F I N A L
S U P P L E M E N T A L E N V I R O N M E N T A L
A S S E S S M E N T

Proposed Wastewater Treatment System for Key Largo Park and Key Largo Trailer Village Key Largo Wastewater Treatment District, Monroe County, Florida

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In response to damages and losses from Hurricane Georges, Congress enacted Public Law 106-31, Emergency Supplemental Appropriations Act for Fiscal Year 1999, to fund long-term disaster recovery projects in Florida counties whose needs were unmet through primary disaster relief funds. Monroe County was included among the counties eligible for "Unmet Needs" funding and requested that wastewater management improvement projects be considered for this funding since many existing wastewater facilities in the county are not storm-resistant.

Since then, the Federal Emergency Management Agency (FEMA) has received a grant application from the Florida Keys Aqueduct Authority, prepared in coordination with Monroe County and the Key Largo Wastewater Treatment District (KLWTD), requesting Federal assistance to build a new wastewater treatment plant (WWTP) to service two communities, Key Largo Trailer Village and Key Largo Park, in Key Largo in the Upper Keys. FEMA prepared this draft Supplemental Environmental Assessment (SEA) to address the likely effects of implementing three alternatives proposed in Key Largo. The alternatives evaluated in this document include:

Alternative 1 – No Action Alternative

FEMA would not fund any wastewater treatment project within Key Largo. Alternate funding sources (such as other grants) would be needed to finance the large capital costs of constructing a wastewater treatment system to meet the Florida Statutory Treatment Standards by 2010. Until alternate funding is secured, environmental degradation would continue.

Alternative 2 – Centralized Wastewater Treatment Plant, Northern Site Alternative (Proposed)

The KLWTD would use FEMA funding to install a wastewater collection system and build a new community WWTP on the ocean side of U.S. Route 1 at about Mile Marker (MM) 100.5. The project site is about 2.6 acres of an approximately 21 acre parcel. Wastewater effluent would be collected through a vacuum pump system. Following tertiary treatment, wastewater effluent would be disposed through two shallow injection wells. The KLWTD would be responsible for facility construction, operation, and maintenance.

Alternative 3 – Centralized Wastewater Treatment Plant, Southern Site Alternative

The KLWTD would use FEMA funding to install a wastewater collection system, build a vacuum pump station (VPS) at MM 100.5, install a wastewater transmission system between the VPS and WWTP, and build a new community WWTP at MM 98. This project site is about 3 acres. Following tertiary treatment, wastewater effluent would be disposed through two shallow injection wells. The KLWTD would be responsible for facility construction, operation, and maintenance.

Alternatives 2 and 3

For both Alternative 2 and Alternative 3, potential project effects on topography, soils, and geology; wetlands and floodplains; hazardous materials and wastes; infrastructure; land use and planning, noise and visual resources within the project areas are expected to be minor.

Appropriate mitigation measures would reduce any potential adverse effects of the project alternatives on these resources. Effects on water resources and water quality, marine biological resources, and public health are anticipated to be beneficial. Effects on air quality and cultural resources would be negligible. Adverse socioeconomic effects would be mitigated with the use of FEMA grant funding, making the system capital costs associated with Alternatives 2 and 3 affordable to service recipients. Moreover, to further reduce adverse economic effects to low-income service recipients, an assistance program has been developed to ensure wastewater costs are not disproportionately high and adverse to this population.

Under Alternative 2, adverse effects on terrestrial biological resources and special status species from WWTP construction would be mitigated through conserving the parcel's unused 18.4 acres of "high-quality" hardwood hammock; tree transplanting plans; restoring 2.6 acres of hardwood hammock; and compliance with Florida Department of Environmental Protection Environmental Resource Permits, Monroe County Land Development regulations, and with the U.S. Fish and Wildlife Service Biological Opinion.

Under Alternative 3, effects on terrestrial biological resources are expected to be minor. Appropriate mitigation measures would reduce any potential adverse effects.

1.1 PROJECT AUTHORITY

In 1998, after Hurricane Georges, Congress enacted Public Law 106-31, Emergency Supplemental Appropriations Act for Fiscal Year 1999, to provide additional monies for long-term disaster recovery projects in the State of Florida. Congress allocated the funds to assist counties whose needs were not met through allocation of primary disaster relief funds. The Federal Emergency Management Agency (FEMA) earmarked this Unmet Needs money for the counties most impacted by Hurricane Georges, including Monroe County. FEMA, the State of Florida, and the impacted counties determined funding priorities.

Monroe County requested that wastewater management improvement projects be considered for disaster funding since many existing wastewater facilities in Monroe County are not storm-resistant, do not provide adequate wastewater treatment, and contribute to degraded water quality in the Keys. Since then, the Florida Keys Aqueduct Authority (FKAA), through the State of Florida Department of Community Affairs (DCA), has applied for FEMA funding assistance to build a wastewater treatment system that would service Key Largo Trailer Village (KLTV). It should be noted that although the FKAA initiated the funding request, the Key Largo Wastewater Treatment District (KLWTD) would implement the project, as it is now the wastewater authority for Key Largo. The wastewater project funding request is consistent with Monroe County's Sanitary Wastewater Master Plan (MCSWMP) (2000) recommendations for Key Largo wastewater service (refer to Chapter 7). Moreover, the FEMA-funded wastewater treatment plant (WWTP) would also provide service to Key Largo Park (KLP), whose wastewater collection system is being funded by the Florida Department of Environmental Protection (FDEP). The project is intended to improve wastewater treatment and ultimately water quality in the Florida Keys, and assist residents in meeting State-mandated water quality targets as set forth in the Florida Statutory Treatment Standards of 2010. Specifically, wastewater treatment systems must treat discharge to advanced wastewater treatment (AWT) or best available technology (BAT) standards. For facilities that treat over 100,000 gallons per day (gpd), the AWT standards are 5 mg/L Biological Oxygen Demand (BOD), 5 mg/L Total Suspended Solids (TSS), 3 mg/L Total Nitrogen (TN), 1 mg/L Total Phosphorus (TP); and for facilities treating less than 100,000 gpd the BAT standards are 10 mg/L, 10 mg/L, 10 mg/L, and 1 mg/L, respectively.

1.2 RELATED ENVIRONMENTAL DOCUMENTS

URS Group, Inc. (URS) prepared a Programmatic Environmental Assessment (PEA) for FEMA in accordance with the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations [CFR] 1500-1508), and FEMA regulations (44 CFR Part 10, Environmental Considerations). These laws and regulations require FEMA to take into account environmental considerations when funding any Federal actions. The PEA, finalized on December 23, 2002, provides a framework to address impacts associated with a range of wastewater treatment projects in the Florida Keys. PEA Section 1.7 (Water Quality Protection Measures at the Local, State, and Federal Levels) provides a more detailed discussion of water quality protection measures at Federal, State, and local levels.

This Supplemental Environmental Assessment (SEA) tiers from the PEA for Wastewater Management Improvements in the Florida Keys (URS, 2002a) and hereby incorporates the PEA by reference, in accordance with 40 CFR Part 1508.28.

1.3 PROJECT LOCATION

The project areas encompass the neighborhoods of KLTV and the KLP (the service area), portions of the U.S. Route 1 (US-1) right-of-way (ROW), the proposed wastewater treatment plant (WWTP) site at Mile Marker (MM) 100.5, and the alternate site at MM 98, which are all located in the central portion of Key Largo, in part of the Florida Keys chain known as the Upper Keys (Figure 1-1). US-1, the main thoroughfare in the Keys, bisects Key Largo into the ocean side and the bay side. Although artificial waterways have been constructed on both sides of the island, most of the land is on the ocean side (Figure 1-1). The project areas are located in Sections 33, 32, 28, 29, and 6; Township 61 South; and Range 39 East.

1.4 PURPOSE AND NEED

PEA Section 1.9 (Purpose and Need for Action) describes the purpose and need for action. In particular, the purpose of the KLWTD project is to reduce wastewater nutrient loading at selected Monroe County “hot spots,” thereby improving water quality. These “hot spots” are believed to contribute to water quality degradation.

As described in PEA Section 2.1 (Alternative Development Background), “hot spots” represent priority areas where the high concentration of people and poor existing wastewater treatment practices justify the installation of a more advanced wastewater treatment system within that area. In 2000, the MCSWMP ranked the KLTV as the second most critical “hot spot” in the Upper Keys, and the fourth most critical “hot spot” Keys-wide. KLP is ranked 15th in the Upper Keys and 27th Keys-wide (PEA Appendix C, Hot Spot Locations). The “hot spot” ranking is linked to the use of cesspools and septic systems as the primary wastewater treatment systems at KLP and KLTV.

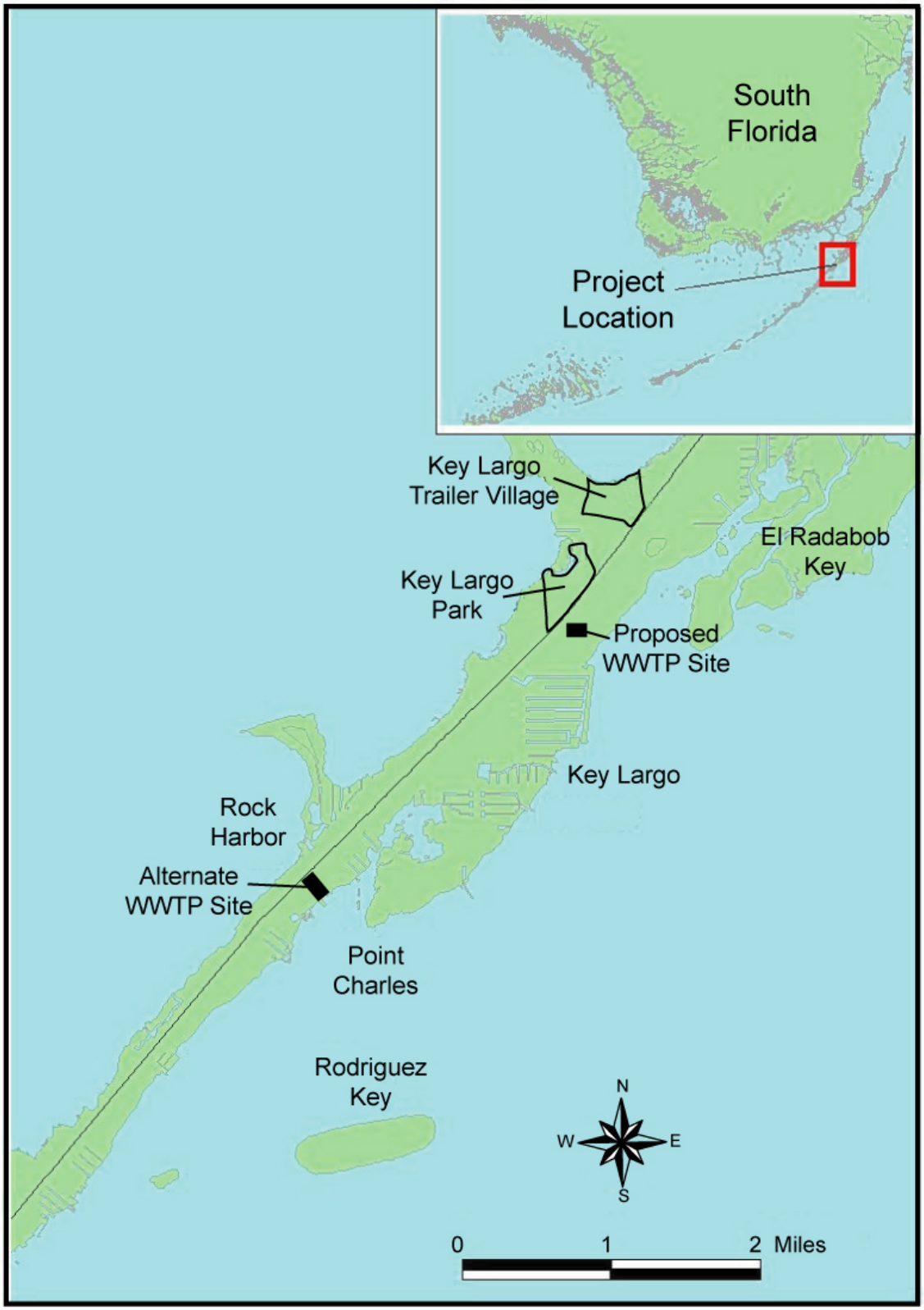


Figure 1-1. Project Vicinity Map

NEPA, CEQ regulations implementing NEPA (40 CFR Parts 1500 to 1508), and FEMA regulations for environmental compliance (44 CFR Part 10) direct FEMA to investigate and evaluate project alternatives. FEMA evaluated alternatives identified in the MCSWMP (2000) and in the PEA for the proposed Key Largo Wastewater Management System. In the following sections, FEMA considered and evaluated three alternatives in detail: No Action, New Wastewater Treatment Plant on Northern Site (MM 100.5), and New Wastewater Treatment Plant on Southern Site (MM 98). While FEMA funding would be applied only to the KLTV collection system and WWTP construction, this document considers the effects to the KLP service area as well because it will be served by the same WWTP. These are viewed as "connected actions" under NEPA, despite separate funding. FDEP will fund the KLP collection system.

2.1 ALTERNATIVE 1 – NO ACTION ALTERNATIVE

As discussed in PEA Section 2.3.1 (No Action Alternative), FEMA would not provide funding assistance to the KLWTD for the proposed action. In order to meet Florida Statutory Treatment Standards of 2010, KLWTD and service area residents and businesses would need to identify another funding source for upgrading currently inadequate wastewater treatment systems.

2.2 ALTERNATIVE 2 – NEW WASTEWATER TREATMENT PLANT ON NORTHERN SITE (PROPOSED)

PEA Section 2.3.3 (Centralized Wastewater Treatment Plant Alternative) describes Alternative 2. KLWTD would use FEMA funds to build a wastewater collection system, vacuum pump station (VPS), and wastewater treatment plant (WWTP) in Key Largo (Figure 2-1).

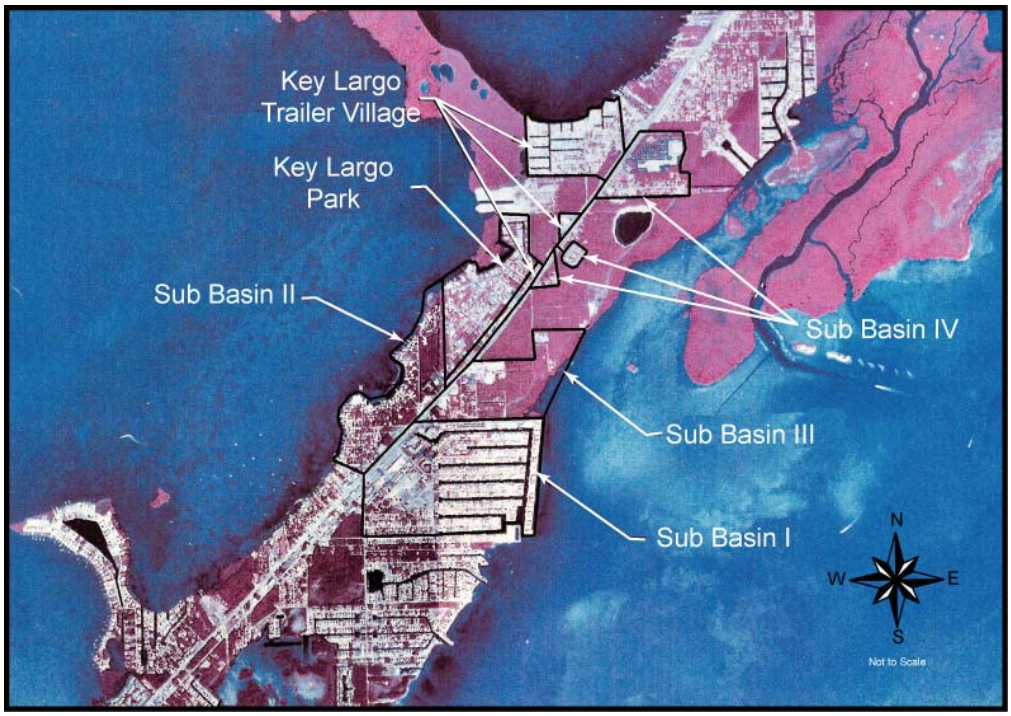


Figure 2-1. Key Largo Wastewater Service District (Boyle, 2003)

Table 2-1. Service Area Flow and EDU Estimates (Boyle, 2003)

Design Parameter	Units	Key Largo Park Flow Contribution[1]			Key Largo Trailer Village Flow Contribution					Total
					Residential		Commercial		Subtotal	
		Developed	Future	Subtotal	Developed	Future	Developed	Future		
No. of Equivalent Dwelling Units (EDUs)	N/A	226	57	283	445	5	61	56	567	850
Flow Contribution per EDU @ Maximum Month Average Daily Flow (MMADF)	gpd/EDU	232.5	232.5	N/A	201	201	232.5	232.5	N/A	216
MMADF/Annual Average Daily Flow (AADF) Factor	N/A	1.5	1.5	N/A	1.5	1.5	1.5	1.5	N/A	1.5
Flow Contribution per EDU @ AADF	gpd/EDU	155	155	N/A	134	134	155	155	N/A	144
MMADF	gpd	52,545	13,253	65,798	89,445	1,005	14,183	13,020	117,653	183,450
	gallons per minute (gpm)	36	9	46	62	1	10	9	63	127
AADF	gpd	35,030	8,835	43,865	59,630	670	9,455	8,680	78,435	122,300
	gpm	24	6	30	41	0	7	6	42	85
Peak Hour/AADF Peaking Factor for Peak Hour	N/A	3.75	3.75	N/A	3.75	3.75	3.75	3.75	N/A	3.75
Peak Hour without Equalization	gpd	131,363	33,131	164,000	223,613	2,513	35,456	32,550	226,000	459,000
	gpm	91	23	114	155	2	25	23	157	319
Flow Contribution per EDU @ Peak Hour	gpd	581	581	N/A	503	503	581	581	N/A	540

[1] Key Largo Park EDU count total includes 23 EDUs (20 developed + 3 future) from the Sunset Waterways subdivision.

The VPS and WWTP would be built at MM 100.5. KLWTD would design the proposed WWTP to meet the Florida Statutory Treatment Standards of 2010 for effluent disposal to shallow injection wells. The new system would serve about 850 EDUs comprising mobile homes, single family homes, multi-family homes, commercial buildings, and vacant lots (parcels) (Boyle, 2003).

KLWTD would implement the proposed Key Largo WWTP in two phases. Phase I would have a design capacity of about 122,000 gpd and would provide new service to residents and business owners in KLTV and KLP (Boyle, 2003). Wastewater flows for residences and businesses in the Phase I service area, obtained from the MCSWMP (Monroe County, 2000; Boyle, 2003), were used to estimate the number of equivalent dwelling units (EDUs), as summarized in Table 2-1. Based on estimates of the developed and future EDUs within the Phase I service area, the total estimated annual average daily flow (AADF) was calculated as 122,300 gpd. The flow from the developed EDUs is about 104,000 gpd or 85 percent of the plant's Phase I capacity. Consequently, about 18,000 gpd AADF, or 15 percent of the WWTP capacity, is available for future connections (Boyle, 2003). The plant capacity available for future connections is not strictly allocated to the KLTV and/or KLP service areas and could be available to other areas.

KLWTD designed the Phase I WWTP with the potential for expansion in modular increments to the Phase II capacity of 2.25 million gallons per day (MGD). Should funding become available, the Phase II WWTP would be capable of serving the entire Key Largo Wastewater Service District that extends from about MM 91 to MM 106.5 (Figure 2-1) (FKAA, 2002).

Build-out flow estimates for the entire Key Largo Wastewater Service District are:

EDUs	2,430 units
AADF	377,000 gpd
MMADF	565,000 gpd
Peak Hour Flow	1,413,750 gpd

About 467 cesspools and septic systems currently utilized by property owners in the KLTV would be removed, as would those in KLP (FKAA, 2002). Pursuant to the Florida Department of Health (DOH) requirements, each property owner would be responsible for decommissioning and abandoning his/her existing on-site system (including cesspits, septic systems and other non-compliant on-site systems).

2.2.1 Wastewater Collection System

KLWTD would place wastewater collection mains within the limits of public road rights-of-way (ROW) throughout the service area in front of the residences and businesses to be served (Figure 2-2). The streets within the KLTV subdivision consist of paved roads with platted ROW widths between 40 and 50 feet (FKAA, 2002). Most construction would be done on one side of the road, reducing traffic disruption. In some cases, KLWTD would place the wastewater collection mains on the opposite side of the ROW from an existing potable water main. Separate collection systems would serve KLTV and KLP. KLWTD would provide vacuum collection main stub-outs to the existing residential side streets on the bay side (west) of US-1 to facilitate the future extension of wastewater collection and transmission services to the KLP and Sunset Waterways subdivisions.

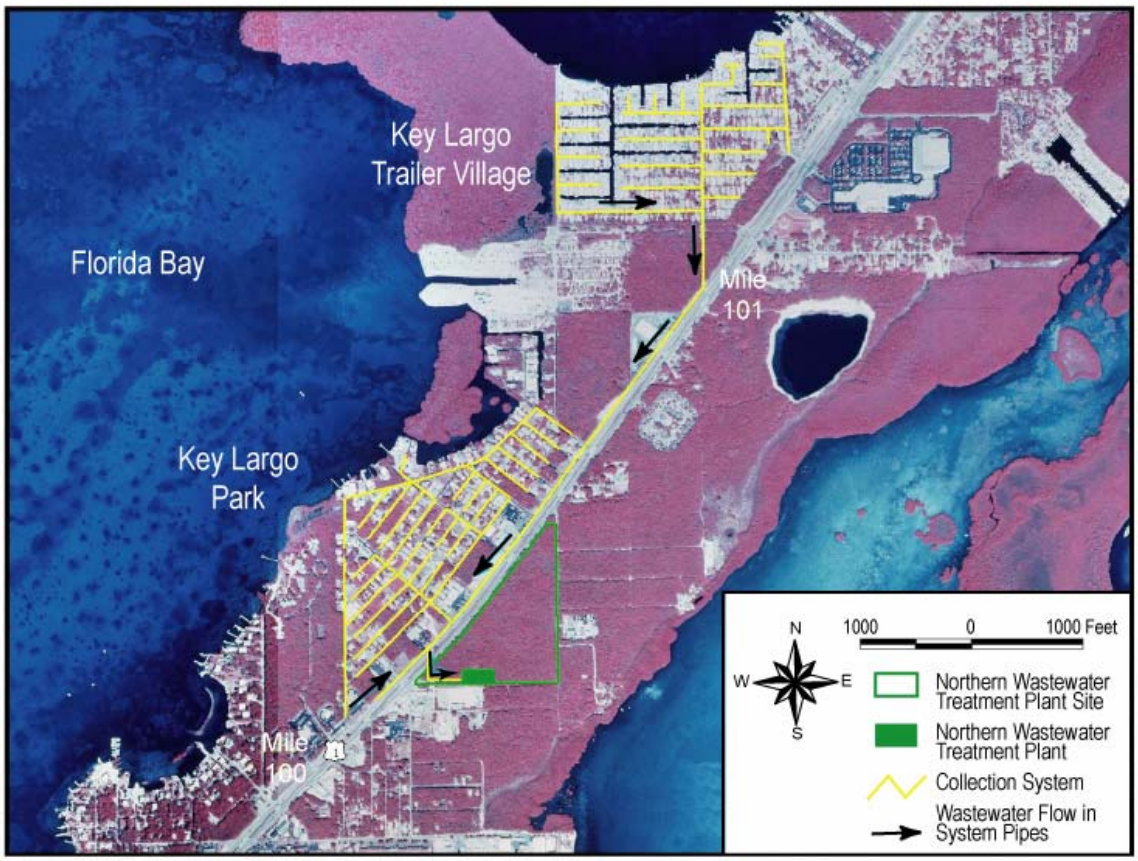


Figure 2-2. Alternative 2 Wastewater Treatment Plant (WWTP) Site Location Map

A transmission main about 4,800 feet long would convey wastewater from the KLTV to the WWTP. KLWTD would install the transmission main along the northern ROW of US-1 and would also serve existing commercial property along US-1. Service laterals consisting of polyvinyl chloride (PVC) pipe would be provided up to the ROW line (Figures 2-3a and b). Property owners would be responsible for constructing individual connections to the service laterals. Special plumbing fixtures or electrical connections would not be required at houses or mobile homes; existing fittings are adequate. KLWTD would excavate about 1,800 cubic feet of soil for the installation of vacuum sewer mains, vacuum pits, buffer tanks, and gravity service laterals. The majority of the excavated material would be used as backfill material for pipe and vacuum pit excavations. Excess excavated material would be used for foundations and grading at the treatment plant site.

