September 2006

Final Environmental Assessment

Florida Keys Water Quality Improvements Program (FKWQIP)

Village of Islamorada Wastewater Treatment Facilities Monroe County, Florida

U.S. Army Corps of Engineers
Jacksonville District

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FINDING OF NO SIGNIFICANT IMPACT

WASTEWATER TREATMENT FACILITIES FOR THE VILLAGE OF ISLAMORADA, FLORIDA

FLORIDA KEYS WATER QUALITY IMPROVEMENTS PROGRAM

MONROE COUNTY, FLORIDA

I have reviewed the Environmental Assessment (EA) for the *Proposed Action*. This Finding incorporates by reference all discussions and conclusions contained in the EA enclosed hereto. Based on information analyzed in the EA, reflecting pertinent information obtained from agencies having jurisdiction by law and/or special expertise, I conclude that the *Proposed Action* will not significantly impact the quality of the human environment and does not require an Environmental Impact Statement. Reasons for this conclusion are in summary:

a. The *Proposed Action*: Provide federal financial and technical assistance from the Corps to develop and implement regional wastewater collection and treatment systems for the Village of Islamorada service area that would address mandatory state wastewater treatment standards. This project is being implemented under the Florida Keys Water Quality Improvement Program, which is intended to assist in alleviating water quality degradation resulting from the discharge of inadequately treated and untreated wastewater into nearshore waters of the Florida Keys National Marine Sanctuary, and includes identified hotspots in the Keys.

b. Since construction would occur in upland areas with no effects on marine resources, the U.S. Army Corps of Engineers has determined that there would be no affect on federally listed endangered or threatened species or Essential Fish Habitat under the jurisdiction of the National Marine Fisheries Service (NMFS). The NMFS has concurred with that determination. During coordination with the U.S. Fish and Wildlife Service (USFWS) it was determined that the proposed sites are not suitable habitat for federally listed species under their jurisdiction and that the propose action is likely to have no negative impacts to listed species. The USFWS has concurred with that determination.

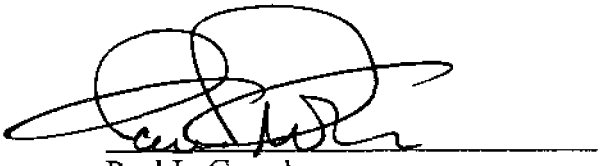
c. Upon reviewing the Draft EA and the Coastal Consistency Determination (Appendix A of this EA), the state has determined that, at this stage, the proposed activity is consistent with the Florida Coastal Zone Management Program. Refer to letter dated April 3, 2006 from the Florida State Clearinghouse in Appendix C of the Final EA.

d. There are no recorded cultural resources on the three proposed WWTF sites; however, consultation with the State Historic Preservation Officer would occur after the selected properties are purchased by the Village, to ensure no significant impacts to historical properties would occur. Should any unanticipated historic or archeological materials be discovered during project work, all activities on the sites shall be halted

immediately and the Village of Islamorada shall consult with the Corps and other concerned parties, SHPO, and other appropriate agencies for further guidance.

e. No Water Quality Certification, pursuant to Section 401 of the Clean Water Act, is required for this action.

f. Measures to eliminate, reduce, or avoid potential impacts to fish and wildlife resources include the following: (1) construction would occur on sites dominated by invasive/exotic vegetation (which would be removed); (2) only 0.35 acres of low quality hardwood hammock would be disturbed; and (3) the loss of 0.35 acres of hardwood hammock would be mitigated as discussed in the EA.



6 Jan 07

Paul L. Grosskruger
Colonel, U.S. Army
District Commander

Date

Executive Summary

The United States (U.S.) Congress has directed the U.S. Army Corps of Engineers (Corps) to assist local municipalities in Monroe County, Florida, in the planning and construction of wastewater and stormwater improvements designed to accomplish the goals listed below:

- Reduce nutrient loading to the nearshore waters of the Florida Keys National Marine Sanctuary (Sanctuary)
- Improve water quality throughout the waters of the Sanctuary
- Comply with relevant federal and state regulatory standards

A Programmatic Environmental Impact Statement (PEIS) was previously prepared by the Corps for the proposed Florida Keys Water Quality Improvements Program (FKWQIP) in accordance with the National Environmental Policy Act (NEPA) and the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations [CFR] 1500-1508). These laws and regulations require the Corps to consider and address environmental issues when funding a major federal action.

The PEIS prepared by the Corps provides a framework to address potential environmental impacts associated with design and implementation of eligible wastewater treatment projects for the FKWQIP. This Final Environmental Assessment (EA) tiers from the PEIS for the FKWQIP and hereby incorporates the PEIS by reference, in accordance with 40 CFR Part 1508.28. The Village of Islamorada wastewater treatment facilities (WWTFs) will address three of the 45 water quality *hot spots* in the Keys identified in the Monroe County Sanitary Wastewater Master Plan (MCSWMP, Monroe County 2000).

The Village of Islamorada WWTFs will address three of the 45 water quality hot spots in the Keys identified in the MCSWMP.

The overall proposed project area is the Village of Islamorada in the Upper Keys, which extends from US-1 mile marker (MM) 90.9 to MM 72.9, and includes four islands (from north to south):

- Plantation Key
- Windley Key
- Upper Matecumbe Key
- Lower Matecumbe Key

The scope of the project is the construction of three centralized wastewater treatment systems to service residents and commercial businesses located in the Village of Islamorada, Florida. All three of the WWTFs would use Immersed Membrane Bioreactor (IMB) technology, which is a common type of extended aeration process capable of meeting the Monroe County effluent standards. This technology is considered appropriate for the Village of Islamorada because land use and sludge handling are reduced, and IMB systems are able to operate over a range of influent flow rates, which is important in consideration of the Village of Islamorada's seasonal fluctuations in population and tourism. The anticipated plant capacities are less than one million

gallons per day (MGD), so all of these WWTFs will use shallow well injection pursuant to state regulatory requirements for effluent disposal. The proposed design capacities of the WWTFs are:

- Plantation Key: 0.35 MGD
- Windley Key: 0.19 MGD
- Lower Matecumbe Key: 0.30 MGD

Purpose and Need

In recognition of the importance of improving water quality in the Sanctuary, the purpose of the *Proposed Action* is to implement the goals and objectives of the Florida Keys Water Quality Improvements Act (Act) and FKWQIP in the Islamorada service area. The *Proposed Action* is needed to reduce nutrient and bacteria loading, improve water quality in the Sanctuary, and expedite compliance with relevant federal, state, and local regulatory standards.

Water quality is critical to maintaining the marine ecosystem of the Sanctuary and influences the coral reef and the organisms dependent on the reef. At the federal level, the Sanctuary and Protection Act of 1990 directed the U.S. Environmental Protection Agency (USEPA) and the state of Florida to develop a water quality protection plan for the Sanctuary. Locally, the *Monroe County 2010 Comprehensive Plan* mandates reduced nutrient loadings to the Sanctuary by the year 2010 and the application of more stringent Florida Statutory Treatment Standards to wastewater treatment.

Unique and nationally recognized marine habitats in the Sanctuary include seagrass meadows, mangrove islands, and the only living coral barrier reef in North America. Numerous scientific studies have documented the contribution of failing septic tanks and cesspools to the deterioration of canal and nearshore water quality that can adversely impact these habitats. However, water users in the service area continue to rely on septic tanks and outdated on-site package facilities rather than central wastewater treatment systems.

Importantly, the Corps' Florida Keys Carrying Capacity Study (FKCCS) model provided a means of quantifying the affects of wastewater improvement projects, specifically reductions in nutrient loads, in the Islamorada service area. The model was run specifically for the FKWQIP and the associated individual projects such as the proposed Islamorada WWTFs, and the model results were used to evaluate impacts of the wastewater improvement projects.

The purpose of the Proposed Action is to reduce nutrient and bacteria loading, improve water quality in the Sanctuary, and expedite compliance with relevant federal and state regulatory standards in the Village of Islamorada service area.

Decision to be Made

Based on the potential benefits of the Islamorada wastewater treatment project and the adverse environmental impacts if water quality improvements are not made, the federal government must determine whether to provide financial and technical assistance to implement wastewater

treatment improvements for the service area under provisions of the FKWQIP. The estimated cost of the proposed project is $49 million and would be funded by the Village of Islamorada, grant funding obtained by the Village of Islamorada, and the FKWQIP (approximately $29.5 million). The locations of the WWTFs are mapped in Figure ES-1.

Description of Alternatives

Wastewater project alternatives for the Islamorada service area provide the basis for decision-making, thereby making up the core of this Final EA. The three alternatives evaluated as part of this Final EA are described briefly below.

- ***Alternative 1: No Action.*** No state or federal agency would provide funding to the Village of Islamorada for implementation of wastewater treatment improvement projects that would address State mandates to meet 2010 Statutory Treatment Standards. Public entities would not construct or operate WWTFs. Village of Islamorada residents, communities, and businesses would be responsible for addressing state mandates aimed at improving water quality in the Sanctuary.
- ***Alternative 2: Proposed Action.*** Provide federal financial and technical assistance from the Corps, as part of the FKWQIP, to develop and implement regional wastewater collection and treatment systems for the Village of Islamorada service area that would address mandatory state wastewater treatment standards.
- ***Alternative 3: Pursue other Sources of Funding for Project Implementation.*** In the absence of federal funding from the Corps, alternative funding sources would be pursued to implement projects for the Village of Islamorada service area that would address State mandates and improve water quality in the Sanctuary. Sources of monies may include other State and Federal funding mechanisms.

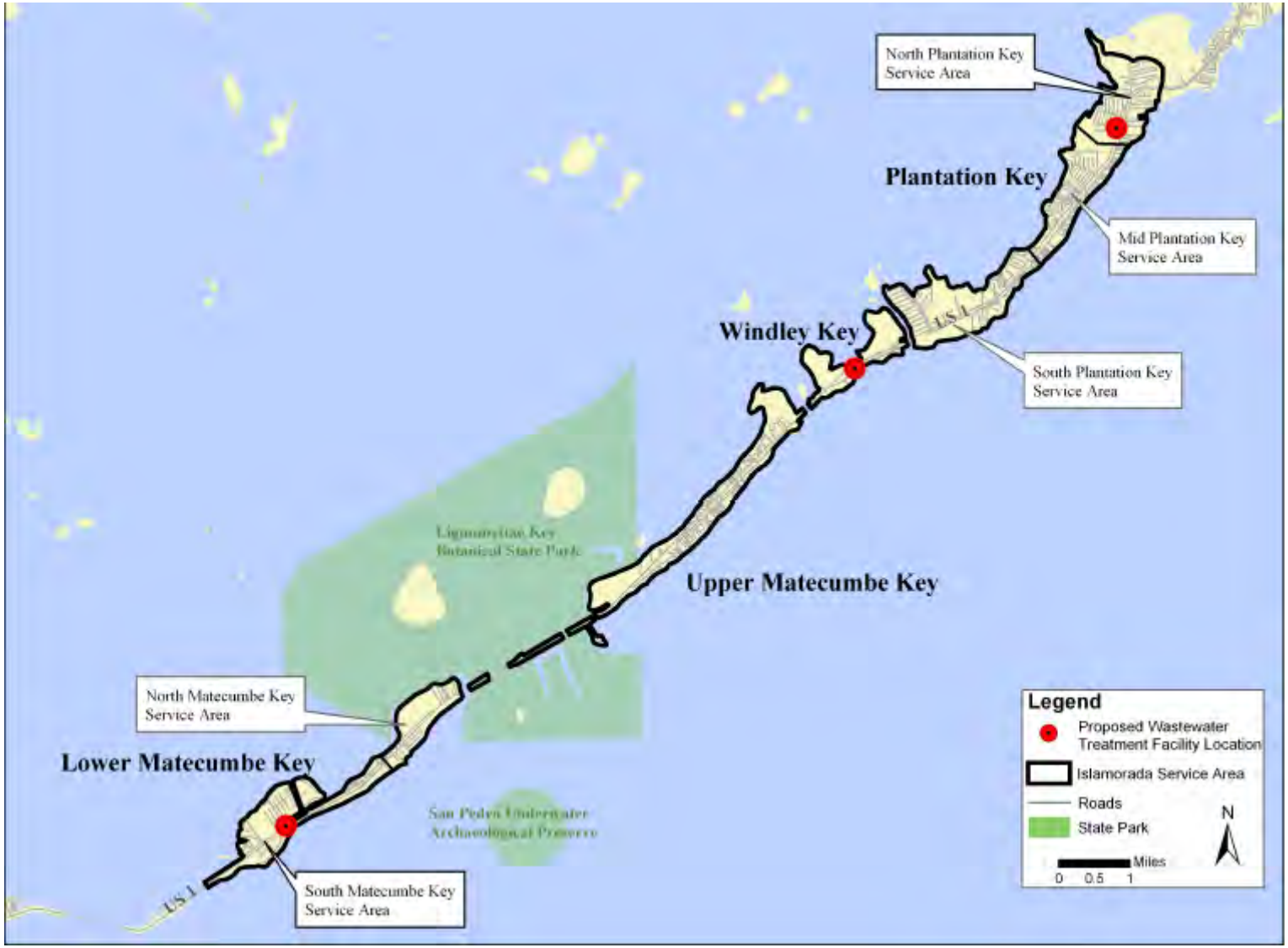
While other funding sources are currently being evaluated to assist in implementing wastewater improvement projects in the Islamorada service area, the proposed federal funding would expedite construction of the WWTFs and associated infrastructure.

Scoping Issues

A Scoping Letter was issued to various stakeholders and interested parties on September 9, 2005 and comments were received through October 10, 2005. Significant issues identified during the scoping process and discussions with regulatory agencies, stakeholders, and residents of the Village of Islamorada are listed below and have guided the preparation of this document.

Issue 1: Water Quality. A number of recent scientific studies have documented the contribution of failing septic tanks and cesspools to the deterioration of the canal and nearshore marine water quality in the Keys. The studies attribute increased algal blooms, seagrass die-off, and the decline in coral reef ecosystems health to inadequate wastewater treatment. Scientists concur that one of the principal sources of water quality degradation in the Sanctuary is the elevated level of nutrients in surrounding canals and nearshore waters. The USEPA has concluded that the magnitude and extent of estimated nutrient

Figure ES-1
Proposed WWTF Locations on Islamorada, in Monroe County, Florida



loadings from wastewater sources are regionally substantial (USEPA 1993). Reductions in TN, TP, and TSS loadings of 85, 79, and 80 percent, respectively, are anticipated in the Islamorada service area as a result of implementing the proposed wastewater improvements.

Issue 2: Facility Site. Vacant lands are scarce in the Keys and potential sites for WWTFs may include sensitive or critical habitat for protected species (see issue 3, below). In addition, sewer collection systems may cross naturally or culturally sensitive lands. Two of the proposed WWTFs would be built on vacant sites heavily vegetated with invasive/exotic plants (Plantation Key and Lower Matecumbe Key), and the Windley Key WWTF would be built on a scarified site.

Issue 3: Protected Species. The Keys are a relatively small landmass in a subtropical to tropical island setting and provide habitat for many rare and protected plants and animals. Because remaining natural areas are scarce, any action by the Village of Islamorada that results in the loss of natural areas has the potential to impact protected species. Protected species that occur or may occur in the service area, associated habitats, and regulatory framework affecting these species, are addressed in this Final EA. Although formal consultation has not occurred, one component of this project (Plantation Key) is adjacent to a wastewater improvement project for which consultation with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Services (NOAA Fisheries) was previously initiated due to Federal Emergency Management Agency (FEMA) funding (Plantation Key). Three state-listed species (Florida thatch palm, West Indian Mahogany, and barbed-wire cactus) were identified on the proposed FEMA site. Based upon information available and consultation with the USFWS, FEMA made a "not likely to adversely affect" finding. In addition, the loss of 0.35 acres of hardwood hammock will be mitigated through plantings that would include wild lime (*Zanthoxylem fagara*) and torchwood (*Amyris elemifera*), which are food sources for the federally listed Schaus swallowtail butterfly (*Papilio aristodemus ponceanus*). Consultation with the USFWS is on-going and will be completed upon purchase of the properties by the Village of Islamorada.

Issue 4: Effluent Disposal. Residents in the Village of Islamorada service area currently rely on septic tanks, cesspools, and package treatment facilities. Deep well injection is required for all WWTFs with capacities greater than 1.0 MGD; therefore, no deep injections wells will be constructed as part of this project. The proposed systems would use shallow injection wells for effluent disposal. Shallow injection wells are considered Class V wells by the EPA. These wells extend 90 feet below ground with a 60-foot casing in the upper portion of the well. The effluent gravity-flows through the upper cased portion of the well and out through the lower 30-foot portion of the well into a porous limestone formation. The effluent will be disinfected with chlorine prior to injection. Disinfection will eradicate any residual bacterial or viral strains in the effluent. Nutrient loadings into the system through injection will be significantly less than current loadings via untreated discharge from septic tanks and cesspits (85, 79, and 80 percent reductions in TN, TP, and TSS, respectively). Because potable water is supplied to Islamorada via pipeline from the mainland, no drinking water supplies will be impacted.

Issue 5: Tourism. The quality of life for tourists in the Keys is dependent on a healthy marine ecosystem and can be negatively impacted by water quality degradation. Over two million individuals per year visit the Keys to enjoy its unique natural features and the Village of Islamorada has been referred to as the "sport fishing capital of the world." Water related activities, including snorkeling, diving, and fishing support 70 percent of tourism in the Keys, which generates over $1.3 billion per year and supports over 21,000 jobs. Poorly treated wastewater presents a public health risk to nearshore waters of the Keys, which in turn can result in beach advisories, decreases in tourism, and economic losses.

Issue 6: Environmental Justice. Approximately seven percent of the population of the Village of Islamorada was living below the poverty level in 2000, and the proportion of residents over the age of 65 is approximately the same as that of the county and state (14.7 percent and 17.6 percent, respectively). This segment of the population often lives on fixed incomes and, while their income may not be below the poverty level, they are affected by cost of living changes. These factors suggest that while the majority of the Village of Islamorada residents are financially well-situated, there is considerable disparity in wealth and income among residents, raising potential environmental justice concerns.

Comparison of Alternatives

The alternatives examined as part of this Final EA were premised on the need to implement water quality improvement projects in the Islamorada service area that will reduce nutrient loading and result in commensurate improvements in water quality to the Sanctuary. Environmental consequences of physical, biological, and human issues are presented in comparative form in Table ES-1.

Proposed Actions under Alternative 2 would: 1) address regional water quality issues, 2) reduce nutrient loadings and improve water quality throughout the Sanctuary, and 3) expedite compliance with federal and state regulatory water quality treatment standards. Alternative 2, or *Proposed Action,* provides for implementation of central community wastewater collection and treatment system in the service area. Under the *Proposed Action*, construction of projects would be expedited and project management and expenditures would be more affective when compared with the *No Action* Alternative or Alternative 3, *Alternative Funding Sources.*

Potential adverse impacts due to implementation of the *Proposed Action* include those related to environmental justice and biological resources. Seven percent of the Islamorada population lives below the poverty level, and it would be difficult for these residents to afford the capital costs and monthly service fees associated with wastewater treatment improvements. As for biological resources, approximately 0.35 acres of tropical hardwood hammock would be eliminated or disturbed as a result of the construction of the WWTFs.

Preferred Alternative

The preferred alternative, or *Proposed Action*, includes financial and technical assistance for the Village of Islamorada to construct three WWTFs, VPSs, and sewer force mains necessary to

serve the Village of Islamorada service area. The *Proposed Action* would accomplish the goals outlined below.

- Meet objectives of the Act
- Address local and regional water quality issues
- Achieve nutrient loadings reductions and commensurate improvement in water quality in nearshore waters of the service area and subsequently, the Sanctuary
- Expedite compliance with federal and state mandated regulatory water quality treatment standards

Areas of Controversy

Controversial issues associated with FKWQIP include the cost of program implementation, the means of recovering initial capital investment, and the means of generating revenues to support maintenance and operational activities.

An issue primarily within the scientific community is whether the improvement of wastewater treatment and the installation of centralized sewers would improve the health of the coral reef in the Sanctuary. Conflicting scientific evidence would seem to indicate that improving nearshore water quality would, at a minimum, have a positive, albeit indirect, impact on the coral reef. Loss of upland hardwood hammocks that provide habitat for protected species is also an issue addressed in this Final EA.

The disposal of wastewater effluent into the ground water through deep well injection and the potential for groundwater contamination is of concern to the public. The three WWTFs proposed for the Village of Islamorada would use shallow well injection, not deep well injection. In addition, residents and businesses in the service area currently rely on residential septic tanks, cesspools, and packaged treatment plants. Implementation of the improved wastewater treatment technologies will reduce the TN and TP loads by 85 and 79 percent, respectively, for the Islamorada service area.

Table ES-1
Comparison of Key Issues for the Village of Islamorada WWTF Alternatives

Scoping Issue	Alternative 1 *No Action*	Alternative 2 *Proposed Action*	Alternative 3 *Alternative Funding Sources*
 **1. Water Quality**	Adverse impacts due to continued untreated wastewater runoff and associated nutrients, toxins, bacteria, and viruses to canals and nearshore waters in the Sanctuary. State and federal mandates to improve water quality in the Sanctuary may not be addressed.	Benefits of centralized wastewater treatment include water quality improvements due to decreased nutrients and other contaminants into canals and nearshore waters of the Sanctuary. Reductions in TN, TP, and TSS loadings of 85, 79, and 80 percent, respectively, are anticipated. These improvements will address state and federal legislation.	Continued degradation of water quality is anticipated until funding is obtained to construct the WWTFs. Piece-meal construction may delay full achievement of project and program objectives.

Table ES-1
Comparison of Key Issues for the Village of Islamorada WWTF Alternatives

Scoping Issue	Alternative 1 *No Action*	Alternative 2 *Proposed Action*	Alternative 3 *Alternative Funding Sources*
 **2. Facility Siting**	No impacts are anticipated. No lands will be required for the location and construction of wastewater facilities. Therefore, existing residences, fish and wildlife habitats, and land uses will not be disrupted.	Net environmental benefits due to improved water quality. Potential adverse impacts to approximately 0.35 acres of hammock. Mitigation proposed for hammock and disturbed wetlands loss, per Islamorada's regulations. Impacts to cultural or historic resources are not anticipated.	Impacts similar to those described under the *Proposed Action* are expected.
 **3. Protected Species**	Adverse impacts to protected species anticipated as a result of continued runoff of untreated wastewater into canals and nearshore waters and subsequent water quality degradation. Because no new facilities would be required, no impacts to habitat for protected species are anticipated.	Minimal adverse impacts due to facilities siting. Regulatory agencies support project. Section 7 USFWS consultation and review by the Florida Fish and Wildlife Conservation Commission (FFWCC) for protected species is on-going.	Impacts similar to those described under the Proposed Action are expected, with delays in benefits, in addition to potentially greater impacts due to larger number of smaller facilities being constructed.
 **4. Effluent Disposal**	Adverse impacts anticipated as a result of unchanged effluent disposal practices. Runoff from cesspools and septic tanks will continue to enter canals and nearshore waters in the Sanctuary.	Construction of centralized sewers will expedite the removal of cesspools and associated pollutants in the Islamorada *hot spots*.	Construction of sewers will be less affective due to fragmented approach. Delays in construction also anticipated.
 **5. Tourism**	Increasing impacts anticipated related to water quality degradation. Continued beach health advisories would adversely affect immediate recreational and tourist opportunities, and long-term impacts could be detrimental to tourism and the local economy.	Improved water quality would decrease the incidence of beach advisories and closings, thereby increasing the opportunity for saltwater-based recreation. Temporary adverse impacts would include transportation delays due to construction activities.	Improved water quality would decrease the incidence of beach advisories and closings, thereby increasing the opportunity for saltwater-based recreation albeit at a slower pace than the Proposed Action.
 **6.Environmental Justice**	Adverse impacts to low-income households who will have difficulties affording the cost of meeting 2010 mandates for wastewater treatment are expected.	Without special consideration and financial assistance, low-income and fixed-income households may have difficulty paying for wastewater hook-up and service fees, and abandonment of on-site treatment facilities and service fees.	Without special consideration and financial assistance, low-income and fixed-income households may have difficulty paying for wastewater hook-up and service fees, and abandonment of on-site treatment facilities and service fees.

