	West Loch, 'Ewa Villages, East Kapolei	N.D.
Ko 'Olina	Ko Olina	Ko Olina Resort	N.D.
Makaīwa Hills	Makaīwa Hills	Makaīwa Hills	N.D.
Kalaeloa Tactical Training Facility	Kalaeloa (Former BPNAS site)	Island-wide	N.D.
Police Stations			
'Ewa Plains Regional Station	City of Kapolei	'Ewa Region	Existing
Ho'opili Substation	Ho'opili	East Kapolei, 'Ewa Beach	N.D.
Emergency Medical Services Facilities	DOH has not identified needed sites		
NOTES:			
¹ To be replaced with new station on Fort Weaver Road.			
² New.			
N.D. Not Determined.			

Population growth will also result in need for additional public emergency shelters. There is a state-wide shortage of shelters, compounded by the fact that around a third of the existing shelters need to be retrofitted if they are to withstand any hurricane strength winds, and few of the existing shelters are capable of withstanding a Category 3 hurricane like Hurricane 'Iwa. Civil defense analysts expect 35 percent of the population will seek public shelter in a disaster. Based on that standard, 'Ewa needed public shelter space for 29,000 residents in 2005, and will need space for 57,600 in 2035. Table 4.5 lists existing 'Ewa shelters and their capacity.

It makes sense to supplement the public shelters with shelters in private buildings since most of the population is not expected to seek a public shelter during a disaster. A State law provides immunity to private organizations which create hurricane resistant shelters that meet State standards. There are no State or City programs providing incentives or support for private organizations who create hurricane shelters or individuals who build hurricane-resistant "safe rooms" in their homes. However, by 2012 at the latest, the building code will require that all new homes either have a safe room or be equipped with hurricane resistant glass.

TABLE 4.5 EXISTING PUBLIC EMERGENCY SHELTERS IN 'EWA, 2009	
Shelter Location	Capacity
Barbers Point Elementary	385
Campbell High (S/P)	5,877
'Ewa Beach Elementary	1,966
'Ewa Elementary	2,689
'Ilima Intermediate (S/P)	2,629
Ka'imiloa Elementary	1,748
Kapolei Elementary (S)	1,255
Kapolei High (S)	511
Makakilo Elementary	2,088
Mauka Lani Elementary (S)	874
Pōhākea Elementary	1,165
TOTAL	21,187
NOTES:	
S Facility designated to serve as a Special Needs Shelter and General Population Shelter	
P Pet Friendly Shelter co-located with General Population Shelter (and, in some cases, Special Needs Shelter).	

4.8.1 GENERAL POLICIES

- Provide adequate staffing and facilities to ensure public safety.
- Approve new development only if staffing and facilities will be adequate to provide fire and police protection and emergency medical service when development is completed.
- Survey and retrofit, as appropriate, Department of Education and other public buildings to make up the shortfall in hurricane resistant shelters.
- Require new City buildings which are “critical facilities used for public assembly and able to perform as shelters” to be designed and built to withstand a Category 3 hurricane.
- Provide incentives for private organizations to create hurricane resistant shelter areas in their facilities and for homes to include hurricane resistant “safe rooms.”

4.9 OTHER COMMUNITY FACILITIES

Other existing and proposed community facilities shown on the Urban Land Use Map in Appendix A include hospitals, and colleges. Key facilities include the planned University of Hawai'i West O'ahu campus. Hawai'i Medical Center West is the major medical facility serving the 'Ewa region.

Location of new community facilities should comply with the following policies:

- **Colleges and Hospitals** - In most cases, locate colleges and hospitals in urban areas near transit nodes, commercial centers, or medium density residential areas.
- **Correctional Facilities** - In most cases, locate correctional facilities on industrial or agricultural lands. (However, a youth detention facility was appropriately located within the City of Kapolei as part of a relocated Family Court.) If such a facility is proposed for lands not planned for industrial or agricultural use, a City review and approval process that provides for public review, complete analysis, and policy approval should be used.