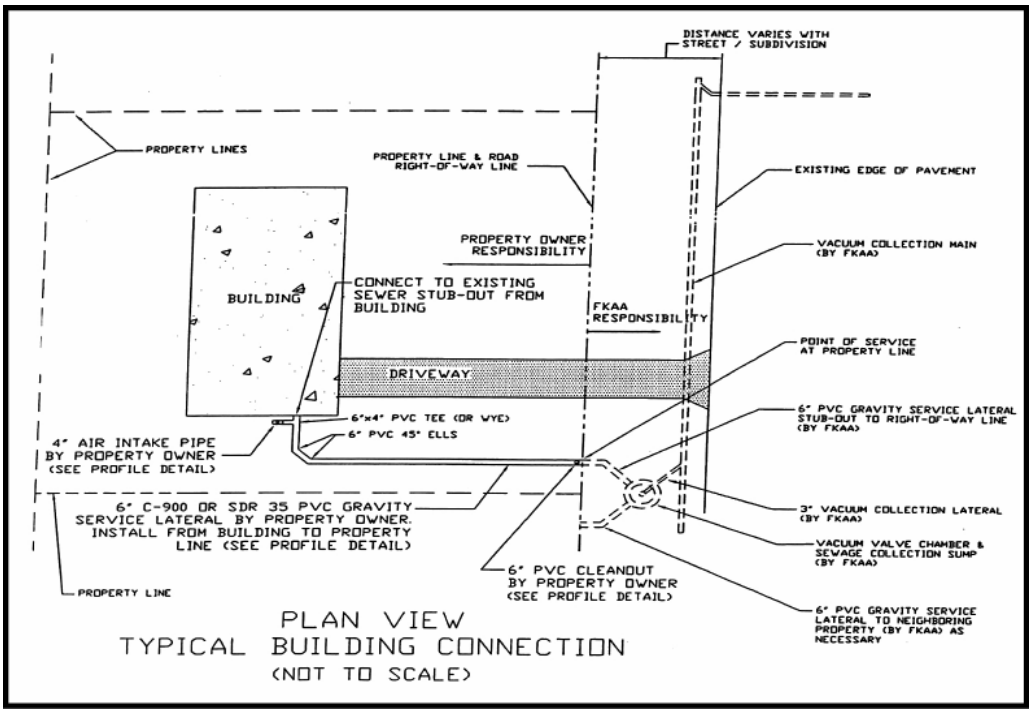


Figure 2-3a. Typical Building Connection (Plan View)

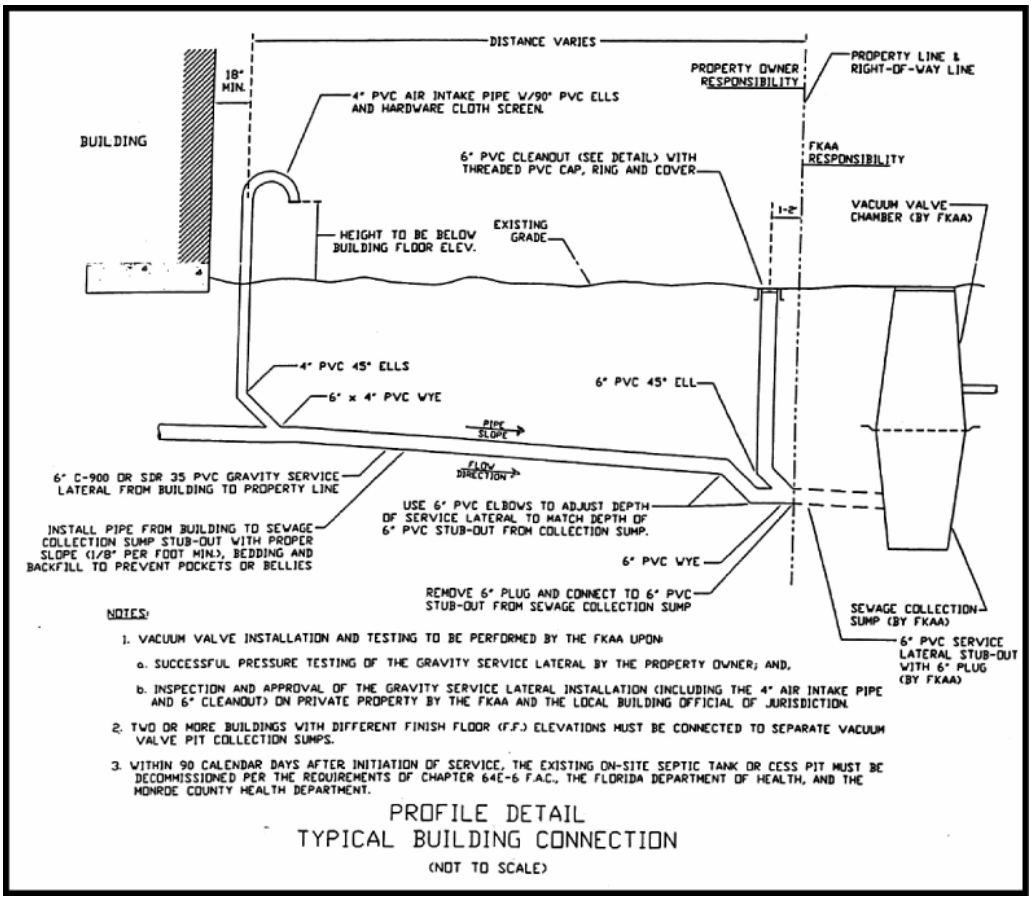


Figure 2-3b. Typical Building Connection (Profile Detail)

The proposed collection system would consist of a vacuum sewer system with gravity collection mains and/or service laterals, sewage holding sumps and vacuum valve pits, vacuum collection mains and a VPS building, as described in PEA Section 2.3.2.1.1 (Vacuum Pumping). Residential sewage would flow by gravity into a vacuum valve pit, the lower portion of which is a fiberglass holding sump and the upper portion of which includes a vacuum valve. Two or more homes would be serviced by one vacuum valve pit. When wastewater in the holding sump rises to a preset level, a sensor extending from the valve chamber into the holding sump detects the liquid level in the sump, and the vacuum interface valve is pneumatically opened. Differential air pressure propels the sewage from the sump through the valve and into 3-inch or larger PVC vacuum wastewater collection mains.

KLWTD would build vacuum mains about 3 feet below existing surface elevation throughout the service area. The system would transport wastewater from the collection mains to the wastewater collection tank at the VPS by the introduction of air into the collection main from successive open/close cycles of the vacuum valves in the system.

A VPS, located within the treatment plant site, would generate the negative pressure necessary for the vacuum collection mains. The station would draw raw sewage through the collection mains and pump it to the treatment plant. The station would be built as a slab-on-grade building, between 1,000 to 3,000 square feet in area, and would have two 430-cubic feet per minute (cfm) vacuum pumps, two 320-gpm discharge pumps, a 6,300-gallon collection tank, and an emergency generator. Discharge pumps connected to the vacuum collection tank would transfer sewage to the treatment plant. The vacuum pumps, operating at about 15 horsepower, could be increased to 75 horsepower as total head conditions increase in the transmission force main due to flows from future wastewater projects in the Key Largo Wastewater Service District. A separate concrete pad external to the station would accommodate odor control equipment (either a vapor phase activated carbon filter or a biological filter) for the treatment of air discharged from the collection tank by the VPS blowers. Initially the station would have capacity for the Phase I service area. Additional equipment (vacuum and discharge pumps) may be added in the future to expand service to the entire Key Largo Wastewater Service District.

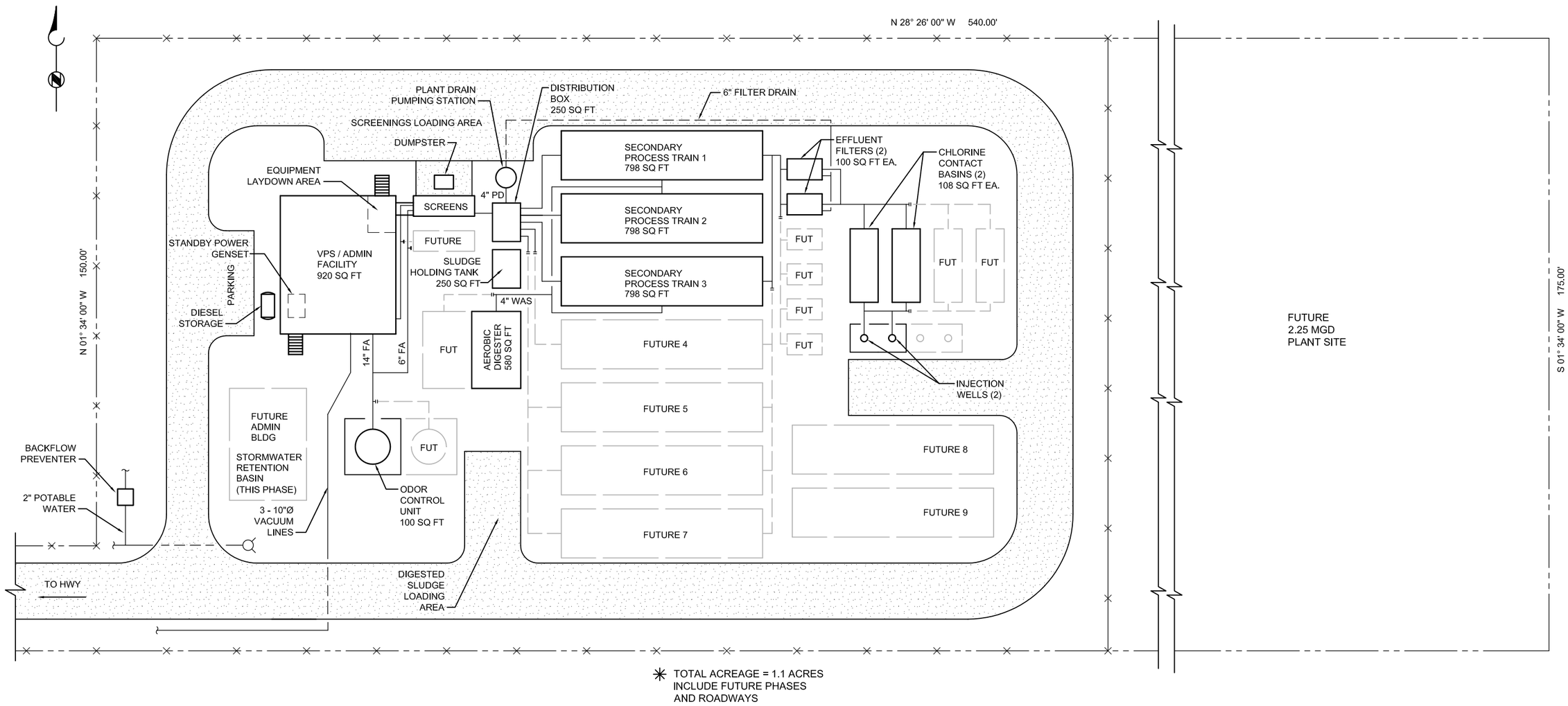
2.2.2 Wastewater Treatment Plant

KLWTD would build the WWTP on currently undeveloped Monroe County lands, on the ocean side of Key Largo at MM 100.5 (Figures 2-2 and 2-4). The proposed plant site is a 1,200-foot by 1,600-foot by 2,000-foot, triangular, 21-acre open space containing mostly high-quality hardwood hammock habitat. KLWTD would build the WWTP on about 2.6 acres, in a roughly L-shaped configuration. The remaining 18.4 acres would remain undeveloped with conservation deed restrictions. Although the site has yet to be identified, a separate 2.6 acres would be rehabilitated and restored to compensate for the WWTP construction impacts on the MM 100.5 parcel. The northwestern property boundary borders US-1, and the southern property boundary is adjacent to an existing FKAA facility and undeveloped lands. Private residences are about 350 feet west of the site. The Florida Straits are the closest water body to the site, about 1,500 feet east. Florida Bay is about 2,500 feet west of the site (FKAA, 2002).

Figure 2-4. Alternative 2 WWTP Site

The WWTP would provide primary treatment, biological treatment, solids removal, nitrogen and phosphorus removal, filtration, effluent disinfection and disposal to shallow injection wells (Figure 2-5). Effluent discharged would meet the 2010 Florida Statutory Treatment Standards for AWT of 5 mg/L BOD, 5 mg/L TSS, 3 mg/L TN, and 1 mg/L TP. An in-line magnetic flow meter would measure, record, and total the amount of raw sewage flow from the pump station into the WWTP. Influent wastewater screening (either manual or automatic) would remove large particulate matter prior to entering WWTP. KLWTD would collect pretreatment screenings in a collection hopper or trash receptacle for collection and hauling to an FDEP-permitted sanitary landfill facility for disposal (FKAA, 2002). If necessary, alkalinity of the influent wastewater would be buffered using sodium hydroxide. The buffering process would use all available sodium hydroxide; the system would not discharge excess sodium hydroxide to the environment. The sodium hydroxide would immediately dissolve and be consumed and would no longer be an active compound in the environment (Garcia, Pers. Comm., 2003). Components of the sodium hydroxide feed system, if needed, would include storage drums, metering pumps, small diameter PVC piping and valves, and a small containment area with a concrete slab and curb, electrical power, and controls (FKAA, 2002).

The WWTP would likely treat wastewater using the sequencing batch reactor with aluminum sulfate (alum) addition and conventional filters, or the upflow sludge blanket filter process with alum addition and conventional filters. Other possible methods of treatment include the modified Ludzak-Ettinger process, the Bardenpho process, and the immersed membrane bioreactor. The WWTP would use two or three parallel process trains, each with equal-sized biological reactor systems, so that if one system were out of service, the remaining train(s) would be capable of treating the system design flow (FKAA, 2002).



✳ TOTAL ACREAGE = 1.1 ACRES INCLUDE FUTURE PHASES AND ROADWAYS

SITE PLAN

SCALE: 1"=30'

CLIENT	FEMA				TITLE PROPOSED KEY LARGO WWTP SITE PRELIMINARY DRAWINGS
PROJ	KEY LARGO SEA				
REVISION NO		DES BY	KC		URS
SCALE	AS SHOWN	DR BY	DK	11-17-03	PROJ NO
FILE	FIG 2-5_CADDrev.dwg	CHK BY	SC		FIGURE 2-5

Additional treatment would include the addition of metal salts, such as alum, sodium aluminate, ferric chloride, ferrous chloride, ferric sulfate, or ferrous sulfate to reduce the total phosphorus of the wastewater to 1 mg/L. The alum would coagulate excess phosphorus and would be disposed of with the decanted sludge (Garcia, Pers. Comm., 2003). KLWTD would dispose of sludge at landfills or apply it to designated lands in compliance with local, State, and Federal laws. Components of a liquid metal salt feed system would include storage drums, metering pumps, small diameter PVC piping and valves, a containment area with a concrete slab and curb, electrical power, and controls. The system may also need filtration to produce effluent with TSS of not more than 5 mg/L, remove soluble effluent phosphorus concentrations in excess of 1 mg/L, and remove unsettled phosphorus precipitate discharged from the settling tank. The system would need two automatic backwashing filter units. KLWTD would size the units such that, with one filter out of service, the remaining unit would have sufficient capacity to receive flow equal to not less than 75 percent of the design capacity of the treatment plant (FKAA, 2002).

Effluent disinfection would occur in a disinfection contact tank using one of three methods: calcium hypochlorite tablets or briquettes, commercial grade or on-site generated sodium hypochlorite, or ultraviolet radiation. The system would dissolve calcium hypochlorite, and sodium hypochlorite dissolved in the effluent stream to render potential biological pathogens harmless. The fate of this material would be in the form of dissolved hypochlorite, sodium, and calcium ions in the effluent stream. Ultraviolet irradiation, a passive disinfection treatment process, does not add materials to the effluent. The system would maintain a minimum concentration of 0.5 mg/L total chlorine residual after 15 minutes of contact time at peak hourly flow. In recent years, ultraviolet irradiation has become the preferred method of disinfection due to the hazards associated with the handling and storage of chlorine (Weiler Engineering, 2003). The system would dispose of effluent by gravity flow into two 8-inch-diameter shallow disposal wells, cased and grouted to 60 feet below land surface (bls), with a gravel-packed open hole section from 60 feet to 90 feet bls. Shallow wells would have a capacity of 400 gpm each. KLWTD would also build one 3-inch groundwater monitoring well with a 10-foot bls cased depth and a 30-foot bls total depth. The system would direct recycle flows, including filter backwash and digester decant, back to the head of the treatment plant for processing (FKAA, 2002).

Stabilization of residual bio-solids would occur via the aerobic digestion process. An aeration system in the aerobic digester would mix and aerate the residual bio-solids. Residual bio-solids would return to the plant for treatment. A draw-off pipe located near the base of the tank would remove settled bio-solids and sludge from the digester, and the bio-solids and sludge would be loaded into tanker trucks for disposal. KLWTD would haul the bio-solids and sludge to one of three Monroe County Solid Waste Transfer Stations. The waste would subsequently be trucked from the Transfer Station to the Miami-Dade Water and Sewer Department South District WWTP, in Florida City. KLWTD would enter into an agreement with the accepting municipality prior to WWTP start-up (Shimokubo, Pers. Comm., 2003). Based on the estimated volume of excess bio-solids generated by the wastewater treatment process and a maximum thickened sludge concentration of 2.0 percent in the aerobic digester, sludge hauling is estimated to be required once per month using a 5,000-gallon capacity tanker truck (FKAA, 2002).

The specific solids handling system for the WWTP has not yet been determined. However, evaluation and cost comparison for solids handling systems and disposal alternatives typically

favor belt filter press dewatering, Class B lime stabilization, and truck hauling of cake to land application sites as the most favorable treatment and disposal method. Lime stabilization would occur at facilities with capacities less than 0.5 MGD as a batch process using bagged lime. Facilities with capacities greater than 0.5 MGD would integrate automatic lime storage and feed systems (Weiler Engineering, 2003).

In addition to the new treatment plant, other site design elements would include parking and paved access roads, as well as storage space for maintenance equipment, treatment chemicals, and other operations materials. KLWTD would floodproof or elevate the finished floor elevation of buildings subject to occupancy, as well as structures containing electrical equipment or process equipment. KLWTD would operate the facility on a permanent basis and would automate the system based on pre-set vacuum and collection tank levels. The facility would have station controls that are resistant to fire, wind, and flood (FKAA, 2002).

Because the proposed WWTP and service areas are located in the 100-year floodplain, the design provisions of the Monroe County Floodplain Ordinance would apply. Furthermore, because of Federal funding, per Executive Order 11988 (Floodplain Management), as implemented in FEMA's regulations at 44 CFR Part 9, wastewater treatment facilities are considered critical facilities and therefore subject to more stringent flood protection requirements. Specifically, KLWTD would floodproof the WWTP and its critical operating components to the 500-year flood, as outlined at 44 CFR Part 9.11.

KLWTD would construct the WWTP, including sewer line placement, in about 12 months. Construction equipment would likely include a backhoe, trenching machine, bulldozer, crane, pile driver, drilling rig, front-end loader, street sweeper, boring machine, and paving machine. Construction would also require trucks to transport equipment and materials to and from the project sites. The proposed site would also have an area that would be used as a temporary staging area for construction equipment and building materials. The lifespan of the treatment plant would be between 30 and 50 years (FKAA, 2002).

2.3 ALTERNATIVE 3 – NEW WASTEWATER TREATMENT PLANT ON SOUTHERN SITE

Alternative 3 is described in PEA Section 2.3.2 (Centralized Wastewater Treatment Plant Alternative). KLWTD would apply FEMA funding to build a VPS at MM 100.5, and a wastewater transmission system (WTS) extending from the VPS to a new community WWTP at MM 98.0 (Figure 2-6).

The basis of design for this alternative is similar to that used for Alternative 2. The total estimated AADF for the Phase I service area would be 122,300 gpd, with an ultimate plant capacity of 2.25 MGD. As in Alternative 2, on-site septic systems currently utilized by property owners in KLTV and KLP would be removed. Pursuant to the Florida DOH requirements, each property owner would be responsible for decommissioning and abandoning his/her existing on-site septic systems (including cesspits, septic systems and other non-compliant on-site systems) (FKAA, 2003).