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List of Acronyms

ACT	Florida Keys Water Quality Improvement Act
ADID	Advanced Identification of Wetlands
AFVP	Atlas of Florida Vascular Plants
AIRFA	American Indian Religious Freedom Act
ARPA	Archaeological Resources Protection Act
AMSL	Above Mean Sea Level
ATUs	Aerobic Treatment Units
AWT	Advanced Wastewater Treatment
BAT	Best Available Technology
BBA	Breeding Bird Atlas
BLS	Below Land Surface
BMPs	Best Management Practices
BOCC	Board of County Commissioners
BOD	Biological Oxygen Demand
BNR	Biological nutrient removal
CARL	Conservation and Recreation Lands
CBIA	Coastal Barrier Improvement Act
CBRA	Coastal Barrier Resources Act
CBRS	Coastal Barrier Resource System
CDBG	Community Development Block Grants
CDP	Census Designated Place
CEQ	Council on Environmental Quality
CERP	Comprehensive Everglades Restoration Plan
CFR	Code of Federal Regulations
cm	centimeter
Corps	U.S. Army Corps of Engineers
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DIN	Dissolved Inorganic Nitrogen
DOI	Department of Interior
Du/Ac	Dwelling Unit per Acre
EA	Environmental Assessment
EDU	Equivalent Dwelling Unit
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EO	Executive Order
EPJV	Everglades Partners Joint Venture
ERP	Environmental Resource Permit
ESA	Endangered Species Act

F.A.C.	Florida Administrative Code
FCMP	Florida Coastal Management Program
FDCA	Florida Department of Community Affairs
FDEP	Florida Department of Environmental Protection
FDOH	Florida Department of Health
FDOT	Florida Department of Transportation
FEMA	Federal Emergency Management Agency
FFWCC	Florida Fish and Wildlife Conservation Commission
FIU	Florida International University
FKAA	Florida Keys Aqueduct Authority
FKCCS	Florida Keys Carrying Capacity Study
FKEC	Florida Keys Electric Cooperative
FKW	Florida Keys Watch
FKWQIP	Florida Keys Water Quality Improvements Program
FLUCFCS	Florida Land Use Cover and Forms Classification System
FMRI	Florida Marine Research Institute
FNAI	Florida Natural Areas Inventory
F.S.	Florida Statute
FWCA	Fish and Wildlife Coordination Act
gpd	Gallons per Day
gpm	Gallons per Minute
HDPE	High density polyethylene
IMB	Immersed Membrane Bioreactor
IWMMP	Islamorada Wastewater Management Master Plan
KEYS	Florida Energy Services
km	kilometer
LOS	Level of Service
MCPA	Monroe County Property Appraiser's Office
MCSWMP	Monroe County Sanitary Wastewater Master Plan
mgd	Million Gallons per Day
mg/L	Milligrams per Liter
MHI	Median Household Income
MM	Mile Marker
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent

NRCS	Natural Resources Conservation Service
NPDES	National Pollution Discharge Elimination System
NWI	National Wetlands Inventory
O&M	Operations and Maintenance
OFW	Outstanding Florida Waters
OWNRS	On-site Wastewater Nutrient Reduction Systems
PEIS	Programmatic Environmental Impact Statement
ppm	Parts per Million
ROAs	Research-only Areas
ROGO	Rate of Growth Ordinance
ROWs	Rights-of-way
Sancturay	Florida Keys National Marine Sanctuary
SBR	Sequencing Batch Reactor
SCUBA	Self Contained Underwater Breathing Apparatus
SERC	Southeast Environmental Research Center
SFWMD	South Florida Water Management District
SGD	Submarine Groundwater Discharge
SHPO	State Historic Preservation Office
System	Integrated Wildlife Habitat Ranking System
TKN	Total Kjeldahi Nitrogen
TN	Total Nitrogen
TNC	The Nature Conservancy
TP	Total Phosphorus
TSS	Total Suspended Solids
US	United States
USDA	U.S. Department of Agriculture
USDW	Underground Source of Drinking Water
USEPA	U.S. Environmental Protection Agency
USF	University of South Florida
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WQPP	Water Quality Protection Program
WWTF	Wastewater Treatment Facility(s)

1.0 Purpose of and Need for Action

The United States (U.S.) Congress has directed the U.S. Army Corps of Engineers (Corps) to assist local municipalities in Monroe County, Florida, in the planning and construction of wastewater and stormwater improvements designed to accomplish the goals listed below:

- Reduce nutrient loading to the nearshore waters of the Florida Keys National Marine Sanctuary (Sanctuary)
- Improve water quality throughout the waters of the Sanctuary
- Comply with relevant federal and state regulatory standards

A Programmatic Environmental Impact Statement (PEIS) was previously prepared by the Corps for the proposed Florida Keys Water Quality Improvements Program (FKWQIP) in accordance with the National Environmental Policy Act (NEPA) and the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations [CFR] 1500-1508). These laws and regulations require the Corps to consider and address environmental issues when funding a major federal action.

The PEIS prepared by the Corps provides a framework to address potential environmental impacts associated with design and implementation of eligible wastewater treatment projects for the FKWQIP. This Final Environmental Assessment (EA) tiers from the PEIS for the FKWQIP and hereby incorporates the PEIS by reference, in accordance with 40 CFR Part 1508.28. The Village of Islamorada wastewater treatment facilities (WWTFs) will address eight of the 45 water quality *hot spots* in the Keys identified in the Monroe County Sanitary Wastewater Master Plan (MCSWMP, Monroe County 2000).

The Village of Islamorada WWTFs will address eight of the 45 water quality hot spots in the Keys identified in the MCSWMP.

The overall proposed project area is the Village of Islamorada in the Upper Keys, which extends from US-1 mile marker (MM) 90.9 to MM 72.9, and includes four islands (from north to south):

- Plantation Key
- Windley Key
- Upper Matecumbe Key
- Lower Matecumbe Key

The scope of the project is the construction of three centralized wastewater treatment systems to service residents and commercial businesses located in the Village of Islamorada, Florida. All three of the WWTFs would use Immersed Membrane Bioreactor (IMB) technology, which is a common type of extended aeration process capable of meeting the Monroe County effluent standards. This technology is considered appropriate for the Village of Islamorada because land use and sludge handling are reduced, and IMB systems are able to operate over a range of influent flow rates, which is important in consideration of the Village of Islamorada's seasonal fluctuations in population and tourism. The anticipated plant capacities are less than one million

gallons per day (MGD), so all of these WWTFs will use shallow well injection for effluent disposal. The proposed design capacities of the WWTFs are:

- Plantation Key: 0.35 MGD
- Windley Key: 0.19 MGD
- Lower Matecumbe Key: 0.30 MGD

This section of the Final EA explains the purpose and need for the federal action and the decision to be made by the federal government. Authorizing legislation for the FKWQIP is described and the project service area delineated. Relevant issues and related environmental documentation addressed during the scoping process are discussed. Finally, the organization of the Final EA is outlined.

1.1 Authorization

Under authority of Public Law 106-554 dated December 21, 2001 (Appendix A of the PEIS), the Corps is authorized to provide technical and financial assistance to carry out projects for the planning, design, and construction of treatment works to improve water quality in the Sanctuary. Design and construction assistance may be provided only for projects owned by public entities. Typically, large programs of this nature are not in accordance with Administration Program priorities of the Corps (i.e. navigation, flood control, or environmental restoration). However, non-traditional projects are routinely undertaken by the Corps as "work for others."

The Florida Keys Water Quality Improvement Act (Act) authorized Congress to appropriate up to $100 million for FKWQIP projects (representing 65 percent of program costs) for the planning and construction of wastewater and stormwater improvements. The total cost of the proposed project is an estimated $57 million ($30 million for Plantation Key, $6.5 million for Windley Key, and $20.5 million for Lower Matecumbe Key).

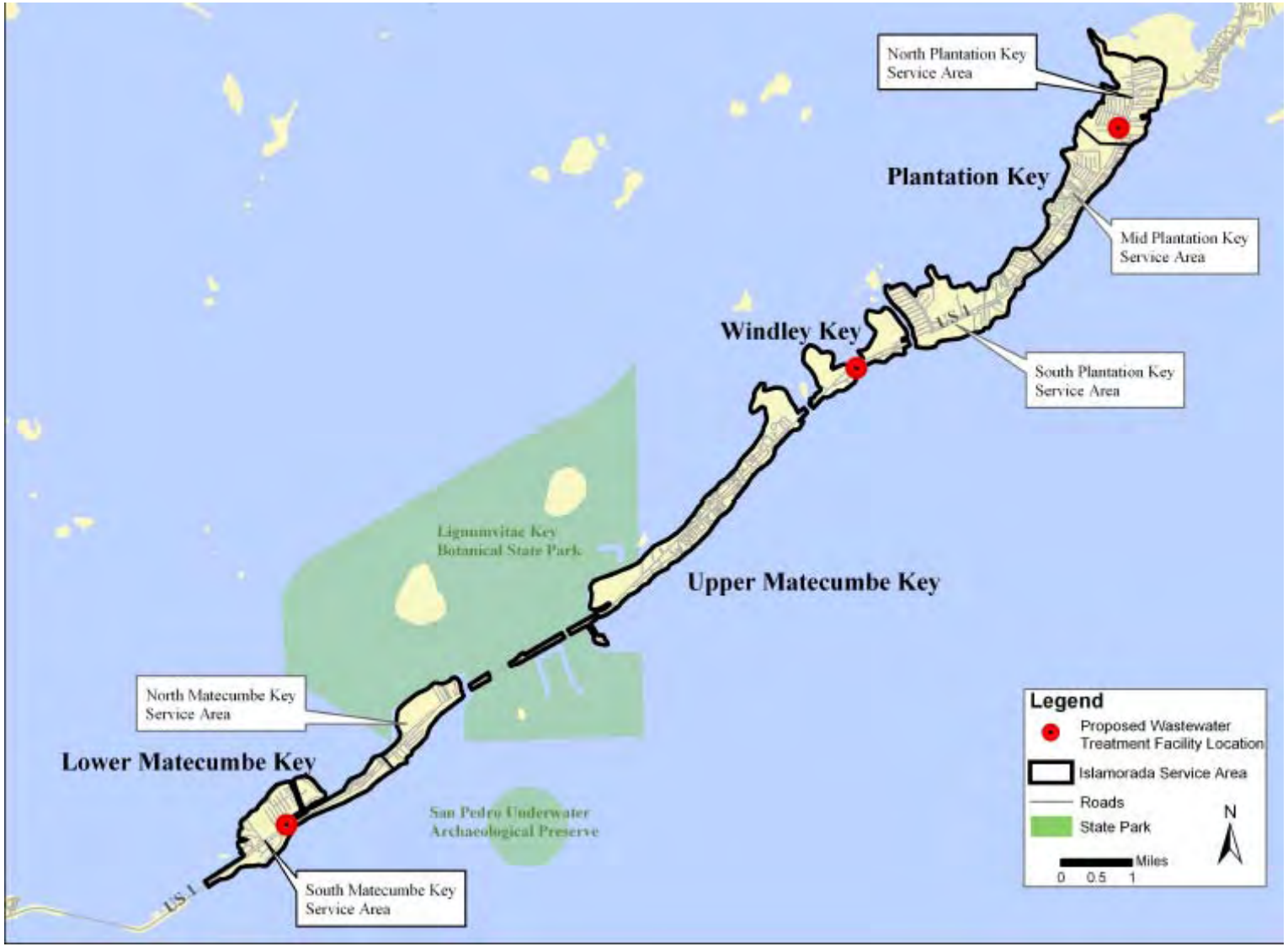
1.2 Village of Islamorada Service Area

The Village of Islamorada is located in the Upper Keys; Village limits extend from MM 90.9 to MM 72.9 (see Figure 1-1). The Village of Islamorada is bordered on the north/west by Florida Bay, and on the south/east by the Atlantic Ocean and consists of four islands, from north to south: Plantation Key, Windley Key, Upper Matecumbe Key, and Lower Matecumbe Key. Projects are proposed on three of these islands: Plantation Key, Windley Key, and Lower Matecumbe Key. Although each WWTF has a specific area that it will service, the service area discussed in this EA is the Village of Islamorada (Figure 1-1). As appropriate, discussions will also include the specific site on each island where the proposed facility would be constructed. The remainder of the Village of Islamorada will either be serviced by the WWTF currently under construction (North Plantation Key), or will not be hooked to centralized sewer as part of this Proposed Action.

Plantation Key

Plantation Key is located between MM 85.5 and MM 90.9. It is approximately 2,100 acres in area and is bordered by Tavernier Creek to the north and Snake Creek to the south. Plantation

Figure 1-1
Proposed WWTF Locations on Islamorada, in Monroe County, Florida



Key is the largest of the four islands in terms of land area, and over half of the Village of Islamorada's residents live in Plantation Key. Wastewater treatment for Plantation Key is divided into three service areas: North Plantation Key, Mid Plantation Key, and South Plantation Key. The proposed WWTF would be located in the North Plantation Key service area, but would serve the Mid Plantation Key service area. The WWTF would be constructed on approximately 0.57 acres on the bayside of Plantation Key at MM 90, immediately north of a WWTF currently under construction, between US-1 to the east and Gardenia Street to the west, and Woods Avenue to the north (Figure 1-2). The site is undeveloped, but heavily vegetated with invasive/exotic plant species (e.g., Brazilian pepper, Australian pine). The surrounding area includes commercial and residential areas, and schools. The proposed WWTF has a design capacity of 0.35 MGD. The WWTF currently under construction has a similar design capacity.

Windley Key

Windley Key is located between MM 84 and MM 85.5 and is the smallest key in terms of land area (approximately 436 acres). The proposed WWTF would be constructed on approximately 0.90 acres, near the intersection of US-1 and Old State Road (S.R.) 4A (Figure 1-3). The site is cleared, grassy, and currently used as a storage area for boats, and is adjacent to a marine theme park. The proposed WWTF has a design capacity of 0.19 MGD.

Lower Matecumbe Key

Lower Matecumbe Key is the southernmost key in the Village of Islamorada chain. It is located between MM 72.9 and MM 77.5, and is approximately 1,076 acres. Wastewater treatment for Lower Matecumbe Key is divided into two service areas: North Lower Matecumbe Key and South Lower Matecumbe Key. The proposed WWTF would service South Lower Matecumbe Key. The WWTF would be constructed on approximately 0.93 acres, near the intersection of US-1 and Gulf View Drive (Figure 1-4). The site is located next to a gas station, a cell phone tower, a small commercial business, and a canal. The proposed WWTF has a design capacity of 0.30 MGD.

1.3 Purpose and Need

In recognition of the importance of improving water quality in the Sanctuary, the purpose of the *Proposed Action* is to assist the Village of Islamorada with the planning and implementation of projects that will support the goals and objectives of the Act and FKWQIP. The *Proposed Action* is needed to reduce nutrient and bacteria loading to the Sanctuary, improve water quality in the Sanctuary, and comply with relevant Federal and State regulatory standards.

The Sanctuary includes unique and nationally significant marine environments such as seagrass meadows, mangrove islands, and the only living coral barrier reef in North America. Similar to other Florida ecosystems, human activities during the past 100 years have affected water quality in the Sanctuary. Bacteria and nutrients from human wastes, and chemicals such as pesticides and mercury, that may reach this delicate ecosystem as a result of little or no treatment, can adversely impact water quality and pose a public health risk.

Figure 1-2
Plantation Key Potential Plant Expansion Site

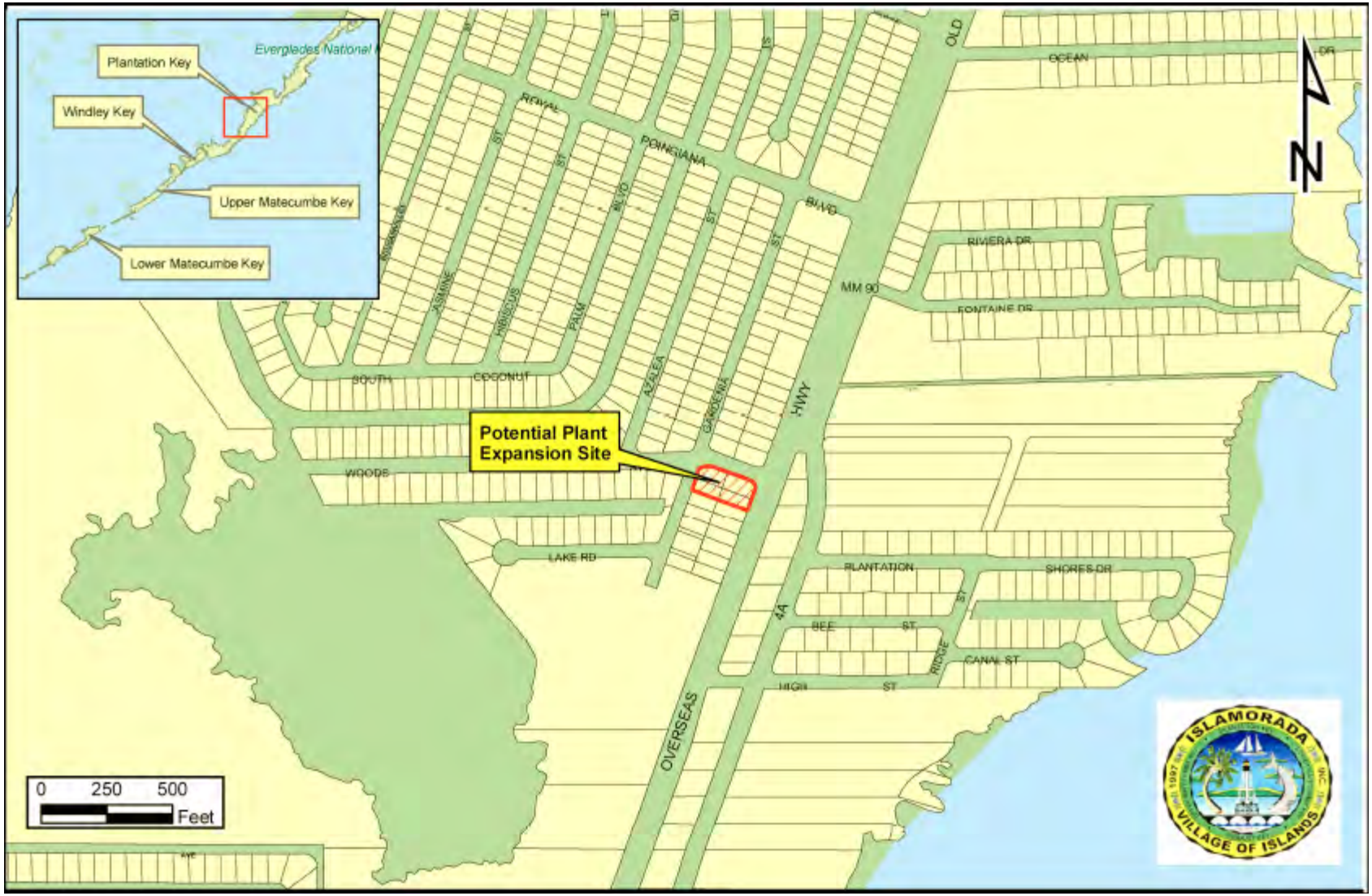


Figure 1-3
Windley Key Potential Wastewater Treatment Plant Site

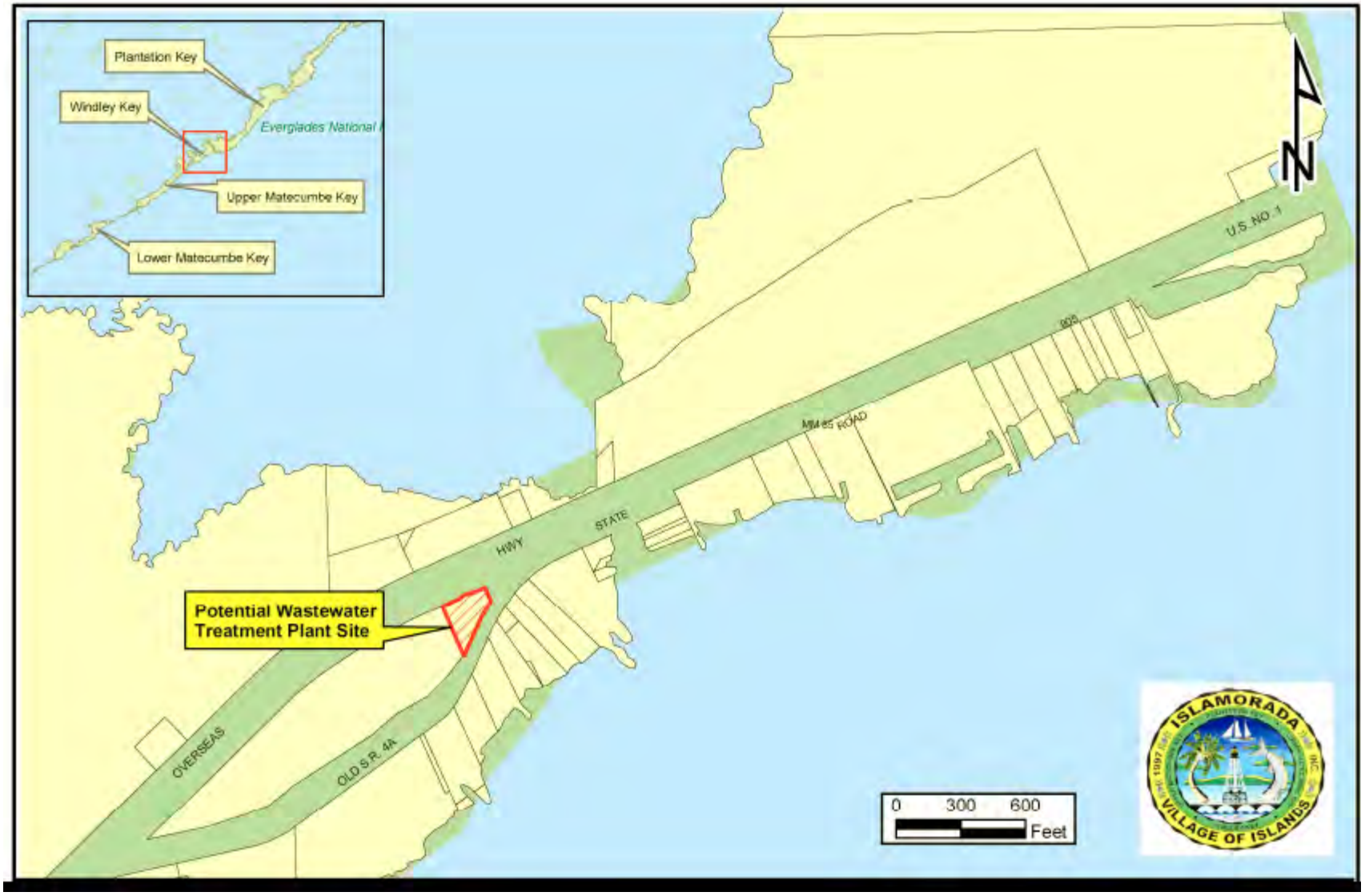


Figure 1-4
Lower Matecumbe Key Potential Wastewater Treatment Plant Site

The purpose of the Proposed Action is to assist the Village of Islamorada with the planning and implementation of projects that will reduce nutrient and bacteria loading, improve water quality in the Sanctuary, and expedite compliance with relevant federal and state regulatory standards.

With the exception of Key West, Plantation Key Colony, and Ocean Reef Resort on Key Largo, communities in the Keys rely on septic tanks, cesspools, and package treatment facilities and shallow injection wells for sewage disposal (Griffin *et al.* 1999). There are currently about 30,000 septic tanks and 600 shallow injection wells in the Keys. These systems, if not properly operated, allow bacteria and nutrients to leach into nearshore waters. In some nearshore areas where water quality is monitored, beaches have been posted for health advisories due to fecal coliform bacteria contamination of surface waters after moderate rainfall events.

There is one centralized wastewater treatment system (currently under construction) in the Village of Islamorada, located on Plantation Key, which will serve the North Plantation Key service area. There were 59 package plants in the Village of Islamorada service area in 2004, with a total permitted capacity of 0.91 MGD, and an average daily flow of 0.44 MGD (Islamorada Wastewater Management Master Plan [IWMMP] Draft 2005). Table 1-1 shows this information broken down per island. The remainder of the areas has on-site treatment systems such as septic tanks or cesspools.

Table 1-1
Existing Wastewater Treatment Package Plant Information per Island (2004)

Island	Number of Package Plants	Permitted Capacity (MGD)	Average Daily Flow (MGD)
Plantation Key	18	0.34	0.15
Windley Key	8	0.12	0.06
Upper Matecumbe Key	29	0.41	0.21
Lower Matecumbe Key	4	0.04	0.02
Total for Islamorada	59	0.91	0.44

Islamorada Wastewater Management Master Plan Draft 2005

Average estimated reductions in wastewater loading to nearshore waters in the Keys due to implementation of FKWQIP are on the order of 69 and 73 percent in total nitrogen (TN) and total phosphorus (TP) loadings, respectively, using advanced water treatment (AWT) standards. Reductions in TN, TP, and total suspended solids (TSS) loadings of 85, 79, and 80 percent, respectively, are anticipated for the Islamorada service area as a result of implementing the proposed wastewater improvements.

Water quality is critical to maintaining the marine ecosystem of the Sanctuary and influences the coral reef and the organisms dependent on the reef. Numerous scientific studies have documented the contribution of failing septic tanks and cesspools to the deterioration of canal and nearshore water quality in the Keys. In addition, research has suggested that increased

nutrient loadings from wastewater into canals and nearshore waters are one of the major contributors to the decline of water quality within the Sanctuary.

Importantly, the Corps' Florida Keys Carrying Capacity Study (FKCCS) model provided a means of quantifying the affects of wastewater improvement projects, specifically reductions in nutrient loads, within the Village of Islamorada service area. The model was run specifically for the FKWQIP and the associated individual projects and the model results were used to evaluate impacts of the wastewater improvement projects.

The Corps' FKCCS model provided a means of quantifying the affects of wastewater improvement projects, specifically the reductions in nutrient loads, in the Village of Islamorada service area.

