

February 28, 2008

City and County of Honolulu

The following information provides an overview of the infrastructure implications of the Refined Station Alternatives. Water, Sewer and Drainage implications for each station are discussed below.

**Introduction****Water**

- ◆ The Board of Water Supply (BWS) provides service to the project areas. The Board of Water Supply system contains three (3) components. These are source, storage and transmission.
- ◆ It is anticipated that the BWS will need to develop new sources to meet the source requirement and that TOD along with other development will be one of the primary reasons that BWS initiates its desalinization facility adjacent to the Campbell Business Park.
- ◆ The floor area ratio (FAR) projections for the TOD areas are far below that allowed by the current zoning for the area and TOD will not produce population growth beyond that previously used for utility master planning purposes.

**Sewer**

- ◆ The City and County of Honolulu Department of Environmental Services provides sewer service to the area. New connections to the wastewater system are processed by the City and County of Honolulu Department of Planning and Permitting-Wastewater Branch.
- ◆ As identified for water, the floor area ratio (FAR) projections for the TOD areas are far below that allowed by the current zoning for the area and TOD will not produce population growth beyond that used in the West Mamala Bay Facility Plan for utility master planning purposes.

**Leoku Station****Water**

- ◆ The existing land uses and zoning around the Leoku Station require pipe sizes suitable for fire flows up to 4,000 gpm. The Farrington Highway corridor contains pipe sizes that are capable of accommodating this flow requirement. Therefore, it is anticipated that backbone transmission system is generally adequate.

- ◆ However, at the Leoku Station area, once out of the Farrington Highway corridor, the local distribution lines are primary 6-inch and 8-inch and increasing distribution line sizes and/or parallel mains should be anticipated. The new minimum line size is anticipated to be 12-inch.
- ◆ Table 1 provides an estimate of increased water demands based on increased population related to TOD. The commercial density and housing increases reflect growth within a ½ mile radius of the station (includes only the designated “areas of change”) and are based on an overall FAR of 1.32. One of the infrastructure implications is that additional source and storage components must be provided. The Leoku Station additional source requirement is estimated to be 1.25 MGD and the additional storage requirement must match the maximum day flow (average daily flow x 1.5) of 1.9 MGD.
- ◆ It is anticipated that additional storage will be located at or near existing BWS reservoirs. The Leoku Station will generate an increased storage requirement of 1.9 MGD.
- ◆ The BWS assesses Water System Facility Charges (WSFC) for all new development requiring water service. The charges are assessed to allow the Board to develop new source, storage and transmission elements to serve new development. The increased water usage converted to equivalent multi-family dwelling units will generate approximately \$12.75 million in WSFC for replenishment of the BWS water system.

## **Sewer**

- ◆ Table 1 provides an estimate of increased wastewater demands based on increased population related to TOD. The commercial density and housing increases reflect growth within a ½ mile radius of the station (includes only the designated “areas of change”) and are based on an overall FAR of 1.32. The Leoku Station net increase in average daily wastewater generation is projected to be 0.68 MGD.
- ◆ The Leoku Station, while having a modest increase in flow, will most likely generate the need for relief gravity sewer from the center core of the ¼ mile radius to the Kunia Sewage Pumping Station. Upgrades to the Kunia Pumping Station are anticipated to be hardware modifications such as changing out of pumps to provide additional pumping capacity. The force main from the Kunia Pumping Station and gravity sewer leading to the downstream Waipahu Pumping Station appear to have sufficient capacity to serve the Leoku Station TOD needs.
- ◆ All sewage generated by the Leoku Station will be treated at the Honouliuli WWTP. The increased population will generate wastewater flows

approximately equal to 2,125 equivalent single family residences (ESDU) and generate \$11.1 million in Wastewater System Facility Charges (2008/09 rate) for wastewater system expansion.