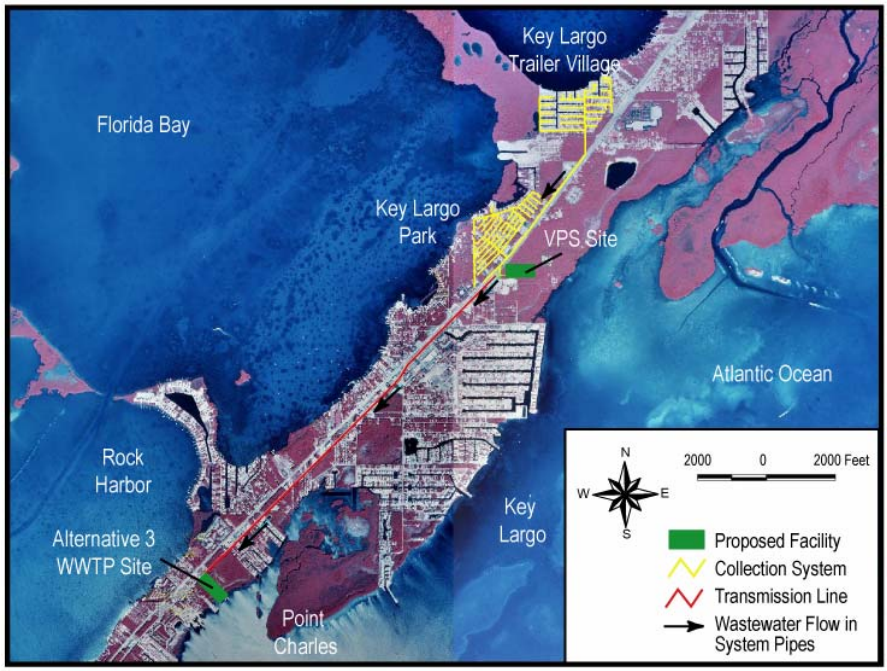


Figure 2-6. Alternative 3 WWTP Site Location Map

Construction of the WWTP, including sewer line replacement, would take about 12 months. Construction equipment would likely include a backhoe, trenching machine, bulldozer, crane, pile driver, drilling rig, front-end loader, and street sweeper. Trucks would also be used to transport equipment and materials to and from work sites. The lifespan of the treatment plant would be between 30 and 50 years (FKAA, 2002).

2.3.1 Wastewater Collection System

The collection system would be similar to the one described in Section 2.2.1. Separate collection systems would serve the KLTV and KLP areas. (Figure 2-6). As in Alternative 2, a force main of about 4,800 linear feet would convey wastewater from the KLTV to the pump station. KLWTD would locate the pump station at the proposed Alternative 2 treatment plant site, as described further in Section 2.2.2 of this document. KLWTD would provide service laterals, for connection to the collection system by residents, up to the property ROW line (Figures 2-3a and b). As in Alternative 2, connection to the collection system would be the responsibility of the property owner. The wastewater collection system would not require special plumbing fixtures or electrical connections because existing fittings are adequate.

2.3.2 Vacuum Pump Station

KLWTD would locate the VPS in the southwest corner of the WWTP site as described in Alternative 2 (Section 2.2.1; Figure 2-6). Site design elements would include the new pump station, influent vacuum mains, and discharge yard piping, site access, parking, and landscaping. The building size would be about 500 square feet. Equipment housed in the VPS would include two 430-cfm vacuum pumps, two 320-gpm discharge pumps, a 6,300-gallon collection tank, and an emergency generator (Figure 2-7). Vacuum blowers would create a vacuum of about 16 to 20

inches of mercury or 0.53 to 0.67 atmospheres, capable of extracting wastewater from the vacuum valve pits through the collection mains into the tank. The tank would provide adequate storage to allow the sewage pumps to operate. Vacuum pumps, operating at about 15 horsepower, would be capable of pumping about a 320-gpm peak hour wastewater flow rate, with one pump operational at peak hour flow and the second pump serving as a backup. The vacuum pumps could be increased to 75 horsepower as total head conditions increase in the transmission force main due to flows from future wastewater projects in the Key Largo Wastewater Service District.

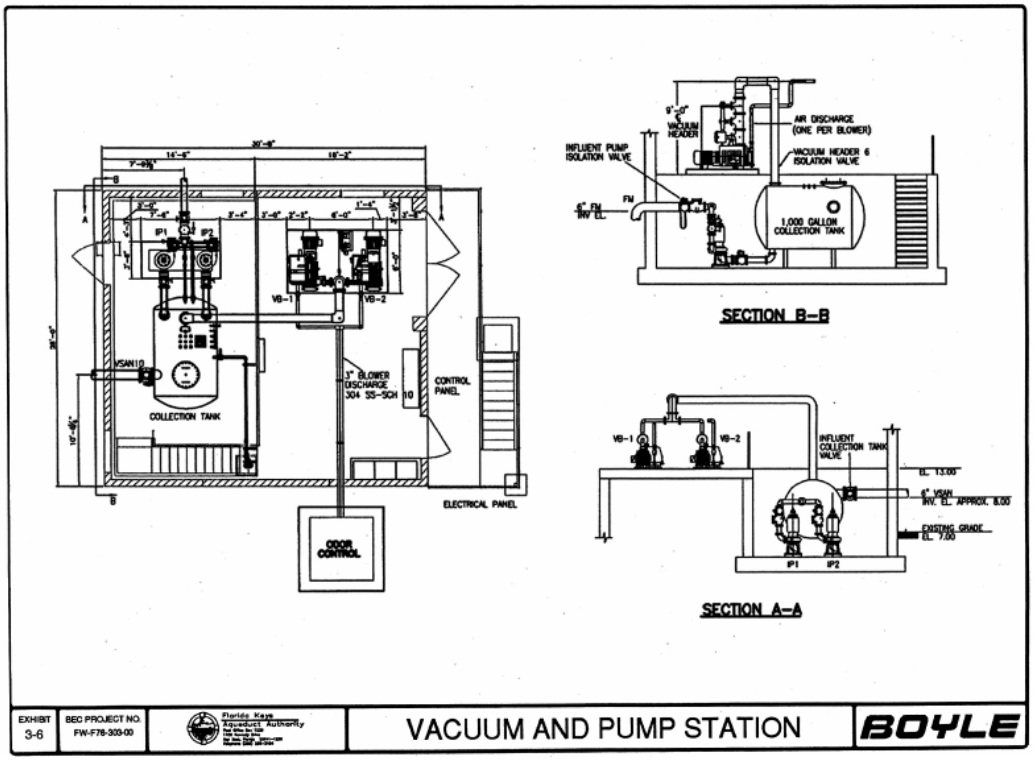


Figure 2-7. Vacuum Pump Station Preliminary Drawings

Wastewater discharge pumps would direct flow accumulated in the vacuum collection tank to the force main transmission system and ultimately to the new WWTP at MM 98.0. Each pump would be capable of about a 320-gpm peak hour wastewater flow. The VPS would utilize submersible pumps since they would be susceptible to inundation. To minimize odors, air discharged from the blower exhaust at the VPS would run through a filter such as an in-ground wood chip bed or packaged iron filings bed before emission. A separate concrete pad external to the station would accommodate odor control equipment for the treatment of air discharged from the collection tank by the VPS blowers. Initially the station would have the capacity for the Phase I service area; additional equipment (vacuum and discharge pumps) may be added in the future to expand service to the entire Key Largo Wastewater Service District.

The building that would permanently house the VPS would consist of a fixed slab-on-grade building. KLWTD would floodproof or elevate the finished floor elevation of buildings subject to occupancy, as well as structures containing electrical equipment or process equipment to provide protection to the 500-year flood. KLWTD would operate the facility on a permanent

basis and would automate the system based on pre-set vacuum and collection tank levels. The facility would have station controls that are resistant to fire, wind, and flood (FKAA, 2002).

2.3.3 Wastewater Transmission System

The transmission main would begin at the pump station and run along US-1 to the new WWTP at MM 98.0 (Figure 2-6). The WTS would require about 13,200 linear feet of transmission force main, wastewater pumps, 8-inch force mains, transmission main valving, and appurtenances. Installation of the force main would require excavation of about 158,400 cubic feet of soil. The force main would be located a minimum of 5 feet from the shoulder of the roadway on the southern side of US-1. KLWTD would maintain a minimum separation of 10 feet between the wastewater force main and potable water mains per FDEP regulations, and clearance from other utilities or structures of at least 3 feet would be maintained to avoid interference during construction or maintenance. The force main would have isolation valves (plug valves) placed about 1,000 to 1,500 feet apart for maintenance and troubleshooting. KLWTD would install air release and vacuum valves at high points in the line and downstream of large elevation differences, as needed.

Force main routing is expected to be routine (at least 5 feet from the shoulder and consistent line and grade); however, the US-1 corridor is well developed, and most utilities are routed along this corridor either underground or aboveground on poles. Where necessary, conflicts with existing utilities and structures would be avoided by deflecting the pipeline route. Deflections and adjustments would require additional pipeline fittings, conflict structures, and use of US-1 which would include additional traffic control and roadway restoration. Approvals for working within the US-1 ROW would be obtained from the Florida Department of Transportation. Pipeline construction would follow the ROW of US-1 between MM 100.5 and MM 98. Pipelines would be installed pursuant to typical underground utility installation that includes well-bedded high-grade PVC pipe with at least 36 inches of properly compacted select fill.

2.3.4 Wastewater Treatment Plant Southern Site

Assuming successful acquisition, the wastewater treatment plant would be constructed on currently developed land on the ocean side of Key Largo at MM 98.0 (Figure 2-8). The proposed plant site is about 3.8 acres, about 200 feet wide by 900 feet long, and is cleared of native vegetation. The site has been developed for boat and vehicle storage and miscellaneous usage. The western property boundary is along US-1; the northern and southern property boundaries border on undeveloped hardwood hammock habitat. The closest private residence is located about 100 feet west of the site. The closest water body to the site is the Straits of Florida, immediately to the east. Florida Bay is about 1,350 feet west of the site.

The basis of design and activities for building the alternate WWTP would be the same as those detailed for the northern WWTP site (Section 2.2.2).

Figure 2-8. Alternative 3 WWTP Site

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER CONSIDERATION

Other technology alternatives were considered but eliminated from further consideration in PEA Section 2.4 (Alternatives Considered but Dismissed). In 2000, Monroe County evaluated a total of 15 sites on Key Largo for the WWTP and VPS and determined that the proposed site (MM 100.5) was most viable, with the MM 98 site as an alternate. Other site options were eliminated from consideration due to market availability issues as described in PEA Section 2.4 (Alternatives Considered but Dismissed).

This section describes environmental consequences of the No Action Alternative and the two action alternatives, and details the potential effects on the project areas' physical, natural, cultural, and socioeconomic resources. Discussion in this document includes direct, indirect, and cumulative effects.

3.1 TOPOGRAPHY, SOILS, AND GEOLOGY

3.1.1 Topography

Affected Environment

The existing environment is similar to that described in PEA Section 3.1.1.1 (Topography; Affected Environment). The highest elevations in the Upper Keys are about 16 to 18 feet above mean sea level (amsl) National Geodetic Vertical Datum (NGVD). Elevation in the service areas is about 3 to 4 feet amsl. The ground elevation is generally flat with a slight increase near US-1 (FKAA, 2002). The WWTP sites are relatively flat with little slope.

Environmental Consequences

Under the No Action Alternative, KLWTD would not receive FEMA funds for wastewater management. KLTV and KLP residents would still need to comply with Florida Statutory Treatment Standards of 2010. It is anticipated that once funding is secured, effects on topography would be similar to those under Alternatives 2 and 3.

Topographic effects of Alternatives 2 and 3 would be limited to temporary surface disturbances during the wastewater collection and transmission system construction. The Alternative 2 site would require site clearing, grubbing, and a possible minor increase in elevation to achieve the final building grade. Topographic effects as a result of hardwood hammock restoration work on the 2.6 acre habitat rehabilitation site would also be surficial. The Alternative 3 site may also require placement of clean suitable fill to achieve the final building grade.

Grading, including stormwater management collection, transmission, and retention requirements, would permanently change the surface topographic elevation of the sites, but this impact is minor because it would not significantly alter the existing flat surface topography of Key Largo.

3.1.2 Soils

Affected Environment

The existing soil conditions are similar to those described in PEA Section 3.1.2.1 (Soils; Affected Environment). Per the Farmland Protection Policy Act, there are no prime farmland soils on Key Largo. The project sites' soil type is the Pennekamp gravelly muck (Figure 3-1). Pennekamp Gravelly muck is a well-drained soil found on tropical hammocks in the Upper Keys. About 10 percent of the surface of this soil is covered with stones that are predominantly 10 to 20 inches in diameter. The seasonal high water table is at a depth of about 3.5 to 5.0 feet and the soils have a moderately rapid permeability (USDA, 1995). This soil type supports the growth of native vegetation.

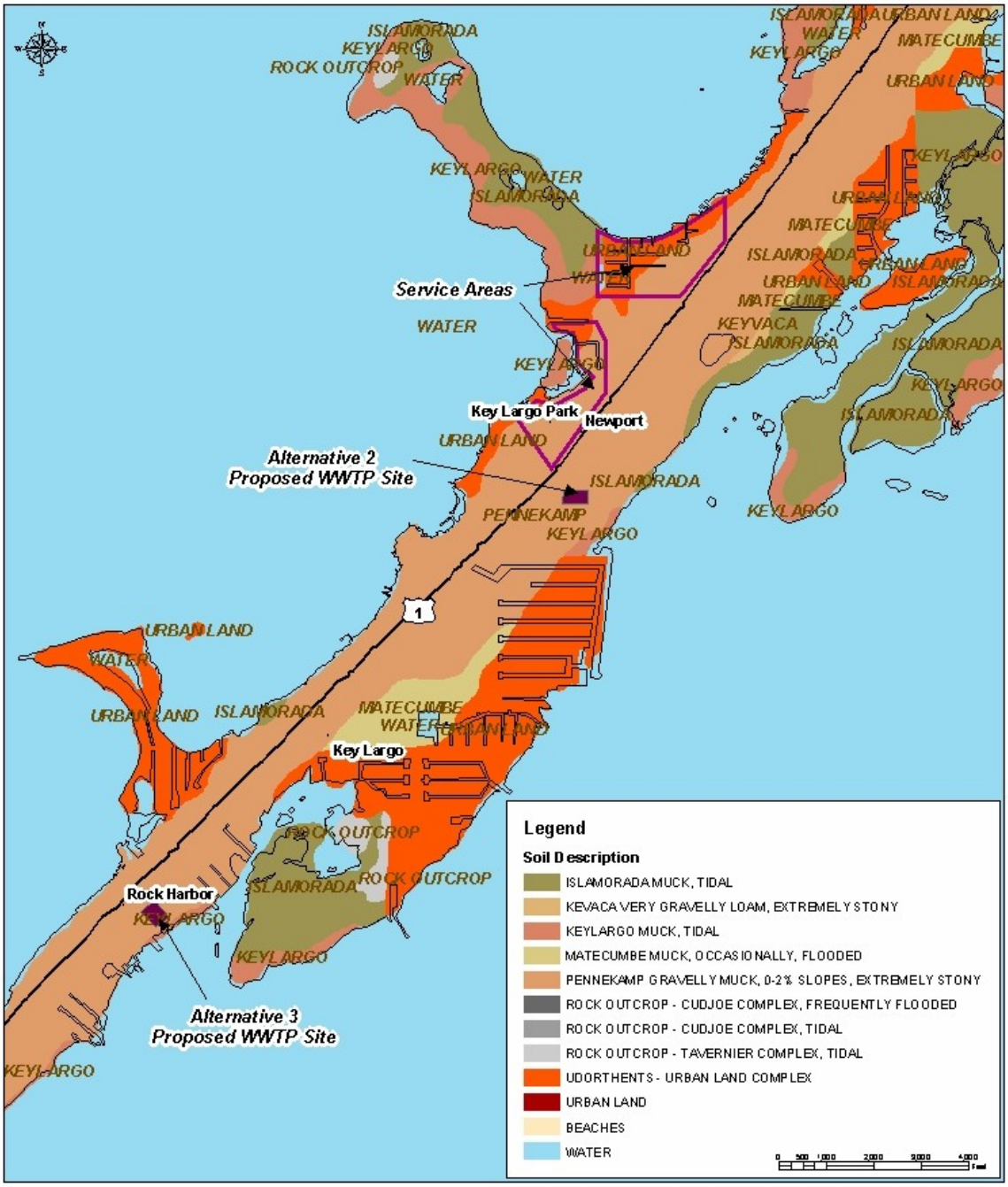


Figure 3-1. Project Area Soils (USDA, 1995)

Another soil type in the project areas is the Udorthents-Urban Land Complex, which dominates the KLTV project area and coastal portions of KLP. It is moderately well drained, consisting mostly of crushed oolitic limestone or coral rock. Udorthents are generally found in constructed upland areas next to water bodies throughout the Keys (USDA, 1995). Houses and other urban structures cover most areas with this soil type.

Environmental Consequences

Under the No Action Alternative, KLWTD would not receive FEMA funds for wastewater management. KLTV and KLP residents would still need to comply with Florida Statutory Treatment Standards of 2010. It is anticipated that once funding is secured, effects on soils would be similar to those under Alternatives 2 and 3.

Under both Alternatives 2 and 3, construction would disturb soils. KLWTD would use clean suitable fill to achieve the final elevation at the proposed Alternative 2 WWTP site. Fill would consist of fine sand, free of rubble, organics, clay, debris, and any other unsuitable material. In addition, KLWTD would excavate about 1,800 cubic feet of soil material to install vacuum sewer mains, vacuum pits, buffer tanks, and gravity service laterals. Hardwood hammock restoration work at the 2.6 acre habitat rehabilitation site would also disturb soils during site preparation and planting activities. Under Alternative 3, KLWTD would excavate an additional 158,400 cubic feet of material for the installation of the WTS. Most of the excess excavated material would be used for backfill, and the remainder would be disposed of in suitable locations off-site.

FEMA recommends the implementation of appropriate best management practices (BMPs), development of an approved Erosion and Sediment Control Plan, and use of conventional site preparation techniques prior to and during ground disturbing activities to protect area water bodies and canals. Planned measures to control sediment from discharge to nearshore surface waters may include, but are not limited to, silt dams, barriers, and straw bales placed at the foot of sloped surfaces. Planned measures to control soil erosion may include, but are not limited to, grassing, mulching, watering, and seeding of on-site surfaces. Site preparation may include grubbing of vegetative roots and topsoil materials, followed by surface compaction and fill placement to attain the required construction elevation.

Applying BMPs and appropriate erosion mitigation measures would limit adverse soil effects during treatment system construction. Pennekamp gravelly muck and Udorthents-Urban land complex soils are well suited for urban development. Overall, no long-term adverse effects on soils are anticipated if site soil excavation, disposal, and erosion potential are managed in accordance with State standards and applicable BMP and erosion control guidelines.

3.1.3 Geology

Affected Environment

The existing geologic environment is similar to that described in PEA Section 3.1.3.1 (Geology). At the project areas, the upper stratum of bedrock is Miami Oolite, a very porous, solution-riddled, carbonate rock. Results of geotechnical test borings conducted at the proposed Alternative 2 WWTP site revealed a surface layer of fine sand with limestone fragments in the upper 1 to 5 feet bls, underlain by light tan medium- to well-cemented limestone to a depth of 25 feet bls. In one soil boring, a layer of peat was encountered at a depth of 2 feet bls. In another soil boring, a 1-foot thick layer of red silty clay was encountered at a depth of 2 feet bls. In addition, a layer of asphalt was encountered at the surface during another soil boring (Nutting Engineers, 2002). Geotechnical investigations have not been conducted at the Alternative 3 site; however, the site geology is expected to be similar.

Environmental Consequences

Under the No Action Alternative, KLWTD would not receive FEMA funds for wastewater management. KLTV and KLP residents would still need to comply with Florida Statutory Treatment Standards of 2010. It is anticipated that once funding is secured, effects on geology would be similar to those under Alternatives 2 and 3.

Both Alternative 2 and 3, with new WWTP construction, would have minor effects on geology. KLWTD would excavate soil to install the sewer mains at elevations of 0- to 1-foot amsl NGVD along service area roads, and to remove existing cesspits and septic systems.

WWTP construction would require installation of one groundwater monitoring well and two shallow wells to dispose of treated wastewater effluent. The shallow injection wells would be cased and grouted to 60 feet bls, with a gravel-packed, open-hole section from 60 feet to 90 feet bls (PEA Section 2.3.2.2 [Wastewater Treatment Plant Effluent Disposal Options]). The shallow wells' effects on project site geology are expected to be minor and are discussed in PEA Section 3.1.3.2.2 (Centralized Wastewater Treatment Plant Alternative). The applicant is responsible for obtaining all applicable FDEP permits for Class V shallow injection wells (Table 3-1).

Table 3-1. FDEP Injection Well Forms

Form Title	Form Number
Application to Construct/Operate/Abandon Class I, III, or V Injection well Systems	62-528.900(1)
Certification of Class V Well Construction Completion	62-528.900(4)
Certification of Monitor Well Completion	62-528.900(10)

As discussed in PEA Section 3.1.3.2.2 (Alternative 2), aside from the potential impacts from injection well use, WWTP construction is not expected to adversely affect the project sites' geology. Hardwood hammock restoration work at the 2.6 acre rehabilitation site is also not expected to adversely affect local geology. The environmental consequences to the geologic environment with shallow injection well use are expected to be limited to the effects of injection of relatively fresh effluent into brackish-to-saline water aquifers, which could affect the rate of limestone solution (dissolving). In mainland Florida, sinkhole development, especially in areas of declining water tables, has been a severe engineering problem. However, on Key Largo, the water table is usually about 5 feet below the ground surface, and water tables have not been declining (Nutting Engineers, 2002). Therefore, new and/or expanded sinkholes are not likely to result from either Alternative 2 or 3.

3.2 WATER RESOURCES AND WATER QUALITY

3.2.1 Groundwater

Affected Environment

The affected groundwater is described in PEA Section 3.2.2.1 (Groundwater). Throughout the project areas, the water of the Biscayne Aquifer ranges from brackish to saline and is of little

potential utility except as input for desalination systems. Freshwater lenses have not been documented for the Key Largo area. Groundwater levels at the treatment plant site are usually about 5 feet below the existing ground surface (Nutting Engineers, 2002). Key Largo has 111 active shallow Class V injection wells throughout the island (U.S. Army Corps of Engineers/Florida DCA, 2003). The existing shallow injection wells are for on-site wastewater nutrient reduction systems (OWNRS).

Environmental Consequences

Under the No Action Alternative, KLWTD would not receive FEMA funding for wastewater management. Although service area residents would still need to comply with Florida Statutory Treatment Standards by 2010, removal of nutrient and pathogen inputs to the shallow groundwater of Key Largo would not occur until a funding source is secured. Therefore, local groundwater quality improvements would be delayed under the No Action Alternative.

Under both Alternatives 2 and 3, KLWTD would build a new WWTP to meet Florida Statutory Treatment Standards of 2010. Treated effluent would still have some nutrients, even under conditions that meet the Florida Statutory Treatment Standards. However, by removing the septic and cesspool systems, Alternatives 2 and 3 would reduce the overall nutrient and pathogen inputs to the shallow groundwater of the island, and overall local groundwater quality would improve. An analysis performed for a representative service area of the Keys demonstrated that wastewater treated to AWT standards would reduce the TN and TP concentrations in treated effluent by about 92 and 86 percent, respectively (PEA Appendix D [Water Quality Improvements Analysis]). In comparison, wastewater treated by septic systems reduces TN and TP concentrations by only 4 and 15 percent, respectively (Kruczynski, 1999). Hardwood hammock restoration work at the 2.6 acre rehabilitation site would have no effect on groundwater resources, because activities would be limited to surface disturbance.

3.2.2 Inland, Nearshore, and Offshore Waters

Affected Environment

The project area surface water resources include (1) canals for boat access to marinas and residential developments; (2) stormwater runoff to ditches and drainage systems in developed areas; and (3) nearshore and offshore marine waters.