FKWQIP was created in response to regulatory requirements and in the interest of protecting public health and water quality. At the federal level, the Sanctuary and Protection Act of 1990 directed the U.S. Environmental Protection Agency (USEPA) and the state of Florida to develop a water quality protection plan for the Sanctuary. Locally, the *Monroe County 2010 Comprehensive Plan* mandates nutrient loading reductions in the marine ecosystem by the year 2010 and that wastewater systems meet more stringent Florida Statutory Treatment Standards.

1.4 Decision to be Made

Due to the high capital costs of implementing the proposed water quality improvement facilities, municipal governments in the Keys have requested assistance from the federal government to develop and implement wastewater treatment and stormwater management actions that will reduce nutrient loadings and improve water quality in the Sanctuary. Based on the potential benefits of the Village of Islamorada WWTFs and the adverse affects on the natural and manmade environment if water quality improvements are not made, the Corps must decide whether to provide financial and technical assistance to the Village of Islamorada in developing and implementing wastewater improvements for the Village of Islamorada service area. Once the proposed WWTFs are completed, the Village of Islamorada residents and visitors can expect improved water quality in the surrounding Sanctuary and nearshore waters.

Once the proposed WWTFs are completed, the Village of Islamorada residents and visitors can expect reduced nutrient and other pollutant loadings to the Sanctuary and local nearshore waters.

1.5 Scoping Issues

Under NEPA 1969, federal agencies are required to determine the scope of issues to be addressed for a project and identify the significant issues related to the *Proposed Action*. This process is called "scoping."

A Scoping Letter was issued to various stakeholders and interested parties on September 9, 2005 and comments were received through October 10, 2005. Significant issues identified during the

scoping process and discussions with regulatory agencies, stakeholders, and residents of the Village of Islamorada are listed below and have guided the preparation of this document.

Issue 1: Water Quality. A number of recent scientific studies have documented the contribution of failing septic tanks and cesspools to the deterioration of the canal and nearshore marine water quality in the Keys. The studies attribute increased algal blooms, seagrass die-off, and the decline in coral reef ecosystems health to inadequate wastewater treatment. Scientists concur that one of the principal sources of water quality degradation in the Sanctuary is the elevated level of nutrients in surrounding canals and nearshore waters. The USEPA has concluded that the magnitude and extent of estimated nutrient loadings from wastewater sources are regionally substantial (USEPA 1993). Reductions in TN, TP, and TSS loadings of 85, 79, and 80 percent, respectively, are anticipated in the Islamorada service area as a result of implementing the proposed wastewater improvements.

Issue 2: Facility Site. Vacant lands are scarce in the Keys and potential sites for WWTFs may include sensitive or critical habitat for protected species (see issue 3, below). In addition, sewer collection systems may cross naturally or culturally sensitive lands. Two of the proposed WWTFs would be built on vacant sites heavily vegetated with invasive/exotic plants (Plantation Key and Lower Matecumbe Key), and the Windley Key WWTF would be built on a scarified site.

Issue 3: Protected Species. The Keys are a relatively small landmass in a subtropical to tropical island setting and provide habitat for many rare and protected plants and animals. Because remaining natural areas are scarce, any action by the Village of Islamorada that results in the loss of natural areas has the potential to impact protected species. Protected species that occur or may occur in the service area, associated habitats, and regulatory framework affecting these species, are addressed in this Final EA. Although formal consultation has not occurred, one component of this project (Plantation Key) is adjacent to a wastewater improvement project for which consultation with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Services (NOAA Fisheries) was previously initiated due to Federal Emergency Management Agency (FEMA) funding (Plantation Key). Three state-listed species (Florida thatch palm, West Indian Mahogany, and barbed-wire cactus) were identified on the proposed FEMA site. Based upon information available and consultation with USFWS, FEMA made a "not likely to adversely impact" finding. In addition, the loss of 0.35 acres of hardwood hammock will be mitigated through plantings that would include wild lime (*Zanthoxylem fagara*) and torchwood (*Amyris elemifera*), which are food sources for the federally listed Schaus swallowtail butterfly (*Papilio aristodemus ponceanus*). Consultation with the USFWS is on-going and would be completed upon purchase of the properties by the Village of Islamorada.

Issue 4: Effluent Disposal. Residents in the Village of Islamorada service area currently rely on septic tanks, cesspools, and package treatment facilities. Deep well injection is required for all WWTFs with capacities greater than 1.0 MGD; therefore, no deep

injections wells will be constructed as part of the Village of Islamorada Project. The proposed systems would use shallow injection wells for effluent disposal. Shallow injection wells are considered Class V wells by the EPA. These wells extend 90 feet below ground with a 60-foot casing in the upper portion of the well. The effluent gravity-flows through the upper cased portion of the well and out through the lower 30-foot portion of the well into a porous limestone formation. The effluent will be disinfected with chlorine prior to injection. Disinfection will eradicate any residual bacterial or viral strains in the effluent. Nutrient loadings into the system through injection will be significantly less than current loadings via untreated discharge from septic tanks and cesspits (85, 79, and 80 percent reductions in TN, TP, and TSS, respectively). Because potable water is supplied to Islamorada via pipeline from the mainland, no drinking water supplies will be impacted.

Issue 5: Tourism. The quality of life for tourists in the Keys is dependent on a healthy marine ecosystem and can be negatively impacted by water quality degradation. Over two million individuals per year visit the Keys to enjoy its unique natural features and the Village of Islamorada has been referred to as the "sport fishing capital of the world." Water related activities, including snorkeling, diving, and fishing support 70 percent of tourism in the Keys, which generates over $1.3 billion per year and supports over 21,000 jobs. Poorly treated wastewater presents a public health risk to nearshore waters of the Keys, which in turn can result in beach advisories, decreases in tourism, and economic losses.

Issue 6: Environmental Justice. Approximately seven percent of the population of the Village of Islamorada was living below the poverty level in 2000, and the proportion of residents over the age of 65 is approximately the same as that of the county and state (14.7 percent and 17.6 percent, respectively). This segment of the population often lives on fixed incomes and, while their income may not be below the poverty level, they are affected by cost of living changes. These factors suggest that while the majority of the Village of Islamorada residents are financially well-situated, there is considerable disparity in wealth and income among residents, raising potential environmental justice concerns.

1.6 Related Environmental Documents

Documents related to the Village of Islamorada WWTFs and water quality improvements in the service area that may influence the scope of this Final EA include the *FEMA Programmatic Environmental Assessment for Wastewater Improvements in the Florida Keys* (2002), the *FEMA Final Supplemental Environmental Assessment for Plantation Key Colony/Plantation Key Proposed Wastewater Treatment System (2003)*, the *Islamorada Wastewater Management Master Plan (Draft 2005)*, and the FKCCS (Corps 2002). These and other relevant documents are discussed in the PEIS.

1.7 National Environmental Policy Act Requirements

Under the NEPA of 1969 and the CEQ regulations implementing NEPA (40 CFR Parts 1500 to 1508), the Corps must consider the environmental consequences of proposed federal actions (projects). Accordingly, the Corps has prepared this document to evaluate the environmental consequences of constructing the three Village of Islamorada wastewater treatment facilities.

These project-specific improvements include wastewater collection, treatment, and disposal options. This Final EA tiers from the PEIS for the FKWQIP as described previously.

1.8 Summary of Prior Regulatory Action

A historical chronology of regulations applicable to the construction of wastewater treatment improvements and stormwater best management practices (BMPs) in the Keys was provided in the previously prepared PEIS to inform the reader of the more stringent Florida Statutory Treatment Standards that will confront residents and commercial entities of Monroe County in the coming years. The *Monroe County Year 2010 Comprehensive Plan* (1997) mandated reductions in nutrient loadings to the marine ecosystem by the year 2010. In 1998, the Florida Governor issued Executive Order (EO) 98-309, directing local and state agencies to coordinate with Monroe County in the implementation of their Year 2010 Comprehensive Plan to eliminate cesspools, failing septic systems, and other substandard on-site wastewater treatment systems (OWTS).

1.9 Document Organization

The basic elements of a Final EA, as well as all applicable sub-elements, are presented in this document. Subsequent individual sections of the Final EA are listed and briefly described below.

- **Chapter 2. Description of Alternatives** including the *Proposed Action*. Presents a description of alternatives considered in the planning of the Village of Islamorada WWTFs, thereby providing the basis for decision-making.
- **Chapter 3. Affected Environment.** A description of existing conditions in the service area provides a context in which to evaluate the alternatives.
- **Chapter 4. Environmental Consequences**. This chapter provides an analysis of the potential environmental consequences anticipated as a result of the *Proposed Action* considered as part of this Final EA.
- **Chapter 5. Public Involvement.** Water quality and the need to reduce nutrient loading in the nearshore waters of the Keys, including the Village of Islamorada service area, are of interest to regulatory agencies and citizens alike. Consequently, public participation has been an important component throughout the preparation of this Final EA to ensure compliance with the intent of NEPA and other applicable statutes.
- **Chapter 6. Conclusion.** In this chapter, conclusions regarding potential environmental impacts of the three alternative actions proposed for the Village of Islamorada WWTFs and associated infrastructure to the physical, biological, and human environment within the service area are presented.
- **Chapter 7. Bibliography.** The bibliography documents the literature cited throughout the Final EA as well as documents used during the preparation of the Final EA that were not specifically cited.
- **Chapter 8. List of Preparers.** The authors primarily responsible for the preparation of this Final EA are listed in this chapter.
- **Chapter 9. Glossary of Terms.**

2.0 Description of Alternatives

Wastewater project alternatives for the Village of Islamorada service area are described and evaluated in this section, providing the basis for decision-making and thereby making up the core of this Final EA. While this chapter relies on supporting information presented in *Chapter 3.0 Affected Environment* and *Chapter 4.0 Environmental Consequences*, it is in this chapter that the environmental consequences are clearly and concisely differentiated for each of the alternatives. The three alternatives evaluated as part of this Final EA are listed below and discussed in the sections that follow.

- ***Alternative 1: No Action.*** No state or federal agency would provide funding to the Village of Islamorada for implementation of wastewater treatment improvement projects that would address State mandates to meet 2010 Statutory Treatment Standards. Public entities would not construct or operate WWTFs. Village of Islamorada residents, communities, and businesses would be responsible for addressing state mandates aimed at improving water quality in the Sanctuary.
- ***Alternative 2: Proposed Action.*** Provide federal financial and technical assistance from the Corps, as part of the FKWQIP, to develop and implement regional wastewater collection and treatment systems for the Village of Islamorada service area that would address mandatory state wastewater treatment standards.
- ***Alternative 3: Pursue other Sources of Funding for Project Implementation.*** In the absence of federal funding from the Corps, alternative funding sources would be pursued to implement projects for the Village of Islamorada service area that would address State mandates and improve water quality in the Sanctuary. Sources of monies may include other State and Federal funding mechanisms.

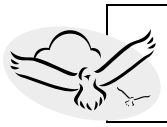
Project alternatives are described and evaluated in this section, providing the basis for decision-making and thereby becoming the core of this Final EA.

While other funding sources are currently being evaluated to assist in implementing wastewater improvement projects in the Village of Islamorada, the proposed Federal funding would expedite construction of the regional WWTFs and associated infrastructure. As stated in the PEIS, it is important to note that while implementation of this project will improve water quality in nearshore waters of the service area, it will not resolve all water quality issues in the Sanctuary.

2.1 Delineation of Alternatives

The enabling legislation for the Act directs the Corps to coordinate with local and state agencies as part of the planning process identifying and developing water quality improvement projects designed to decrease nutrient loading and improve the water quality of the Sanctuary. At the programmatic level, the alternatives analysis examined the potential environmental affects of alternative proposed water quality improvement projects to identify those with the greatest potential for improving water quality throughout the Sanctuary.

Planning at the county level has also addressed water quality improvements in the Keys, primarily in response to the mandated Florida Statutory Treatment Standards of 2010. In addition, local municipalities in Monroe County have prepared sanitary wastewater treatment master plans during the past eight years. The Village of Islamorada is currently in the process of preparing and adopting their wastewater master plan. Consequently, the water quality improvement projects proposed for the Village of Islamorada have undergone a rigorous analysis of alternatives, including facility siting and treatment technology applications. Consequently, additional plan formulation was not undertaken for this project-specific activity. It should be noted that MCSWMP recommendations included the construction of wastewater treatment systems to serve the highest ranked "hot spot areas" for the islands of Islamorada.



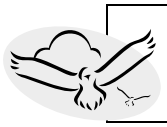
MCSWMP recommendations included the construction of wastewater treatment systems to serve the highest ranked "hot spot areas" for the islands of Islamorada.

2.2 Description of Alternatives

Three alternatives have been proposed for improved wastewater treatment for the Village of Islamorada, and are described in the following sections.

2.2.1 Alternative 1 (*No Action*): No Implementation of Wastewater Treatment Improvement Projects for the Village of Islamorada

Under the *No Action* alternative, no State or Federal funding would be provided to the Village of Islamorada, as part of the FKWQIP, for needed improvements or upgrades to wastewater collection and treatment systems that would address state mandates to improve water quality in the Sanctuary. Residents and commercial businesses in the service area would continue using on-site systems, such as cesspools and septic tanks, to treat wastewater.



Under the No Action alternative, no state or federal agency would provide funds to the Village of Islamorada for needed improvements or upgrades to wastewater collection and treatment systems.

Reliance on individual and privately owned cluster or package treatment facilities would continue under the *No Action* alternative. Individual property owners and commercial businesses would be responsible for meeting the defined level of service (LOS) standards prescribed by county ordinance or state regulation. Public entities would not own or operate any of the proposed WWTF. Under the *No Action* alternative, the Village of Islamorada residents would not benefit from financial and program management assistance, which would otherwise be provided by the federal government.

2.2.2 Alternative 2 (*Proposed Action*): Provide Federal Financial and Technical Assistance to Develop and Implement Wastewater Improvement Projects for the Village of Islamorada

The *Proposed Action* includes financial and technical assistance for the Village of Islamorada to construct three WWTFs and associated infrastructure to serve the Mid Plantation Key, Windley Key, and the South Lower Matecumbe Key service area. The *Proposed Action* would accomplish the goals listed below:

- Meet objectives of the Act;
- Address local and regional water quality issues;
- Achieve nutrient loading reductions and commensurate improvements in water quality in nearshore waters of the service area and subsequently, the Sanctuary; and
- Comply with federal and state mandated regulatory water quality treatment standards in a timely manner.

Under Alternative 2, the Proposed Action, federal funds would be used to assist in the construction of three WWTFs to service the Mid Plantation Key service area, the Windley Key service area, and the South Lower Matecumbe Key service area.

The *Proposed Action* would include new service to residents with on-site systems in the service areas. All single-family residences and almost all small commercial entities currently use some type of on-site system, either permitted/unpermitted septic tank systems, or illegal cesspools. There were 59 package plants in the Village of Islamorada service area in 2004, with a total permitted capacity of 0.91 MGD, and an average daily flow of 0.44 MGD (IWMMP Draft 2005). Once the proposed facility is completed, residents would be connected to the new collection system over an anticipated two to three year period of time.

The concept of Equivalent Dwelling Units (EDUs) has been employed in the planning process to compare the costs of various wastewater alternatives. EDUs are also utilized in the apportionment of the costs of wastewater management implementation. One EDU has been defined by the Village as a single-family residence. Condominiums and other multi-family units are counted as 0.8 EDUs. Water use records are used to estimate wastewater discharges. A factor of 0.9 is used to convert water usage to wastewater generation to account for outdoor usage. Growth projections for projected wastewater flows were completed for 2008 and 2018 (Tables 2-1 and 2-2, respectively). The results predict a 14 percent growth in total wastewater generation during the twenty year period from 1998 to 2018 (IWMMP Draft 2005).

Table 2-1 Projected Wastewater Generation: 2008							
	Total Residential Flow			Total Non-Residential Flow		Total Flow	
Island	MGD	EDUs	gpd/EDU	MGD	EDUs	MGD	EDUs
Lower Matecumbe Key	0.1578	1,045	151	0.0377	250	0.1955	1,295
Upper Matecumbe Key	0.1830	1,096	167	0.1917	1,148	0.3747	2,244
Windley Key	0.0065	43	150	0.1202	801	0.1266	844
Plantation Key	0.5122	3,241	158	0.1786	1,131	0.6908	4,372
Islamorada Total	0.8595	5,425	AVE: 157	0.5282	3,330	1.3876	8,755

Table 2-2 Projected Wastewater Generation: 2018							
	Total Residential Flow			Total Non-Residential Flow		Total Flow	
Island	MGD	EDUs	gpd/EDU	MGD	EDUs	MGD	EDUs
Lower Matecumbe Key	0.1732	1,147	151	0.0404	267	0.2136	1,415
Upper Matecumbe Key	0.1934	1,158	167	0.1939	1,161	0.3873	2,319
Windley Key	0.0068	45	150	0.1202	802	0.1270	847
Plantation Key	0.5593	3,540	158	0.1891	1,197	0.7485	4,737
Islamorada Total	0.9327	5,890	AVE: 157	0.5436	3,427	1.4764	9,318

At the owner's expense, existing residential septic systems and cesspools would be removed from residences and businesses in the service area. Similarly, service recipients would be responsible for the installation of conveyance pipes from their residence or business to the wastewater collection system service lateral to the street. Removal of existing systems would be phased in accordance with construction of the collection system, and pursuant to Florida Department of Health (FDOH) requirements.

2.2.2.1 Alternative Site Selection

Multiple sites on the four islands were considered as potential locations for facilities to service the Village of Islamorada. Viable sites were extremely limited due to market availability issues. The proposed locations on Plantation Key, Windley Key, and Lower Matecumbe Key were chosen based on evaluation with respect to location, existing and future land use, adjacent land uses, general environmental and habitat considerations, present ownership, development constraints, and cost. Consequently, additional plan formulation was not undertaken for this project-specific activity for this Final EA.

2.2.2.2 Wastewater Collection and Transmission System

The MCSWMP evaluation considered a variety of collection system alternatives, including conventional gravity sewers, simplified gravity sewers, small diameter gravity sewers, low pressure sewer grinder pump systems, septic tank effluents pump systems, and vacuum sewer systems. Vacuum sewers and grinder pump systems are the preferred wastewater collection technology for the Village of Islamorada because the subsurface conditions found in the Keys create difficulties in the installation and operation of traditional gravity systems. The MCSWMP concluded that vacuum collection systems are the most cost affective option for Plantation Key

and Lower Matecumbe Key, while a progressive cavity grinder pump collection system was deemed the most cost-affective technology for Windley Key. Also, as an option described in the IWMMP (Draft August 2005), a vacuum system would be considered to provide uniformity among the systems and due to the legal, administrative and operational advantages over a progressive cavity grinder pump collection system. The IWMMP recommended that the pros and cons of each system be reviewed during the conceptual design phase to determine the preference of one system over the other.

Collection System

Vacuum Collection System
The proposed collection system for Plantation Key and Lower Matecumbe Key and as an alternative for Windley Key includes a vacuum sewer system with gravity collection mains and/or service laterals, wastewater holding sumps and vacuum valve pits, vacuum collection mains, and a VPS building. Residential wastewater would be collected via gravity into a vacuum valve pit composed of a lower fiberglass holding sump and an upper vacuum valve. Each valve pit would serve two or more residences. Increased wastewater levels in the holding sump activate the VPSs and pump wastewater into three-inch or larger PVC vacuum wastewater collection mains. The wastewater then flows through vacuum mains into the collection tank at the VPS and is pumped through the force mains and into the treatment facility. The VPS would be constructed as a slab-on-grade building and would have a minimum of two vacuum pumps, two discharge pumps, a collection tank, and an emergency generator. A separate concrete pad external to the station would accommodate odor control equipment (either a vapor phase activated carbon filter or a biological filter) to treat air discharged from the collection tank by the VPS blowers.

Grinder Pump Collection System
Low pressure sewers used in conjunction with individual grinder pumps are constructed of two- to three-inch in diameter PVC or high density polyethylene (HDPE) pipe. Individual service connections are typically one-inch in diameter. This system requires an individual grinder pump at each residence that can be located outside of the home. The grinder pump is designed to macerate solids (similar to the way that a kitchen garbage disposal grinds solids) in addition to lifting the wastewater up to the low pressure sewer. The advantages to this system are that smaller diameter pipes can be installed at shallower depths, similar to vacuum collection systems, thus eliminating the need for deep excavations, as compared to conventional gravity collection systems. The main disadvantage is the need to have a pump at each individual home/service connection. The main disadvantage of the grinder collection system is that the grinder pump is subject to potential failure and will not operate during a power outage, however provisions can be made by the system operator to provide stationary or portable, depending on the size of the service connection, emergency power.

2.2.2.3 Wastewater Treatment Facilities

Site Description. The proposed WWTFs would be constructed on Plantation Key, Windley Key, and Lower Matecumbe Key.

Plantation Key
The WWTF would be constructed on approximately 0.57 acres on the bayside of Plantation Key at MM 90, immediately north of the WWTF (also know as the Plantation Key Facility) currently under construction, between US-1 to the east, Gardenia Street to the west, and Woods Avenue to the north. The site is undeveloped, but heavily vegetated with invasive/exotic plant species (e.g., Brazilian pepper, Australian pine). The surrounding area includes commercial and residential areas, and schools. A conceptual layout of the proposed WWTF is included as Figure 2-1. The associated infrastructure (vacuum pumps and collection/transmission systems) would be constructed within existing rights-of-way (ROW).

Windley Key
The proposed WWTF would be constructed on approximately 0.90 acres, near the intersection of US-1 and Old S.R. 4A. The site is cleared, grassy, and currently used as a storage area for boats, and is adjacent to a marine theme park. A conceptual layout of the proposed WWTF is included as Figure 2-2. The associated infrastructure (vacuum pumps and collection/transmission systems) would be constructed within the existing ROW.

Lower Matecumbe Key
The proposed WWTF would be constructed on approximately 0.93 acres, near the intersection of US-1 and Gulf View Drive. The site is located next to a gas station, a cell phone tower, a small commercial business, and a canal. A conceptual layout of the proposed WWTF is included as Figure 2-3. The associated infrastructure (vacuum pumps and collection/transmission systems) would be constructed within the existing ROW.

2.2.2.4 Construction Activities

Proposed construction includes building the WWTFs and associated infrastructure, installing treatment tanks, underground and aboveground transmission lines, pumping stations, and sand or fabric filtration facilities. Removal of septic systems and pipeline trenching activities would occur throughout the service area at the residents' expense.

Excavation activities for the collection system and WWTF site development, transmission lines, and septic tank and cesspool removals would require heavy construction equipment, such as trenching equipment, excavators, bulldozers, front-end loaders, and dump trucks to transport material, equipment, and construction debris. Existing utilities within the ROWs on either side of U.S. 1 may require the construction of portions of the wastewater collection mains, force mains, and transmission mains under one or more paved lanes of U.S. 1, resulting in temporary traffic delays in proximity to the construction. All construction will meet Florida Department of Transportation (FDOT) requirements to minimize traffic impacts, and conform to FDOT standards for restoration of roadways. Depending on the time required for construction on U.S. 1, construction may take place during evening hours.