## **Drainage**

- ◆ The Leoku Station is located in a “developed” land use area. All lands have essentially been touched by urban development. There are no significant issues of increased runoff aggravating downstream conditions. However, there may be some localized existing drainage problems that will need to be addressed during the TOD redevelopment process.
- ◆ The Leoku Station and surrounding areas are identified as being in Zone D of the Flood Insurance Rate Map (FIRM) system. Zone D is defined as areas in which flood hazards are undetermined, but possible. There are no FIRM requirements for development in Zone D. All development in a Zone D area would be subject to compliance with the Rules Relating to Storm Drainage Standards of the City and County of Honolulu.
- ◆ It is anticipated that the existing Canal between Leokane and Leoleo Streets could be redeveloped as a natural greenway. This would require additional width and intermediate benches to accommodate a variety of flows. The center most and deepest sections would be designed to carry smaller flows on a frequent basis and the over bank benches would be used primarily for recreational purposes but able to convey water from infrequent large intensity storms. The widening of the canal section will allow for lower velocities in the channel. The lower velocities will allow the sections to be less “hardened” and more aesthetically appealing.

## **Mokuola Station**

### **Water**

- ◆ The existing land uses and zoning around the Mokuola Station require pipe sizes suitable for fire flows up to 2,000 gpm. Larger distribution lines are located in Waipahu Street (16-inch), Managers Drive/Mokuola Street (20, 16 and 12-inch) and Waipahu Street (12-inch). However, there are numerous smaller 6-inch or smaller lines in the Mokuola Station area. Upgrading distribution lines to a minimum of 8-inch and/or 12-inch should be anticipated.
- ◆ Table 1 provides an estimate of increased water demands based on increased population related to TOD. The commercial density and housing increases reflect growth within a ½ mile radius of the station (includes only the designated “areas of change”) and are based on an overall FAR of 1.04. One of the infrastructure implications is that additional source and storage components must be provided. The Mokuola Station additional source requirement is estimated to be 0.50 MGD and the storage requirement must match the maximum day flow (average daily flow x 1.5) of 0.75 MGD.

- ◆ It is anticipated that additional storage will be located at or near existing BWS reservoirs. The Mokuola Station will generate an increased storage requirement of 0.75 MGD.
- ◆ The BWS assesses WSFC for all new development requiring water service. The charges are assessed to allow the Board to develop new source, storage and transmission elements to serve new development. The increased water usage converted to equivalent multi-family dwelling units will generate approximately \$12.75 million in WSFC for replenishment of the BWS water system.

## **Sewer**

- ◆ Table 1 provides an estimate of increased wastewater demands based on increased population related to TOD. The population increases reflect growth within a ½ mile radius of the station (includes only the designated “areas of change”) and are based on an overall FAR of 1.04. The Mokuola Station net increase in average daily wastewater generation is projected to be 0.34 MGD.
- ◆ The Mokuola Station will generate a modest increase in flow for the existing collection system. The gravity collection sewers in the Mokuola Station area are relatively good size (8, 12, 15, 24-inch) and can reasonably be expected to absorb the additional flows and transport the flow to the Waipahu Pumping Station.
- ◆ All sewage generated by the Mokuola Station will be treated at the Honouliuli WWTP. The increased population will generate wastewater flows approximately equal to 1,063 equivalent single family residences (ESDU) and generate \$5.5 million in Wastewater System Facility Charges (2008/09 rate) for wastewater system expansion.
- ◆ There are regional considerations that must be addressed with respect to the Waipahu Sewage Pumping Station. This sewage pumping station acts as a hub for all sewage flows entering the Honouliuli WWTP from as far away as Halawa Valley and Mililani/Waipio. The West Mamala Bay Facilities Plan area (Figure 2-11 attached) shows the Honouliuli WWTP service area stretching east to Halawa Valley. The Waipahu Pumping Station will be directly impacted by increased flow from the Leoku Station and the Mokuola Station. The City’s fixed guideway project includes two stations in the Pearl City area. The increased flow from these stations would also impact the Waipahu Pumping Station. Ultimate assessment of the Waipahu Pumping Station must be based on the impact of all TODs and other development in the Wastewater Facility Plan boundary area.