3.2.2.1 Inland Waters

Inland waters in the project areas include artificial canals and enclosed water bodies, as described in PEA Section 3.2.3.1.1 (Inland Waters). About 10 artificial water bodies are in the KLTV project area. No artificial water bodies are in the KLP project area.

During a review of Outstanding Florida Waters in the Florida Keys, canals and other confined water bodies showing signs of eutrophication were listed as “Hot Spots” (refer to PEA Appendix C [Hot Spot Locations]). Monroe County (2000) ranked the KLTV as the second and fourth most critical “hot spots” believed to contribute to water quality degradation in the Upper Keys and Keys-wide, respectively. KLP is ranked 15th in the Upper Keys and 27th Keys-wide.

3.2.2.2 Nearshore and Offshore Marine Waters

Kruczynski (1999) and Szmant and Forrester (1996) determined that, in general, nutrient pollution emanating from the Keys has greater nearshore effects than offshore effects due to dilution by tides and currents. Offshore areas in the Middle Keys had higher nutrient levels than offshore areas in the Upper Keys. The higher nutrient levels were attributed to the relatively high nutrient-content of Florida Bay (Kruczynski, 1999; Szmant and Forrester, 1996).

Nearshore and offshore marine waters are described in PEA Section 3.2.3.1.2 (Nearshore and Offshore Marine Waters). The Florida DOH collects beach water quality data from the John Pennekamp State Park water quality monitoring station on the ocean side of Key Largo (MM 105). Located about 2.4 miles northeast of the proposed WWTP site, it is the closest monitoring station to the service areas. Since August 2000, five health advisories/warnings have been issued (DOH, 2003). Health advisories are issued by DOH when sampling results indicate that contact with the water at that site may pose increased risk of infectious disease, particularly for susceptible individuals. A poor rating is measured as 104 or greater of *Enterococcus* sp. or 400 or greater fecal coliform organisms per 100 milliliters of marine water (DOH, 2003). A poor rating requires re-sampling before issuing a health advisory. On six other occasions between August 2000 and June 2003, water at this site received a poor water quality rating, although a health advisory was not issued (DOH, 2003). No trends were observed regarding correlation with a particular time of year, or with poor water quality ratings for either fecal coliform or *Enterococcus* sp. categories.

The Water Quality Monitoring Project for the Florida Keys National Marine Sanctuary's Water Quality Protection Program maintains a monitoring station (Station 220) about 3 miles northeast of Key Largo, in Hawk Channel (Southeast Environmental Research Center [SERC], 2003). Established by the Environmental Protection Agency (EPA) in 1995, the project objective is to characterize Keys water quality status and trends. Although surface TN concentrations recorded at Station 220 between 1995 and 2003 fluctuate, they averaged 0.146 parts per million (ppm); these levels are less than the Keys-wide average of 0.176 ppm recorded over the same period. Surface TP concentrations recorded at Station 220 from 1995 to 2003 also fluctuate, but they averaged 0.007; these levels are comparable to the Keys-wide average of 0.007 ppm recorded over the same time period (SERC, 2003). It is difficult to correlate these trends directly with nutrient loads from KLTV and KLP because of the distance of Station 220 from the service areas.

3.2.2.3 Stormwater

US-1 represents the topographic divide for each island, whereby lands on the bay side of US-1 drain mainly toward Florida Bay and lands on the ocean side of US-1 drain toward the Florida Straits (Monroe County, 2001). Stormwater runoff from roadways, bridges, driveways and yards, rooftops, and parking lots contributes to nearshore water nutrient loading. On-site wastewater treatment systems overflow during storm events and contribute nutrient pollution and fecal contamination to stormwater runoff. Stormwater management and water quality improvement projects have not been conducted within the project areas. However, a project to eliminate nuisance flooding is being planned for KLTV.

Environmental Consequences

Under the No Action Alternative, effects on surface water quality near the service area would likely continue due to nutrient and pathogen inputs from KLTV and KLP's on-site systems. Under this alternative, FEMA would not fund this wastewater management project. Service area residents would still need to comply with Florida Statutory Treatment Standards of 2010. Once KLWTD secures funding, effects on surface waters would likely be similar to those under Alternatives 2 and 3.

Under both Alternatives 2 and 3, KLWTD would build a new WWTP to meet Florida Statutory Treatment Standards of 2010. Alternatives 2 and 3 would remove on-site systems from the service areas and would reduce the overall nutrient and pathogen inputs to inland, nearshore and offshore waters near the project area. Local water quality would improve. As described in PEA Section 3.2.3.2.2 (Environmental Consequences; Inland, Nearshore and Offshore Waters), improvements to water quality under Alternatives 2 and 3 would incrementally reduce wastewater TN and TP loadings on the order of 92 and 86 percent, respectively (PEA Appendix D). The effluent would be treated to the AWT standard, but would still contain some nutrients. Although the Alternative 2 rehabilitation site (2.6 acres) has not been identified yet, site preparation and planting activities are not expected to adversely affect surrounding surface waters.

Alternatives 2 and 3 eliminate the nutrient pollution and fecal contamination of canal and nearshore waters caused by onsite systems in the service areas overflowing during storm events. Implementation of either alternative would not adversely affect stormwater flow quantity or quality, and is expected to have generally positive effects on the stormwater quality.

Under Alternatives 2 and 3, KLWTD would prepare and fully implement a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP would include the use of appropriate BMPs, as required by FDEP National Pollutant Discharge Elimination System (NPDES) requirements to protect the project areas' surface waters. Planned measures and BMPs to control sediment from discharge to surface waters include, but are not limited to, silt dams, barriers, and straw bales placed at the foot of sloped surfaces.

3.2.3 Floodplains and Wetlands

Affected Environment

3.2.3.1 Floodplains

Executive Order (EO) 11988 (Floodplain Management) requires Federal agencies to minimize floodplain occupancy and alteration. Application of the EO 11988 Eight-Step Decision-Making Process, per 44 CFR Part 9, ensures that Federally funded projects comply with EO 11988. By its nature, the NEPA compliance process involves the same basic decision-making methods to meet its objectives as the Eight-Step Decision-Making Process. Therefore, FEMA has applied the Eight-Step Decision-Making process through implementation of the NEPA process.

PEA Section 3.2.4.1.1 (Floodplains) describes the affected environment related to floodplains. According to the National Flood Insurance Program Flood Insurance Rate Map, KLTV and KLP are in the FEMA-designated Zones AE and VE (a storm-surge hazard zone) (12087C1006G,

FEMA 1995). The Alternative 2 WWTP site is located in the FEMA-designated Zones AE and X (12087C1006G; FEMA 1995). The Alternative 3 WWTP site is entirely in the FEMA-designated Zone AE (12087C1004G, FEMA 1995) (Figure 3-2). The highest elevation within the project areas is the centerline of US-1; the remainder of the land is at elevations less than 10 feet NGVD.

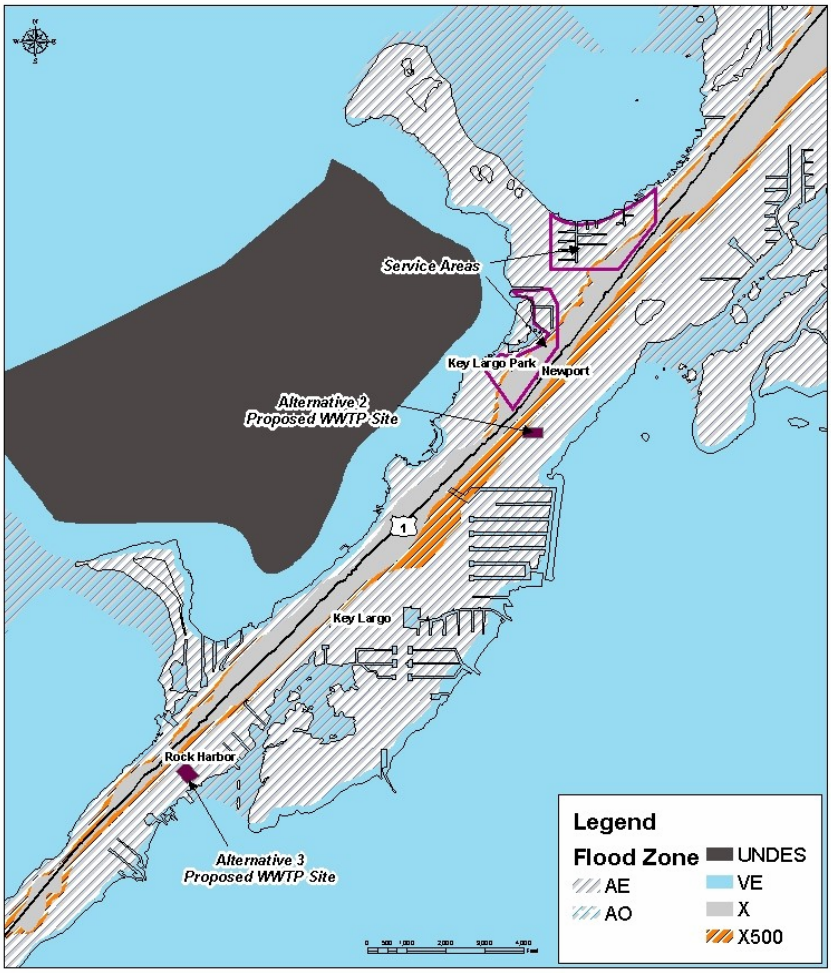


Figure 3-2. Project Area Floodplains (FEMA, 1995)

3.2.3.2 Wetlands

PEA Section 3.2.4.1.2 (Floodplains and Wetlands; Affected Environment-Wetlands) discusses wetland communities. Under EO 11990 (Wetland Protection), Federal agencies must minimize the destruction, loss, or degradation of wetlands and preserve and enhance their natural and beneficial values. FEMA applies the Eight-Step Decision-Making Process, required by 44 CFR Part 9, to comply with EO 11990, as described above.

A Biological Assessment (BA) was completed on October 25, 2000, by URS and the Monroe County Department of Marine Resources for the Alternative 2 site at MM 100.5. Field investigations were conducted by two URS biologists on April 24, 2003, to identify wetlands within the Alternative 3 project site at MM 98. No freshwater wetlands were identified within the WWTP project sites (Figure 3-3). The nearest wetland area to the Alternative 2 proposed WWTP site consists of mangroves bordering the ocean side, about 0.25 mile to the east. Fringing

mangroves may occur along small ditches or swales extending into upland forests, but no wetland species extend near the vicinity of the site. The Alternative 3 site is completely developed but is bordered on its northern and southern sides by undeveloped lands that have coastal fringe wetlands. Field investigation photographs are in Appendix C.

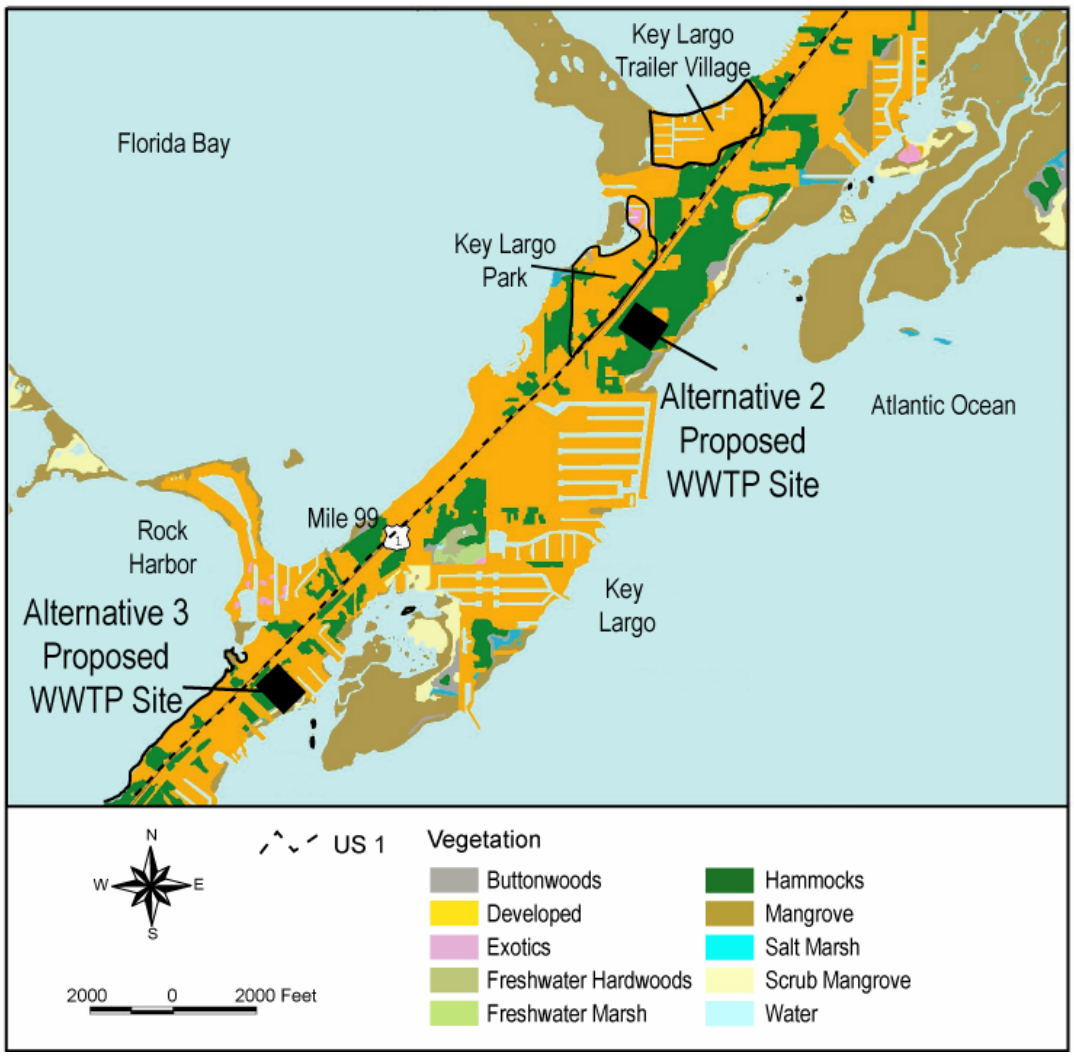


Figure 3-3. Project Area Vegetation (McNeese, 1998)

Environmental Consequences

Under the No Action Alternative, effects on floodplains and wetlands would ultimately be similar to Alternative 2 and 3. The No Action Alterative would have no notable effect on the floodplain. Without FEMA funding, water quality degradation would likely continue until KLWTD upgrades systems with another funding source; however, there would be negligible effects to coastal wetlands. In the absence of Federal funding, EO 11988 and 11990 would not apply. Wastewater system design would have to comply only with the Monroe County Floodplain Ordinance and be protected to the 100-year-flood level. Specific floodplain ordinance provisions are further described in PEA Section 3.2.4.2.1.

As discussed in PEA Section 3.2.4.2.2 (Centralized Wastewater Treatment Plant Alternative), implementation of Alternatives 2 and 3 would not have notable effects on floodplains. Since WWTPs are considered critical facilities, KLWTD would protect the plants and critical operating components to the 500-year flood, through elevation or floodproofing, to protect the federal investment from flood damages, per EO 11988 as outlined at 44 CFR Part 9.11. Because much of the Keys is in the 100-year floodplain, there are usually no practicable alternatives to siting wastewater facilities outside the floodplain. There is public concern that the proposed WWTP under Alternatives 2 and 3 would lead to further floodplain development by introducing key infrastructure, which is often linked to additional development. However, Keys development is not controlled by the addition of key infrastructure, but instead by Monroe County's Rate of Growth Ordinance (ROGO) permit allocation system, as described further in PEA Section 3.10 (Land Use and Planning). KLWTD proposes to build a wastewater treatment system in the Keys to effectively treat existing wastewater flows and comply with the Florida Statutory Treatment Standards of 2010; the improvements are not intended to introduce or support floodplain development. If growth and development in the floodplain occurs after implementation of either alternative, it would be the result of established county planning and would not be directly related to the proposed wastewater project. Given the above points, FEMA did not conduct an evaluation of secondary effects on floodplains with regard to the potential for increased development under the alternatives. It should be noted that KLP and KLTV are mostly built out, so additional development is unlikely (refer to Table 2-1).

No direct impacts on wetlands are anticipated, since there are no wetlands at either proposed WWTP site or along service area roads. Accordingly, coastal wetlands near the project sites would not be notably affected by construction. Although not identified yet, it is not expected that the 2.6 acre rehabilitation site for Alternative 2 will have wetlands either. If wetlands are present on or near the site to be selected, and if the project may affect these wetlands, then further actions will be taken by the Applicant, DCA, and FEMA, for full regulatory compliance per applicable laws, regulations, permits, and other applicable conditions.

As stated in PEA Section 3.2.2.2 (Inland, Nearshore and Offshore Waters; Environmental Consequences) the use of appropriate construction BMPs and development and full implementation of an FDEP- or South Florida Water Management District -approved Erosion and Sediment Control Plan are recommended prior to and during construction to protect area water bodies and wetlands. Planned measures to control sediment from discharge to nearshore surface waters include, but are not limited to, silt dams, barriers, and hay bales placed at the foot of sloped surfaces.

3.3 BIOLOGICAL RESOURCES

As in much of the Keys, humans have significantly altered the lands and waters within the Key Largo project area through development activities, including clearing, grading, dredging, and filling. Of the six major Keys-wide native (natural) terrestrial communities (i.e., pine rocklands, tropical hardwood hammocks, mangroves, salt marsh, freshwater systems, and dunes/coastal ridges) (further described in PEA Section 3.3.1.1, Terrestrial Environment), only one natural community (habitat) type, tropical hardwood hammocks, exists within the project sites. Two other habitat types, mangroves and salt marshes, exist near the proposed service areas. Of the four natural marine communities (seagrass beds and sand flats, coral reefs, hardbottom, and

sandy bottom) that exist in the Keys, only coral reefs are not present near the project sites. Section 3.3.1 of this document and PEA Section 3.3 (Biological Resources) further discuss these terrestrial and marine habitats.

Per the Endangered Species Act (ESA) of 1973, URS completed a BA on October 25, 2000, in coordination with Monroe County, for the Alternative 2 WWTP site at MM 100.5. The BA fieldwork was done between June 29 and October 11, 2000. Although the MM 100.5 parcel covers about 21 acres, only 2.6 acres are needed for WWTP siting. Consequently, the study focused on the proposed construction area. The study included a census of all trees over 4 inches in diameter at breast height (DBH), all individuals (including seedlings) of State- or Federal-listed threatened or endangered plant species, and all woody plants protected under Monroe County's Land Development Regulations (Section 9.5) to determine presence and habitat suitability of special status species. The MM 100.5 site BA is in Appendix H.

On December 18, 2000, FEMA requested a formal consultation with the U.S. Fish and Wildlife Service (USFWS) under Section 7 of the ESA because of the potential to impact Federally listed species. Based on the BA information provided, on June 11, 2001, the USFWS issued a Biological Opinion (BO) for the proposed construction on the Alternative 2 WWTP site. The BO is provided in Appendix H.

Similarly, URS completed a reconnaissance-level field survey of the Alternative 3 WWTP site at MM 98.0 on March 24, 2003, to verify vegetation type boundaries based on reviews of literature and photographs. The field survey photographs are in Appendix C.

Affected Environment

3.3.1 Terrestrial Ecosystem

Key Largo is highly developed. Pockets of tropical hardwood hammocks are scattered throughout the island. The Florida Keys Wetlands Advance Identification (ADID) mapping project shows the KLTV and KLP service areas as a developed land use cover; managed and ornamental vegetation dominate the service areas (McNeese, 1998; Figure 3-3).

The 2.6-acre construction area for the Alternative 2 WWTP is roughly L-shaped and is located at the southwest end of the 21-acre triangular parcel of undeveloped, Monroe County-owned land. This site is on the ocean side of Key Largo at MM 100.5 (Figure 2-2 and 2-4). The northwestern property boundary is along US-1, and the southern property boundary is north of an existing FKAA maintenance facility and undeveloped land. The 21-acre parcel has a hardwood hammock that qualifies as "high-quality hammock" under the Monroe County Land Development Regulations Environmental Design Criteria (URS, 2000). The proposed construction area is the most disturbed portion of the 21-acre parcel, showing evidence of clearing, debris dumping, and invasion by exotic (non-indigenous) plant species.

The Alternative 3 WWTP site is rectangular and covers about 3.8 acres. It is bounded by US-1 to the northwest, the Florida Straits to the southeast, and hardwood hammock to the northeast and southwest. The site is cleared, grubbed, and developed; it is presently used for boat and vehicle storage and miscellaneous uses. Boat repairs are done on site. Weedy vegetation is along the maintained US-1 ROW next to the property and areas along the property boundary. Access to the property shoreline was restricted due to dense mangrove growth on adjacent properties.

The roughly 2.5-mile Alternative 3 WTS corridor is within and/or next to the US-1 ROW, on the east (ocean) side of the roadway. FKAA would locate the force main a minimum of 5 feet from the shoulder of the roadway. Much of the vegetation next to the roadway consists primarily of grasses and weeds typical of maintained Keys ROWs. Lands next to the ROW are primarily developed with commercial or residential uses. From Atlantic Avenue (MM 99.5) to the service areas, the WTS corridor consists of dense commercial development. Vegetation on these parcels consists of common landscape plants and trees. An 8-foot wide bicycle/pedestrian trail is located along the transmission corridor, extending from Atlantic Boulevard (MM 99.5) past Central Avenue (MM 100.5), the southern boundary of the VPS site.

A discussion of several habitat types within or near the project areas follows.

3.3.1.1 Pine Rocklands and Tropical Hardwood Hammocks

PEA Section 3.3.1.1.1 discusses pine rocklands and tropical hardwood hammocks. Pine rocklands are limited in distribution throughout the Upper and Middle Keys and are not present within the project sites (Figure 3-3). Tropical hardwood hammocks exist on the Alternative 2 WWTP site. In addition, tropical hardwood hammocks border the Alternative 3 VPS, WTS, and WWTP site.

The Alternative 2 WWTP site is part of a 21-acre hardwood hammock that the Florida Department of Environmental Protection Conservation and Recreation Lands (CARL) Program had targeted for acquisition. Gumbo limbo (*Bursera simaruba*), poisonwood (*Metopium toxiferum*), pigeon plum (*Coccoloba diversifolia*) and willow bustic (*Bumelia salicifolia)* dominate the canopy vegetation at this site. Exotic vegetation, including white leadtree (*Leucaena leucocephala*), Brazilian pepper (*Schinus terebinthifolius*), and sapodilla (*Manilkara zapota*) dominate approximately 0.41 acre along the southern fringe of the proposed 2.6-acre construction area. This fringe is about 500-feet along the common property line with the FKAA maintenance facility, which was previously cleared for a road and fence easement. The remaining 2.2 acres are higher quality hardwood hammock habitat with fewer exotic plants. The BA (Appendix H) provides a more detailed discussion of this site and a full listing of vegetation observed.