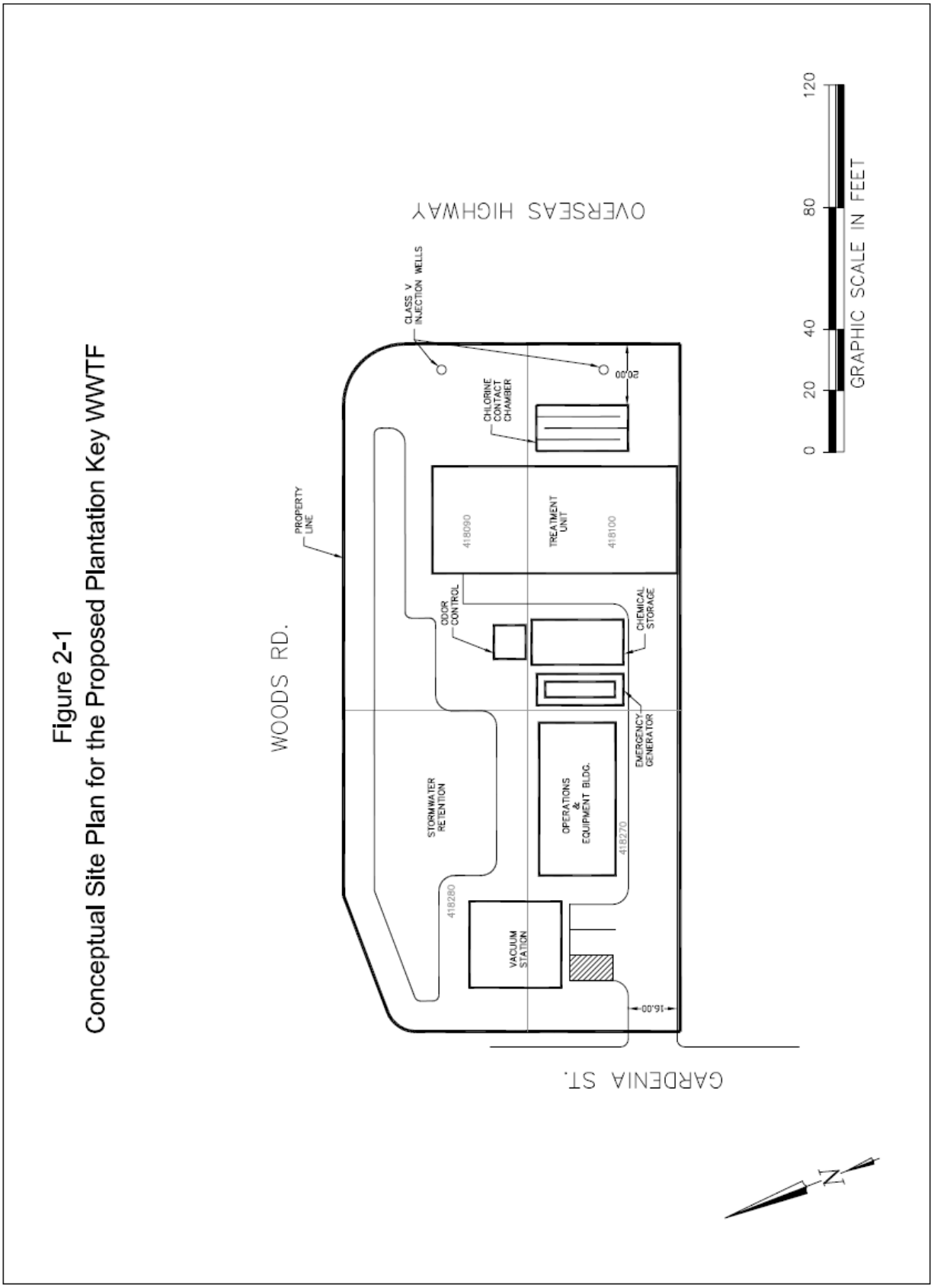


Figure 2-1
Conceptual Site Plan for the Proposed Plantation Key WWTF

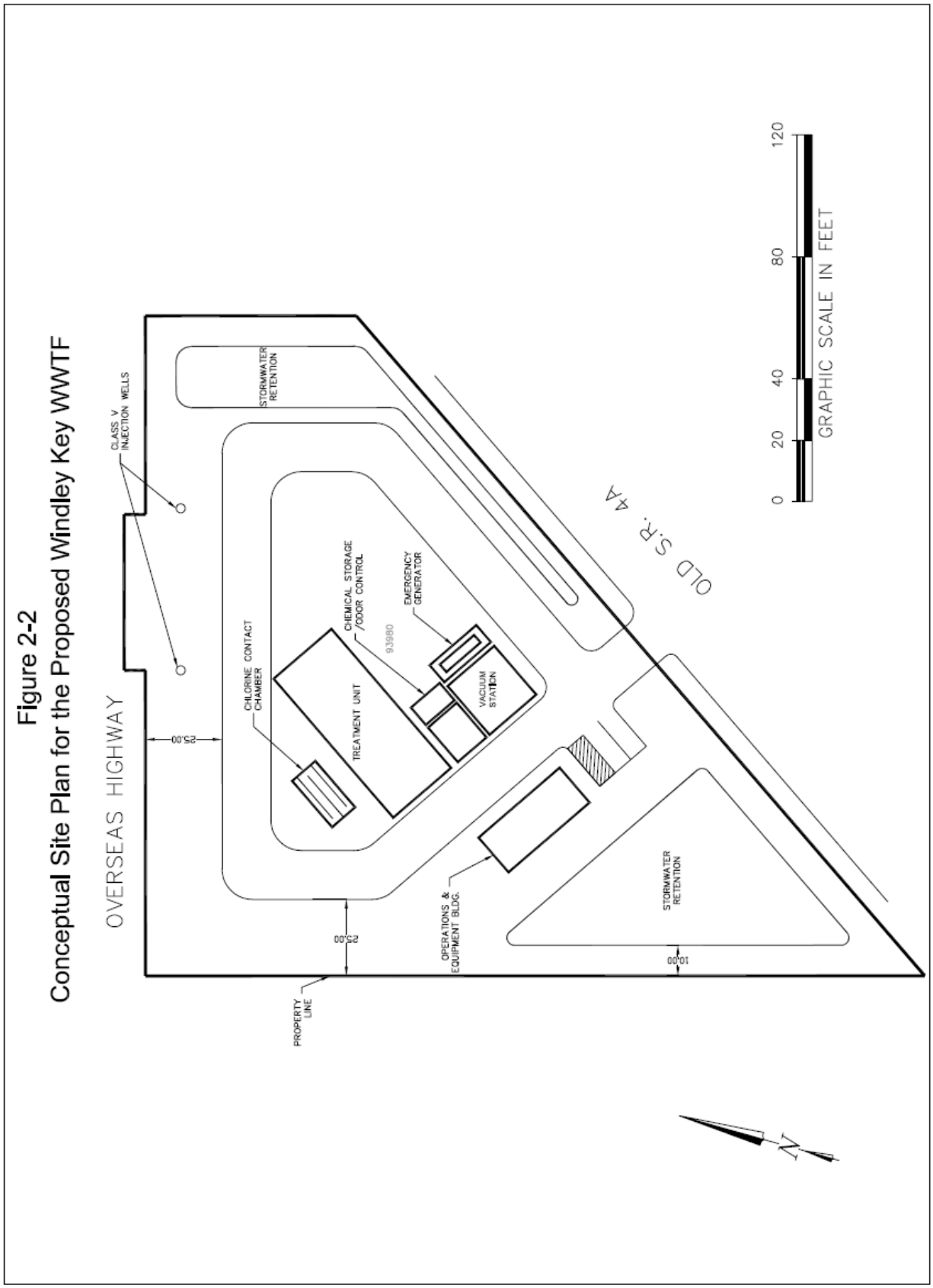


Figure 2-2
Conceptual Site Plan for the Proposed Windley Key WWTF
OVERSEAS HIGHWAY
OLD S.R. 4A
CLASS V INJECTION WELLS
STORMWATER RETENTION
CHLORINE CONTACT CHAMBER
TREATMENT UNIT
CHEMICAL STORAGE /ODOR CONTROL
EMERGENCY GENERATOR
VACUUM STATION
OPERATIONS & EQUIPMENT BLDG.
STORMWATER RETENTION
PROPERTY LINE
25.00
25.00
10.00
93980
0
20
40
80
120
GRAPHIC SCALE IN FEET
N

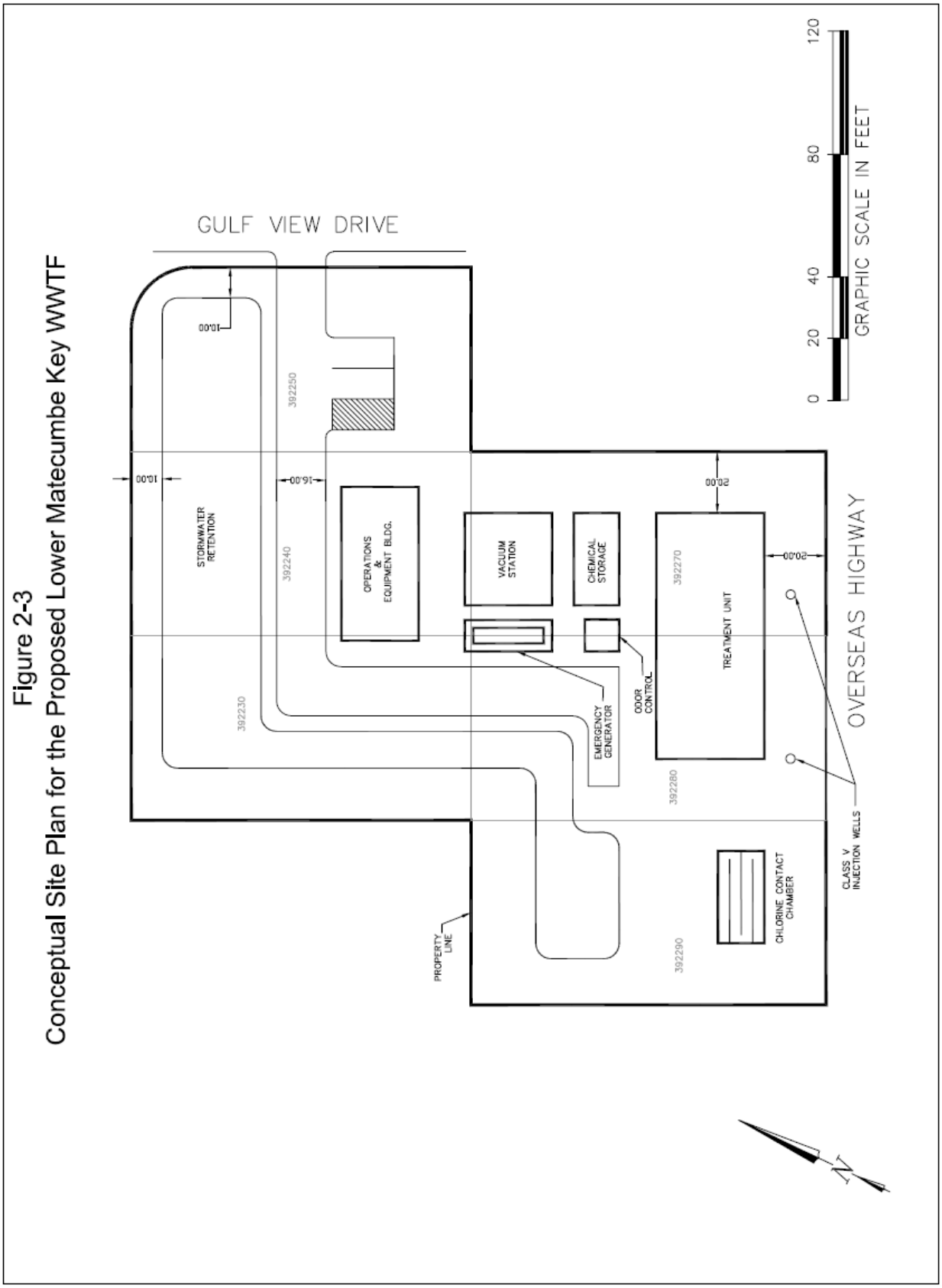


Figure 2-3
Conceptual Site Plan for the Proposed Lower Matecumbe Key WWTF

All construction activities would be conducted pursuant to applicable facility planning regulations at the state and county level. Coordination between and among the Village of Islamorada local governments, including the Building Department, Public Works, and city engineers, would be required to ensure that facility structural and mechanical integrity comply with current codes, and to ensure that required permits for siting, planning, design, and operation are obtained.

2.2.2.5 Operation and Maintenance

The new WWTFs would be operated and maintained by the Village of Islamorada.

Wastewater Treatment Components
Design of the new WWTFs include the facility, storage for maintenance, treatment, effluent disposal and operations materials, parking, paved access roads, and landscaping. While each WWTF process may vary slightly, the overall design includes influent flow measurement and pretreatment screening, biological nutrient removal (BNR) reactors, chlorine contact basins, sludge holding facilities, odor control equipment as required, Class V injection wells, and ancillary equipment such as pumps and blowers to support each unit process.

Wastewater Treatment System Operation
The WWTFs will generally include a field-erected treatment facility, an emergency power generator, two injection wells, headworks, odor treatment, an operations building, facility pump station, and a blower/electrical building. Roads, landscaping, and stormwater retention will also be included. Influent and effluent concentrations for which the facilities will be designed are as noted in Table 2-3 below.

Table 2-3
Design Wastewater Influent and Effluent Characteristics

Parameter	Influent Concentration	Effluent Concentration
Biological Oxygen Demand (BOD) 5	225 parts per million (ppm)	5 ppm
TSS	225 ppm	5 ppm
Total Nitrogen (TN)	45 ppm	3 ppm
TP	10 ppm	1 ppm

WWTF would provide biological treatment, solids removal, nitrogen and phosphorus removal, filtration, effluent disinfection and disposal to injection wells. A flow meter would measure and record the wastewater flow into the WWTF.

Immersed Membrane Bioreactor (IMB) technology used for biological treatment is a common type of aeration process capable of meeting the Monroe County effluent standards. The IMB process is a continuous-flow system that combines activated sludge aeration, nutrient removal, and filtration. IMB technology minimizes land usage by combining multiple treatment processes within the same structure and by eliminating the need for equalization tanks between steps in the treatment process. The IMB process is stable over a range of flows and load variations. IMB

systems also operate at higher mixed liquor suspended solids concentrations than comparable processes, minimizing sludge volume and disposal costs.

IMB plants include multiple compartments for the various stages of biological treatment. The compartments alternate anoxic and aerobic processes. The final stage of biological treatment takes place in an aerobic compartment containing vertically installed synthetic microfilter membranes with 0.1 micron pores. Vacuum pressure pulls the wastewater through the membrane, removing solids. The liquid effluent can then be extracted and mechanically pumped for disinfection and discharge. Because the pore size of the membrane is very small, the effluent is filtered and therefore needs no secondary clarification or filtration, additional processes that are required as part of most wastewater treatment systems. Within the IMB compartment, the wastewater is continuously aerated to promote mixing of the wastewater with microorganisms and oxygen, while also cleaning the outer surface of the membranes.

Concentrated sludge is removed directly from the aeration tank. The sludge produced by the IMB process tends to be more concentrated than the sludge produced by other types of processes. Typically, the sludge volume is one third of that produced by an SBR process. The residual sludge will then be transported offsite to an FDEP permitted facility.

The IMB process is well-suited for use in the Village of Islamorada because land use and sludge handling are reduced. Another advantage is that IMB systems are able to operate over a range of influent flow rates, which is important in consideration of seasonal fluctuations in population and tourism.

Disadvantages to the IMB process include the fact that the immersed membrane pore spaces must be monitored for potential clogging; there are operating costs associated with maintaining and repairing immersed membranes; and increased annual energy costs, in comparison to SBR systems, related to the operation of pumps.

Effluent and Sludge Disposal

By-products of the wastewater treatment process include liquid effluent and a solids residual or sludge.

Effluent Disposal

Effluent disposal for the proposed WWTFs would be through shallow well injection. At the Plantation Key WWTF (currently under construction via FEMA monies), effluent disposal is also partially through reuse for irrigation. Effluent disposal through water reuse applications is not currently planned for the proposed WWTFs; however it could be used should the demand for reuse water be sufficient. Shallow injection wells are considered Class V wells by the EPA, and the required effluent quality is dependent in the capacity of the WWTF. The effluent quality for the proposed WWTFs is as stated in Table 2-3.

These wells extend 90 feet below ground with a 60 foot casing in the upper portion of the well. The effluent gravity flows through the upper cased portion of the well and out through the lower 30-foot portion of the well into a porous limestone formation. Chlorine would be added to effluent to reduce risk from bacteria and viral organisms.

Sludge Disposal
Current plans for managing sludge at the proposed sites also include temporary storage followed by off-site processing and disposal. The only exception might be the Plantation Key Plant. At some point in the future, the addition of a sludge processing facility at this location may be evaluated. The facility would process sludge from all Village of Islamorada WWTFs.

2.2.3 Alternative 3 (*Alternative Funding Sources*): Pursue Other Sources of Funding for the Village of Islamorada Wastewater Improvement Projects

Under Alternative 3, *Alternative Funding Sources,* including state and federal funding alternatives (other than Corps funds), would be pursued to implement the Village of Islamorada wastewater improvement projects. This alternative is not within the jurisdiction of the Corps and no monies would be obtained from the Corps. Consequently, the project would be implemented as funding became available, potentially delaying full implementation. The overall potential impacts of implementing *Alternative Funding Sources* are briefly summarized below:

- Fail to meet objectives of the Act until alternate funding is identified and obtained;
- Delay addressing local and regional water quality issues;
- Delay nutrient loading reductions and commensurate improvements in water quality in nearshore waters of the service area and subsequently, the Sanctuary; and
- Delay compliance with federal and state regulatory water quality standards until all funding is made available.

2.3 Comparison of Alternatives

The alternatives examined as part of this Final EA were premised on the need to implement water quality improvement projects that will reduce nutrient loading and result in commensurate water quality improvements in the Sanctuary. The environmental consequences are summarized in Table 2-3 and a more detailed analysis is presented in *Chapter 4.0 Environmental Consequences*.

2.4 Preferred Alternative

The preferred alternative is Alternative 2, the *Proposed Action*. Under the *Proposed Action*, the Corps would provide financial and technical assistance to the Village of Islamorada for implementation of a wastewater improvement project that would reduce nutrient loads and pollutants to nearshore waters in the Sanctuary.

Under the Proposed Action, the Corps would provide financial and technical assistance to the Village of Islamorada for the construction of WWTFs and associated infrastructure that would reduce nutrient and pollutant loads to nearshore waters in the Sanctuary.

2.5 Summary of Mitigation Requirements for Islamorada WWTFs

Some unavoidable impacts may occur as a result of the *Proposed Action* and would require mitigation. Proposed mitigation measures are described below.

Biological Resources. Adverse impacts to existing hardwood hammock habitat are anticipated as a result of the proposed project at the Plantation Key site. Hardwood hammocks are protected under the Village of Islamorada's Land Development Regulations (Section 30-1611-17). The Village of Islamorada requires that a habitat analysis be submitted for lands containing hardwood hammocks (Section 30-1613). Based on the size of the hammock (0.35 acres) and the surrounding land use, the hammock habitat on the Plantation Key Site is likely low quality hammock. The Village of Islamorada also has open space requirements (Section 30-1614). Any native vegetation that is removed for the proposed development must be replaced, mitigated, or restored. In addition, any species listed as endangered, threatened, or regionally important must be replaced at a minimum ratio of 1:1 of similar size and maturity. As part of the mitigation, wild lime (*Zanthoxylem fagara*) and torchwood (*Amyris elemifera*) will be the primary planting focus due to their importance as food for the caterpillars of the federally listed Schaus butterfly. Mitigation actions will be consistent with the Village of Islamorada development regulations (section 30-1616) and is anticipated to occur within 30 days of facility construction completion. Based upon scientific literature the Village of Islamorada would mitigate for up to 100 native hardwood trees. A habitat analysis and specific native hardwood re-vegetation plan would be implemented pursuant to Monroe County and Village of Islamorada requirements once the property is purchased by the Village of Islamorada.

No wetlands occur on any of the proposed three sites for development, consequently no wetlands mitigation will be required.

Cultural Resources. The results of a review of the Florida Master Site files indicated no known archaeological or historic sites on, or in direct proximity to, the proposed project locations. Consequently, no affect on historic, archaeological, or cultural resources is anticipated as a result of the proposed project. Consultation with SHPO is on-going and will be completed after the properties have been purchased by the Village of Islamorada. Should any historic or archeological items be discovered during project work, all activities would be terminated and the Village of Islamorada would consult with the Corps, SHPO, and other appropriate agencies for further guidance.

The results of a review of the Florida Master Site files of the proposed WWTF locations indicated no known archaeological or historic sites on, or in direct proximity to, the proposed project locations.

Environmental Justice. EO 12898 directs federal agencies to solicit participation by minorities and low-income populations in the federal decision-making process, and further directs agencies to fully disclose any adverse affects of plans and proposals on minority and low-income populations. Potential impacts to low-income residents are a concern from the perspective of environmental justice in Islamorada. While the median household income (MHI) in Islamorada is relatively high, seven percent of the residents live below poverty level in Islamorada. This percentage may actually be larger given that the cost of living in Monroe County is about ten percent higher than that of the state, as described in the PEIS (Section 3.13) and in this document (Section 3.13).

In addition, the Village of Islamorada has a proportion of residents over the age of 65 comparable to the county and state. This segment of the population often lives on fixed incomes and while their income may not be below the poverty level, they are affected by cost of living changes. These factors suggest that while the majority of the Islamorada residents are financially secure, there is considerable disparity in wealth and income among residents, raising potential environmental justice concerns. Three potential approaches that the Village of Islamorada may elect to address for this issue are presented below, as previously outlined in the PEIS.

- ***Subsidize Connection Fees***. Subsidize the cost of connection for low-income or fixed-income residents. The principal issue associated with providing subsidies for this group of residents is the source of funding, which could be provided by the water treatment utility or local government property tax revenues. In each case, the potential for funding would have to be evaluated.

- ***Subsidize the Recurring Cost of Sewer Service.*** Again, the principal issue would be the source of funding. A major difference between funding requirements for subsidizing connection charges and recurring charges is the continuing nature of the recurring charges.

- ***Implement a Rate Structure Based on Water Volume Use.*** Apply service fees based on the volume of water actually used. Such a rate structure would include a very low base charge for the first 3,000 gallons of water use per month, with a sharply increasing charge for greater volumes of water use.

- ***Subsidize Abandonment of Existing Onsite Treatment Facilities.*** Subsidize the cost of abandoning onsite treatment (i.e., septic tank and drainage field) for low income or fixed income residents. As stated above, the principal issue would be the source of funding.

Table 2-4
Comparison of Environmental Consequences for the Village of Islamorada Regional WWTF Alternatives

Scoping Issue	Alternative 1 *No Action*	Alternative 2 *Proposed Action*	Alternative 3 *Alternative Funding Sources*
 **1. Water Quality**	Adverse impacts due to continued untreated wastewater runoff and associated nutrients, toxins, bacteria, and viruses to canals and nearshore waters in the Sanctuary. State and federal mandates to improve water quality in the Sanctuary may not be addressed.	Benefits of centralized wastewater treatment include water quality improvements due to decreased nutrients and other contaminants into canals and nearshore waters of the Sanctuary. Reductions in TN, TP, and TSS loadings of 85, 79, and 80 percent, respectively, are anticipated. These improvements will address state and federal legislation.	Continued degradation of water quality is anticipated until funding is obtained to construct the WWTFs. Piece-meal construction may delay full achievement of project and program objectives.
 **2. Facility Siting**	No impacts are anticipated. No lands will be required for the location and construction of wastewater facilities. Therefore, existing residences, fish and wildlife habitats, and land uses will not be disrupted.	Net environmental benefits due to improved water quality. Potential adverse impacts to approximately 0.35 acres of hammock. Mitigation proposed for hammock and disturbed wetlands loss, per Islamorada's regulations and will include wild lime and torchwood, which are food sources for the federally listed Schaus swallowtail butterfly Impacts to cultural or historic resources are not anticipated.	Impacts similar to those described under the *Proposed Action* are expected.
 **3. Protected Species**	Adverse impacts to protected species anticipated as a result of continued runoff of untreated wastewater into canals and nearshore waters and subsequent water quality degradation. Because no new facilities would be required, no impacts to habitat for protected species are anticipated.	Minimal adverse impacts due to facilities siting. Regulatory agencies support project. Section 7 USFWS consultation and review by Florida Fish and Wildlife Conservation Commission (FFWCC) for protected species is on-going.	Impacts similar to those described under the Proposed Action are expected, with delays in benefits, in addition to potentially greater impacts due to larger number of smaller facilities being constructed.
 **4. Effluent Disposal**	Adverse impacts anticipated as a result of unchanged effluent disposal practices. Runoff from cesspools and septic tanks will continue to enter canals and nearshore waters in the Sanctuary.	Construction of centralized sewers will expedite the removal of cesspools and associated pollutants in the Islamorada *hot spots*. Chlorine would be added to effluent to reduce risk of bacteria and viral organisms.	Construction of sewers will be less affective due to fragmented approach. Delays in construction also anticipated.
 **5. Tourism**	Increasing impacts anticipated related to water quality degradation. Continued beach health advisories would adversely affect immediate recreational and tourist opportunities, and long-term impacts could be detrimental to tourism and the local economy.	Improved water quality would decrease the incidence of beach advisories and closings, thereby increasing the opportunity for saltwater-based recreation. Temporary adverse impacts would include transportation delays due to construction activities.	Improved water quality would decrease the incidence of beach advisories and closings, thereby increasing the opportunity for saltwater-based recreation albeit at a slower pace than the *Proposed Action*.

Table 2-4
Comparison of Environmental Consequences for the Village of Islamorada Regional WWTF Alternatives

Scoping Issue	Alternative 1 *No Action*	Alternative 2 *Proposed Action*	Alternative 3 *Alternative Funding Sources*
 **6. Environmental Justice**	Adverse impacts to low-income households who will have difficulties affording the cost of meeting 2010 mandates for wastewater treatment are expected.	Without special consideration and financial assistance, low-income and fixed-income households may have difficulty paying for wastewater hook-up, abandonment of on-site treatment facilities, and service fees.	Without special consideration and financial assistance, low-income and fixed-income households may have difficulty paying for wastewater hook-up, abandonment of on-site treatment facilities, and service fees.

3.0 Affected Environment

A PEIS was previously prepared by the Corps for the proposed FKWQIP. The PEIS was prepared in accordance with the NEPA, the CEQ regulations implementing NEPA (40 CFR 1500-1508), and FEMA regulations (44 CFR Part 10, Environmental Considerations). These laws and regulations require the Corps to consider and address issues when funding any Federal action.