If the demands of the Leoku Station and Mokuola Station are duplicated at the two Pearl City TOD sites, there is a realistic possibility that major

renovation will be required at the Waipahu Pumping Station and an additional force main or replacement force main will be required to convey sewage from the pumping station to the Honouliuli WWTP.

## Drainage

- ◆ The Mokuola Station has significant drainage issues. The site is in zone AE (Floodway) of the Flood Insurance Rate Map (FIRM) system. The floodway must remain free of (new) encroachments since it actively conveys flood waters from the confluence of Waikele Stream, Kapakahi Stream and the Wailani Flood Control Channel. The combined carrying capacity of the three drainage ways (with Waikele Stream being the primary contributor) is inadequate for a 100-year storm event (1% annual occurrence) which may result in water spilling out of the defined channels and into the area defined as floodway.
- ◆ The City and County of Honolulu, through a separate contract, is evaluating the potential to revise the FIRM for the area to remove areas from the floodway and transfer it into shallow flooding zones (AO zones). The analysis to date has not been able to produce the desired result. The only meaningful method to remove the floodway within the ¼ mile radius appears to be the construction of a levee along the Waikele Stream corridor. (The City previously analyzed the levee [Park Engineering, 2004] but determined the cost [\$22 million] was excessive. TOD was not a part of the economic evaluation for the Park Engineering study).
- ◆ The levee option will most likely remove all of the Mokuola Station TOD area from the floodway and put it into areas outside the floodplain or at worst put the area into floodplain where fill is allowed. The levee option essentially contains the flow of Waikele Stream within the Waikele Stream channel and will not allow major spillage over its eastern bank into the TOD area. This levee option will greatly enhance TOD with respect to drainage issues. FIRM revision is dependent on the completion of detailed drainage studies, physical construction of the levee elements and the processing of a letter of map revision (LOMR) with the City and FEMA.
- ◆ New construction in the defined floodway can only be accomplished by obtaining a Flood Hazard Variance. The variance requires technical support which includes the preparation of a “No-Rise” Certification. The certification mandates that proposed improvements will not increase the flooding elevation. From a “big picture” perspective, new development in the floodway district will be highly restricted to the point where it may be unfeasible to provide the required technical back-up. In concept, all structures within the floodway will have to consider at-grade parking with habitable and commercial space above. The at-grade parking will be open air with vertical columns supporting the structure above.

- ◆ Renovation of existing structures in the floodway district can occur as long as the work does not exceed 50% of the current building value.

## **Infrastructure Implementation**

### **Water**

- ◆ BWS source, storage and major off-site regional transmission requirements for TOD projects will be paid for directly by individual projects by means of payment of the applicable portion of the Board's Water Service Facility Charges. The Board will in turn use fees to upgrade its facilities on a regional basis.
- ◆ Individual TOD projects will be required to include, as a part of project construction, localized water distribution and transmission system upgrades, as determined by the Board, when individual TOD projects are identified. These distribution system and transmission system upgrades will be primarily aimed at increasing pipe sizes serving the individual projects with connection(s) to the existing BWS system to provide the required fire flow.
- ◆ The Board does not anticipate undertaking any BWS sponsored pipe system improvement projects at the "local" level to upgrade fire protection in advance projects coming on-line.
- ◆ The Board plans to develop an integrated program to coordinate localized distribution system improvements once the TOD area and network of new streets moves past the "Alternatives" development stage.