As stated above, the hardwood hammocks at the Alternative 2 WWTP site qualify as “high-quality hammock” under the Monroe County’s Land Development Regulations Environmental Design Criteria (see attachment to the BA, Appendix H). In addition to Monroe County’s Land Development Regulations design criteria; for comprehensive planning purposes and in response to the Florida Keys Carrying Capacity Study, Monroe County has also designated high quality hardwood hammock as Tier I lands (Protection, Conservation, Restoration), to be avoided for development. The Study’s Terrestrial Module found that Keys’ development had “surpassed the capacity of upland habitats to withstand further development” (USACE/DCA, 2001). FEMA agrees with the Study’s finding and County’s tiering approach. These county regulations require that 80 percent of the hardwood hammock within a proposed construction site be protected in its natural state (URS and Monroe County, 2000).

The Alternative 3 WWTP site is completely developed, and no hardwood hammock habitat is on site. However, the site is bordered on the northeast and southwest by low quality hardwood hammock altered by vegetation removal, and to the south by a forested fringe of coastal wetland vegetation with an open connection to the Florida Straits. Exotic plant species, such as Brazilian

pepper and white leadtree are limited to roadside margins and a few individuals in the interior of the property.

Undeveloped lands next to the Alternative 3 WTS corridor are characterized as a degraded hardwood hammock affected by habitat fragmentation and infestation by invasive, exotic plant species. Species observed in these areas included gumbo limbo, pigeon plum, poisonwood, and Brazilian pepper. The Alternative 3 VPS was previously described under Alternative 2.

3.3.1.2 Mangrove Forests and Salt Marshes

Throughout the Keys, mangroves dominate most coastal vegetation communities. Mangroves exist along the edges of shorelines, bays, and lagoons, and on overwash areas throughout the Keys. PEA Section 3.3.1.1.2 (Mangroves) further discusses mangroves.

Mangroves and salt marshes are not present within the project sites (Figure 3-3). However, fringing mangroves dominate shorelines near the Alternative 2 and 3 WWTP sites, and large mangrove communities border both the KLP and KLTV service areas (Figure 3-3). Three mangrove tree species—red mangrove (*Rhizophora mangle*), black mangrove (*Avicennia germinans*) and white mangrove (*Laguncularia racemosa*)—are the dominant components.

A small salt marsh is located near the KLP service area (Figure 3-3). Salt marshes, which are not well developed in most of the Keys, usually consist of mostly single-species stands of black needlerush (*Juncus roemerianus*) and salt marsh cordgrass (*Spartina alterniflora*). Other common Keys salt marsh species include marsh elder (*Iva frutescens*), saltbush (*Baccharis halimifolia*), seaside goldenrod (*Solidago sempervirens*), salt grass (*Distichlis spicata*), sea purslane (*Sesuvium portulacastrum*), and mangroves. Sand or limerock areas at the upper end of the tidal zone may have sea ox-eye (*Borrichia arborescens*), saltwort (*Batis maritima*), seablight (*Suaeda linearis*), and sea lavender (*Argusia gnaphalodes*).

3.3.1.3 Freshwater Systems

There are no freshwater wetlands at the project sites (Figure 3-3).

3.3.1.4 Dunes and Coastal Ridges

Dunes and coastal ridges are not present within the project sites (Figure 3-3).

3.3.2 Aquatic Ecosystem

Marine habitats are present within the artificial canals and marine waters around the Key Largo project sites. Seagrasses and hardbottom communities mixed with seagrasses dominate marine habitats near the project sites (Figure 3-4). A discussion of individual marine community types is below.

As described in PEA Section 3.3.3.1 (Special Status Species), essential fish habitat (EFH) present near the project sites consists of estuarine seagrass, marine live/hardbottom, mangrove, and marine water column. In the Keys, the Gulf of Mexico (GMFMC) and South Atlantic (SAFMC) Fishery Management Councils regulate fisheries. A compiled list of the fishery species under GMFMC and SAFMC management is in Appendix F.

3.3.2.1 Seagrass Beds and Sand Flats

Seagrass communities are the most common Keys marine community type. Interacting factors, including sediment depth, water quality, water depth, and current velocity, influence distribution of seagrass communities (Florida Marine Research Institute [FMRI], 2000). When seagrass meadows in low-energy environments are disturbed by high energy influences, seagrass growth can become patchy with areas of sandflats (FMRI, 2000). Keys seagrass communities are dominated by turtle-grass (*Thalassia testudinum*) and manatee-grass (*Syringodium filiforme*), with shoal-grass (*Halodule wrightii*) becoming dominant in areas with high nutrient loads (Fonseca et al., 1998).

Seagrass communities dominate both the western, bay side of the island and the eastern, ocean side near the project sites (Figure 3-4). This community type exists alone or in combination with hardbottom communities. PEA Section 3.3.1.2.1 (Seagrass Beds and Sand Flats) further describes the affected environment for seagrass beds and sand flats

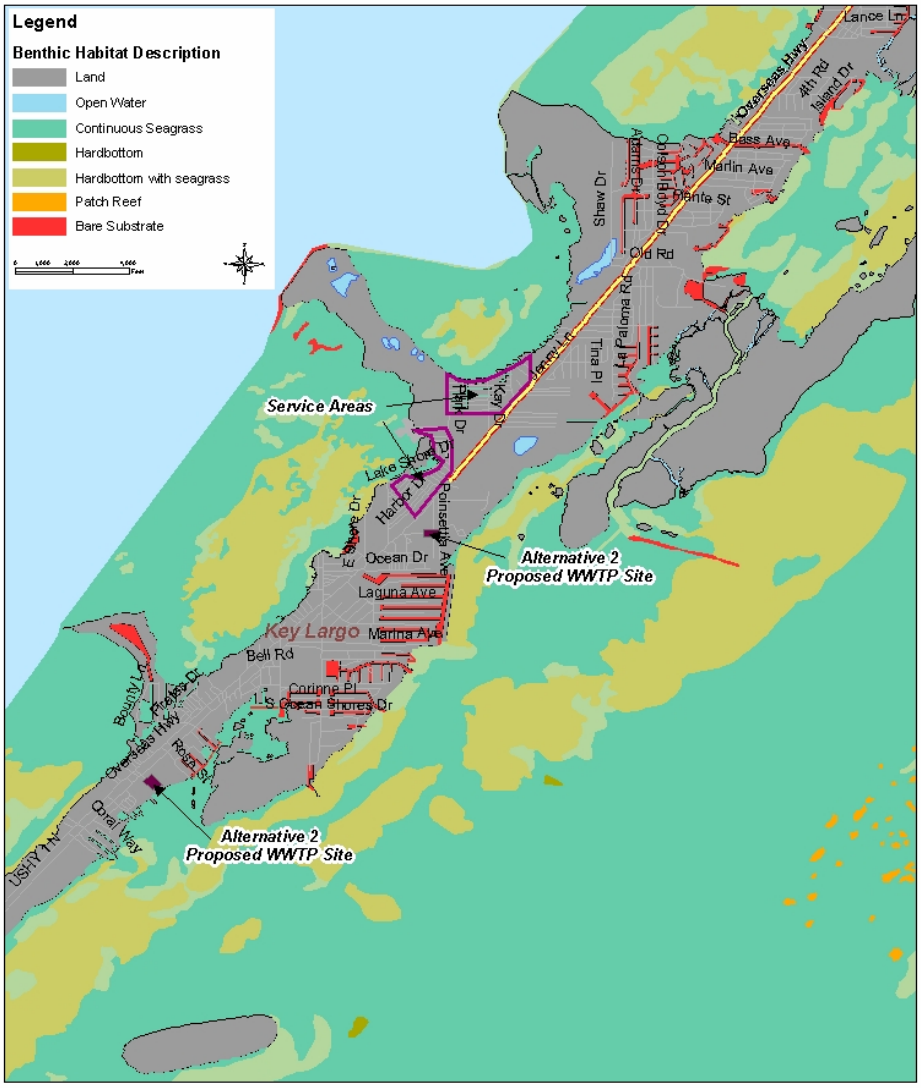


Figure 3-4. Project Area Benthic Habitats (FMRI, 1992)

3.3.2.2 Coral Reefs

In the Upper Keys, the reef tract forms an almost continuous community that extends from the south side of Hawk Channel at Caryfort Reef to Crocker Reef in the south. The reef tract is about 7 miles southwest of the proposed service areas and WWTP project sites. This area also has many patch reefs and well-developed bank reefs (FMRI, 2000). Patch reefs exist seaward of Hawk Channel and inshore of the bank reefs, at depths of about 6 to 30 feet (Myers and Ewel, 1990). The closest patch reef to the proposed service areas and the Alternative 2 WWTP site is Mosquito Bank, about 3.7 miles to the southeast. The closest patch reef to the Alternative 3 WWTP site is in an unnamed area about 3.3 miles to the southeast (FMRI, 2000).

3.3.2.3 Hardbottom

Hardbottom habitats are solid, flat to low-relief, rock substrate composed of rock and/or rubble that is either exposed or covered with a thin layer of sediment (FMRI, 2000). Nearshore hardbottom is the dominant marine community throughout the Keys. Hardbottom communities are characterized by their proximity to shore, shallow depth, and visual dominance of octocorals (Chiappone and Sullivan, 1994). These communities exist within 1.25 miles of shore on either side of the Keys at depths of about 3 to 16 feet (Chiappone and Sullivan, 1996).

Hardbottom habitat is mixed with seagrass communities on both the bay and ocean sides of Key Largo near the project sites (Figure 3-4). PEA Section 3.3.1.2.3 (Hardbottom) further describes the affected environment for hardbottom communities.

3.3.2.4 Sandy Bottom

Bare bottom communities, over either calcareous muds and/or sands, lack algae and seagrasses. The associated flora and fauna is sparse and typically dominated by sponges, small corals, and calcareous algae (Chiappone, 1996).

Sandy bottom communities exist throughout the artificial waterways on Key Largo (see Figure 3-4). PEA Section 3.3.1.2.4 (Sandy Bottom) further describes the affected sandy bottom.

Environmental Consequences

3.3.2.5 Alternative 1 – No Action Alternative

Under the No Action Alternative, KLWTD would not use FEMA funds to implement improved wastewater management activities to meet the new Florida Statutory Treatment Standards of 2010. Without FEMA funds, the KLWTD would have to get other financing, which would delay wastewater treatment improvements. Adverse effects on nearshore marine ecosystems would continue as a result of septic system and cesspools effluents, which continue to contribute to the eutrophication of nearshore marine waters. Once comprehensive wastewater treatment improvements are made, nearshore marine ecosystem benefits would be similar to those of Alternatives 2 or 3. Effects on upland ecosystems would depend mostly on the chosen WWTP locations.

3.3.2.6 Alternative 2 – New Wastewater Treatment Plant on Northern Site

Site preparation, including clearing and grubbing, would eliminate up to 2.6 acres of hardwood hammock at the proposed WWTP construction site. No other areas of this 21-acre parcel would be cleared. Construction activities would require authorization in the form of two Environmental Resource Permits (ERPs): one from the FDEP for stormwater-related features, and one from the Monroe County Growth Management Division.

Section 9.5-345 of Monroe County's Land Development Regulations and the USFWS overlapping BO for the Alternative 2 WWTP site, which require minimizing development environmental effects, would regulate proposed construction on the Alternative 2 site. The following outlines adverse effect minimization measures mandatory for legal compliance (see BA and BO in Appendix H for further conservation and mitigation measure details). WWTP construction would be clustered into the lowest-quality portion of hardwood hammock on the 21-acre parcel. The undeveloped portion of the parcel would serve as a mitigation area for transplanting protected species, planting hardwood hammock species, and removing exotic and nuisance vegetation. The KLWTD would restore 2.6 acres of hardwood hammock and conserve the parcel's remaining 18.4 acres as undeveloped land in perpetuity. Both the 2.6 acre rehabilitation site (once identified) and rehabilitation plan, and 18.4 acre conservation provisions are subject to FEMA and USFWS approval, before WWTP construction work. Native hardwood hammock tree species, with a DBH greater than 3.5 inches would be transplanted or replaced within the remaining 18.4 acres or into landscaped areas. Finally, siting the WWTP next to the existing FKAA facility also serves as a hardwood hammock mitigation measure. Alternative 2 project implementation, as proposed, along with ERP, Monroe County Land Development Regulation, and USFWS BO compliance, before and during construction activities, is not expected to result in significant adverse effects to terrestrial ecosystems. FEMA has received agency comments and considerable and persistent public comments opposing use of the MM100.5 site and recommending use of a previously, substantially altered alternative site.

Although no direct effects on aquatic ecosystems would occur under Alternative 2, wastewater treatment improvements would indirectly affect the nearshore marine waters near KLTV and KLP. Treating wastewater to meet Florida Statutory Treatment Standards of 2010 would improve nearshore marine waters by reducing TN and TP loadings by about 82 and 86 percent, respectively (see PEA Appendix D [Water Quality Improvement Analysis]). Although treated to Florida Statutory Treatment Standards of 2010, the effluent would still have a higher level of nutrients than natural concentrations. Accordingly, reducing nutrient and pathogen loading would incrementally benefit all aquatic communities in the marine ecosystem dependent on good water quality; as further described in PEA Sections 3.2.3.1.2 (Nearshore and Offshore Marine Waters); 3.3.1.2 (Aquatic Environment); and 3.3.2 (Environmental Consequences). Coral reefs are located over 3 miles from the service areas and the Alternative 2 WWTP site in Hawk Channel. Removal of septic and cesspool systems would not directly benefit these coral reef systems due to the location of the service areas on the bayside of Key Largo and the distance to the reefs. Likewise, the construction and operation of a WWTP at the Alternative 2 site would not have an effect on the coral reefs due to the distance between them. As further described in PEA Section 3.2.3.1.2 (Nearshore and Offshore Marine Waters), recent studies have found a decreasing gradient in nutrients from nearshore to offshore waters.

Other substances (e.g., hormones, surfactants, pesticide, pharmaceuticals) that may be discharged in the treated effluent pose a relatively low environmental risk to marine biological resources; because they would be discharged within legal limits (which is the expected norm), discharges would be monitored and subject to regulatory action, and wastewater treatment processes would be changed as needed to meet future regulatory change. Some of these substances are also discussed in PEA Section 3.3.2.1 (Alternative 1 – No Action Alternative).

3.3.2.7 Alternative 3 – New Wastewater Treatment Plant on Southern Site

The effects of Alternative 3 on aquatic ecosystems would be similar to those of Alternative 2. The Alternative 3 WWTP site is completely developed, and WWTP construction would not require additional clearing or grubbing. Trenching activities from the proposed MM 100.5 VPS to the proposed WWTP site would occur in the mowed grass areas of US-1 ROW. After construction, this area would be seeded with grass and allowed to revegetate. The VPS would be sited in the southwest corner of the Alternative 2 WWTP site, immediately next to the FKAA facility. Construction would require clearing and grubbing of a small exotic plant -dominated vegetation area, as described under Alternative 2. Monroe County Land Development Regulations may require some hardwood hammock mitigation measures similar to those described under Alternative 2.

3.3.3 Special Status Species

The ESA requires Federal agencies to consider effects of their actions on federally threatened and endangered species and their designated critical habitats, and to take steps to conserve and protect these species and their habitat. Federal agencies must also comply with the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 et seq.), which requires the EFH identification for Federally managed fishery species and the implementation of measures to conserve and enhance this habitat per the Sustainable Fisheries Act (SFA) Public Law 104-297. PEA Section 3.3.3.1 (Special Status Species, Affected Environment) describes special status species.

In the State of Florida, wildlife and plants are regulated by two separate agencies. The Florida Fish and Wildlife Conservation Commission (FFWCC) regulates wildlife within the jurisdiction of the State of Florida under Chapter 68A-1.004, Florida Administrative Code (FAC). The Florida Department of Agriculture and Consumer Services regulates protected plant species under the Preservation of Native Flora of Florida Act (Chapter 5B-40, FAC).

Monroe County, through its Land Development Regulations, protects wildlife and protected plant species by requiring conservation and enhancement of environmentally sensitive lands. Hardwood hammocks are protected under Monroe County's Land Development Regulation Section 9.5-345 (Environmental Design Criteria), which is an attachment to the Biological Assessment in Appendix H. Monroe County has designated several plant species as Regionally Important (RI) plants.

Affected Environment

URS did biological investigations for both Alternative WWTP sites. As reported in the BA, biologists did not observe any plant or animal species listed as endangered or threatened by the USFWS on the Alternative 2 WWTP site (Appendix H), although hardwood hammock is suitable habitat for the Schaus' swallowtail butterfly (*Heraclides aristodemus ponceanus*), Stock Island tree snail (*Orthalicus reses*), and eastern indigo snake (*Drymarchon corais couperi*) (URS and Monroe County, 2000.) USFWS has listed both the Stock Island tree snail and the eastern indigo snake as threatened and the Schaus' swallowtail butterfly as endangered.

Biologists observed several State-listed threatened or endangered species at the Alternative 2 WWTP site. The threatened plant species included spicewood (*Calyptranthes pallens*), prickly pear (*Opuntia stricta*), blackbead (*Pithecellobium keyensis*), red ironwood (*Reynosia septentrionalis*), and spiny greenbrier (*Smilax havanensis*). The endangered species included cinnamon bark (*Canella winterana*), milkbark (*Drypetes diversifolia*), princewood (*Exostema caribaeum*), white ironwood (*Hypelate trifoliata*), white flower passion flower (*Passiflora multiflora*), hammock snout pea (*Rhynchosia swartzii*), mahogany (*Swietenia mahogani*) and thatch palm (*Thrinax radiata*.). Additional State-listed plant species are known to exist in the nearby Newport Hammock CARL site and may also exist at the Alternative 2 WWTP site, per the FFWCC. These include yellowwood (*Schaefferia frutescens*, endangered), Simpson's prickly apple (*Harrisia simpsonii*, endangered), banded wild pine (*Tillandsia flexuosa*, endangered), wild cotton (*Gossypium hirsutum*, endangered), joewood (*Jacquinia keyensis*, threatened), wild dilly (*Manilkara bahamensis*, threatened), and golden leather fern (*Acrostichum aureum*, threatened). The Alternative 2 WWTP site hardwood hammock is suitable habitat for the white-crowned pigeon (*Columba leucocephala*), Florida tree snail (*Liguus fasciatus*), and Miami black-headed snake (*Tantilla oolitica*). FFWCC has listed the white-crowned pigeon and Miami black-headed snake as threatened and the Florida tree snail is a Species of Special Concern. The State also lists Schaus' swallowtail butterfly and Stock Island tree snail as endangered.

In addition to State- and Federal-listed threatened and endangered species, Monroe County has listed several plant species observed on the Alternative 2 WWTP site as RI (Regionally Important) species. RI species observed include inkwood (*Exothea paniculata*), black ironwood (*Kruigiodendron ferreum*), lancewood (*Nectandra coriacea*), capeweed (*Phyla nodiflora*), paradise tree (*Simarouba glauca*) and tallowwood (*Ximenia americana*). In addition, Monroe County has listed tropical hardwood hammock habitat itself for protection. Further Alternative 2 WWTP site special status species details are in the BA and BO in Appendices H and I, respectively.

Two URS biologists conducted a site visit on March 24, 2003, concurrently with vegetation and wildlife investigations, to evaluate the potential presence of protected species and suitable habitat for these species on the Alternative 3 WWTP site. The biologists did not observe any State- or Federal-listed threatened or endangered species in the proposed Alternative 3 WWTP and WTS construction sites. Vegetated portions of these proposed sites consist of disturbed weedy and landscape plants; therefore, no portions of the proposed construction sites are likely to provide nesting, roosting, or feeding habitat for any special status species that could exist in the Key Largo area. The Alternative 3 VPS would be built on a small portion of the Alternative 2 WWTP site. As noted above no federally listed plant species were observed on the Alternative 2 site. Several State- and county-listed plant species may be present in the pest- and exotics- dominated

construction area at the southwestern fringe of the parcel. This small area could support some State- or Federally listed threatened or endangered animal species, as described above.

Environmental Consequences

Under the No Action Alternative, FEMA would not fund the proposed wastewater management improvements in Key Largo, and KLTV and KLP residents would still need to comply with Florida Statutory Treatment Standards of 2010. As such, ESA Section 7 and EFH compliance would not be required unless there is other Federal funding. Effects on special status species, once funding is secured would likely be similar to those under Alternatives 2 and 3.

3.3.3.1 Alternative 2 – New Wastewater Treatment Plant on Northern Site

Per ESA Section 7, FEMA consulted the USFWS and the National Marine Fisheries Service (NMFS) regarding the potential effects of Alternative 2. On July 7, 2000, FEMA initiated informal consultation with the USFWS, then completed a draft BA and sent it to USFWS on October 30, 2000. On December 18, 2000, FEMA requested the informal consultation be elevated to a formal consultation because of the potential for "incidental take" of Federally listed species, including the Schaus' swallowtail butterfly, eastern indigo snake, and Stock Island tree snail. In this situation, "take" means harm through 2.6 acres of direct habitat loss and by harassment to these species. Based on the BA information provided, on June 11, 2001 (and reaffirmed on December 19, 2003), the USFWS issued a BO for the proposed construction on the Alternative 2 WWTP site. The USFWS concluded that Alternative 2 would "not likely jeopardize" the continued existence of either the Stock Island tree snail or the Schaus' swallowtail butterfly and would "not likely adversely affect" the eastern indigo snake. In addition, since the USFWS has not designated critical habitat for these species, none will be affected.

The USFWS's conclusions are based upon two, scope of work incorporated, reasonable and prudent measures to minimize "take," during Alternative 2 construction, of the Stock Island tree snail and Schaus' swallowtail butterfly. These measures include restoring 2.6 acres of hardwood hammock habitat and deeding the undeveloped 18.4 acres of hardwood hammock habitat as permanent conservation land. Both of these provisions; once a rehabilitation site is identified and rehabilitation plan drafted, and conservation land plans drafted; are subject to FEMA and USFWS approval before any site work starts. Under the ESA, these are viewed as non-discretionary "terms and conditions," which FEMA will require of the KLWTD for funding reimbursement. Additional implementation details are in the BO (Appendix H). FEMA consulted the NMFS regarding the potential effects of Alternative 2 under ESA Section 7. In a letter dated June 5, 2003, FEMA initiated informal consultation with NMFS, provided its findings, and requested determination concurrence. NMFS concurred on November 19, 2003 that Alternative 2 would not likely affect threatened or endangered species under their jurisdiction. Similarly, on June 24, 2003, NMFS concurred with FEMA's finding that Alternative 2 would "not likely affect" EFH; therefore, no further action is required under the MSA and the SFA. Agency coordination letters for this SEA are in Appendix B.