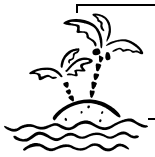
The PEIS was prepared by the Corps and published in the Federal Register in September 2004 and provides a framework to address potential environmental impacts associated with design and implementation of the FKWQIP. This Final EA tiers off from the PEIS for the FKWQIP and thereby incorporates the PEIS by reference, in accordance with 40 CFR Part 1508.28. The *Proposed Action* is the construction of three centralized wastewater treatment systems to service residents and commercial businesses located in the Village of Islamorada, Florida. The proposed design capacities of the WWTFs for the individual service areas are:

- Plantation Key: 0.35 MGD
- Windley Key: 0.19 MGD
- Lower Matecumbe Key: 0.30 MGD

The affected environment addressed by this Final EA includes the Village of Islamorada service area, which extends from US-MM 90.9 to MM 72.9, and includes four islands (from north to south):

- Plantation Key
- Windley Key
- Upper Matecumbe Key
- Lower Matecumbe Key

The environmental components addressed in the Final EA are summarized in Table 3-1. While global or regional conditions such as climate will not be affected by the alternatives under consideration, habitat, protected species, environmental justice, and water quality are issues of concern and are therefore evaluated in appropriate detail. This chapter provides a current baseline against which comparisons of alternatives discussed in Chapter 4, *Environmental Consequences*, can be made.



In this chapter, the environmental resources of the service area are described and provide a current baseline against which comparisons of alternatives can be made.

✓	✓	✓	✓	✓	✓

Table 3-1
Relationship Between Scoping Issues and Environmental Resources

Section	*Affected Environment*	Scoping Issues					
		1. Water Quality	2. Facility Siting	3. Protected Species	4. Effluent Disposal	5. Tourism	6. Environmental Justice
3.1	Climate						
3.2	Topography, Geology and Soils	✓	✓		✓	✓	
3.3	Water Resources	✓	✓	✓	✓	✓	
3.4	Water Quality	✓	✓	✓	✓	✓	
3.5	Ecological Habitats	✓	✓	✓		✓	
3.6	Protected Species	✓	✓	✓		✓	
3.7	Essential Fish Habitat (EFH)	✓	✓	✓		✓	
3.8	Air Quality and Noise		✓				
3.9	Cultural Resources		✓				
3.10	Demographics and Socioeconomics	✓	✓			✓	✓
3.11	Recreation	✓	✓	✓		✓	
3.12	Open Space and Aesthetic Resources	✓	✓	✓		✓	
3.13	Environmental Justice		✓			✓	✓
3.14	Land Use and Planning	✓	✓	✓	✓	✓	✓
3.15	Infrastructure		✓				
3.16	Hazardous Materials and Waste		✓				

3.1 Climate

The climate in the Village of Islamorada service area is the same as that described for the Keys in the PEIS (Section 3.1). The Keys are marked by a wet summer season (June to October) characterized by numerous thunderstorms, while winters (November to May) are dry with infrequent, fast-moving cold fronts (30-40 each year). Precipitation in the Keys is low compared with other portions of Florida. Rainfall averages 40 inches per year and peaks in June and late September and accounts for most of the precipitation in the Keys.

3.2 Geology, Topography, and Soils

The geology, topography, and soils in the Keys are described in the PEIS (Section 3.2). Geologically, the Village of Islamorada service area which is comprised of Plantation, Windley, Upper and Lower Matecumbe Keys is part of a fossilized coral reef formation referred to as the

Key Largo Limestone (Randazzo and Halley 1997) that characterizes the middle and upper Keys. The Village of Islamorada service area is relatively flat with elevations less than five feet to about 20 feet above mean sea level (amsl) National Geodetic Vertical Datum (NGVD). The topography of the Village of Islamorada is varied and includes a ridge system on Plantation Key and the highest point in the Keys which is located on Windley Key and is approximately 20 feet amsl.

The topography, geology, and soils in the Keys provide the substrate over and through which water flows to nearshore waters and are therefore important to understanding impacts that may result from the Proposed Action.

✓	✓		✓	✓	

Service Area. Soil maps of the Village of Islamorada service area (Plantation Key, Windley Key, Upper and Lower Matecumbe Keys) (U.S. Department of Agriculture [USDA] Natural Resources Conservation Service [NRCS] 1990) indicate ten soil map units in the Village of Islamorada service area. Pennekamp gravelly muck dominates Plantation, Upper and Lower Matecumbe Keys, covering 33.46 percent of the service area. Udorthents are the second most dominant cover type, comprising 25.96 percent of the service area. Urban cover (13.20%) and Key Largo muck (10.09%) comprise the third and fourth dominant soil types within the service area.

The remaining seven soil types make up ~18 percent of the service area, and are Lignumvitae marl, Islamorada muck, Matecumbe muck, Cudjoe tidal complex, Tavernier tidal complex, rock outcrops, and beaches (USDA 1990).

Pennekamp gravelly muck is a well-drained soil typical of tropical hammocks in the Upper Keys. These soils have a surface that is approximately ten percent large stones, 10 to 20 inches in diameter and are moderately well drained. Seasonal High Water Table (SHWT) in these soils is about three and a half to five feet and the soils have a moderately rapid permeability (USDA, 1990).

The Udorthents soils complex is composed of crushed oolitic limestone or coral bedrock spread over original soil material and consequently do not support vegetation growth. These soils are moderately well drained and have a water table at two to four feet below land surface (bls) during the wet season. Houses and other urban structures occur on approximately 40 percent of the Udorthents in the Keys (USDA 1990).

Nearly 40 percent (1895 acres) of the soils in the Village of Islamorada service area are poorly drained soils with high runoff potential, while the remaining soils have more moderate infiltration and runoff characters (USDA 1990). There are no prime farmlands in Monroe County that fall under the Farmland Protection Policy Act.

In total only 2.3 acres will be taken up by the proposed WWTFs, which will provide treatment for residents and businesses within the Village of Islamorada.

WWTF Location. Because the WWTF sites in the Village of Islamorada are privately owned no soil borings have been completed to date. As a result, existing soil survey information was analyzed in order to describe soils of the proposed WWTF sites for the Village of Islamorada.

The Lower Matecumbe Key WWTF location is made up entirely of Udorthent soils. The Plantation Key WWTF site is mostly Pennekamp soils, with less than two percent Udorthent soils. Matecumbe mucky soils make up the Windley Key WWTF location (USGS 2002).

3.3 Water Resources

Ground water, surface waters, and nearshore and marine waters in the Keys are the environmental resources targeted by the FKWQIP and the proposed wastewater improvement project for the Village of Islamorada, as described in the PEIS (Section 3.3). The Village of Islamorada regional WWTFs will address eight of the 45 water quality hot spots in the Keys (Monroe County 2000).

The Village of Islamorada regional WWTFs will address several of the 45 water quality hot spots in the Keys, previously identified in the MCSWMP.

✓	✓	✓	✓	✓	

3.3.1 Ground Water

Service Area. Water in the Biscayne Aquifer provides a potable water source only on the mainland of Florida, although the geologic structure extends as far as the Keys. The aquifer ranges from brackish to saline throughout the Keys and is not used as a potable water source (that is, it is not a designated underground source of drinking water, or USDW) except as input for desalination systems. The Florida Keys Aqueduct Authority (FKAA) is the sole provider of potable water for all residents of the Keys and no new domestic water supply wells have been permitted in the Keys since 1986 (FEMA 2002). The presence of freshwater lenses has not been documented for the Village of Islamorada area.

WWTF Locations. Groundwater levels at the treatment plant site are usually about five feet below the existing ground surface (Nutting Engineers 2002), based on the results of a geotechnical survey. The groundwater fluctuates due to tidal influence, seasonal precipitation, construction activities, and other site-specific impacts.

3.3.2 Surface Waters and Stormwater Runoff

Service Area. Inland waters in the Village of Islamorada service area include artificial ponds, canals, and boat basins and little to no freshwater systems. Freshwater wetlands and ponds in the Keys are generally limited to relatively thin freshwater lenses on the larger islands of the lower Keys and less than one acre of these surface waters are mapped in the Village of Islamorada service area.

Surface waters include 840 acres of mangrove areas and 90 acres of canals that provide boat access to marinas and residential developments and a drainage system for stormwater runoff. The 42 acres of streams are located adjacent to canals. Inland canals and access channels in the Keys are often 10 to 20 feet in depth and discharge directly into the ocean, as described in the PEIS (Section 3.3). In addition, stormwater ponds, retention ponds, and wet extended detention ponds in the service area may be permanent or seasonal. Stormwater swales collect and divert stormwater from roads and highways into canals and nearshore waters. Although a few small inland ponds occur on the bay side of U.S. 1, most of the 60 acres of inland waters are lagoons that gradually merge with the coastal mangrove system (Table 3-2) (USGS 2002).

Inland surface waters in the service area include 150 acres of canals and ponds that receive stormwater runoff, ground water, and direct rainfall.

Canal systems in the Village of Islamorada vary in design and physical characteristics such as length, depth, slope and underlying geology. Each canal is affected differently by the impacts of nutrient loading, flushing rates, which ultimately affects the water quality of the canal. In a 1985 study, Florida Department of Environmental Protection (FDEP) (formerly Florida Department of Environmental Regulation [FDER] concluded that the majority of the Keys met the criteria for designation as Outstanding Florida Waters (OFWs), except canals and other specific areas. Many of the canal systems tested exhibited low values in dissolved oxygen, high nutrient values, and violations of the fecal coliform standard (Kruczynski, W. 1999).

Subsequent recommendations made by EPA and the South Florida Water Management District (SFWMD) through an interagency workshop for the Water Quality Protection Program (1996) for the poorly designed canal systems included installation of BAT wastewater treatment, collection and treatment of stormwater runoff, and improvements to canal circulation.

WWTF Locations. There are no surface waters in the proposed WWTF locations for the Village of Islamorada. Stormwater runoff flows to the bay or into stormwater culverts along U.S. 1.

Table 3-2 Acres and Percent Cover of Water and Land in the Service Area		
Hydrography	**Acres**	**Percent of Total**
Land	3073.0	65.79
Mangrove area	839.9	17.98
Bays, estuaries, gulfs, oceans, seas	566.2	12.12
Ditch or canal	89.9	1.92
Lake or pond	59.9	1.28
Stream	42.1	0.90
Channel in water area	0.3	0.01
Total	4671.2	100.00

3.3.3 Nearshore and Offshore Waters

Service Area. The service area includes nearshore waters of the Gulf of Mexico and Atlantic Ocean, which are home to the largest living coral reef system in the U.S. The reef system provides habitat for 80 percent of fish species in the U.S., and most commercially valuable fish species depend on nearshore waters at some point during their development, as described in the PEIS (Section 3.3.3). In addition to valuable fish and wildlife habitat, nearshore and marine waters provide numerous recreational opportunities, such as boating, diving, swimming, surfing, snorkeling, and fishing. In general, nutrient pollutants from the Keys have greater nearshore affects than offshore affects due to dilution by tides and currents (Kruczynski 1999, Szmant and Forrester 1996).

WWTF Locations. The proposed WWTFs do not occur on or directly adjacent to nearshore or offshore waters. Stormwater runoff flows to the bay or into stormwater culverts along U.S. 1.

3.4 Water Quality

The purpose of the proposed WWTFs for the Village of Islamorada service area is to decrease the discharge of nutrients and other pollutants and consequently improve water quality in the Sanctuary, consistent with the mission of state and federal entities. The proposed project is designed to protect the biodiversity, natural beauty, and recreational opportunities of the Keys that are important to Florida's tourism industry which make up a significant part of the nation's collective natural resources.

The water quality of the nearshore environment of the Keys is affected by nutrient loading from an estimated 200 package plants, 22,000 septic tanks, 5,000 cesspools and 139 marinas harboring over 15,000 boats via canals and channels. Average estimated reductions in wastewater loading to nearshore waters in the Keys due to implementation of FKWQIP are approximately 69 and 73 percent in TN and TP loadings, respectively, using AWT standards. Reductions in TN, TP, and TSS loadings of 85, 79, and 80 percent, respectively, are anticipated for the Village of Islamorada service area as a result of implementing the proposed wastewater improvements. The proposed WWTFs would meet AWT standards and includes disinfection.

AWT effluent standards at the proposed WWTFs would represent a major improvement in groundwater quality compared with existing reliance on cesspools and septic tanks.

✓	✓	✓	✓	✓	

3.4.1 Ground Water

The Village of Islamorada service area is considered a pollutant source to nearshore coastal waters. Numerous cesspools and septic systems which provide little to no treatment due to high groundwater levels and small residential lot sizes release effluent into canals and the nearshore environment. As of 2004, there were 59 FDEP permitted package plants in the service area, with a total permitted capacity of 0.91 MGD and an average daily flow of 0.44 MGD (Village of Islamorada Draft 2005).

WWTFs are required to treat effluent to AWT or BAT standards. For facilities that treat over 100,000 gallons per day (gpd), the AWT standards are five milligrams per liter (mg/L) BOD, five mg/L TSS, three mg/L TN, one mg/L TP (5:5:3:1); and for facilities treating less than 100,000 gpd the BAT standards are ten mg/L, ten mg/L, ten mg/L, and one mg/L, (10:10:10:1) respectively. Generally, WWTFs in the Keys dispose of their treated effluent into shallow injection wells (cased zero to 60 feet with open holes from 60-90 feet) and into the highly permeable Upper Water-Bearing Zone limestone of the Biscayne Aquifer. This disposal system is categorized as a Class V well by the state of Florida and is designated for treatment facilities with capacities greater than 100,000 gpd. Chlorine would be added to effluent to reduce risk of potential harmful bacteria and viral organisms.

Because of the density differences, shallow, relatively freshwater lenses overlay saline ground waters in the Keys and injected wastewater seeps to the ocean on both the bay and ocean sides (Kump 1998). In two studies, one in Long Key (just south of the Village of Islamorada service area) and one in Key Largo (just north), wastewater migrated toward the ground surface and phosphate, nitrate, and ammonia concentrations were highest near the injection well at a depth of five meters, in different directions from the point of injection. In another injection study on Long Key, a viral tracer injected into ground waters was found in a canal located across U.S. 1 from the injection site (Paul *et al*. 1997).

The actual LOS for existing privately owned and operated package treatment plants varies. The most common process utilized is the activated sludge treatment process, which provides the resident biological organisms with an environment in which they can digest the organic materials contained in the effluent. There are numerous modifications of the activated sludge process such as conventional, step aeration, and contact stabilization. The primary process used by the package treatment facilities is the extended aeration process, which provides an aeration detention time of at least 24 hours. The package treatment plants in the Village of Islamorada currently dispose of effluent treated to secondary treatment standards to Class V, Group III,

injection wells. These injection wells are designed at 90 feet deep with 60 feet of steel casing. There are three underground injection wells (UIWs) in the Village of Islamorada (FDEP 1999).

Wastewater effluent disposal from package treatment plants or onsite disposal systems into (shallow) Class V injection wells results in nutrient enrichment of the groundwater (Kruczynski 1999). Injected wastewater is buoyant relative to saline groundwater and, based on results of tracer studies, can rise to the surface in hours to days. These studies demonstrated that tracers were greatly diluted before reaching surface waters and that some phosphorus was stripped from groundwater by the substrate. Patterns of (shallow) groundwater input into Florida Bay have also been established using natural tracers of submarine groundwater discharge (SGD) (Burnett and Chanton 2000). A groundwater velocity of approximately 1.9 centimeter (cm) day^{-1} was estimated for three sites in the Keys and results suggest that the interactions between groundwater and surface water are greatest nearshore along the Florida Bay side of the Keys.

3.4.2 Surface Waters and Stormwater Runoff

The pollutant loads in stormwater runoff, and subsequently surface and nearshore waters, are largely a function of rainfall quantity, pervious nature of soils, and land use. As described previously in this Final EA (Section 3.2), the amount of soil in the Keys and the service area is minimal, moderately impervious, and has a high runoff potential.

Swales along U.S. 1 are the primary drainage system in the Keys and convey stormwater along the highway into the ocean, although much of U.S. 1 has no drainage system (Monroe County 1997b). Stormwater discharge is regulated at the federal level through the Clean Water Act (CWA) and the National Pollution Discharge Elimination System (NPDES) permit programs.

3.4.3 Nearshore and Offshore Waters

The relationship between fecal contamination and nutrient enrichment of nearshore waters and septic tanks has been reviewed in many studies, including Lapointe and Clark (1992) and Paul *et al*. (1995 and 1997). These studies generally concluded that septic tank use increases the nutrient contamination of ground water and consequently, shallow nearshore waters, and that transport of contaminants from septic tanks can occur in hours or days (ten hours for Key Largo and 53 hours for the middle Keys). Several authors (Lapointe and Clark 1992, Lapointe and Matzie 1996, and Lapointe and Matzie 1997) have concluded that nutrient enrichment at offshore reefs is possible following heavy rains and/or high wind events, but have also noted that nutrient concentrations in sediments decreased rapidly from the shore.

The Southeast Environmental Research Center (SERC) at Florida International University (FIU) has collected water quality data for the National Marine Sanctuary Water Quality Protection Program (WQPP) since 1995. Nearshore water quality stations revealed elevated levels of dissolved inorganic nitrogen (DIN), which was not found in the nearshore environment of Dry Tortugas, pointing to a land use source of elevated DIN. Data from 154 monitoring stations in the Keys were used to characterize the status and trends in water quality. Data for the middle Keys (including the Village of Islamorada) indicated a gradient of elevated nutrients DIN, TP, total organic carbon (TOC) and turbidity from inshore to offshore (Boyer and Jones 2004).

However, these trends could not be correlated with a specific nutrient loadings source due to the distance to the stations.

Fecal contamination of nearshore waters due to untreated or poorly treated wastewater has also been examined in the service area. Ten canal sites between Key Largo and Boca Chica were sampled for viral pathogens and microbial indicators. Six indicators of fecal pollution were assessed in canals at the sites (Griffin *et al*. 1999). The sites had variable rankings based on site sampled. A single site at the Village of Islamorada had only a single instance where the recommended *Enterococcus* maximum (104 CFU) was exceeded, which occurred during a single rain event. No evidence of Norwalk virus and Hepatitis A virus were detected. This study did not address seasonal variability. Data from the Florida Keys Watch (FKW), a partnership among the USEPA, University of South Florida (USF), and The Nature Conservancy (TNC) indicated similar results.

Water Quality *Hot Spots*. The Village of Islamorada locations were included as water quality *hot spots* in the USEPA report (1996) that lists 88 *hot spots* based on water quality issues and wastewater influences. The Village of Islamorada regional WWTFs will address several of the 45 water quality hot spots in the Keys, including two of the four most critical hot spots identified in the MCSWMP (Monroe County 2000). *Hot spot* locations correspond with higher-density urban areas and higher ranks represent neighborhoods and subdivisions with the poorest sewage treatment and strongest need for central sewage facilities.

Health Advisories. Clean public beaches and nearshore water quality are leading health concerns in Monroe County. Of the 17 Monroe County beaches monitored in 2004, three were found to have elevated bacterial levels and received water quality advisories. None of these were located within the Village of Islamorada service area (FDOH 2004).

3.5 Ecological Habitats

Unique and nationally significant resources, most notably the only living barrier coral reef in North America, emphasize the importance of the Keys and Sanctuary as part of a complex ecosystem that includes numerous public conservation areas and habitat for protected species. The Village of Islamorada service area and associated nearshore waters are a component of this complex ecosystem, which supports over 6,000 species of plants, fishes and invertebrates and is dominated by the third largest coral reef system in the world. These habitats can be altered by anthropogenic influences, including increased urban development, water quality degradation, altered groundwater flows, and expansion of non-native and invasive species.

Service Area. Wetlands comprise approximately 28 percent of the habitat in the 4,671-acre service area of the Village of Islamorada (Table 3-3). Wetlands include mangroves, buttonwood, salt marsh, and freshwater hardwoods. Uplands make up approximately 55 percent of the service area and include hammocks, ridge/hammock, and developed lands. Since developed land does not provide significant or essential ecological habitat for wildlife or native plants, it is not discussed in this section.

The Advanced Identification of Wetlands (ADID) data, produced by the Florida Fish and Wildlife Conservation Commission (FFWCC), indicate eleven habitat types in the 4,671-acre service area (Table 3-3) (FFWCC 1991). Marine habitats such as seagrass beds cover an additional 5,685 acres in the nearshore waters of the service area.

The eleven habitat types identified in the Village of Islamorada service area, listed according to frequency of occurrence, are: developed land (45 percent), mangroves (25 percent), hammocks (ten percent), buttonwoods (one percent), non-native (one percent), and six habitats that are found in less than one percent of the service area (scrub mangrove, water, salt marsh, freshwater hardwoods, ridge/hammock, and dune). In addition to specific terrestrial and marine habitat types, floodplains are addressed in this section.

It should be noted that a separate category (land boundary difference) was created to account for differences in the amount of land covered between databases from different sources. This category allows for the acreage of the service area to stay constant at 4,671 acres.

WWTF Location. There are three potential sites for the proposed WWTFs that will serve the Village of Islamorada service area: Plantation Key Site, Windley Key Site, and Lower Matecumbe Key Site. Only upland habitats are identified on these sites.

3.5.1 Upland Habitats

Service Area. Hammock and ridge/hammock habitat types comprise approximately ten percent of the Village of Islamorada service area (Table 3-3) and are found scattered throughout the service area. The hammock habitat is often found adjacent to mangrove areas, while the ridge/hammock habitat often occurs between mangroves and developed areas. The PEIS (Section 3.5.1) describes the general characteristics of the tropical hardwood hammocks of the Keys, along with the typical vegetation and wildlife occurring in such a community.

Table 3-3
Habitat Types in the Service Area

Class	Total Acres (approximate)	Percent of Total Habitat
Hammocks	480	10
Ridge/Hammock	2	<1
Developed	2,092	45
Total Uplands	**2,574**	**55**
Mangrove	1,155	25
Scrub Mangrove	27	<1
Buttonwood	52	1
Salt Marsh	18	<1
Water	40	<1
Freshwater Hardwoods	1	<1
Coastal Dune	9	<1

Table 3-3 Habitat Types in the Service Area		
Class	**Total Acres (approximate)**	**Percent of Total Habitat**
Total Wetlands/Water/Coastal Dune	**1,301**	**28**
Non-Native	64	1
Total Non-Native and Invasive	**64**	**1**
Land Boundary Difference	**731**	**16**
Totals	**4,671**	**100**

Source: FFWCC 1991

WWTF Sites. The three potential sites (Plantation Key Site, Windley Key Site, and Lower Matecumbe Key Site) are comprised entirely of upland habitat, including hammocks, ridge/hammock, and developed land. The 0.56-acre Plantation Key Site is mapped as 100 percent upland habitat, of which 38 percent is classified as developed land and 62 percent is hammock habitat. The 0.8-acre Windley Key Site is mapped as 100 percent upland habitat, all of which is classified as developed land. The 0.94-acre Lower Matecumbe Key Site is mapped as 100 percent upland habitat, all of which is classified as developed land. The upland hammock area (0.35 acres) of the Plantation Key Site would require mitigation pursuant to Monroe County and Village of Islamorada requirements.

3.5.2 Non-Native and Invasive Species

Service Area. Non-native species make up approximately one percent of the Village of Islamorada service area. These habitats are found scattered through Upper and Lower Matecumbe Keys, usually in close proximity to developed areas.

WWTF Sites. Non-native and invasive species habitat have been identified on the proposed Plantation Key WWTF site.

3.5.3 Estuarine and Freshwater Wetland Habitats and Coastal Dune

Service Area. Wetlands include areas where water is present either at or near the surface of the soil for all or part of the year, resulting in characteristic soils, water regimes and plant species. ADID data for the Village of Islamorada indicate the presence of estuarine and freshwater wetlands and coastal dune habitat in the service area. Freshwater wetlands and coastal dune habitat each comprise less than one percent of the service area.

Inland and coastal wetlands make up approximately 28 percent of the service area. The USFWS National Wetlands Inventory (NWI) maps identify the wetlands in the service area as estuarine and marine (Table 3-3).

Mangrove and Scrub Mangrove. Mangrove and scrub mangrove habitat types comprise approximately 25 percent and less than one percent of the service area, respectively (Table 3-3). The three species of mangrove found in the Keys are the red mangrove (*Rhizophora mangle*),

black mangrove (*Avicennia germinans*), and white mangrove (*Laguncularia racemosa*) (Tomlinson 1986). Based on ADID data, mangrove habitats are distributed throughout the Village of Islamorada service area. Concentrated areas of this habitat type are found on northern and southern Plantation Key, on Windley Key north of US-1, on northern and southern Upper Matecumbe Key, and on northern and southern Lower Matecumbe Key.

Salt Marsh and Buttonwood. Based on the ADID data, the salt marsh comprises less than one percent and buttonwood habitat types comprise one percent of the service area (Table 3-3). Salt marshes are identified in small, isolated patches on northern and southern Plantation Key, on southern Windley Key, and on southern Lower Matecumbe Key. Salt marsh habitat is typically found adjacent to mangrove habitat. Buttonwood habitat is identified in small patches on northern and southern Plantation Key, on central Windley Key, on southern Upper Matecumbe Key, and on northern and southern Lower Matecumbe Key. Buttonwood habitat typically occurs between mangrove and hammock habitat.

Water. The water habitat type comprises less than one percent of the Village of Islamorada service area (Table 3-3) and is scattered throughout the service area. This habitat type represents areas of water that are enclosed within other habitat types and are not connected to large waterbodies (i.e. the Atlantic Ocean or Gulf of Mexico).