### **Sewer**

- ◆ The Department of Environmental Services intends to identify, schedule and implement improvements that are considered "regional in nature". This is part of an ongoing process related to other factors including: 1) Project development in the area other than TOD, 2) Consent Decree requirements related to the Honouliuli WWTP and Collection System and 3) Stipulated Order provisions also related to the Honouliuli WWTP and Collection System. These types of improvements would include pump station upgrades, force main upgrades and major transmission system upgrades. Should there be a need to implement one of the regional improvements in advance of its schedule; individual developers would be afforded the opportunity at the developer's expense. The developer's Wastewater System Facility Charges (WSFC) would be credited to the expenditure.
- ◆ Localized sewer improvements would be the responsibility of the individual developers. These types of improvements would consist of smaller diameter relief sewers (8, 10, 12 and 15-inch typically) required to provide increased sewer capacity between the TOD areas and the two main pump stations

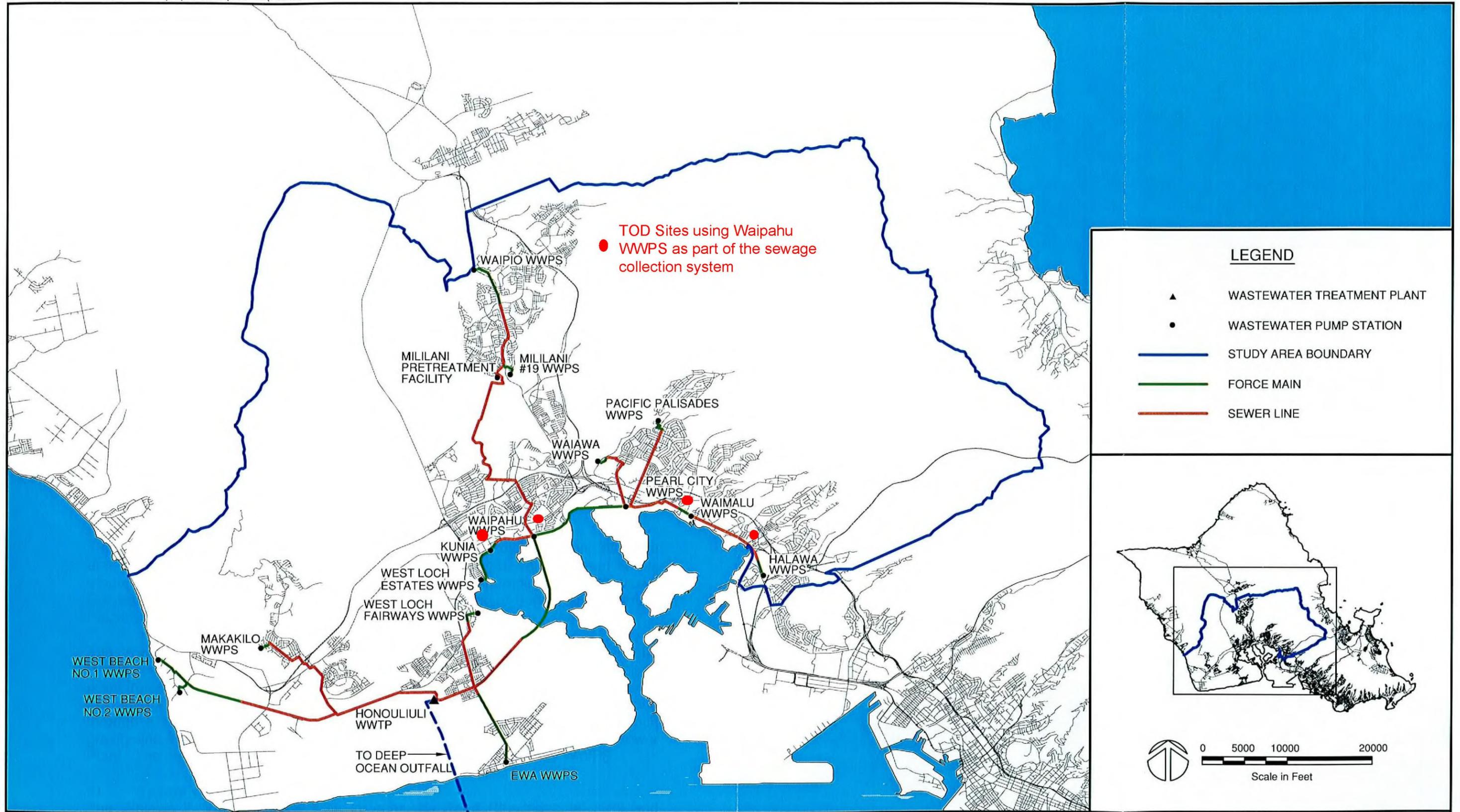
serving these areas. Developers that provide localized sewer improvements can have their (WSFC) credited toward the expenditure.