Several State special status species are known to exist or may exist at the Alternative 2 WWTP site. The FFWCC sent a letter to FEMA, dated July 14, 2000, stating opposition to building a WWTP on the proposed Alternative 2 site, due to the presence of important hardwood hammock

habitat and State-listed plants and animals, and providing a copy of their comments to a separate Monroe County environmental assessment. The FFWCC sent this letter before FEMA had completed formal consultation with USFWS. On January 23, 2001, a copy of FEMA's BA was provided to FFWCC for comment, and no comments were received. The mitigation measures outlined in the BA and the "reasonable and prudent measures" and "implementing terms and conditions" identified in the USFWS BO would minimize the loss of hardwood hammock habitat and State-listed plants and animals. On June 5, 2003, FEMA requested comment from the FFWCC on its intent to prepare this SEA. On July 1, 2003, the FFWCC reiterated its opposition to construction on the Alternative 2 site. Agency coordination letters are in Appendix B.

Adverse effects to Monroe County's RI-listed plant species from construction of Alterative 2 would be mitigated through KLWTD compliance with the County's Land Development Regulations and the mitigation measures identified in the BA and BO. Accordingly, Alternative 2 WWTP site construction as proposed, with Monroe County Land Development Regulation and USFWS BA and BO compliance before construction activities, is not expected to result in significant adverse effects to special status species.

3.3.3.2 Alternative 3 – New Wastewater Treatment Plant on Southern Site

On June 5 and July 22, 2003, FEMA initiated consultation per ESA Section 7, with USFWS and NMFS, regarding Alternative 3 potential effects. As noted above, URS completed a biological evaluation of the WWTP site on March 24, 2003, and no State or Federally listed species were observed. The Alternative 3 VPS will be located on a small pest- and exotic plant-dominated portion of the Alternative 2 WWTP site. On December 19, 2003 the USFWS concurred with FEMA's finding of no effect for this alternative (Appendix H).

NMFS stated in a June 24, 2003 response, that neither the construction nor operation of Alternative 3 would affect EFH; therefore, MSA and the SFA require no further action. NMFS concurred on November 19, 2003 that Alternative 2 would not likely affect threatened or endangered species under their jurisdiction.

On June 5, FEMA requested review of the project alternatives by FFWCC. On July 1, 2003, the FFWCC encouraged use of the Alternative 3 WWTP site because the potential for adverse effects on threatened and endangered species would be less at this site. Monroe County's Land Development Regulations may require some mitigation measures for protection of County RI-listed plant species at the Alternative 3 VPS Site. Accordingly, no notable adverse effects to special status species are anticipated for Alternative 3.

3.4 AIR QUALITY

Affected Environment

Air pollution within the project areas has not been extensively documented; however, motor vehicles are usually the primary source of air emissions. The FDEP has designated Monroe County as an air quality attainment area, meaning that air quality standards set by both FDEP and the EPA are maintained countywide (Monroe County, 1995). Air quality in the Florida Keys is generally excellent, and data from FDEP's two ambient air monitoring stations in Key West and Marathon indicate that particulate matter concentrations remain well below the State

standards. The affected environment for air quality is similar to that described in PEA Section 3.4.1 (Air Quality, Affected Environment).

Environmental Consequences

Under the No Action Alternative, FEMA would not fund the proposed wastewater management improvements. KLTV and KLP residents would still need to comply with Florida Statutory Treatment Standards of 2010. It is anticipated that effects on air quality, once funding is secured, would be similar to those under Alternatives 2 and 3.

Under both Alternative 2 and 3, minor temporary adverse effects on air quality would occur during construction from increased exhaust pollutants and fugitive dust. These temporary effects could be mitigated through standard construction BMPs, including decreasing vehicle idle times and watering down construction areas. WWTP operations effects on air quality would be similar to those discussed in PEA Section 3.4.2.2 (Environmental Consequences, Alternative 2 – Centralized Wastewater Treatment Plant). The pump station minimizes odors by controlling air emissions from equipment. The only release of air occurs from the blower exhaust at the pump station, which passes through a biofilter before emission. In addition, an odor control system, such as an in-ground wood chip bed or packaged iron fillings bed, would be implemented to minimize odors. No long-term effects on air quality are anticipated.

3.5 CULTURAL RESOURCES

Affected Environment

PEA Section 3.5.1 (Cultural Resources, Affected Environment) provides an overview of Monroe County's cultural history. In addition to review under NEPA, consideration of effects on cultural resources is mandated under Section 106 of the National Historic Preservation Act (NHPA), as amended, and as implemented by 36 CFR Part 800. Requirements include identification of significant historic properties that may be affected by the proposed project. For the purposes of Section 106, historic properties are defined as archaeological sites, buildings, structures, districts, or sites that are listed in or are eligible for listing in the National Register of Historic Places (36 CFR 60.4).

As defined in 36 CFR Part 800.16(d), the Area of Potential Effect (APE) "is the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist."

The APE for Alternatives 2 and 3 differ, and are described in Sections 2.2 and 2.3 respectively. However, the KLTV and KLP service areas are the same for both WWTP site alternatives. In addition to identifying historic properties that may exist in the proposed project's APE, the Federal agency must also determine, in consultation with the appropriate State Historic Preservation Officer (SHPO), what effect, if any, the action would have on historic properties. Moreover, if the project would have an adverse effect to these properties, the Federal agency must consult with the SHPO on ways to avoid, minimize, or mitigate the adverse effect.

Cultural Resources Assessments of Alternatives 2 (exclusive of the yet to be identified 2.6 acre rehabilitation site) and 3 were done by URS archaeologists. The purpose of these assessments

was to assist FEMA's project planning, ensure NEPA and NHPA compliance, and provide the Florida SHPO at the Florida Division of Historic Resources (DHR) with information on potential cultural resource effects. The assessments included a search of the Florida Master Site File, maintained by the DHR. Files indicate that there are nine known historic properties near the APE for Alternative 2. The Florida Master File indicates that there are no known historic properties within or near the APE of Alternative 3.

DHR sites 8MO26, 8MO27, and 8MO1258 are located north of the proposed WWTP site for Alternative 2, across US–1, and between KLP and KLTV, in the Calusa Campground. DHR Site 8MO1258, a rock mound and midden, is a National Register-listed archaeological site. The two other DHR sites north of US-1, 8MO26 and DHR 8MO27, have been nominated to the National Register, but were not listed (Rock Mound National Register Nomination 1974). Both of these two sites are rock mounds with associated middens dating from the Glades period. Remains of these resources were observed and documented during a November 14, 2003 URS site visit in the Calusa Campground (see Appendix G).

Four of the other sites are likely related and are located northeast of the Alternative 2 proposed WWTP site. They are DHR sites 8MO2057 and 8MO2058, historic cisterns; 8MO2060, a historic pioneer domestic site; and 8MO2067, a historic cistern and home site, all of which are probably associated with the settlement of Newport Village. The two remaining prehistoric DHR sites, 8MO2061 and 8MO2066 are shell middens. A site-visit was conducted at the Alternative 2 WWTP site on January 10, 2001 by a URS archaeologist. The purpose of this survey was to identify visible cultural resources and to assess the necessity for a more detailed archaeological survey. URS staff conducted a pedestrian survey of the WWTP APE, noting soil conditions, signs of disturbance, and any visible evidence of cultural resources. No historic properties were observed during the survey and the site conditions suggested a low probability for presence of significant cultural resources. The results of this survey were submitted to the DHR (See Appendix G, Cultural Resources Correspondence).

A site visit was conducted by URS staff at the Alternative 3 site on April 24, 2003. The proposed WWTP site is about 200 feet wide by 900 feet long, covering 3.8 acres. The site has been cleared, grubbed, and developed. It is presently used for boat and vehicle storage. US-1 runs along the western property boundary; the northern and southern property boundaries border on undeveloped hardwood hammock habitat. The closest private residence is located about 100 feet (0.02 mile) west of the site. The closest water body to the site is the Florida Straits, immediately east of the site. Florida Bay is located about 1,350 feet (0.26 mile) west of the site. Boats, trailers, lumber, and other construction debris are strewn about the entire property.

There is no source of potable water and no vegetation across most of the parcel. No historic features or historic properties were noted during the survey, and it is apparent that the area has been intensively used during the second half of the 20th century. The results of this survey were submitted to the Florida DHR (See Appendix G, Cultural Resources Assessment Survey).

Environmental Consequences

Under Alternative 1, the No Action Alternative, FEMA would not provide funds for wastewater management improvements. Key Largo residents would still need to comply with Florida Statutory Treatment Standards of 2010. It is anticipated that once funding is secured, effects on cultural resources would be similar to those under Alternatives 2 and 3.

The APEs for Alternatives 2 and 3 have been affected by modern disturbances. This coupled with the absence of visible cultural resources, the highly depleted or absent soils, and the lack of potable water, indicates that there is a very low probability of significant cultural resources occurring within the WWTP sites. The service areas are similarly disturbed from residential construction and road work. Therefore, no effect on historic, archaeological, or cultural resources is anticipated from either Alternative. In letters dated May 16, 2001, and August 18, 2003, respectively, the Florida DHR concurred with the findings that no historic properties were likely to be located within either the Alternative 2 or 3 WWTP sites (see Appendix G). Although the Calusa Campground is not incorporated in the currently proposed service areas, the above-described historic properties may be adversely affected if the KLWTD connects this facility to the KLTV or KLP collection system. The KLWTD would be advised to avoid sensitive archaeological features, have professional on-site archaeological monitoring during collection system work, and further coordinate activities with the SHPO. Furthermore, although the 2.6 acre rehabilitation site is likely to have been previously disturbed, site work and planting activities have the potential to affect historic properties. Accordingly, should Alternative 2 be selected, further cultural resources evaluation will be required, including SHPO consultation.

Should any unanticipated historic or archeological materials be discovered during project work, however, all activities on the site shall be halted immediately and the KLWTD shall consult with FEMA, SHPO, and other appropriate agencies for further guidance. In addition, if human remains are discovered, Florida's unmarked human burial law will be implemented (Florida Statute Title XLVI, 872.05 Unmarked human burials), specifically:

> When an unmarked human burial is discovered…all activity that may disturb the unmarked human burial shall cease immediately, and the district medical examiner shall be notified. Such activity shall not resume unless specifically authorized by the district medical examiner or the State Archaeologist. If the district medical examiner finds that the unmarked human burial may be involved in a legal investigation or represents the burial of an individual who has been dead less than 75 years, the district medical examiner shall assume jurisdiction over and responsibility for such unmarked human burial, and no other provisions of this section shall apply. The district medical examiner shall have 30 days after notification of the unmarked human burial to determine if he or she shall maintain jurisdiction or refer the matter to the State Archaeologist. If the district medical examiner finds that the unmarked human burial is not involved in a legal investigation and represents the burial of an individual who has been dead 75 years or more, he or she shall notify the State Archaeologist, and the division may assume jurisdiction over and responsibility for the unmarked human burial pursuant to subsection (6) [of Florida Statute 872.05]. When the division assumes jurisdiction over an unmarked human burial, the State Archaeologist shall consult a human skeletal analyst who shall report within 15 days as to the cultural and biological characteristics of the human skeletal remains and where such burial or remains should be held prior to a final disposition [Florida Statute Title XLVI, Chapter 872.05].

3.6 SOCIOECONOMIC RESOURCES

3.6.1 Tourism

Affected Environment

Tourist facilities on Key Largo are located on both the bay and ocean sides of the island and are concentrated along the US-1 corridor. Facilities include a dive shop, hotels and resorts, marina and boat ramp, and commercial businesses. Since about the 1950s, Key Largo shifted its economic focus to tourism and is now known as the "diving capital of the world" (FloridaKeys.com, 2003). Tourism is an important component of Key Largo's economy, and many facilities take advantage of natural areas such as John Pennekamp State Park (ecotourism) and local marine resources. Table 3-3 lists tourist and commercial businesses located near the project sites and service areas.

Table 3-3. Project Area Businesses

Business Name	Location
Scotty's Hardware	Key Largo Park
PYM Marine	Key Largo Park
Auto Doctor	Key Largo Park
Al's Wrecker Service	Key Largo Park
Unique Marine	MM 100 Overseas Highway
Enterprise Car Rental	MM 99.5 Overseas Highway
Frank's Key Cafe	MM 99.5 Overseas Highway
Le Shoppe Hair Salon	MM 99 Overseas Highway
Tropical Cleaners	MM 99 Overseas Highway
Shell Gas Station	MM 99 Overseas Highway
Ramada Hotel	MM 99 Overseas Highway
Holiday Inn	MM 99 Overseas Highway
Citgo Gas Station	MM 99 Overseas Highway
Hess Gas Station	MM 99 Overseas Highway
TIB Bank	MM 99 Overseas Highway
DJ's Diner	MM 99 Overseas Highway
Key Largo Travel Lodge	MM 99 Overseas Highway
Yesterday's Consignment	MM 99 Overseas Highway
Pink Juntique	98725 Overseas Highway
Joyce Bennet School of Dance	MM 98.5 Overseas Highway
Thom Thumb Gas Station	MM 98.5 Overseas Highway
Papa John's Pizza	MM 98.5 Overseas Highway
Key Largo Boating Center	MM 98.5 Overseas Highway
Sea Trail Hotel	98620 Overseas Highway

Table 3-3. Project Area Businesses

Business Name	Location
Taco Bell	MM 98.5 Overseas Highway
Kentucky Fried Chicken	MM 98.5 Overseas Highway
Mermaid Marine Ship Store	MM 98.5 Overseas Highway
Discount Auto Parts	MM 98.5 Overseas Highway
NAPA Auto Parts	MM 98.5 Overseas Highway
Mel Harris's Boat Yard	MM 98 Overseas Highway
Ballyhoo Seafood Restaurant	MM 98 Overseas Highway
Tom Thumb Gas Station	MM 98 Overseas Highway

Environmental Consequences

Under the No Action Alternative, FEMA would not fund the proposed wastewater management improvements. Wastewater projects may be funded by local sources, which may increase local taxes. These costs could be passed on to Keys tourists through higher costs for hotels, food, and other goods and services. In addition, economic losses from decreased water quality, such as area beach advisories and storm damage of the existing wastewater infrastructure, would continue until wastewater improvements were implemented. It is anticipated that once funding is secured, effects to tourism would be similar to those under Alternatives 2 or 3.

Under Alternatives 2 and 3, adverse construction effects on Key Largo tourism would be short-term and minor. Collection system installation would temporarily hinder, but not obstruct, service area traffic movement. Appropriate signage and traffic management, as described in PEA Section 3.9.1 (Traffic and Circulation), would reduce the degree of this impact. Installation and operation of the treatment plant is not expected to impact tourism beyond those effects described in PEA Section 3.6.1.2.1 (Socioeconomic Resources; Tourism; Environmental Consequences – Alternative 2). Additionally, improved water quality in the Key Largo area may benefit the tourism industry by incrementally increasing tourist enjoyment of activities listed in PEA Section 3.6.1.1 (Tourism, Affected Environment).

3.6.2 Fishing Industry

Affected Environment

Key Largo ranks as one of the best sport-fishing areas in the world (FloridaKeys.com, 2003). Species recreationally harvested around Key Largo include tarpon, bonefish, kingfish, dolphin, sailfish, wahoo, snapper, grouper, shark, and barracuda. Several fishing tournaments are held in Key Largo throughout the year (Keys Technologies, 2003). Commercially harvested species that may occupy the Key Largo nearshore waters include spiny lobster, white mullet, gray snapper, various flounder, shrimp and stone crab. In the 2000 Census, over 100 individuals in Key Largo listed their occupation as fisherman (U.S. Census, 2000) The affected environment for the fishing industry is described further in PEA Section 3.6.2.1 (Fishing Industry, Affected Environment).

Environmental Consequences

Under the No Action Alternative, FEMA would not fund wastewater management improvements. Any environmental benefits to the fishing industry would be delayed until funding was obtained for wastewater management improvements on Key Largo (as described in PEA Section 3.6.2.2.1, [No Action Alternative]).

Under both Alternatives 2 and 3, FEMA would provide funding to build a WWTP and or collection system. This project is expected to improve, at least the service area's, nearshore water quality, which in turn would incrementally benefit nearshore commercial and recreational species that are currently being adversely affected by poor water quality. Beneficial effects on commercial fishing are described in PEA Section 3.6.2.2 (Environmental Consequences). Furthermore, FEMA consulted the NMFS regarding the potential effects of Alternatives 2 and 3 on fisheries resources. The NMFS stated in their June 24, 2003, letter that neither alternative would be likely to affect EFH; therefore, no further action is required under MSA and SFA. Agency coordination letters for this SEA are in Appendix B.

3.6.3 Local Fees and Taxes

Affected Environment

Monroe County residents must pay county, State, and Federal taxes. The average property tax rate for all Monroe County districts is 13.4 percent of the appraised property value, excluding property tax deductions such as the homestead exemption (Monroe County, 2001b). Several governmental agencies within Monroe County affect the total property tax rate to provide revenue for local services. Additional details on local taxes are in PEA Section 3.6.3.1 (Local Fees and Taxes, Affected Environment).

3.6.3.1 Existing Wastewater Management Costs in the KLTV and KLP Service Area

For the purpose of this SEA, wastewater management cost discussions include reference to:

1) **system capital costs,** which include expenses associated with planning, designing, engineering, purchasing, building, and installing a wastewater treatment system, and the required wastewater conveyance piping in public ROWs and selected effluent disposal method;
2) **abandonment and lateral costs,** which include the expenses associated with removal and disposal of the existing wastewater treatment system and piping on service recipients' property for connection to a new system; and
3) **operation and maintenance (O&M) costs** for the new system.

Five basic types of wastewater systems are presently used in Monroe County: cesspits, septic systems, on-site aerobic treatment unit (ATU), OWNRS, and centralized WWTPs. On Key Largo, cesspools and septic systems are currently utilized by property owners. Septic systems collect sewage in a tank and allow the liquid waste to filter through a drainfield into shallow soils and subsurface limestone. For septic systems in working condition, pumping to remove solid waste is needed only about every 6 to 10 years (D and D Enterprises, Inc., Pers. Comm., 2001).

The cost to pump a standard 1,000-gallon septic tank, presently about $300, would average about $38 a year or a little over $3 a month if pumped once every 8 years.

Almost all cesspits in the Keys are at residences built before 1970. From discussions with wastewater service companies in the Keys, it was found that "properly" functioning cesspits (i.e., those that drain and leach out effluent into the surrounding soil and subsurface limestone) do not need to be pumped out and consequently have little or no associated operation and maintenance costs. As most of them were installed more than 30 years ago, there are also currently no associated system capital costs. Cesspits are currently illegal to install in Monroe County and are being removed as part of the Monroe Cesspit Identification and Elimination Grant Program (discussed in detail in PEA Section 3.6.3.2.1 [Local Fees and Taxes, Environmental Consequences]).

For comparison, the average monthly wastewater rates for customers that currently use non-compliant WWTP systems in other parts of Monroe County are $56, $64, and $55 per month for customers of Key Haven Utilities, Ocean Reef Club, and Key West Resort Utilities, respectively.

As noted above in Table 3-3 and Section 3.6.1, there are numerous commercial businesses in the KLTV and KLP service areas. Like the residences in the service areas, most of these businesses currently use septic systems (Sheets, Pers. Comm., 2003b). Some of the larger hotels in Key Largo have their own advanced wastewater treatment systems, and would not require additional services.

Additional information related to local fees and taxes is in PEA Section 3.6.3 (Local Fees and Taxes).

Environmental Consequences

Under the No Action Alternative, FEMA would not fund the proposed wastewater management improvements. To achieve compliance with Florida Statutory Treatment Standards, residents and businesses would have to use other funding for improvements.

Economic effects of the No Action Alternative on local wastewater fees or taxes are difficult to quantify, as they will depend on the final costs of the 2010-compliant systems chosen, the amount of State and Federal grants and contributions, and the details of the chosen financing options, including applicable repayment terms. Based upon information in PEA Section 3.6.3.3, the No Action Alternative may result in higher wastewater management costs for KLTV and KLP service area residents and businesses than would be expected from either FEMA-funded Alternative 2 or 3. However, it should be noted that the KLWTD has adopted wastewater cost reasonableness goals (Resolution 2003-6) of $2,700 per EDU for system capital costs and $35 a month for O&M fees (KLWTD, 2003).

Under Alternatives 2 and 3, the estimated system capital cost and monthly O&M fee to service recipients after grant funding has been applied, is as noted above; $2,700 per EDU and $35 per month (with no capital costs included) for system capital costs and O&M fee, respectively. In addition, all property owners would be assessed a yearly tax of $35 per $100,000 of appraised property value (Sheets, Pers. Comm., 2003). Service area property owners would also pay for their on-site system abandonment and lateral connection costs, estimated between $1,500 and $5,000 per EDU depending on the type of existing on-site system and the amount of work needed to remove or abandon the system (PEA Section 3.6.3.2.2).

Under both Alternatives 2 and 3, businesses in the service areas would be assessed wastewater fees in the same manner as residential service recipients, with system capital costs following the rates outlined above and monthly O&M fees following a flow-based rate structure. The flow-based rate structure would follow the same per EDU cost as residential service recipients. Businesses that used more than one EDU worth of water would be charged accordingly. As an example, under Alternative 2, a business that generated 2.5 times the residential EDU amount would be charged 2.5 times the residential O&M rate or $87.50. Those businesses whose wastewater discharge rates are less than their clean water consumption rates or businesses that operate under extenuating circumstances will have the opportunity to discuss their situation with the KLWTD and will have the option to petition for a wastewater flow analysis to determine wastewater generation (Sheets, Pers. Comm., 2003).

Also, under both Alternatives 2 and 3, service recipients unable to pay their system capital cost in full at the time of availability of service would be able to make amortized annual payments of principal plus interest (currently estimated at 5 percent) under a 20-year, non-ad valorem special assessment, which would be included on their annual property taxes (Sheets, Pers. Comm., 2003). Under Alternatives 2 and 3, this assessment would be about $216.65 a year for 20 years.

Under both Alternatives 2 and 3, wastewater costs would be required to be near the affordability threshold of 2 percent of Median Household Income ($75 per month) and within the per EDU O&M ($30-60 per month) and system capital cost ranges set forth, intended for eligible low-income and very-low property owners, in PEA Section 3.6.3 ($3,000 to $4,500, as spread over a 20-year term). Alternatives 2 and 3 are currently within these ranges. With the use of FEMA grant funding towards wastewater system costs for KLTV and KLP, no substantial economic impacts to service recipients are expected.

3.6.4 Public Health

Affected Environment

As discussed in Section 3.2.2.2 (Nearshore and Offshore Marine Waters), beach water quality data has been collected since August 2000 by Florida DOH from the John Pennekamp State Park monitoring station on Key Largo (MM 105). On 11 separate occasions, these data indicated elevated levels of fecal coliform and *Enterococcus* sp. in the vicinity of the monitoring station that could potentially pose a health risk. Consequently, the Florida DOH issued five health advisories/warnings (DOH, 2003). The John Pennekamp State Park monitoring station is about 2.4 miles northeast of the Key Largo project site and is the closest monitoring station to the service area. Public health consequences from contaminated water are described further in PEA Section 3.6.4.1 (Public Health, Affected Environment).