Coastal Dune. Based on the ADID data, the coastal dune habitat type comprises less than one percent of the Village of Islamorada service area (Table 3-3). Coastal dune habitat is found in two areas of Lower Matecumbe Key, south of US-1.

Floodplains. EO 11988 (Floodplain Management) requires federal agencies to minimize floodplain occupancy and alteration, 44 CFR Part 9. The Village of Islamorada service area occurs within Zones AE, VE, X, and X500 (Figure 3-1). Zones AE and VE are within the 100-year floodplain, and comprise approximately 77 and 16 percent of the service area, respectively. All three of the proposed WWTF sites appear to be located within the 100-year floodplain (Zones AE and/or VE). Consequently, provisions of the Monroe County Floodplain Ordinance would apply. In addition, federal funding, per EO 11988 requires that WWTFs, because they are designated critical facilities, are subject to more stringent construction requirements. Specifically, FKAA would flood-proof the WWTF and its critical operating components to the 500-year floodplain standards per CFR Part 9.11.

WWTF Sites. No estuarine or freshwater wetland habitats occur on the three proposed WWTF sites.

3.5.4 Marine and Benthic Habitats

Marine habitats are characterized by high productivity and biodiversity and are essential to many commercially and recreationally important fisheries (Livingston 1990), as well as recreational activities such as self contained underwater breathing apparatus (SCUBA) diving, snorkeling, and boating, all of which are in turn important to the local and regional economy. Marine habitats, particularly seagrasses and coral reefs, are susceptible to water quality degradation. The affects of water quality degradation in these habitats are described in the PEIS (Section 3.4).

Figure 3-1
Flood Zones in the Islamorada Service Area

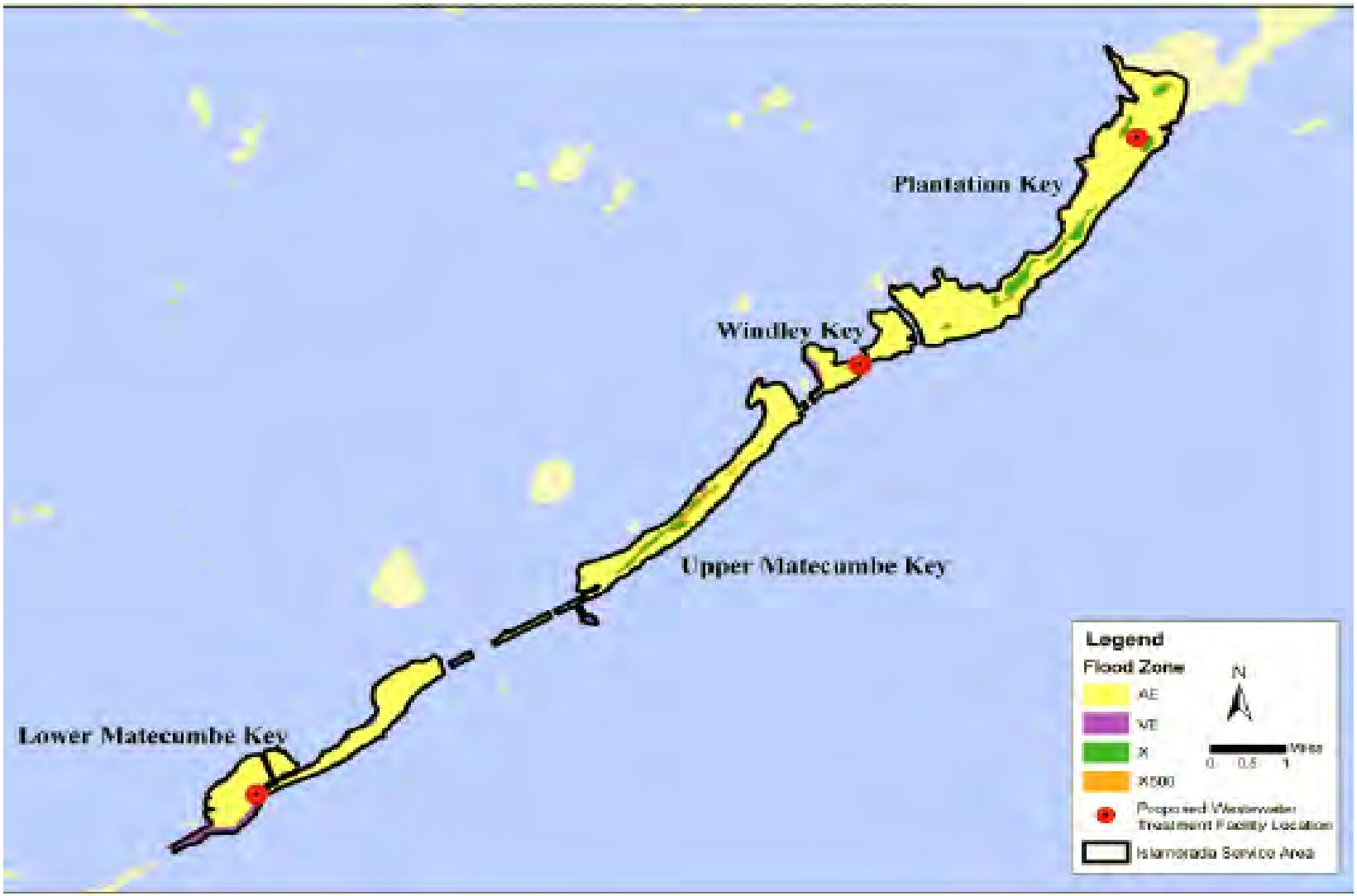
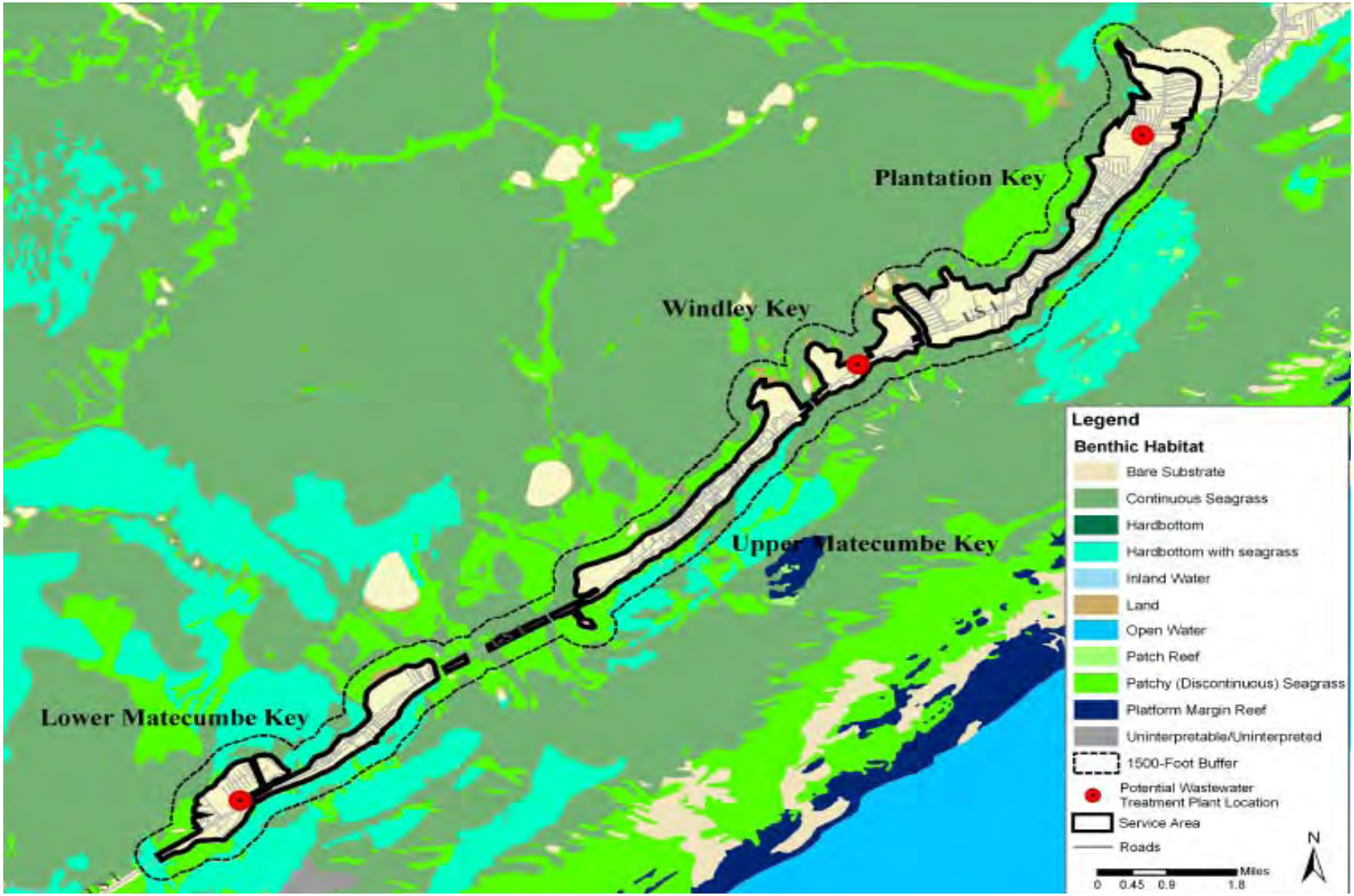


Figure 3-2
Benthic Habitat in a 1,500 Foot Buffer Area Around the Village of Islamorada Service Area



Service Area. Acreages and percentages of each marine habitat type were calculated based on the FFWCC Benthic Habitats of the Keys data (FMRI 1995). A 1,500-foot buffer zone was used to calculate the nearshore benthic habitats surrounding the service area (Table 3-4 and Figure 3-2). The buffer zone includes approximately 5,685 acres. Florida Marine Research Institute (FMRI) data indicate the presence of benthic habitats such as seagrass beds; hard-bottom communities with seagrass; and bare substrate in the buffer zone. The general ecology and characteristics of these communities in the Keys, such as typical vegetation and wildlife occurring within the communities, were described in greater detail in the PEIS (Section 3.5.4).

Patchy and continuous seagrasses together comprise approximately 74 percent of the benthic habitat in the service area (Figure 3-2) and occur within tidally-influenced areas. Hardbottom habitat with seagrass and bare substrate comprise approximately 17 percent and one percent of the service area's benthic habitat, respectively. These habitat types area mapped in Figure 3-2.

WWTF Sites. None of these benthic habitat types occur on the three proposed WWTF sites.

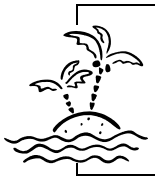
Table 3-4
Marine Benthic Habitats in the 1,500 Foot Buffer Zone

Habitat Group	Area (acres)	Percent
Continuous Seagrass	3716.81	45.5
Patchy Seagrass	2321.97	28.4
Hard-bottom with Seagrass	1424.65	17.4
Land	642.23	7.9
Bare Substrate	67.18	0.8
Inland Water	0.22	0.0
Total	**8173.06**	**100**

Data from FMRI (1995).

3.6 Protected Species

The Keys provide habitat for many rare, threatened, and endangered plants and animals. In addition, the limited remaining undeveloped natural habitat in the Keys makes these areas and associated species vulnerable to development. Any project that results in the loss of natural areas has the potential to impact protected species. Protected species refers to both federally and state listed species considered endangered, candidate, proposed, threatened, and species of special concern.



Although located on developed lands, site visits to the Village of Islamorada WWTFs (Plantation Key, Windley Key, and Lower Matecumbe Key) will be conducted to make definitive determinations as to the presence or absence of protected species.

✓	✓		✓	✓	

3.6.1 Regulatory Framework

The Endangered Species Act (ESA) of 1973 was created to protect those species at risk of extinction throughout all or a significant portion of their range and to conserve the ecosystems on which those species depend. Section 7 of the ESA prohibits activities that would jeopardize a protected species or destroy or modify its critical habitat.

The USFWS is responsible for listing and conserving federally protected terrestrial and freshwater animals and plants, while the National Marine Fisheries Service (NMFS) is responsible for most marine and anadromous species. If the proposed wastewater project has the potential to adversely affect or lead to incidental taking of a federally protected species, a formal Section 7 Consultation with the USFWS, and/or NMFS would be required.

Similarly, state lists of animals are maintained by the FFWCC and designated as endangered, threatened, and of special concern, per Rules 39-27.003, 39-27.004 and 39-27.005, respectively, Florida Administrative Code (F.A.C.). Any actions that may adversely impact a state listed animal require individual consultation with the FFWCC. Plants also may be designated endangered, threatened, or commercially exploited, and are listed by the Florida Department of Agriculture and Consumer Services (FDAC) (Chapter 5B-40, F.A.C.).

3.6.2 Federally and State Protected Species in the Service Area

Protected species data for Monroe County were obtained from the Florida Natural Areas Inventory (FNAI) database, FDAC, and Atlas of Florida Vascular Plants (AFVP). Protected species potentially occurring in Monroe County include 82 animal and 91 plant species, although fewer have a documented presence (FFWCC and FNAI). Several state protected species, such as the roseate spoonbill and the red rat snake, are not federally protected and consultation is limited to the state level if adverse impacts to these species are anticipated as a result of the proposed project. Documented occurrences of protected species in the Village of Islamorada service area are summarized in Table 3-5.

Table 3-5
Summary of Protected Species Occurrences in the Islamorada Service Area

Taxonomic Group	Federally and State Protected*	State Protected Only	Total
Mammals	2	0	2
Birds	2	11	13
Reptiles	2	3	5
Amphibians	0	0	0
Fish	1	0	1
Invertebrates	1	1	2
Plants	2	24	26
Total	**10**	**39**	**49**

*All federally protected species are also state protected.

3.6.3 Protected Species Occurrences

The FNAI database was reviewed to identify species occurrences in the service area recorded since 1985. This database provides listings within U.S. Geological Survey (USGS) map quadrangles. For this project, the Tavernier, Plantation, Upper Matecumbe and Lower Matecumbe quadrangles were reviewed.

Service Area. The FNAI database records for the service area include 68 rare and protected species, six natural communities, and bird rookeries within the service area. Of the 68 species, 49 are protected by the state and/or federal government (Table 3-6). Bird rookeries are located within Florida Bay and are not located on the Keys island chain within the service area.

The white-crowned pigeon, bald eagle, least tern, piping plover are the protected (state threatened) bird species documented to occur in the Islamorada service area. No reported rookeries occur in the service area.

Breeding nests and eggs in the service area have been recorded in the FFWCC Breeding Bird Atlas (BBA) survey data for 1986–1991 (Endries *et al*. 2001). The BBA states that 41 species were recorded in the Tavernier Quad, 41 species in the Plantation Key Quad, and 40 species in the Upper Matecumbe Quad, and 16 species in the Lower Matecumbe Quad. Of these, one is federally protected (bald eagle) and eight are state protected species. Wading bird rookeries data (FFWCC 2002c) indicated no wading bird rookeries in the service area and the closest rookery is approximately one mile west of the service area located within Lignumvitae Key Botanical State Park. Critical wintering habitat was found for piping plover near the Lower Matecumbe Key WWTF (FWC 2001). However, this species is a shoreline inhabitant and is not anticipated to be disturbed by the WWTF placement or construction.

Table 3-6
Protected Species Occurrence Records

Common Name/Scientific Name	Status	Habitat
MAMMALS		
Key Largo woodrat *Neotoma floridana smalli*	FE, SE	Terrestrial: deciduous forest, dry tropical forest
Key Largo cotton mouse *Peromyscus gossypinus*	FE, SE	Terrestrial: deciduous forest
BIRDS		
Roseate spoonbill *Ajaia ajaja*	SSC	Estuarine: mangrove-dominated pools. Palustrine: various freshwater areas
Piping plover *Charadrius melodus*	FT, ST	Terrestrial: marshes, tidal flats (feeding), shoreline (feeding and nesting)
White-crowned pigeon *Columba leucocephala*	ST	Terrestrial: mangrove covered islands (nesting), tropical hardwood forest (feeding)
Little blue heron *Egretta caerulea*	SSC	Estuarine: marshes, shoreline. Palustrine: floodplain, swamp. Riverine: shoreline
Reddish egret *Egretta rufescens*	SSC	Terrestrial: coastal islands (nesting), sand and mud flats (feeding)

Table 3-6
Protected Species Occurrence Records

Common Name/Scientific Name	Status	Habitat
Snowy egret *Egretta thula*	SSC	Estuarine: marshes, shoreline, tidal swamp. Lacustrine: lake edges. Palustrine: swamp, floodplain, ruderal. Riverine: shoreline
Tricolored heron *Egretta tricolor*	SSC	Estuarine: marshes, tidal swamps, shoreline. Lacustrine: lake edges. Palustrine: swamp, floodplain, ruderal. Riverine: shoreline
White ibis *Eudocimus albus*	SSC	Estuarine and Terrestrial: various freshwater, brackish and saline environments.
Bald eagle *Haliaeetus leucocephalus*	FT, ST	Estuarine: marsh edges, tidal swamp, open water. Lacustrine: swamp lakes, edges. Palustrine: swamp, floodplain. Riverine: shoreline, open water. Terrestrial: pine and hardwood forests, clearings
Osprey *Pandion haliaetus*	SSC**	Riverine and Palustrine: swamp forest, riparian woodlands, belts of cypress trees
Brown pelican *Pelecanus occidentalis*	SSC	Estuarine: islands for nesting, open water. Marine: open water
Black skimmer Rynchops niger	SSC	Terrestrial: nests on beaches and feed s in nearshore and offshore waters.
Least tern *Sterna antillarum*	ST	Estuarine: various. Lacustrine: various. Riverine: various. Terrestrial: beach dune, ruderal.
REPTILES		
Eastern indigo snake *Drymarchon corais couperi*	FT, ST	Terrestrial: mangrove swamps, wet prairies, xeric pineland and scrub
Red Rat Snake *Elaphe guttata*	SSC	Terrestrial: upland habitat, inhabit trees, abandoned buildings
Florida Keys mole skink *Eumeces egregius egregius*	SSC	Terrestrial: sandy shorelines
Key Mud Turtle *Kinosternon baurii*	SSC	Estuarine and terrestrial: Mud dwellers and feeders. Take refuge in upland habitat.
Loggerhead *Caretta caretta*	FT, ST	Terrestrial and Marine: beach dunes and shorelines as well as open water (nearshore and offshore)
FISH		
Mangrove Rivulus *Rivulus marmoratus*	FC, SSC	Estuarine to marine
INVERTEBRATES		
Schaus swallowtail butterfly Papilio *(=Heraclides) aristodemus ponceanus*	E	Tropical hardwood hammocks
Florida Tree Snail *Liguus fasciatus matecumbbensis*	SSC	Tropical hardwood hammocks
PLANTS		
Golden leather fern *Acrostichum aureum*	SE	Terrestrial: mangrove swamp, saltmarsh hydric hammock
Sea lavender *Argusia gnaphalodes*	SE	Terrestrial: beach dune, coastal strand
Blodgett's Wild-Mercury *Argythamnia blodgettii*	SE	Terrestrial: tropical rockland hammock
Myrtle-of-the-river *Calyptranthes zuzygium*	SE	Terrestrial: rockland hammocks, coastal berm
Wild cinnamon *Canella winteriana*	SE	Terrestrial: rockland hammock, maritime hammock
Rhacoma *Crossopetalum rhacoma*	ST	Terrestrial: rockland hammock, pine rockland, coastal scrub
Milkbark	SE	Terrestrial: tropical hammock

Table 3-6
Protected Species Occurrence Records

Common Name/Scientific Name	Status	Habitat
Drypetes diversifolia		
Red stopper *Eugenia rhombea*	SE	Terrestrial : rockland hammock
Wild cotton *Gossypium hirsutum*	SE	Terrestrial: coastal berm, shell mounds, maritime hammock
Lignum-vitae *Guaiacum sanctum*	SE	Terrestrial: rockland hammock
False Boxwood *Gyminda latifolia*	SE	Terrestrial: upland hammocks
Simpson's prickly apple *Harrisia simpsonii*	SE	Terrestrial: coastal hammocks and thickets
Manchineel *Hippomane mancinella*	SE	Terrestrial: coastal forest
White ironwood *Hypelate trifoliate*	SE	Terrestrial: rockland hammocks
Florida Keys indigo *Indigofera mucronata var. keyensis*	FC, SE	Terrestrial: rockland hammock, coastal berm, rock barren
Joewood *Jacquinia keyensis*	ST	Terrestrial: coastal salt flat, coastal scrub, maritime hammock, pine rockland
Wild dilly *Manilkara bohamensis*	ST	Terrestrial: upland hammock
Whitish passionflower *Passiflora multiflora*	SE	Terrestrial: hammocks, scrublands
Tree cactus *Pilosocereus robini*i	FE, SE*	Terrestrial: tropical hardwood hammock, cactus hammock, thorn scrub
Florida boxwood *Schaefferia frutescens*	SE	Terrestrial: hammocks
West Indies mahogany *Swietenia mahagoni*	ST	Terrestrial: rockland hammock, maritime hammock
Brittle thatch palm *Thrinax morrisii*	SE	Terrestrial: open woodland and coastal forest
Florida thatch palm *Thrinax radiate*	SE	Terrestrial: maritime hammock, upland hammock, coastal Terrestrial: scrub
Banded wild pine *Tillandsia flexuosa*	SE	Terrestrial: pine rockland

Source: FNAI (date unavailable). FE–Federally Endangered/SE–State Endangered/FT–Federally Threatened/ST–State Threatened/FC–Federal Candidate Species/FT (S/A)–Federally Threatened due to Similarity of Appearance/SSC–State Species of Special Concern/*a recovery plan is available for this species/**only listed for Monroe County.

WWTF Locations. The locations for the three proposed Village of Islamorada WWTFs (Plantation Key, Windley Key, and Lower Matecumbe) are located on private property. No biological surveys have been conducted to date. At this time, protected animal or plant species are believed not to be present within any of the three WWTF sites (Plantation Key, Windley Key, or Lower Matecumbe Key). Section 7 consultation with the USFWS is on-going and would be completed upon purchase of the properties by the Village of Islamorada.

3.6.4 Existing and Potential Habitat Areas for Protected Species

Identification of habitats of particular interest or importance allows these habitats to be avoided during implementation of this and other FKWQIP projects. Existing and potential wildlife habitats in the Keys have been identified by the FMRI, based on habitat and numbers of key

species, many of which are protected. Importantly, biodiversity *hot spots* and Strategic Habitat Conservation Areas (SHCAs) have been developed by Cox *et al*. (1994) to identify conservation targets considered necessary to meet conservation goals in Florida.

Service Area. The FFWCC biodiversity *hot spots* data (FFWCC 2002b), reviewed for the service area, represent areas of overlap among potential habitats of 49 rare or focal species of wildlife and seven important natural communities. Overlap among greater numbers of species indicates higher biodiversity.

SHCAs for three bird species (white-crowned pigeon, black-whiskered vireo, mangrove cuckoo), and one reptile (American crocodile), were identified in the service area (Figure 3-3). The white-crowned pigeon is a state protected threatened species, while the black-whiskered vireo and mangrove cuckoo are not protected at the state or federal level. The SHCAs for the white-crowned pigeon, black-whiskered vireo and mangrove cuckoo are scattered throughout the Village of Islamorada service area. None of the proposed WWTF parcels are located within any of the SHCAs.

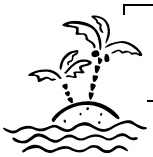
Biodiversity hotspots of three to four focal species and seven or more focal species were analyzed in relation to the three proposed WWTFs (Figure 3-3). The proposed WWTFs were no less than 0.25 miles away from the nearest biodiversity *hot spot*. Individual species data are not available for this data set.

The Village of Islamorada service area includes SHCAs for the state protected white-crowned pigeon. The closest SHCA for this species is one mile from the proposed Plantation Key WWTF.

WWTF Location. The proposed WWTFs in the Village of Islamorada service area are located on private property within the service area. The lands are already developed and currently are covered by the invasive Australian pine (*Casuarina equisetifolia*) (FFWC 1991). Although site visits have not been conducted it is expected that these parcels will not require special permits.