## **Drainage**

- ◆ Individual TOD projects will need to prepare as a part of their project development documents, a Drainage Master Plan. The plan will need to demonstrate compliance with the County's "Rules Relating to Storm Drainage Standards" with respect to hydraulic capacity of existing pipe systems in the area as well as storm water quality. Individual projects should anticipate the use of structural methods to comply with the storm water quality provisions of the Standards. Localized improvements, borne at the expense of the developer should be anticipated within both the Leoku and Mokuola TOD sites.
  
- ◆ The Mokuola TOD site requires substantial improvement to alleviate flooding causing a significant portion of the TOD site to be designated as "Floodway". It appears that channel and levy improvements bounding Waikele Stream are the only viable alternative. Preliminary cost projections for the channel and levy improvements are projected at \$22 million. The City has an independent consultant evaluating the alternatives and this analysis is on-going.

**TABLE 1  
WAIPAHU TOD  
WASTEWATER AND WATER DEMANDS**

<b>Wastewater</b>					
TOD Site	Commercial/Industrial (S.F.)	Dwelling Units	Wastewater Generation MGD <sup>1</sup> (Commercial/Industrial)	Wastewater Generation <sup>2</sup> (Dwelling Units)	Total Wastewater Generation (MGD)
<b>Leoku Station</b>					
Existing Uses	3,366,000	220	0.56	0.05	0.61
Proposed <sup>A</sup>	3,176,800	3,400	0.53	0.76	1.29
				<b>Net Increase</b>	<b>0.68</b>
<b>Mokuola Station</b>					
Existing Uses	970,000	540	0.16	0.12	0.28
Proposed <sup>B</sup>	1,530,800	1,658	0.26	0.37	0.63
				<b>Net Increase</b>	<b>0.34</b>
<b>Water</b>					
TOD Site	Commercial/Industrial (S.F.)	Dwelling Units	Water Requirement MGD <sup>3</sup> (Commercial/Industrial)	Water Requirement <sup>4</sup> (Dwelling Units)	Total Water Requirement (MGD)
<b>Leoku Station</b>					
Existing Uses	3,366,000	220	0.34	0.09	0.42
Proposed <sup>A</sup>	3,176,000	3,400	0.32	1.36	1.68
				<b>Net Increase</b>	<b>1.25</b>
<b>Mokuola Station</b>					
Existing Uses	970,000	540	0.10	0.22	0.31
Proposed <sup>B</sup>	1,530,800	1,658	0.15	0.66	0.82
				<b>Net Increase</b>	<b>0.50</b>
<sup>1</sup> Based on 1 person per 150 Sq. Ft. and 25 gpcd					
<sup>2</sup> Based on 2.8 persons per unit and 80 gpcd					
<sup>3</sup> Based on 100 gallons per 1,000 Sq. Ft.					
<sup>4</sup> Based on 400 gallons per Dwelling Unit					
<sup>A</sup> Based on 3,176,800 Sq. Ft. Commercial & Retail (40%) and 4,765,200 Sq. Ft./3,400 Dwelling Units (60%)					
<sup>B</sup> Based on 1,530,800 Sq. Ft. Commercial & Retail (40%) and 2,231,200 Sq. Ft./1,658 Dwelling Units (60%)					



Reprinted From  
Final Report  
West Mamala Bay  
Facilities Plan  
December 2001

WEST MAMALA BAY FACILITIES PLAN

MAJOR WASTEWATER LINES AND PUMP STATIONS  
FOR HONOLIULI WWTP

FIGURE  
2-11