Environmental Consequences

Under the No Action Alternative, it is likely that nearshore and offshore water quality conditions affecting public health would improve, but the rate of improvement depends on funding to implement wastewater management improvements. Available Keys data do not conclusively link instances of infection or health problems to groundwater or offshore contamination caused by current sewage treatment practices. However, as described in PEA Section 3.6.4.1 (Affected Environment), the presence of enteric microbes in canals and nearshore marine waters can pose a

health risk through ingestion (e.g., while swimming), inhalation contaminated water spray (e.g., while boating), or eating contaminated seafood (Paul et al., 1995; Caffry, Pers. Comm., 2001). Therefore, it may be reasonably assumed that public health risks related to the presence of enteric microbes exist and would continue to exist under this No Action alternative.

Under Alternatives 2 and 3, at least service area residents would benefit from reduced nearshore sewage discharges near KLTV and KLTV from improved wastewater treatment. The environmental consequences of both Alternatives 2 and 3 are discussed further in PEA Section 3.6.4.2.2 (Alternative 2 – Centralized Wastewater Treatment Plant).

3.7 DEMOGRAPHICS AND ENVIRONMENTAL JUSTICE

Executive Order (EO) 12898 (Environmental Justice), entitled "Federal Action to Address Environmental Justice in Minority Populations," directs Federal agencies "to make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States…" EO 12898 also requires Federal agencies to ensure that public notifications regarding environmental issues are concise, understandable, and easily accessible. Accordingly, the socioeconomic and demographic conditions in the service area were examined, including alternative effects.

Affected Environment

3.7.1 Population and Race

Results from the U.S. Census (2000) were obtained for the Key Largo census designated place (CDP), which includes the project areas (KLTV and KLP, and WWTP sites). CDPs are delineated cooperatively by State and local officials and the U.S. Census Bureau, following Bureau guidelines. The total population of the Key Largo CDP is 11,886. The population is listed as 94 percent white and 2 percent other ethnic groups (U.S. Census, 2000).

3.7.2 Income and Poverty

U.S. Census (2000) data for the Key Largo CDP indicates that about 31 percent of families had incomes less than $35,000 per year, and about 32 percent had incomes between $35,000 and $59,999 per year. The remaining 37 percent had incomes greater than $60,000. The corresponding average family size for the Key Largo CDP was 2.8 people.

As discussed in PEA Section 3.7 (Socioeconomics), a common indicator of income level used by government agencies is the county-specific estimated Median Family Income (MFI). In 2003, the annual MFI for Monroe County was estimated at $56,500 (U.S. Department of Housing and Urban Development [HUD], see citation below Table 3-4.). The indicator known as the "poverty threshold" is set for the entire nation and, with the exception of Alaska and Hawaii, is not adjusted for local cost-of-living differences. For the year 2003, the poverty threshold was set at an annual income of $15,250 for a household of three people (U.S. Census, 2003). In areas like the Keys, where the cost of living is higher than the national average, $15,250 consequently buys

less, effectively making a household near the poverty threshold in the Keys poorer than similar households in areas where the cost of living is lower. The Monroe County Housing Authority currently uses the first two tiers of HUD's MFI-based income levels to administer its *low-income* assistance programs. To administer their programs fairly, HUD makes annual projections of MFI by county and adjusts for family size. The first two tiers of *low-* and *very low-income* levels are set as percentages of the county MFI. In 2003, the income limits for a family of three in Monroe County were $40,700 for the *low-income* level and $25,450 for the *very low-income* level. Table 3-4 below shows HUD's FY 2003 *low* and *very low-income* levels for various family sizes in Monroe County.

Table 3-4. Fiscal Year 2003 – HUD's *Low-Income* and *Very Low-Income* Limits, Monroe County, Florida – Median Family Income = $56,500

	Number of People in Household							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Low-Income	$31,650	$36,150	$40,700	$45,200	$48,800	$52,450	$56,050	$59,650
Very Low-Income	$19,800	$22,600	$25,450	$28,250	$30,000	$32,750	$35,050	$37,300

http://204.29.171.80/framer/navigation.asp?charset=utf-8&cc=US&frameid=1565&lc=en-us&providerid=112&realname=HUD&uid=2318084&url=http%3A%2F%2Fwww.hud.gov%2F

Published annually by U.S. Department of Housing and Urban Development.

MFI figures are projected from the most recent county-level census data.

Although no service area-specific statistics have been compiled to date, based on the above statistics and for project planning purposes, it is estimated that up to 25 percent of homestead-exempt homeowners in KLTV and KLP may be considered *low* and *very low-income*. As described in PEA Section 3.7, it has been determined that *low-* and *very low-income* service recipients would incur a financial hardship if their wastewater management costs increased.

Environmental Consequences

The installation of wastewater systems that meet Florida Statutory Treatment Standards, under any of the alternatives, would improve water quality in shallow aquifers, canals, and nearshore marine waters, and, to a lesser extent, offshore marine waters. The resulting reduced fecal contamination and nutrient pollution would likely reduce adverse effects on public health. *Low-income* and minority populations are expected to benefit from these wastewater management improvements to the same degree as other Keys demographic populations.

Under the No Action Alternative, FEMA would not fund the proposed Key Largo wastewater management project. To comply with Florida Statutory Treatment Standards of 2010, KLTV and KLP residents and businesses would have to use other funding for improvements. As described in PEA Section 3.6.3 (Local Fees and Taxes), the No Action Alternative may result in higher wastewater management costs for KLTV and KLP residents and businesses than would be expected with the benefit of FEMA funding. Households at or below the *low-income* level would incur financial hardship if their wastewater management costs increase to levels that approximate

the affordability threshold cited in PEA Section 3.6.3.1.2, of near 2 percent of Median Household Income (about $75 per month) or even the KLWTD's adopted wastewater cost goals (Resolution 2003-6). Furthermore, all property owners are responsible for the costs to abandon their onsite system and connect to a WWTP collection system, estimated between $1,500 and $5,000. On October 15, 2003, the Monroe County Board of County Commissioners passed Resolution 471-2003, which included low income assistance provisions for wastewater projects. KLWTD has endorsed these provisions and developed a Low-Income Assistance Plan (Appendix I). If the KLWTD adheres to the above affordability and low-income assistance resolutions for the No Action Alternative, no disproportionately high and adverse effects on *low-income* populations are expected.

As described in Section 3.6.3.1, for Alternatives 2 and 3, the estimated per EDU system capital cost and monthly O&M fee to service recipients, after grant funding has been applied, would be about $2,700 and $35, respectively. There would also be the yearly tax of $35 per $100,000 of appraised property value. In addition, property owners would pay for their on-site system abandonment and lateral connection costs ($1,500 to $5,000).

Under Alternatives 2 and 3, the above costs would be reduced for *low-income* and *very low-income* service recipients in compliance with EO 12898. As described in PEA Section 3.7, the estimated amount of assistance available to cover the system capital costs for homestead-exempt *low-* and *very low-income* property owners under Alternatives 2 and 3 is shown in Table 3-5. *Low-income* property owners would receive assistance with at least 70 percent of their system capital cost and 70 percent of their existing system abandonment and lateral connection costs, up to $3,000. *Very low-income* property owners would receive assistance with at least 90 percent of their system capital cost and 90 percent of their existing system abandonment and lateral connection costs, up to $3,000. For *low-income* property owners, the estimated resulting system capital cost after assistance would be about $810 in one payment or about $65 a year for 20 years (about $1,299.93 total). For *very low-income* property owners, the estimated resulting system capital cost after assistance would be about $270 in one payment, or about $21.67 a year for 20 years (about $433.31 total).

Table 3-5. Alternatives 2 and 3 *Low-Income* and *Very Low-Income* Funding Assistance for the System Capital Cost

	Amount of Assistance - % of Capital Cost Covered	Estimated System Capital Cost After Assistance	Estimated Annual Payment Assessed with Property Tax*
Low-Income Qualified Family	70%	$810.00	$67.78
Very Low-Income Qualified Family	90%	$270.00	$22.59

*Amortized annual payment of principal plus interest at 5% under a 20-year non-ad valorem special assessment.

Because the property owner's total cost for on-site system abandonment and lateral connection costs will vary from one property to the next, it is not possible to estimate the actual final costs to property owners with the assistance program. Nevertheless, the assistance program would cover

at least 90 percent of this cost for *very low-income* property owners (up to $3,000 total) and at least 70 percent of this cost for *low-income* property owners (up to $3,000 total).

At this time, no programs would be available to help *low-* and *very low-income* populations to pay the monthly O&M fees.

Under Alternatives 2 and 3, property owners unable to pay their system capital cost in full at the time of availability of service would be able to make amortized annual payments of principal plus interest (at 5 percent) under a 20-year, non-ad valorem special assessment, which would be included on their annual property taxes (Sheets, Pers. Comm., 2003).

In resolution 471-2003, Monroe County adopted an Implementation Plan that is consistent with the above provisions, to assist KLTV and KLP's low-income service recipients. This assistance will likely be funded through a Community Development Block Grant (KLWTD, 2003).

The Community Development Program Administrator in the Special Programs Office of the Monroe County Housing Authority would administer the *low-income* assistance program for Key Largo. The Implementation Plan would be administered according to the County's Housing Assistance Plan (HAP) (Amended). In part, the HAP states that all funds awarded would be in the form of grants to homeowners and loans to property owners providing rentals to qualified beneficiaries. The process for selecting, accepting, reviewing, and approving requests for assistance is outlined in Appendix I (KLWTD, 2003).

FEMA does not have specific requirements under EO 12898 to assist *low-income* renters. KLWTD has committed to provide such assistance to homeowners who rent their property to income-eligible tenants. KLWTD intends to provide the same level of assistance to this renting population, as described above.

FEMA would require Monroe County/KLWTD to meet the above guidelines during project implementation in order for the KLWTD to receive grant funding. With the implementation of the FEMA assistance program and the use of grant funding, *low-income* or *very low-income* property owners would incur no highly disproportionate or adverse economic effects under either alternative.

3.8 HAZARDOUS MATERIALS AND WASTES

Affected Environment

A Phase I Environmental Site Assessment was done by Environmental Consulting & Technology, Inc. (ECT) to evaluate possible hazardous materials and wastes at the Alternative 2 WWTP site. Phase I results indicated a low potential for site chemical contamination from onsite sources; little potential for offsite contamination from onsite sources; and little potential for site impact from offsite contaminant migration in surface and/or groundwater from adjacent sites within a 0.25-mile radius of the property (ECT, 2000).

Environmental Consequences

Under the No Action Alternative, effects related to hazardous materials and wastes are expected to be similar to Alternatives 2 and 3 described below. Wastewater sludge from the Keys would

continue to be hauled to a transfer facility and taken to a wastewater facility in Miami-Dade County for treatment.

Under Alternatives 2 and 3, wastewater would be treated as described in Section 2.2.2 (Waste Water Treatment Plant). Additional environmental consequences of these alternatives are discussed in PEA Section 3.8.2.2 (Alternative 2 – Centralized Wastewater Treatment Plant Alternative). Decanted sludge would be temporarily stored in an aerated holding tank on-site, and the liquid sludge would be hauled by truck to one of the three Monroe County Solid Waste Transfer Stations, for eventual disposal at the Miami-Dade wastewater facility.

The most common hazardous materials that enter the wastewater systems are grease and typical household cleaning products (Rios, Pers. Comm., 2001). The effects of an inadvertent disposal of hazardous wastes into wastewater effluent is more likely to affect smaller plants than larger plants like that proposed under Alternatives 2 and 3, because the materials are usually more diluted in the larger plants. However, the frequency of these incidents at a smaller facility should be correspondingly lower, so there would likely be no net increase in potential concern. Hazardous materials that would enter the WWTP may kill the biological component that treats the wastewater. Wastewater contaminated with hazardous materials would have to be pumped out and sent to a larger treatment plant for reprocessing.

Treatment chemicals would be added at various points in the treatment process. Influent wastewater pH may be adjusted by adding sodium hydroxide, a buffering agent. The sodium hydroxide would immediately dissolve, raising and neutralizing the wastewater pH. To remove phosphorus from the wastewater, metal salts may be added to coagulate the excess phosphorus. The resultant sludge would be collected and disposed, as previously described, at a Miami-Dade wastewater facility. The metal salts would be disposed with this material and would not be released to the aquifer or aquatic environment. Disinfectants, such as sodium hypochlorite or calcium hypochlorite, may be added to kill remaining biologic pathogens as the wastewater effluent is released to the environment. These materials would dissolve and disinfect the organic materials. In the process of disinfection, by-products may be formed through the interaction of chlorine with dissolved organics in the wastewater. When the treated effluent is discharged, these by-products may be diluted, volatized, or absorbed by nearby sediments and would not represent a potential hazard (U.S. Geological Survey, 2003).

Because no recognized environmental conditions were found at the Alternative 2 WWTP site, no notable environmental effects or hazardous materials abatement are anticipated for construction. If the Alternative 3 WWTP site is selected, a Phase I Environmental Site Assessment would be conducted in accordance with American Society of Testing and Materials (ASTM E)-1527 before work begins, to identify site hazardous material contamination concerns. If contamination is found, abatement would be required before site work would begin. Since the Alternative 3 VPS is located on a portion of the Alternative 2 WWTP site, no hazardous materials concerns are anticipated for VPS construction. Similarly, if Alternative 2 is selected, a Phase I Environmental Site Assessment will need to be done, as described above, for the 2.6 acre rehabilitation site, once the site has been identified.

3.9 INFRASTRUCTURE

3.9.1 Traffic and Circulation

Affected Environment

The project area is within the Tavenier Highway capacity segment (MM 91.5 to MM 99.5) and the Key Largo Highway capacity segment (MM 99.5 to MM 106). The 2001 level of service (LOS) for both segments of US-1 in the project area is Class A, classified as "good", with a travel speed criteria of 51 mph or greater; median speed through the segment was 54 mph (URS, 2002b). This LOS is above the LOS C standard (45.0 mph to 47.9 mph) adopted for Monroe County. County roads, such as those in KLP and KLTV, are subject to a lower standard (LOS D) than US-1. Based on the analysis found in the Technical Document of the Monroe County Year 2001 Comprehensive Plan, all County roads are operating at or above LOS D (Monroe County, 2002).

Environmental Consequences

Under the No Action Alternative, FEMA would not fund the proposed Key Largo wastewater management project. Therefore traffic and circulation effects would be delayed until funding is secured for system upgrades to the Florida Statutory Treatment Standards of 2010. Nonetheless, it is anticipated that effects would be similar to those under Alternatives 2 and 3.

Under Alternatives 2 and 3, construction traffic would temporarily increase during wastewater project implementation. Temporary construction traffic would increase near the proposed WWTP facility and would last for about 8 months from the start of construction. Construction activities are not expected to interrupt vehicular traffic on US-1. Collection system installation would temporarily hinder, but not obstruct, traffic movement to and from local businesses and residences in KLTV or KLP. Under Alternative 3, pipeline trenching activities for building the transmission system would not obstruct the access roads to US-1.

Public service disruptions from construction are expected to be brief and infrequent. During construction, minor detours may be needed to allow homeowners access to their property (FKAA, 2002). A traffic control plan would be developed and implemented as required by funding and/or permitting agencies. This plan would include specific information about temporary traffic control, alternate routes, staging area locations, and optimal working times to minimize traffic disruption. Construction activities in roadway ROWs would not be subject to Monroe County Land Development Regulations since development, as defined by the Monroe County Comprehensive Plan (Monroe County, 1995), excludes roads. Florida Department of Transportation permitting may be required for work in the US-1 ROW.

3.9.2 Utilities and Services

Affected Environment

Electricity, gas, and potable water services are discussed in PEA Section 3.9.2.1 (Public Utilities and Services, Affected Environment). There is an existing 12-inch water main in the east ROW

of US-1 situated immediately adjacent to the Alternative 2 proposed WWTP site at MM 100.5. The main types of wastewater treatment systems in the service areas are septic tanks and cesspools. There are about 467 of these systems in the service areas (FKAA, 2003)

Environmental Consequences

Under the No Action Alternative, the KLWTD would not receive FEMA funds for wastewater management. However, KLTV and KLP residents would still be required to comply with the Florida Statutory Treatment Standards of 2010. Once an alternate funding source has been secured, it is anticipated that effects on services and utilities would be similar to those under Alternatives 2 and 3.

Under Alternatives 2 and 3, there would likely be temporary utility and service disruptions during construction. Key Largo is largely developed and has all utilities/services that would support the proposed wastewater treatment improvements. The KLWTD would contact the diggers/excavation utility hotline at the Sunshine State One Call Center at least 2 business days before construction to identify underground utilities that may be near the project sites and to ensure that there are minimal disruptions to services during wastewater project construction. Brief disruption to wastewater service will occur as residents and businesses connect to the new wastewater system. If proper utility notification and construction practices are observed, adverse long-term effects on service area utilities and services are not expected. Long-term beneficial effects from increased service reliability and uniform maintenance are expected as current wastewater treatment methods are discontinued and wastewater treatment becomes centrally operated. For both Alternatives 2 and 3, sewer collection mains would be installed with a 10-foot horizontal separation from the existing FKAA water system as required by FDEP. Proposed rule changes may revise the required separation of water and vacuum sewer collection mains to a 3-foot horizontal separation and 12-inch vertical separation. However, the current applicable rule requirements would be applied at the time of construction. No water service interruptions are expected.

3.10 LAND USE AND PLANNING

Affected Environment

Key Largo is part of unincorporated Monroe County. Zoning for the proposed Alternative 2 WWTP site is Suburban Commercial. Permitted land uses for the island include mobile homes, detached dwellings, vacation rentals, and commercial fishing uses. Figures 3-5a and 3-5b illustrates project site/area land uses. Zoning for the proposed Alternative 3 WWTP site is Urban Residential Mobile Home. The affected environment for land use and planning is further discussed in PEA Section 3.10.1 (Land Use and Planning, Affected Environment).

State-identified CARL is not present in the service area. However, there are CARL lands near the Alternatives 2 and 3 sites. The Alternative 2 site borders the Newport Hammock site. The Newport Hammock site is a 191-acre high-quality hardwood hammock habitat parcel (FDEP, 2003). The FDEP considered purchase of the Alternative 2 site under the CARL program before Monroe County purchased it (FFWCC 2000, USFWS 2000). The Point Charles Hammock site is located next to the Alternative 3 WWTP site. The Port Charles Site is of lesser quality than the

Newport Hammock site (FDEP, 2003). Two Coastal Barrier Resource System (CBRS) units (Coastal Barrier Resource Area Zones), FL-37 and FL-36P are located near the project sites (Reisinger, Pers. Comm., 2003). FL-37 is located near MM 96 and FL-36 is located near MM 102.

The portion of Key Largo associated with the project sites is located within a larger Planning Area Enumeration District 21 (located from approximately MM 99.5 to MM 112.5; Monroe County, 2002).

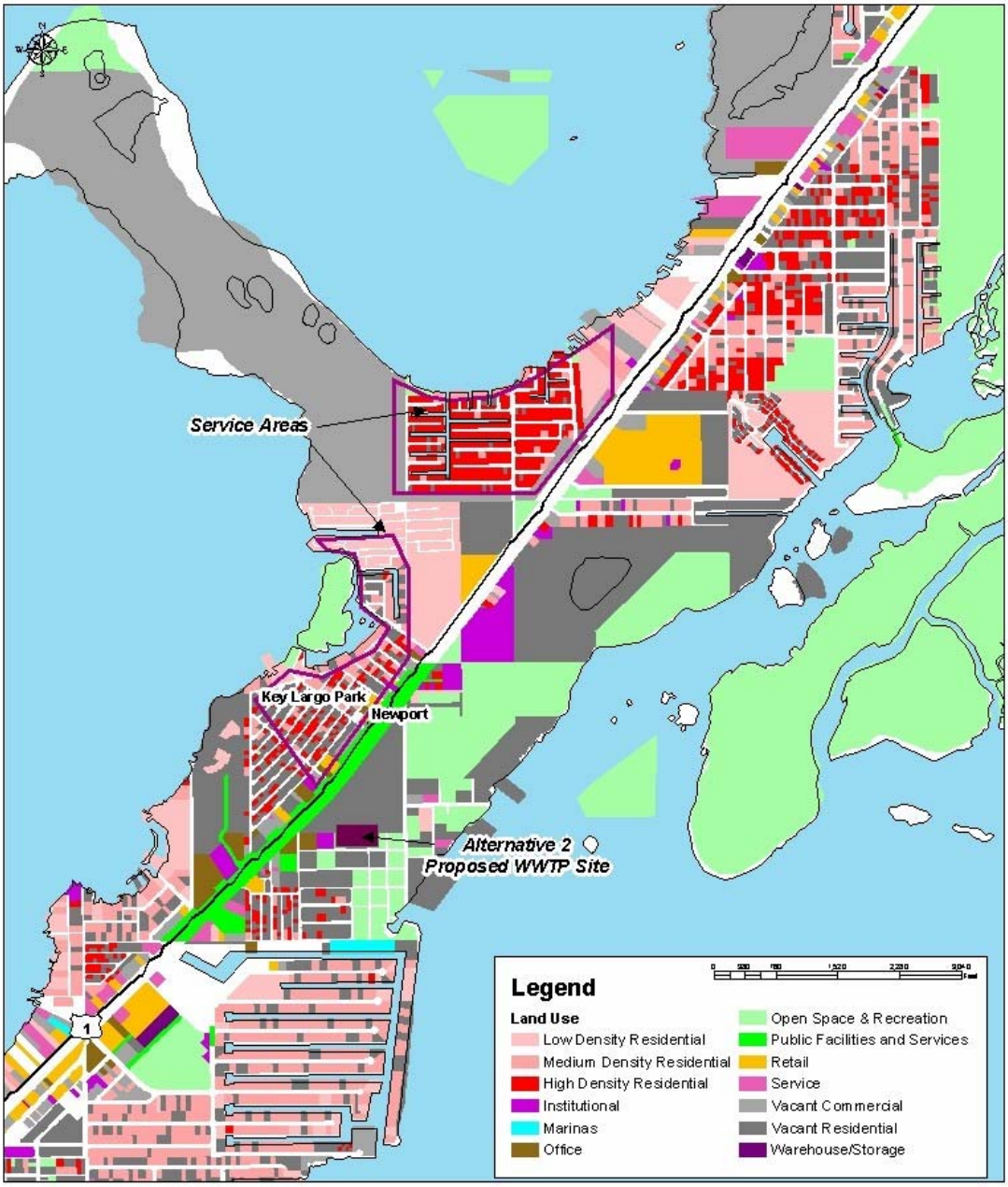


Figure 3-5a. Project Area Land Use (Service Areas and Alternative 2 WWTP site) (Monroe County Property Appraiser's Database, 2001)

Figure 3-5b. Project Area Land Use (Alterative 3 WWTP site) (Monroe County Property Appraiser's Database, 2001)

Environmental Consequences

Under the No Action Alternative, KLWTD would not receive FEMA funds for wastewater management. KLTV and KLP residents would still need to comply with Florida Statutory Treatment Standards of 2010. It is anticipated that once funding is secured, effects on land use and planning would be similar to those under Alternatives 2 and 3.