3.7 Essential Fish Habitat

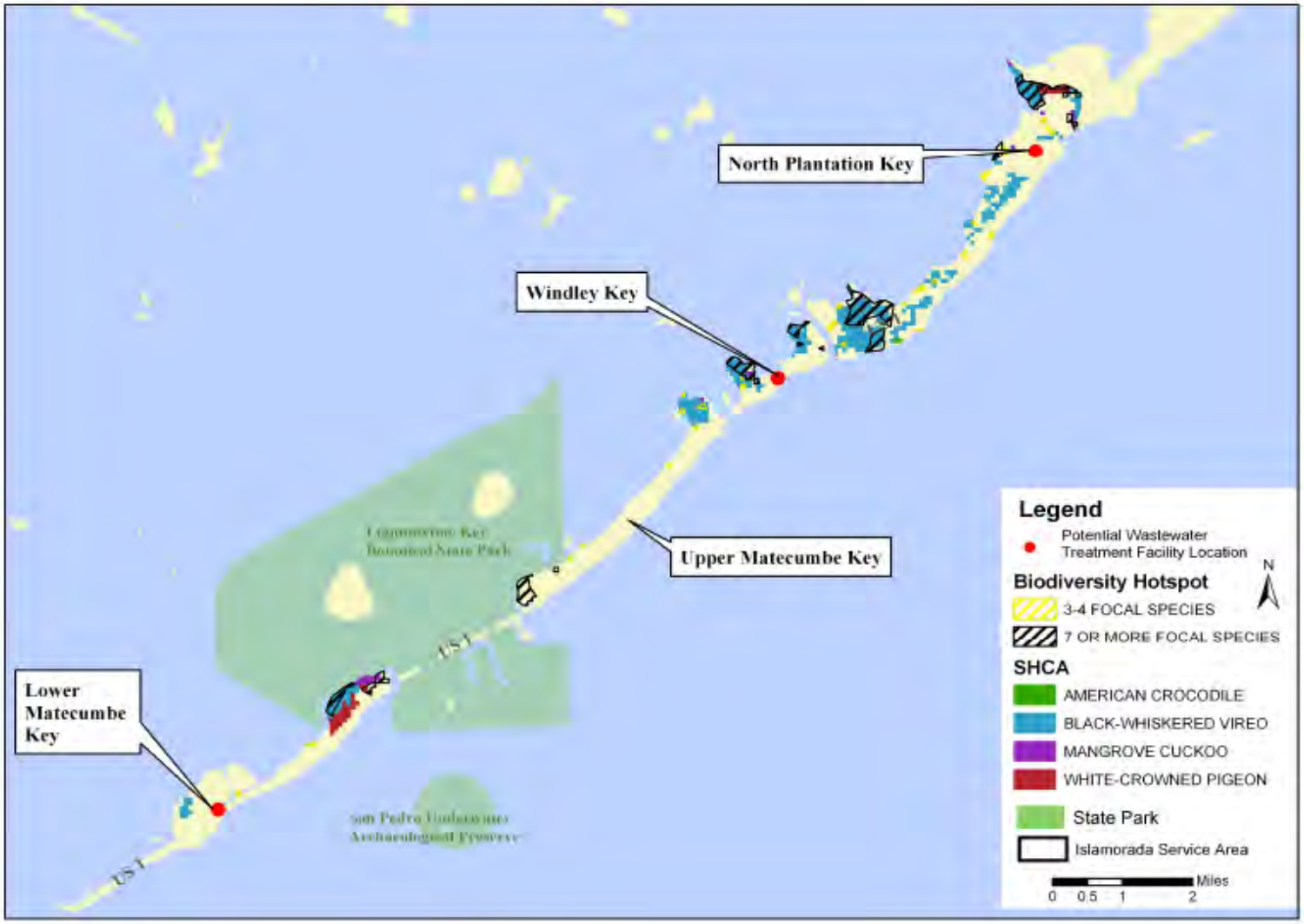
Coral reefs and other benthic habitats identified as EFH must be considered as part of any federal action. Federal agencies must also comply with the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 *et seq*.) that requires implementation of measures to conserve and enhance this habitat per the Sustainable Fisheries Act (SFA) Public Law 104-297. EFH in the service areas and the Keys is described in the PEIS (Section 3.7).



Coral reefs and other benthic habitats are identified as EFH and must be considered as part of any federal action.

✓	✓	✓		✓	

Figure 3-3
SHCAs and Biodiversity Hot Spots for Village of Islamorada



The MSA requires federal agency consultation on activities that may adversely affect EFH. The NMFS, a service of the U.S. Department of Commerce-National Oceanographic and Atmospheric Administration (NOAA), is responsible for implementing this mandate. Informal consultation with NMFS was initiated as part of the preparation for the PEIS. Species and associated habitats identified as relevant to the proposed project include panaeid shrimp (e.g. pink and brown shrimp) and rock shrimp, red drum, snapper, the grouper unit, golden crab, and spiny lobster.

3.8 Air Quality and Noise

The Village of Islamorada service area currently meets or exceeds all federal air quality standards. Noise levels are typical of urban areas dominated by commercial and recreational activities.

Air quality in the Keys presently meets or exceeds federal air quality standards, and noise levels are typical of areas dominated by recreational and commercial activities.

	✓				

3.8.1 Air Quality

The affected environment for air quality is similar to that described in the PEIS (Section 3.8.1). Air pollution within the service area has not been extensively documented, however the FDEP has designated Monroe County as an air quality attainment area, which means that air quality standards set by both FDEP and the USEPA are maintained countywide (Monroe County 1995). F.A.C. 62-604.400 and 62-296.320 require reasonable assurance from the applicant that the facility will not cause objectionable odors, such as those resulting from WWTF hydrogen sulfide discharges, at levels that would adversely affect neighboring residents or commercial uses.

Air quality in the Keys is generally excellent, and data from two FDEP ambient air monitoring stations in Key West and Marathon indicate that particulate matter concentrations remain well below Florida standards. Motor vehicles are generally the main source of emissions.

3.8.2 Noise

Noise in the Keys is typical of areas with urban activities such as traffic, construction, aircraft (near airports), and boats, as described in the PEIS (Section 3.8.2). Since 1982, responsibility for noise abatement and control has been delegated to state and local governments, but noise levels and exposure recommendations developed by the USEPA under the Noise Control Act are still relevant (FEMA 2002). The State of Florida addresses noise control in Title XXIX, Chapter 403 (Public Health, Environmental Control) of the Florida Statutes (F.S.). Chapter 62-600 of the F.A.C. addresses rules for siting and operation of WWTFs and requires that new facilities are located to minimize noise from the facility that may impact sensitive noise receptors such as residences, schools, hospitals, churches, and parks.

Noise levels over a 24-hour period should be less than 70 decibel (dB) to prevent any measurable hearing loss over a lifetime. Likewise, maximum levels of 55 dB outdoors and 45 dB indoors are identified as preventing activity interference and annoyance. Monroe County has adopted an ordinance that prohibits noise equal to or exceeding 60 dB (typical of a residential area) beyond the property line of the sound source and may collect fines up to $500 per day from violators.

3.9 Cultural Resources

The protection of cultural, archaeological, and historical resources in the Keys is described in the PEIS (Section 3.9). Major federal laws protecting cultural resources include the National Historic Preservation Act (NHPA), Archaeological Resources Protection Act (ARPA), Native American Graves Protection and Repatriation Act (NAGPRA), and American Indian Religious Freedom Act (AIRFA) of 1978. Section 106 of the NHPA requires federal agencies to consider the affects of the *Proposed Action* on identified and potentially present cultural resources. In addition, the State Historic Preservation Office (SHPO), Tribal Historic Preservation Officers, and the Advisory Council on Historic Preservation (ACHP), could review and comment on a *Proposed Action*.

According to the Florida Master Site File, thirty-one cultural resource sites have been identified in the Village of Islamorada.

A review of the Florida Master Site File indicates the presence of thirty-one identified sites within the Village of Islamorada limits (Florida Department of State, personal communication September 27, 2005). Table 3-7 lists those sites on the three islands of our proposed WWTF sites (no WWTFs are proposed for Upper Matecumbe Key).

Table 3-7
Archaeological and Historic Resources

Site ID	Register Name	Island
MO03433	Old State Road 4A / Old US 1	All
MO00012	Lower Matecumbe Key 1	Lower Matecumbe Key
MO00076	Lower Matecumbe Key 2	Lower Matecumbe Key
MO00088	Lower Matecumbe Key 3	Lower Matecumbe Key
MO02096	East Matecumbe	Lower Matecumbe Key
MO03477	Mate Lindo Beach Subdivision Canal # 1	Lower Matecumbe Key
MO03478	97 Sea Lane	Lower Matecumbe Key
MO03479	76241 U.S. 1	Lower Matecumbe Key
MO03480	Mate Lindo Beach Subdivision Canal # 2	Lower Matecumbe Key
MO03481	Star of the Sea	Lower Matecumbe Key
MO00253	Coin Wreck	Plantation Key
MO01479	Plantation Key	Plantation Key
MO02095	Tower	Plantation Key
MO00020	Plantation Key 1	Plantation Key
MO00021	Plantation Key 2	Plantation Key

MO00024	Plantation Key 5	Plantation Key
MO00011	Coon Key	Windley Key
MO00018	Whale Harbor	Windley Key
MO00019	Windley Key	Windley Key
MO01471	Florida Keys Memorial	Windley Key
MO01475	Islamorada Railroad Residence	Windley Key
MO01482	LaBranche Fishing Camp	Windley Key
MO01961	Windley Key Quarry	Windley Key
MO02098	Windley Key Shell Scatter	Windley Key
MO03975	Lady Cyana Divers	Windley Key
MO03976	Key Lime Pie Shop	Windley Key

Only one cultural resource site is less than 0.25 miles from a proposed WWTF (Site MO01479 on Plantation Key). The proposed WWTF is adjacent to a WWTF currently under construction (with FEMA funding). A Cultural Resources Assessment was conducted on the FEMA site as part of the EA for that proposed action (FEMA 2003).

Consultation with the SHPO is on-going and would be completed upon purchase of the properties by the Village of Islamorada. The Village of Islamorada would be advised to avoid sensitive archaeological features, have professional onsite archaeological monitoring during collection system work, and further coordinate activities with the SHPO. Should any unanticipated historic or archeological materials be discovered during project work, all activities on the sites shall be halted immediately and the Village of Islamorada shall consult with the Corps and other concerned parties, SHPO, and other appropriate agencies for further guidance.

3.10 Demographics and Socioeconomics

Like most of the Keys, the economy of the Village of Islamorada is largely dependent on the continued health of the coral reefs in the sanctuary. The coral reefs support a major recreational industry that attracted more than three million tourists to the Keys and South Florida by the early 1990s who then spent an estimated $1.3 billion (Crosby 1997), figures that are no doubt substantially greater today. Scuba and free diving are the principal recreational activities revolving around the coral reef, attracting over 1.2 million divers annually to the Keys and generating more than $220 million in economic benefit. Commercial fishing contributes about one-half the economic benefit as diving, and constitutes the second largest of the water-based economic contributors. While these figures are for the entire Keys, they indicate the importance of the health of the coral reef to the Keys, including the residents and businesses of the Village of Islamorada.

Tourism is the principal economic force in the Village of Islamorada and Monroe County and is largely dependent on the continued health of the coral reefs in the Sanctuary.

✓	✓			✓	✓

3.10.1 Demographics and Socioeconomics

The Village of Islamorada is an incorporated area in northeast Monroe County, and is designated by the U. S. Census Bureau as a Census Designated Place (CDP). While the area is somewhat larger than the project area, the characteristics of the area are representative of the project area.

The permanent population of the Village of Islamorada CDP in 2000 was 6,846 (Table 3-8). Population estimates for the Village of Islamorada for more recent years indicate that the population has changed little since the year 2000 Census. Other characteristics of the Village of Islamorada CDP include:

- By age group, the population Village of Islamorada is very similar to that of Monroe County as a whole, except for the median age of residents, which is four years greater than for the County. Monroe County's population is, in turn, four years older than the State of Florida as a whole.
- In 2000, most (97 percent) of the residents of the Village of Islamorada were white, compared to 91 percent for Monroe County and 78 percent for the State of Florida,
- Reflecting the seasonal nature of residency in the Village of Islamorada, the percentage of occupied housing units was only 58 percent, compared to Monroe County's 68 percent and the State of Florida's 87 percent.
- Village of Islamorada's percentage of housing used seasonally, for recreation, or occasional use, was considerably higher than that of Monroe County (37% versus 24%), and much higher than the State of Florida (7%).
- The housing vacancy rate in 2000 in Islamorada was only eight percent, compared to Monroe County's 12 percent and the State of Florida's nine percent.
- The average household size in the Village of Islamorada is close to that of Monroe County but considerably lower than the average for the State of Florida.

The Islamorada CDP had a population in 2000 of about 11,886, most of whom were white, with a median age of 43 years.

Table 3-8
Demographic Characteristics
Islamorada Census Designated Place, Monroe County, and State of Florida

Subject	Islamorada		Monroe County		State of Florida	
	Number	Percent	Number	Percent	Number	Percent
Total population	**6,846**	**100**	**79,589**	**100**	**15,982,378**	**100**
SEX AND AGE						
Male	3,626	53	42,379	53.2	7,797,715	49
Female	3,220	47	37,210	46.8	8,184,663	51
Under 5 years	256	3.7	3,462	4.3	945,823	6
5 to 9 years	292	4.3	3,802	4.8	1,031,718	7
10 to 14 years	305	4.5	4,003	5	1,057,024	7
15 to 19 years	310	4.5	3,698	4.6	1,014,067	6
20 to 24 years	210	3.1	3,639	4.6	928,310	6
25 to 34 years	610	8.9	10,260	12.9	2,084,100	13
35 to 44 years	1,271	18.6	14,493	18.2	2,485,247	16
45 to 54 years	1,396	20.4	14,647	18.4	2,069,479	13
55 to 59 years	579	8.5	5,596	7	821,517	5
60 to 64 years	462	6.7	4,341	5.5	737,496	5
65 to 74 years	687	10	6,779	8.5	1,452,176	9
75 to 84 years	360	5.3	3,893	4.9	1,024,134	6
85 years and over	108	1.6	976	1.2	331,287	2
Median age (years)	46.2	(X)	42.6	(X)	39	(X)
18 years and over	5,784	84.5	65,984	82.9	12,336,038	77
Male	3,058	44.7	35,272	44.3	5,926,729	37
Female	2,726	39.8	30,712	38.6	6,409,309	40
21 years and over	5,636	82.3	63,981	80.4	11,736,378	73
62 years and over	1,429	20.9	14,137	17.8	3,245,806	20
65 years and over	1,155	16.9	11,648	14.6	2,807,597	18
Male	579	8.5	5,867	7.4	1,216,647	8

Female	576	8.4	5,781	7.3	1,590,950	10
RACE						
One race	6,778	99	78,171	98.2	15,606,063	98
White	6,630	96.8	72,151	90.7	12,465,029	78
Black or African American	31	0.5	3,795	4.8	2,335,505	15
American Indian and Alaska Native	15	0.2	301	0.4	53,541	0
Asian	42	0.6	657	0.8	266,256	2
Asian Indian	8	0.1	106	0.1	70,740	0
Chinese	12	0.2	149	0.2	46,368	0
Filipino	16	0.2	195	0.2	54,310	0
Japanese	1	0	54	0.1	10,897	0
Korean	4	0.1	52	0.1	19,139	0
Vietnamese	0	0	33	0	33,190	0
Other Asian [1]	1	0	68	0.1	31,612	0
Native Hawaiian and Other Pacific Islander	6	0.1	35	0	8,625	0
Native Hawaiian	1	0	10	0	2,131	-
Guamanian or Chamorro	0	0	9	0	2,319	-
Samoan	0	0	2	0	1,232	-
Other Pacific Islander [2]	5	0.1	14	0	2,943	-
Some other race	54	0.8	1,232	1.5	477,107	3
Two or more races	68	1	1,418	1.8	376,315	2
HOUSEHOLDS BY TYPE						
Total households	**3,174**	**100**	**35,086**	**100**	**6,337,929**	**100**
Family households (families)	1,854	58.4	20,387	58.1	4,210,760	66
With own children under 18 years	567	17.9	7,315	20.8	1,779,586	28
Married-couple family	1,592	50.2	16,416	46.8	3,192,266	50
With own children under 18 years	431	13.6	5,175	14.7	1,215,197	19
Female householder, no husband present	154	4.9	2,558	7.3	759,000	12
With own children under 18 years	83	2.6	1,497	4.3	437,680	7
Nonfamily households	1,320	41.6	14,699	41.9	2,127,169	34
Householder living alone	1,026	32.3	10,089	28.8	1,687,303	27

Householder 65 years and over	281	8.9	2,884	8.2	710,025	11
Households with individuals under 18 years	619	19.5	8,069	23	1,986,554	31
Households with individuals 65 years and over	789	24.9	8,354	23.8	1,943,478	31
Average household size	2.1	(X)	2.23	(X)	2.46	(X)
Average family size	2.63	(X)	2.73	(X)	2.98	(X)
HOUSING OCCUPANCY						
Total housing units	**5,461**	**100**	**51,617**	**100**	**7,302,947**	**100**
Occupied housing units	3,174	58.1	35,086	68	6,337,929	87
Vacant housing units	2,287	41.9	16,531	32	965,018	13
For seasonal, recreational, or occasional use	1,999	36.6	12,332	23.9	482,944	7
Homeowner vacancy rate (percent)	3.2	(X)	3	(X)	2	(X)
Rental vacancy rate (percent)	7.9	(X)	11.5	(X)	9	(X)
HOUSING TENURE						
Occupied housing units	**3,174**	**100**	**35,086**	**100**	**6,337,929**	**100**
Owner-occupied housing units	2,257	71.1	21,893	62.4	4,441,799	70
Renter-occupied housing units	917	28.9	13,193	37.6	1,896,130	30
Average household size of owner-occupied unit	2.20	(X)	2.23	(X)	2.49	(X)
Average household size of renter-occupied unit	1.84	(X)	2.23	(X)	2.39	(X)

(X) Not applicable

[1] Other Asian alone, or two or more Asian categories.
[2] Other Pacific Islander alone, or two or more Native Hawaiian and Other Pacific Islander categories.
[3] In combination with one or more other races listed. The six numbers may add to more than the total population and the six percentages may add to more than 100 percent because individuals may report more than one race.
Source: U.S. Census Bureau, Census 2000 DP-1 - Profile of General Demographic Characteristics, Summary File 1, Matrices P1, P3, P4, P8, P9, P12, P13, P,17, P18, P19, P20, P23, P27, P28, P33, PCT5, PCT8, PCT11, PCT15, H1, H3, H4, H5, H11, and H12.

Social Characteristics. Social characteristics for the Village of Islamorada CDP are also similar to those of Monroe County, and the State of Florida (Table 3-9). Within the school-aged population, the Village of Islamorada has a lower percentage of children in elementary school than Monroe County and the State of Florida. Also, like Monroe County, a relatively large number of the residents of the Village of Islamorada have moved there since 1995 from outside the County, compared to elsewhere in Florida. The level of educational attainment in the Village

of Islamorada is significantly higher than that of Monroe County, which is itself higher than the State as a whole.

Table 3-9
Social Characteristics
Islamorada Census Designated Place, Monroe County, and State of Florida

Subject	Islamorada		Monroe County		State of Florida	
	Number	Percent	Number	Percent	Number	Percent
SCHOOL ENROLLMENT						
Population 3 years and over enrolled in school	**1,182**	**100**	**14,277**	**100**	**3,933,279**	**100**
Nursery school, preschool	128	10.8	983	6.9	271,313	6.9
Kindergarten	52	4.4	876	6.1	212,744	5.4
Elementary school (grades 1-8)	441	37.3	6,405	44.9	1,716,991	43.7
High school (grades 9-12)	252	21.3	2,985	20.9	845,406	21.5
College or graduate school	309	26.1	3,028	21.2	886,825	22.5
EDUCATIONAL ATTAINMENT						
Population 25 years and over	**5,451**	**100**	**61,161**	**100**	**11,024,645**	**100**
Less than 9th grade	149	2.7	2,827	4.6	739,222	6.7
9th to 12th grade, no diploma	303	5.6	6,405	10.5	1,480,726	13.4
High school graduate (includes equivalency)	1,639	30.1	17,664	28.9	3,165,748	28.7
Some college, no degree	1,346	24.7	13,738	22.5	2,403,135	21.8
Associate degree	455	8.3	4,944	8.1	773,486	7
Bachelor's degree	1,013	18.6	10,256	16.8	1,573,121	14.3
Graduate or professional degree	546	10	5,327	8.7	889,207	8.1
Percent high school graduate or higher	91.7	(X)	84.9	(X)	79.9	(X)
Percent bachelor's degree or higher	28.6	(X)	25.5	(X)	22.3	(X)
MARITAL STATUS						
Population 15 years and over	**5,977**	**100**	**68,261**	**100**	**12,946,990**	**100**
Never married	1,378	23.1	16,798	24.6	3,076,457	23.8
Now married, except separated	3,387	56.7	36,301	53.2	7,032,798	54.3
Separated	58	1	1,227	1.8	309,160	2.4
Widowed	339	5.7	3,795	5.6	1,026,014	7.9
Female	221	3.7	2,867	4.2	826,317	6.4
Divorced	815	13.6	10,140	14.9	1,502,561	11.6
Female	438	7.3	4,615	6.8	851,134	6.6
GRANDPARENTS AS CAREGIVERS						
Grandparent living in household with one or more own grandchildren under 18 years	**49**	**100**	**1,042**	**100**	**345,949**	**100**
Grandparent responsible for grandchildren	15	30.6	409	39.3	147,893	42.7

VETERAN STATUS						
Civilian population 18 years and over	**5,705**	**100**	**64,846**	**100**	**12,283,486**	**100**
Civilian veterans	1,223	21.4	12,535	19.3	1,875,597	15.3
DISABILITY STATUS OF THE CIVILIAN NONINSTITUTIONALIZED POPULATION						
Population 5 to 20 years	**965**	**100**	**12,002**	**100**	**3,264,015**	**100**
With a disability	81	8.4	1,113	9.3	284,514	8.7
Population 21 to 64 years	**4,340**	**100**	**50,824**	**100**	**8,746,066**	**100**
With a disability	943	21.7	12,587	24.8	1,914,507	21.9
Percent employed	79.7	(X)	67	(X)	58.3	(X)
No disability	3,397	78.3	38,237	75.2	6,831,559	78.1
Percent employed	70.3	(X)	76.4	(X)	74.9	(X)
Population 65 years and over	**1,117**	**100**	**11,303**	**100**	**2,720,127**	**100**
With a disability	325	29.1	3,836	33.9	1,075,545	39.5
RESIDENCE IN 1995						
Population 5 years and over	**6,587**	**100**	**76,301**	**100**	**15,043,603**	**100**
Same house in 1995	3,614	54.9	36,782	48.2	7,352,091	48.9
Different house in the U.S. in 1995	2,912	44.2	36,469	47.8	7,038,906	46.8
Same county	1,171	17.8	16,405	21.5	3,866,184	25.7
Different county	1,741	26.4	20,064	26.3	3,172,722	21.1
Same state	709	10.8	7,080	9.3	1,311,950	8.7
Different state	1,032	15.7	12,984	17	1,860,772	12.4
Elsewhere in 1995	61	0.9	3,050	4	652,606	4.3

(X) Not applicable.

[1] The data represent a combination of two ancestries shown separately in Summary File 3. Czech includes Czechoslovakian. French includes Alsatian. French Canadian includes Acadian/Cajun. Irish includes Celtic.

Source: U.S. Census Bureau, Census 2000 DP-2 Profile of Selected Social Characteristics, Summary File 3, Matrices P18, P19, P21, P22, P24, P36, P37, P39, P42, PCT8, PCT16, PCT17, and PCT19

Housing Characteristics. In one respect in particular, housing characteristics of the Village of Islamorada differ significantly from those of Monroe County and the State of Florida; the Village of Islamorada has a much lower percentage of mobile homes. Only about eight percent of the housing units in the Village of Islamorada are mobile homes, compared to about 19 percent for Monroe County and 12 percent for the State of Florida as a whole. Also, houses in the Village of Islamorada are generally larger than in Monroe County.

Compared to both Monroe County and the State of Florida, very few households are without vehicles, only five percent in the Village of Islamorada compared to nine percent for Monroe County and eight percent in the State of Florida. Village of Islamorada residents are very dependent on owned vehicles for transportation.

The estimated value of housing units in the Village of Islamorada is reasonably similar to that of Monroe County, but differs greatly from the State of Florida. As Table 3-10 shows, in 2000, the Village of Islamorada had virtually no owner-occupied housing units valued at less than $50,000, and only about one and a half percent of the housing units were valued at between $50,000 and $100,000. While these figures were not far different from those of Monroe County, they were much lower than those for the State of Florida. The housing values in the Village of Islamorada were much higher than the State of Florida.

As would be expected, the cost of home ownership is generally higher in the Village of Islamorada than the State of Florida as a whole. For example, Table 3-10 shows that the percentage of owner-occupied households with a mortgage of more than $2000 per month was nine percentage points greater in the Village of Islamorada than the State of Florida. Correspondingly, the table also indicates that the Village of Islamorada had a large percentage of households where the percentage of household income needed for housing exceeded 35 percent. Interestingly, the data in Table 3-10 indicate that the cost for renter-occupied housing units was generally comparable to that of the State of Florida as a whole.