Under Alternative 2, the proposed WWTP would be on Monroe County property, which may be deeded to the KLWTD. In accordance with the Monroe County Comprehensive Plan (Sections 9.5-257.4 and 9.5-257.5), construction of a new treatment plant or pump station would not require amendments to the permitted land uses in areas zoned either Suburban Commercial or Suburban Residential as discussed in PEA Section 3.10.2.1 (Land Use and Planning – Environmental Consequences – Alternative 1).

Effects on land use and planning for Alternative 2 are further discussed in PEA Section 3.10.2.2 (Land Use and Planning, Environmental Consequences). Construction and operation of the WWTP would be consistent with the current land use at the adjacent FKAA maintenance facility. Although the 2.6 acre rehabilitation site has not been identified, it is expected that a conservation use would be consistent with surrounding land uses.

Under Alternative 3, the property would have to be purchased by Monroe County or the KLWTD. In accordance with the Monroe County Comprehensive Plan (Sections 9.5-257.4 and 9.5-257.5), construction of a new treatment plant or pump station would not require amendments to the permitted land uses in areas zoned Urban Residential Mobile Home as discussed in PEA Section 3.10.2.1 (Land Use and Planning – Environmental Consequences – Alternative 1). Under this alternative, the VPS would be constructed at the Alternative 2 site. The effects on land use and planning would be similar to those previously stated.

Effects on land use and planning for Alternative 3 are further discussed in PEA Section 3.10.2.2 (PEA Section 3.10.2.2 (Land Use and Planning, Environmental Consequences). Construction and operation of the WWTP would be consistent with the current land use at this property.

As described in PEA Section 3.10 (Land Use and Planning), development within the Keys is not controlled by addition of key infrastructure, but instead by Monroe County's ROGO permit allocation system. Installing new wastewater treatment infrastructure in the Florida Keys is essential to effectively treat existing wastewater flows, and would not introduce or support increased development. Therefore, growth and development occurring after implementation of either alternative would be the result of established county planning and not of the proposed wastewater management improvements.

Construction activities would be limited to the project sites and would not directly impact CARL lands. However, under Alternative 2, about 18.4 acres of the 21-acre parcel for the WWTP would be preserved in perpetuity under a conservation easement. Nearby CBRS units, would not be affected by either alternative or served by the proposed WWTP.

FEMA consulted the Florida DCA on potential project effects. In a letter dated August 5, 2003, the Florida Office of Intergovernmental Programs, on behalf of DCA, FDEP and the South Florida Regional Planning Council, stated that for Alternatives 2 and 3, water quality improvement in the Keys was an agency priority and that it supports the proposed projects and they are consistent with the State's comprehensive coastal management program (Appendix B).

3.11 NOISE AND VISUAL RESOURCES

3.11.1 Noise

Affected Environment

Noise within the project areas has not been well documented but is associated primarily with traffic. Sensitive noise receptors are considered to be areas that sustain greater effects from noise sources than other areas (such as industrial areas). Sensitive receptors to noise typically include churches, schools, homes and residential areas, hospitals, and public facilities.

Potential noise receptors in the project areas were documented by URS on April 24, 2003. As discussed in PEA Section 3.11.1.1 (Noise), the KLTV and KLP service areas are urban residential and the overall noise level for this type of classification is moderately loud along a major roadway (US-1). These service area residents would be the noise receptors. The proposed Alternative 2 WWTP site consists of a 21-acre tropical hardwood hammock parcel, of which only 2.6 acres would be developed. This forested natural site may be considered a mixed urban commercial/residential area. The lots located north of the proposed project site are vegetated and provide a level of noise buffering for these properties. An existing FKAA facility and commercial businesses occur south of the proposed project site. Most of the noise at the proposed project site is from:

- General vehicle operation along US-1, about 20 feet west of the project site;
- FKAA facilities immediately south and adjacent to the site;
- The Keys sanitation waste transfer facility about 50 feet east of the site (across Central Avenue);
- Commercial businesses on the west side of US-1, about 100 feet from the site; and
- Commercial businesses about 880 feet south of the site.

Observed noise receptors near the project site include:

- Residents near Central Avenue (the closest home is about 300 feet east of the site parcel);
- The Church of Christ at 100695 Overseas Highway, about 350 feet north of the site;
- Key Largo Church of the Nazarene, about 100 feet west of the site, on the west side of US-1; and
- Key Largo Seventh Day Adventist Church, about 100 feet west of the site, on the west side of US-1.

The Alternative 3 WWTP site consists of developed commercial land. Natural undeveloped lands, characterized as hardwood hammock habitat, border the site to the northeast and southwest. The site is bordered by the Atlantic Ocean on the east and US-1 to the west. The vegetation currently provides some noise buffering north and south of the site. The site may be considered a commercial area along a major roadway. As discussed in PEA Section 3.11.1 (Noise), the overall noise level for this type of classification is moderately loud. Noise

characteristics at the Alternative 3 VPS site are as described under Alternative 2. Most noise at the WWTP site is from:

- General vehicle operation along US-1 about 20 feet west of the site;
- Commercial businesses adjacent to the site;
- A marina about 1,000 feet south of the site; and
- Commercial businesses adjacent to the WTS along US-1.

The only observed noise receptors near the project site are residents, the closest home is about 500 feet west of the project site on the west side of US-1.

Environmental Consequences

Under the No Action Alternative, the KLWTD would not receive FEMA funds for wastewater management projects. Service area residents would still need to comply with Florida Statutory Treatment Standards of 2010. It is anticipated that effects on noise levels, once funding is secured, would be similar to those under Alternatives 2 and 3.

Alternatives 2 and 3 would involve a similar range of construction activities and the noise effects within the project areas would be similar as discussed in PEA Section 3.11.1.2 (Environmental Consequences). An increase in localized noise levels would occur at various locations throughout the approximate 8-month construction period (Teague, Pers. Comm., 2001). KLP and KLTV residents may experience disruptive noises during construction work hours, but these are permissible under current Monroe County Code (Article III, Sections 13-51 to 13-55). The potential for residents to experience hearing damage or loss due to construction noises is considered low.

Under Alternatives 2 and 3, construction and operation of the WWTP would have little impact on sensitive receptors due to their distance from the construction area. However, construction personnel would be required to observe the established noise ordinance of Monroe County Code to reduce disruptive noises to adjacent areas. For Alternative 2, it is anticipated that the FKAA maintenance facility to the south and the undeveloped 19-acre parcel to the north and east of the site would provide adequate noise buffering from both plant construction and operation. For Alternative 3, it is anticipated that US-1 to the west, vegetative areas on parcels to the north and south, and the Atlantic Ocean to the east would provide adequate noise buffering from both plant construction and operation. Should the adjacent lots be developed in the future, vegetative buffering may be required to mitigate potential noise pollution.

To protect against noise effects, construction workers and plant operators would be required to comply with applicable occupational safety regulations and implement appropriate noise control measures, such as wearing hearing protection (e.g., earplugs, ear muffs, a helmet, or canal caps) and limiting exposure times. If these measures are implemented during construction and operations, no adverse noise effects on workers are anticipated.

3.11.2 Visual Resources

Affected Environment

As discussed in PEA Section 3.11.2 (Visual Resources), visual resources refer to the landscape character (what is seen), visual sensitivity (human preferences and values regarding what is seen), scenic integrity (degree of intactness and wholeness of landscape character), and landscape visibility (relative distances of seen areas) of a geographically defined "viewshed." A visual resources assessment was conducted for the project areas by URS on April 24, 2003.

Key Largo is largely developed and is dominated by residential areas, roadways, canals, and commercial structures. Remaining vegetation on Key Largo has many native plant species, although habitat fragmentation and invasion by exotic species is a problem. There are areas of mangrove fringe along both sides of the island.

The Alternative 2 WWTP site is a forested natural parcel that is designated a mixed urban commercial/residential land use along a major roadway. The site consists of undeveloped high-quality hardwood hammock habitat. Only 2.6 acres located on the southern boundary of the site are proposed for WWTP construction. The hardwood hammock habitat would offer natural buffering for aesthetics to the north, east, and west. No other natural aesthetic buffers exist between the project area and adjacent commercial properties to the south. Dominant features of the project site viewshed include:

- Overseas Highway (US-1);
- FKAA facility buildings and a large parking area;
- Commercial structures; and
- Undeveloped lands, including hardwood hammock.

The Alternative 3 WWTP site is a developed commercial area along a major roadway. The site is an open area with forested parcels to the north and south. The Atlantic Ocean and US-1 border the site on the east and west, respectively. The surrounding area consists of a mix between commercial areas, single-family homes, and undeveloped natural lands (predominantly hardwood hammock habitat). Dominant features of the project site viewshed include:

- Overseas Highway (US-1);
- Commercial structures;
- Marine waters; and
- Undeveloped lands, including hardwood hammock.

Environmental Consequences

Under the No Action Alternative, the KLWTD would not receive FEMA funds for wastewater improvement projects. Service area residents would still need to comply with Florida Statutory Treatment Standards of 2010. It is anticipated that effects on visual resources, once funding is secured, would be similar to those under Alternatives 2 and 3.

Under Alternatives 2 and 3, WWTP or pump station siting would not affect the service areas' scenic quality because both proposed sites are located away from the service areas. The facility may have a negative effect on the aesthetic values of the adjacent forested sites and marine waters. To mitigate this effect, the areas surrounding the site may be landscaped with fences or vegetative screens to obscure views from US-1, the forested areas, and marine waters.

Under the No Action Alternative, FEMA would not fund the proposed wastewater management improvements. The County (Monroe County, private wastewater utility operators, business owners, and homeowners) would have to obtain alternate funding to finance the large capital costs to improve their wastewater treatment systems to meet the Florida Statutory Treatment Standards of 2010. Communities that currently use on-site systems such as cesspools and septic systems to manage wastes would have to build community or regional WWTPs, install an OWNRS. As a result, the cumulative effects on physical, biological, and socioeconomic resources would be similar for all alternatives, as discussed below. The Monroe County Planning Department provided the following list of infrastructure projects recently completed, under construction, or planned near the project area (Buckley, Pers. Comm., 2003):

- Tradewinds Hammocks-Phase I: 68-unit affordable housing project at MM 101.5; recently completed construction;
- Tradewinds Hammocks-Phase II: 52-unit affordable housing project at MM 101.5; in the planning phase; and
- KLTV Stormwater Management Project: installation of about 6,720 linear feet of vegetated, roadside swales to reduce nuisance flooding (in the planning phase - construction expected in fiscal year 2004).

4.1 TOPOGRAPHY, SOILS, AND GEOLOGY

Construction of new wastewater treatment services on Key Largo would cumulatively increase the impervious surface area; however, the actual land area required for these activities is small (maximum of 2.6 acres) relative to the total surface area of the island. Soils would be temporarily disturbed during construction, but the implementation of standard construction BMPs for erosion and sedimentation control would decrease the potential for long-term surface soil erosion. No cumulative effects are anticipated for topography and geology.

4.2 WATER RESOURCES AND WATER QUALITY

Cumulative effects on water resources, including surface waters and wetlands, and water quality for the Florida Keys are discussed in PEA Section 4.2.2 (Water Resources and Water Quality). Considering Keys-wide wastewater and stormwater management activities and the Comprehensive Everglades Restoration Program (CERP), cumulative water quality improvements are expected in the service area, in the canals and nearshore marine waters and, to a lesser extent, in offshore marine waters. The KLTV stormwater project is an example of these actions. Monroe County's Rate of Growth Ordinance, under the Florida Department of Community Affairs' oversight, controls Keys' development, and Monroe County's Floodplain Ordinance regulates building in the floodplain; both reduce adverse cumulative floodplain effects.

4.3 BIOLOGICAL RESOURCES

Cumulative effects on marine biological resources are expected to be beneficial due to improved groundwater, surface water, and marine water quality and are further discussed in PEA Section 4.2.3 (Biological Resources). Implementation of Alternative 2 would eliminate about 2.6 acres of

hardwood hammock habitat in the short-term. This, combined with other development pressure in the Key Largo area, would have a negative cumulative effect on terrestrial biological resources in the area. However, the Alternative 2 scope of work includes mitigation measures so there would be no long-term net loss of hammock from the project. Other habitat and special status species cumulative effect mitigation measures include: USFWS review of Monroe County Building Permits through a previous formal consultation with FEMA for ESA compliance and implementation of Monroe County's tiering system whereby land use is mapped into three categories (Tier I Conservation, Restoration, Protection; Tier II Transition, Reduce Sprawl; and Tier III Redevelopment, Infill Development) and development is steered away from Tier I and II lands.

4.4 AIR QUALITY

Potential cumulative effects on air quality are expected to be minor and are discussed in PEA Section 4.2.4 (Air Quality).

4.5 CULTURAL RESOURCES

Because non-Federally funded wastewater projects under the No Action Alternative would not be subject to Section 106 review for potential effects on cultural resources, potential cumulative effects on historic and cultural resources may occur. Coordination and project review with the SHPO and the Monroe County Historic Preservation Society would reduce the effects on cultural resources from ground-disturbing activities associated with wastewater projects. Cumulative effects on cultural resources are not anticipated and are discussed in PEA Section 4.2.5 (Cultural Resources).

4.6 SOCIOECONOMICS

The implementation of improved wastewater services from the proposed and future projects would cumulatively improve ground and nearshore water quality and would help reduce the number of Keys' beach and canal public health advisories. This would likely increase the number of visitors to beaches that formerly posted health advisories and/or reduce visitor pressure on alternate beaches and recreational activities, consequently having a positive effect on tourism. The cumulative effects of a strong tourism sector on the Keys economy would be positive, with a resulting increase in demand for goods and services. Cumulative water quality improvements would also benefit commercial and recreational fisheries to the extent they are currently being adversely affected by nutrient and biological pollution. Generally, it may be predicted that harvested species that occur in nearshore waters, such as spiny lobster, white mullet, gray snapper, various flounder, shrimp, and stone crab, would benefit from improved water quality. Benefits may range from relatively minor to potentially substantial improvements in harvest rates, thus benefiting the fishing industry, related industries, and consumers. With the use of FEMA funding to reduce the Key Largo wastewater project capital costs, no substantially cumulative economic impacts on service recipients are expected.

4.7 DEMOGRAPHICS AND ENVIRONMENTAL JUSTICE

The wastewater facility siting is not expected to have any cumulative adverse effects on minority and/or *low-income* populations. Although implementation of any of the alternatives would generally result in increased wastewater disposal costs for service recipients, these costs would be substantially reduced for qualifying *low-income* homeowners through implementation of the PEA financial assistance guidelines. No significant adverse cumulative economic effects on *low-income* service recipients are expected from Alternatives 2 or 3. The PEA provisions would not be required for the No Action Alternative; consequently, cumulative economic effects on *low-income* homeowners would depend on the chosen system and sponsor's rate structure. Cumulative effects on demographics and environmental justice are further discussed in PEA Section 4.2.7 (Demographics and Environmental Justice).

4.8 HAZARDOUS MATERIALS AND WASTES

Potential cumulative effects from hazardous materials and wastes are not expected under any of the alternatives, as discussed in PEA Section 4.2.8 (Hazardous Materials and Wastes).

4.9 INFRASTRUCTURE

Building wastewater facilities as proposed in Alternatives 2 or 3, in combination with other wastewater improvement activities throughout the Keys, would lead to an overall centralization of wastewater treatment systems as opposed to individual septic systems and cesspits. This should improve the maintenance and servicing of wastewater systems and improve overall water quality throughout the Keys.

4.10 LAND USE AND PLANNING

The installation of new wastewater facilities is not expected to change the County's existing growth pattern. Since the proposed facilities are outside of conservation areas, CARL lands, and CBRS units, adverse cumulative effects on these special status lands are not anticipated. The Florida Keys Tidal Restoration Project, a component of the CERP, is located south of Key Largo; so no cumulative effects with this project would occur. PEA Section 4.2.10 (Land Use and Planning) further discusses the cumulative effects of the alternatives on land use and planning.

4.11 NOISE AND VISUAL RESOURCES

Potential cumulative effects from noise and on visual resources are expected to be minor and are discussed in PEA Section 4.2.11 (Noise and Visual Resources).

FEMA's public involvement activities for the proposed Key Largo wastewater project began with the publication of a Notice of Intent (NOI) (Appendix D) to prepare this SEA. The NOI was published in *The Upper Keys Reporter* on May 30, 2003, and in the *Key West Citizen* on May 27, 2003.

In addition to FEMA's public involvement, the FKAA, KLWTD, and Monroe County Board of County Commissioners have discussed this project during some of their regularly scheduled monthly public meetings over the past year. Similarly, Monroe County held a series of public meetings throughout the Keys during the development of the MCSWMP, as described in PEA Section 5 (Public Involvement).

FEMA released the Draft SEA on November 21, 2003, for a 30-day intergovernmental review and public comment period. The Draft SEA was sent to the agencies and organizations listed in Appendix B and was available to the public at the Key Largo Branch of the Monroe County Public Library (101485 Overseas Highway, Key Largo, FL 33047) during the comment period. It was also available on the FEMA website (www.fema.ehp/docs.shtm.gov). Agency comments received to date are included in Appendix B. FEMA held a public meeting on the proposed project on December 3, 2003, at the Monroe County Key Largo Branch Library.

As part of its NEPA process, FEMA reviewed comments from the public and government agencies and addressed these comments in this Final SEA, as appropriate. Appendix E lists comments received.

6.1 MITIGATION

To mitigate adverse effects of the chosen alternative, the project applicant would be required to or it is recommended that they:

- Develop an approved Erosion and Sediment Control Plan (required);
- Implement appropriate BMPs during construction (recommended);
- Use conventional site preparation techniques before and during construction (recommended);
- Select ultraviolet radiation as the effluent disinfection method (recommended);
- Plant appropriate vegetative barriers around the WWTP site to reduce construction noise and obscure views from US-1 and any adjacent residences (recommended);
- Develop and fully implement a Stormwater Pollution Prevention Plan, under FDEP NPDES requirements (required);
- Ensure that construction workers comply with the established noise ordinances and with all applicable occupational safety regulations (required);
- Avoid environmentally sensitive lands for WWTP siting and use scarified lands (recommended);
- For Alternative 2, the WWTP site design must minimize construction effects to the hardwood hammock and to threatened and endangered species consistent with the BA and BO, including executing permanent conservation deed restrictions for the unimpacted 18.4 acres, restoring 2.6 acres of hammock (conservation land and restoration site provisions subject to FEMA and USFWS approval), and transplanting key plant/tree species from the construction area to the conservation area (See Appendices H and I) (required);
- For Alternative 2, KLWTD would comply with Monroe County Land Development Regulations Environmental Design Criteria for High Quality Hammock (see Appendix H) (required);
- Limit residential service recipients' system capital costs to no more than those presented in the PEA Section 3.6.3.2.2 ([Centralized Wastewater Treatment Plant Alternative] $4,500 per EDU after grant funding has been applied), which would be achieved by KLWTD's adherence to their cost reasonableness goal ($2,700 per EDU) (required);
- Provide wastewater service (inclusive of any amortized system capital costs) at a cost that falls near the affordability threshold described in PEA Section 3.6.3.2.2 ([Centralized Wastewater Treatment Plant] $75/month), which would be achieved by KLWTD's adherence to their cost reasonableness goal ($35/month O&M per EDU) (required); and
- Implement financial assistance, for qualifying *low-income* and *very low-income* service recipients, for system capital and service lateral and onsite system abandonment costs consistent with guidelines and definitions as described in PEA Section 3.7.1.5 (Centralized Wastewater Treatment Plant Alternative) (required).

6.2 PERMITS AND LICENSES

Permits required to build and operate the Key Largo Wastewater Treatment System are listed in PEA Appendix E (Applicable Permit Information). These permits may include an Application for a Domestic Wastewater Facility; Application to Construct/Operate/Abandon Class V Injection Well Systems; a Certification of Construction Completion; and a Certification of Monitor Well Completion. Construction activities would also require authorization in the form of two Environmental Resource Permits (ERPs); one from the FDEP and one from the Monroe County Growth Management Division NPDES permit for stormwater discharges from construction activities. Siting the wastewater treatment system in the 100-year floodplain will require compliance with Monroe County's Floodplain Ordinance. Moreover, because it is considered a critical action under EO 11988, the plant and its critical operating components must be protected to the 500-year flood per 44 CFR Part 9.11.

Construction, operation, and maintenance of either the Alternative 2 or 3 wastewater project, as outlined, would have some adverse impacts and long-term positive impacts on the human environment. Most of the adverse impacts would be short-term and construction-related. Adverse effects on topography, soils, and geology; floodplains and wetlands; terrestrial biological resources (for Alternative 3); hazardous materials and wastes; infrastructure; land use and planning; and noise and visual resources are expected to be minimal with implementation of appropriate mitigation measures. Adverse effects on air quality, tourism, the fishing industry, and cultural resources are expected to be negligible.

For either Alternative 2 or 3, positive effects on water resources, including inland, nearshore, and offshore waters, are expected from better water quality because of incremental improvements in wastewater treatment. Similarly, improved water quality will benefit public health from reduced pathogen release in the treated wastewater discharge. Marine biological resources would indirectly benefit from better water quality. It is recommended that the KLWTD initiate a water quality monitoring program during project implementation to better quantify the project's effectiveness. This can be done in coordination with existing monitoring efforts, such as those of Florida International University.

For either Alternative 2 or 3, increased wastewater management costs would have limited adverse economic effects on wastewater service recipients, particularly for those who have cesspits or septic systems; because costs are considered affordable and reasonable per the PEA. The potential for disproportionately high and adverse economic effects on low-income service recipients would be substantially reduced through implementation of Monroe County's low-income assistance plan, which is consistent with the PEA's guidance.

For Alternative 2, there would be adverse effects to terrestrial biological resources. However, these would be minimized. FEMA has received public and agency comments opposing use of the site and recommending use of scarified lands. Although FEMA generally agrees with the Florida Keys Carrying Capacity Study's finding to avoid hardwood hammock development, the County's corresponding Tier I designation, and the considerable and persistent public opposition to using this particular site, these do not carry the weight of law to require the FKAA to not select this site.

Impacts on the human environment, from either Alternative 2 or 3 are expected to be less than significant with implementation of prescribed adverse affect minimization/mitigation measures outlined in this SEA, along with applicable regulatory permit compliance.

For the No Action Alternative, environmental degradation and public health risks would persist in the near-term (i.e., the next five to 10 years). In the long-term, effects from wastewater system construction and operation would generally be similar to those described above. Environmental benefits would be delayed pending KLWTD's receipt of alternative funding. Adverse economic effects on service recipients could be substantial, particularly on low-income residents. The severity of this effect would depend upon the chosen wastewater system, level of funding assistance, and adherence to the County's cost reasonableness goals. Consequently, the significance of human environment impacts for the No Action Alternative would depend on the KLWTD's implementation choices.

These conclusions are based upon the analyses, conditions, and necessary assumptions contained in the PEA and this SEA.

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