Table 3-10
Housing Characteristics
Islamorada Census Designated Place, Monroe County, and State of Florida

	Islamorada		Monroe County		State of Florida	
Subject	Number	Percent	Number	Percent	Number	Percent
Total housing units	**5,462**	**100**	**51,617**	**100**	**7,302,947**	**100**
UNITS IN STRUCTURE						
1-unit, detached	3,378	61.8	24,212	46.9	3,816,527	52.3
1-unit, attached	357	6.5	4,203	8.1	429,457	5.9
2 units	207	3.8	2,531	4.9	196,327	2.7
3 or 4 units	142	2.6	2,770	5.4	313,631	4.3
5 to 9 units	116	2.1	2,154	4.2	363,281	5
10 to 19 units	190	3.5	1,727	3.3	366,197	5
20 or more units	589	10.8	3,427	6.6	940,712	12.9
Mobile home	434	7.9	9,814	19.0	849,304	11.6
Boat, RV, van, etc.	49	0.9	779	1.5	27,511	0.4
YEAR STRUCTURE BUILT						
1999 to March 2000	22	0.4	986	1.9	214,120	2.9
1995 to 1998	253	4.6	3,165	6.1	674,760	9.2
1990 to 1994	989	18.1	5,848	11.3	768,470	10.5
1980 to 1989	1,533	28.1	12,362	23.9	1,916,430	26.2
1970 to 1979	1,629	29.8	12,805	24.8	1,686,263	23.1
1960 to 1969	698	12.8	6,660	12.9	934,219	12.8
1940 to 1959	303	5.5	6,592	12.8	899,664	12.3
1939 or earlier	35	0.6	3,199	6.2	209,021	2.9

ROOMS						
1 room	65	1.2	1,476	2.9	172,853	2.4
2 rooms	357	6.5	4,536	8.8	442,807	6.1
3 rooms	580	10.6	8,738	16.9	840,626	11.5
4 rooms	1,306	23.9	14,448	28	1,418,028	19.4
5 rooms	1,495	27.4	11,212	21.7	1,657,617	22.7
6 rooms	825	15.1	6,420	12.4	1,295,505	17.7
7 rooms	471	8.6	2,660	5.2	774,119	10.6
8 rooms	221	4	1,210	2.3	420,337	5.8
9 or more rooms	142	2.6	917	1.8	281,055	3.8
Median (rooms)	4.8	(X)	4.3	(X)	5	(X)
Occupied Housing Units	**3,175**	**100**	**35,086**	**100**	**6,337,929**	**100**
YEAR HOUSEHOLDER MOVED INTO UNIT						
1999 to March 2000	515	16.2	8,518	24.3	1,420,535	22.4
1995 to 1998	1,079	34	11,123	31.7	1,991,209	31.4
1990 to 1994	706	22.2	6,137	17.5	1,099,721	17.4
1980 to 1989	566	17.8	5,736	16.3	1,074,907	17
1970 to 1979	252	7.9	2,024	5.8	478,089	7.5
1969 or earlier	57	1.8	1,548	4.4	273,468	4.3
VEHICLES AVAILABLE						
None	148	4.7	3,137	8.9	515,455	8.1
1	1,208	38	14,758	42.1	2,626,233	41.4
2	1,382	43.5	13,332	38	2,419,707	38.2
3 or more	437	13.8	3,859	11	776,534	12.3
HOUSE HEATING FUEL						
Utility gas	9	0.3	183	0.5	377,299	6
Bottled, tank, or LP gas	117	3.7	1,642	4.7	226,573	3.6
Electricity	2,663	83.9	25,398	72.4	5,527,713	87.2
Fuel oil, kerosene, etc.	10	0.3	39	0.1	70,496	1.1
Coal or coke	0	0	0	0	284	0
Wood	37	1.2	98	0.3	16,538	0.3
Solar energy	22	0.7	104	0.3	2,527	0
Other fuel	0	0	36	0.1	4,744	0.1
No fuel used	317	10	7,586	21.6	111,755	1.8
SELECTED CHARACTERISTICS						
Lacking complete plumbing facilities	20	0.6	279	0.8	30,134	0.5
Lacking complete kitchen facilities	11	0.3	370	1.1	35,010	0.6
No telephone service	97	3.1	1,020	2.9	139,891	2.2
OCCUPANTS PER ROOM						
Occupied housing units	**3,175**	**100**	**35,086**	**100**	**6,337,929**	**100**
1.00 or less	3,153	99.3	33,143	94.5	5,927,582	93.5
1.01 to 1.50	15	0.5	1,065	3	215,294	3.4
1.51 or more	7	0.2	878	2.5	195,053	3.1

Specified owner-occupied units	**1,647**	**100**	**14,104**	**100**	**3,242,202**	**100**
VALUE						
Less than $50,000	26	1.6	89	0.6	232,080	7.2
$50,000 to $99,999	24	1.5	597	4.2	1,287,169	39.7
$100,000 to $149,999	169	10.3	1,965	13.9	839,775	25.9
$150,000 to $199,999	317	19.2	2,688	19.1	407,296	12.6
$200,000 to $299,999	478	29	4,007	28.4	270,659	8.3
$300,000 to $499,999	383	23.3	3,227	22.9	132,683	4.1
$500,000 to $999,999	167	10.1	1,069	7.6	54,446	1.7
$1,000,000 or more	83	5	462	3.3	18,094	0.6
Median (dollars)	263,500	(X)	241,200	(X)	105,500	(X)
MORTGAGE STATUS AND SELECTED MONTHLY OWNER COSTS						
With a mortgage	919	55.8	8,480	60.1	2,323,452	71.7
Less than $300	0	0	7	0	12,975	0.4
$300 to $499	7	0.4	93	0.7	122,608	3.8
$500 to $699	50	3	396	2.8	335,230	10.3
$700 to $999	130	7.9	1,210	8.6	683,336	21.1
$1,000 to $1,499	337	20.5	2,925	20.7	700,028	21.6
$1,500 to $1,999	145	8.8	1,870	13.3	266,771	8.2
$2,000 or more	250	15.2	1,979	14	202,504	6.2
Median (dollars)	1,366	(X)	1,436	(X)	1,004	(X)
Not mortgaged	728	44.2	5,624	39.9	918,750	28.3
Median (dollars)	541	(X)	490	(X)	306	(X)
SELECTED MONTHLY OWNER COSTS AS A PERCENTAGE						
OF HOUSEHOLD INCOME IN 1999						
Less than 15 percent	497	30.2	4,454	31.6	1,107,462	34.2
15 to 19 percent	227	13.8	1,885	13.4	546,299	16.8
20 to 24 percent	154	9.4	1,563	11.1	443,882	13.7
25 to 29 percent	102	6.2	1,189	8.4	307,703	9.5
30 to 34 percent	124	7.5	851	6	204,169	6.3
35 percent or more	509	30.9	3,948	28	601,349	18.5
Not computed	34	2.1	214	1.5	31,338	1
Specified renter-occupied units	**917**	**100**	**13,138**	**100**	**1,889,455**	**100**
GROSS RENT						
Less than $200	0	0	243	1.8	71,963	3.8
$200 to $299	34	3.7	389	3	64,650	3.4
$300 to $499	128	14	1,266	9.6	347,435	18.4
$500 to $749	243	26.5	2,952	22.5	722,946	38.3
$750 to $999	208	22.7	3,250	24.7	392,136	20.8
$1,000 to $1,499	196	21.4	2,846	21.7	155,594	8.2
$1,500 or more	50	5.5	887	6.8	46,265	2.4
No cash rent	58	6.3	1,305	9.9	88,466	4.7

Median (dollars)	771	(X)	820	(X)	641	(X)
GROSS RENT AS A PERCENTAGE OF HOUSEHOLD INCOME IN 1999						
Less than 15 percent	147	16	1,570	12	276,173	14.6
15 to 19 percent	87	9.5	1,446	11	253,428	13.4
20 to 24 percent	156	17	1,661	12.6	244,091	12.9
25 to 29 percent	103	11.2	1,394	10.6	201,446	10.7
30 to 34 percent	76	8.3	1,119	8.5	149,658	7.9
35 percent or more	268	29.2	4,398	33.5	622,632	33
Not computed	80	8.7	1,550	11.8	142,027	7.5

(X) Not applicable.
Source: U.S. Census Bureau, Census 2000 DP-4 Profile of Selected Housing Characteristics, Summary File 3, Matrices H1, H7, H20, H23, H24, H30, H34, H38, H40, H43, H44, H48, H51, H62, H63, H69, H74, H76, H90, H91, and H94

Employment and Income. Selected economic characteristics for the Village of Islamorada CDP, Monroe County, and the State of Florida are provided in Table 3-11 and indicate that employment characteristics of the Village of Islamorada residents are similar to those of Monroe County. About 63 percent of the population of the Village of Islamorada was in the labor force in 2000, compared to about 65 percent for Monroe County and about 58 percent for the State of Florida. Also, like Monroe County, the Village of Islamorada's unemployment rate was very low, only about two percent, compared to the State average of three percent. Since 2000, the State of Florida unemployment rate has risen, but it has remained relatively unchanged in Monroe County.

Among occupational groups, the Village of Islamorada has a significantly lower percentage of its labor force working in construction than the State of Florida (seven percent compared to ten percent). By industry sector, the characteristics of the Village of Islamorada are similar to those of Monroe County and the State with two exceptions. First, 20 percent of the employment in the Village of Islamorada is in retail trade, far higher than the 13 percent figure for Monroe County and 13 percent for the State of Florida. Second, similar to Monroe County, 21 percent of the labor force in the Village of Islamorada work in the arts, entertainment, recreation, accommodation and food services sector, compared to only 12 percent for the State of Florida.

While the cost of living in the Village of Islamorada is higher than that of the State of Florida, household income is also generally higher than the State average. In 2000, the family income in the Village of Islamorada was over $56,000 per year, while the corresponding figure for Monroe County was about $51,000, more than $5000 greater than that of the State of Florida.

Table 3-11
Economic Characteristics
Islamorada Census Designated Place, Monroe County, and State of Florida

Subject	Islamorada		Monroe County		State of Florida	
	Number	Percent	Number	Percent	Number	Percent
EMPLOYMENT STATUS						
Population 16 years and over	**5,913**	**100**	**67,582**	**100**	**12,744,825**	**100**
In labor force	3,720	62.9	43,838	64.9	7,471,977	58.6
Civilian labor force	3,661	61.9	42,545	63	7,407,458	58.1
Employed	3,524	59.6	41,181	60.9	6,995,047	54.9
Unemployed	137	2.3	1,364	2	412,411	3.2
Percent of civilian labor force	3.7	(X)	3.2	(X)	5.6	(X)
Armed Forces	59	1	1,293	1.9	64,519	0.5
Not in labor force	2,193	37.1	23,744	35.1	5,272,848	41.4
Females 16 years and over	**2,784**	**100**	**31,249**	**100**	**6,615,066**	**100**
In labor force	1,598	57.4	18,666	59.7	3,491,052	52.8
Civilian labor force	1,598	57.4	18,488	59.2	3,482,224	52.6
Employed	1,552	55.7	18,067	57.8	3,275,775	49.5
Own children under 6 years	**344**	**100**	**3,867**	**100**	**1,069,643**	**100**
All parents in family in labor force	223	64.8	2,519	65.1	645,389	60.3
COMMUTING TO WORK						
Workers 16 years and over	**3,557**	**100**	**41,617**	**100**	**6,910,168**	**100**
Car, truck, or van -- drove alone	2,680	75.3	27,976	67.2	5,445,527	78.8
Car, truck, or van -- carpooled	263	7.4	4,633	11.1	893,766	12.9
Public transportation (including taxicab)	4	0.1	436	1	129,075	1.9
Walked	279	7.8	2,223	5.3	118,386	1.7
Other means	70	2	4,257	10.2	116,325	1.7
Worked at home	261	7.3	2,092	5	207,089	3
Mean travel time to work (minutes)	23.4	(X)	18.4	(X)	26.2	(X)
Employed civilian population 16 years and over	**3,524**	**100**	**41,181**	**100**	**6,995,047**	**100**
OCCUPATION						
Management, professional, and related occupations	988	28.0	11,232	27.3	2,206,193	31.5
Service occupations	710	20.1	9,635	23.4	1,183,660	16.9
Sales and office occupations	1,058	30.0	10,422	25.3	2,066,191	29.5
Farming, fishing, and forestry occupations	138	3.9	1,332	3.2	63,572	0.9
Construction, extraction, and maintenance occupations	246	7.0	5,006	12.2	717,333	10.3
Production, transportation, and material moving occupations	384	10.9	3,554	8.6	758,098	10.8

INDUSTRY						
Agriculture, forestry, fishing and hunting, and mining	129	3.7	1,430	3.5	92,463	1.3
Construction	232	6.6	3,839	9.3	562,111	8
Manufacturing	66	1.9	829	2	507,870	7.3
Wholesale trade	41	1.2	928	2.3	278,360	4
Retail trade	712	20.2	5,299	12.9	943,449	13.5
Transportation and warehousing, and utilities	235	6.7	2,435	5.9	374,179	5.3
Information	75	2.1	845	2.1	215,787	3.1
Finance, insurance, real estate, and rental and leasing	193	5.5	2,790	6.8	563,552	8.1
Professional, scientific, management, administrative, and waste management services	319	9.1	3,426	8.3	739,516	10.6
Educational, health and social services	448	12.7	4,883	11.9	1,264,965	18.1
Arts, entertainment, recreation, accommodation and food services	742	21.1	9,181	22.3	732,460	10.5
Other services (except public administration)	114	3.2	2,047	5	359,425	5.1
Public administration	218	6.2	3,249	7.9	360,910	5.2
CLASS OF WORKER						
Private wage and salary workers	2,505	71.1	30,355	73.7	5,579,314	79.8
Government workers	476	13.5	6,518	15.8	960,611	13.7
Self-employed workers in own not incorporated business	543	15.4	4,111	10	435,619	6.2
Unpaid family workers	0	0	197	0.5	19,503	0.3
INCOME IN 1999						
Households	**3,170**	**100**	**35,106**	**100**	**6,341,121**	**100**
Less than $10,000	165	5.2	3,093	8.8	606,995	9.6
$10,000 to $14,999	197	6.2	2,017	5.7	427,050	6.7
$15,000 to $24,999	497	15.7	4,394	12.5	918,455	14.5
$25,000 to $34,999	422	13.3	4,633	13.2	901,454	14.2
$35,000 to $49,999	460	14.5	6,044	17.2	1,103,554	17.4
$50,000 to $74,999	570	18	6,974	19.9	1,170,569	18.5
$75,000 to $99,999	370	11.7	3,632	10.3	552,379	8.7
$100,000 to $149,999	256	8.1	2,411	6.9	398,860	6.3
$150,000 to $199,999	56	1.8	766	2.2	114,432	1.8
$200,000 or more	177	5.6	1,142	3.3	147,373	2.3
Median household income (dollars)	41,522	(X)	42,283	(X)	38,819	(X)
With earnings	2,526	79.7	27,689	78.9	4,739,369	74.7
Mean earnings (dollars)	56,095	(X)	53,376	(X)	51,993	(X)
With Social Security income	828	26.1	8,765	25	2,072,258	32.7
Mean Social Security income (dollars)	14,549	(X)	11,891	(X)	11,814	(X)
With Supplemental Security Income	91	2.9	1,008	2.9	265,883	4.2
Mean Supplemental Security Income (dollars)	8,408	(X)	7,403	(X)	6,295	(X)
With public assistance income	65	2.1	683	1.9	178,166	2.8

Mean public assistance income (dollars)	4,588	(X)	3,191	(X)	2,449	(X)
With retirement income	491	15.5	5,674	16.2	1,262,325	19.9
Mean retirement income (dollars)	25,310	(X)	22,782	(X)	18,701	(X)
Families	**1,823**	**100**	**20,661**	**100**	**4,238,409**	**100**
Less than $10,000	38	2.1	1,009	4.9	243,787	5.8
$10,000 to $14,999	57	3.1	869	4.2	195,528	4.6
$15,000 to $24,999	227	12.5	2,236	10.8	524,009	12.4
$25,000 to $34,999	166	9.1	2,412	11.7	579,514	13.7
$35,000 to $49,999	267	14.6	3,592	17.4	782,918	18.5
$50,000 to $74,999	399	21.9	4,636	22.4	907,388	21.4
$75,000 to $99,999	305	16.7	2,725	13.2	452,986	10.7
$100,000 to $149,999	198	10.9	1,732	8.4	332,735	7.9
$150,000 to $199,999	29	1.6	561	2.7	96,551	2.3
$200,000 or more	137	7.5	889	4.3	122,993	2.9
Median family income (dollars)	56,118	(X)	50,734	(X)	45,625	(X)
Per capita income (dollars)	29,519	(X)	26,102	(X)	21,557	(X)
Median earnings (dollars):						
Male full-time, year-round workers	31,339	(X)	31,266	(X)	32,212	(X)
Female full-time, year-round workers	25,670	(X)	25,709	(X)	25,480	(X)
POVERTY STATUS IN 1999 (below poverty level)						
Families	**63**	**(X)**	**1,403**	**(X)**	**383,131**	**(X)**
Percent below poverty level	(X)	3.5	(X)	6.8	(X)	9
With related children under 18 years	35	(X)	801	(X)	281,303	(X)
Percent below poverty level	(X)	6.2	(X)	9.9	(X)	14.2
With related children under 5 years	0	(X)	325	(X)	132,180	(X)
Percent below poverty level	(X)	0	(X)	11.7	(X)	17.4
Families with female householder, no husband present	**15**	**(X)**	**473**	**(X)**	**187,257**	**(X)**
Percent below poverty level	(X)	12.1	(X)	19.8	(X)	25.3
With related children under 18 years	15	(X)	389	(X)	164,596	(X)
Percent below poverty level	(X)	16.5	(X)	25.4	(X)	32.8
With related children under 5 years	0	(X)	169	(X)	75,752	(X)
Percent below poverty level	(X)	0	(X)	36.8	(X)	44.6
Individuals	**466**	**(X)**	**7,977**	**(X)**	**1,952,629**	**(X)**
Percent below poverty level	(X)	6.9	(X)	10.2	(X)	12.5
18 years and over	378	(X)	6,358	(X)	1,324,632	(X)
Percent below poverty level	(X)	6.7	(X)	9.8	(X)	11
65 years and over	50	(X)	994	(X)	246,641	(X)
Percent below poverty level	(X)	4.5	(X)	8.8	(X)	9.1
Related children under 18 years	73	(X)	1,548	(X)	607,607	(X)
Percent below poverty level	(X)	7	(X)	11.8	(X)	17.2
Related children 5 to 17 years	73	(X)	1,138	(X)	434,180	(X)

Percent below poverty level	(X)	9.4	(X)	11.5	(X)	16.6
Unrelated individuals 15 years and over	292	(X)	3,865	(X)	663,080	(X)
Percent below poverty level	(X)	15.1	(X)	17.8	(X)	22.2

(X) Not applicable.

Source: U.S. Census Bureau, Census 2000 DP-3 Profile of Selected Economic Characteristics, Summary File 3, Matrices P30, P32, P33, P43, P46, P49, P50, P51, P52, P53, P58, P62, P63, P64, P65, P67, P71, P72, P73, P74, P76, P77, P82, P87, P90, PCT47, PCT52, and PCT53

Tourism. Tourism is the principal economic force in the Village of Islamorada and Monroe County (Corps 2004). A reported 2.29 million visitors spent an estimated 14.3 million days in the Keys between June 1997 through May 1998. Visitors spent an estimated $1.38 billion in the county during this period and generated an estimated $1.55 billion in total output and sales. In turn, this provided approximately $565,000,000 in income, and supported nearly 19,000 jobs (Leeworthy and Vanesse 1999). The income generated by tourism amounted to an estimated 47 percent of the county total, while the employment supported by tourism was estimated to be nearly 37 percent of the county total.

Cost of Living. One of the principal factors affecting the cost of living in the Keys and a factor that would be impacted by the proposed project is the cost of utility services. Rates for utility services are elevated for residents in the Keys due to the distance requirement for utility lines to provide service to residents. In addition, the cost of sewer service is relatively high in the Keys due to infrastructure requirements for collecting wastewater, treatment, and disposal of treated effluent.

Monroe County has the highest cost of living per county in Florida. The principal contributing factors in the county, including the Village of Islamorada CDP, are elevated costs of real estate, insurance, transporting goods and services, sales tax, and utilities.

Cost of living data are available only at the county level, and it is reasonable to assume that the cost of living in the Village of Islamorada varies little from Monroe County. The 2003 Florida Price Level Index identified Monroe County as having the highest cost of living in Florida, with an index value of 109.63 (Bureau of Economic and Business Research 2003). This index indicates that the cost of living is almost ten percent higher than the state average. It is worth noting that only five other counties had an index greater than 100; therefore, the cost of living in Monroe County is significantly higher than most parts of Florida. The principal factors that contribute to the high cost of living in Monroe County, including the Village of Islamorada, are elevated costs of real estate, insurance, transporting goods and services, sales tax, and utilities. Goods and services are generally more costly in the Keys than elsewhere in Florida, mainly due to the high cost of transportation to and from the area. With no rail transportation or commercial seaport, virtually all goods are shipped by truck from the mainland.

Home Ownership. The home ownership rates in the Village of Islamorada as well as Monroe County are lower than for the State of Florida. In the Village of Islamorada, about 71 percent of

the residents owned their own homes, compared to 62 percent for Monroe County and 70 percent for the State of Florida (U. S. Census Bureau 2001). The lower home ownership rate in Monroe County is attributable to the much higher cost of housing units in Monroe County and the transient nature of the population. The higher home ownership rate in the Village of Islamorada indicates that the area has a lower percentage of temporary residents.

Poverty Level. Largely because of the area's higher income levels, the Village of Islamorada's percentage of families living below the poverty level was reportedly only seven percent, compared to the State of Florida's nine percent. (U.S. Census Bureau 2001) For individuals, the corresponding figures were seven percent for the Village of Islamorada, ten percent for Monroe County, and 12 percent for the State of Florida.

However, because the cost of living in Monroe County is about ten percent higher than the Florida average, the actual proportion of residents in the village and the county living below the poverty level is much greater than the figures indicate. The definition of poverty applied by the Census Bureau does not provide a meaningful indication of the proportion or number of village or county residents with little or no discretionary income.

Because of the high cost of living in Monroe County, the number of actual residents below the poverty line is actually greater than the estimated seven percent of the Village of Islamorada CDP (U.S. Census 2001).

As part of the implementation of the wastewater improvements funded by FEMA, a Housing and Urban Development income level system for identifying residents eligible for financial assistance was developed. The system defines low-income residents as those with 80 percent of the median family income (MFI), and very low-income residents as those with household income of 50 percent of the median. Based on these definitions, very low-income residents have no discretionary income. Those designated as low-income households have discretionary income levels of about $750 per month (FEMA 2002).

Utility Costs. The residents of the Village of Islamorada CDP rely primarily on septic systems for wastewater treatment. The costs associated with operating and maintaining these systems are generally very low. However, where central wastewater treatment facilities have been installed, the costs associated with developing wastewater transmission and treatment facilities, connecting residences and businesses, and maintaining the facilities is often very high.

There are currently five central wastewater treatment facilities that are fully operational in Monroe County (U.S. Army Corps of Engineers 2004). Only two, in the cities of Key West and Key Colony Beach, comply with future state of Florida wastewater treatment standards (FEMA 2002). In the three wastewater treatment plant service areas currently not complying (Key Haven Utilities, Ocean Reef Club, and KW Resort Utilities) residents pay from $1,215 to $2,700 toward the cost of wastewater treatment and transmission capacity. The charges include system development charge, additional charges to connect the resident's sewer line to the transmission system, and from $55 to $64 per month for sewer service.

The estimated fraction of income that a resident can afford to pay for sewer service is two percent (FEMA 2002). Based on the median household income in the Village of Islamorada, $56,118 per year or $4676 per month, an average resident can afford $93 per month for sewer service. Excluding the costs of connection, the monthly sewer bills paid by customers of central wastewater treatment facilities are within the target amount for sewer bills for persons with median household income or above. However, for persons with household incomes substantially below the median, the monthly cost of sewer service could greatly exceed the generally accepted affordability level.

Affordability indices focus on the ability to pay for continuing service. However, two other expenses incurred by new customers that are of equal or greater significance are the system development charge and the cost of the connecting the residence or business to the wastewater transmission system, including the tapping fee. The Florida Keys Aqueduct Authority allows payment of the system development charge over time. Adding this cost to the monthly charge noted above could drive the monthly charge above the affordability index for even a household enjoying the median income.

3.11 Recreation

While local geology limits the formation of sandy beaches in the Keys, the primary natural attraction is the coral reef, as described in the PEIS (Section 3.11). The 2.29 million visitors to the Keys rely on clean water and beaches as well as the abundant fish and wildlife that characterize this popular vacation spot. These visitors provide the basis of the tourism industry on which the economy of the Keys relies. Consequently, potential impacts to recreational amenities and tourism that may result from the implementation of FKWQIP must be examined.

Ninety percent of all visitors responded that recreation or vacation was their primary purpose for visiting the Keys.

✓	✓	✓		✓	

Ninety percent of visitors to the Keys visit for recreation or vacation. In addition to water sports, historical and cultural resources associated with the Keys support tourism. Historical attractions include the remnants of the Overseas Railroad constructed in the early 1900s, Fort Zachary Taylor in Key West, and Fort Jefferson in the Dry Tortugas. Recreation days in Monroe County (Table 3-12) indicate that most activities are related to saltwater.

Fifteen percent of the Village of Islamorada is designated as conservation lands. The vast majority of these environmentally sensitive lands were acquired through State programs.

Fifteen percent of the Village of Islamorada is designated as conservation lands (Source: FNAI and Geoplan Center, 1999). The vast majority of these environmentally sensitive lands are

publicly owned, acquired through State programs such as Conservation and Recreation Lands (CARL).

The Village of Islamorada includes four islands, each of which are separated by a channel with tidal flats that are accessible on either side of the connecting bridges. Recreation areas on the four islands provide active and passive recreation opportunities, rather than focusing on conservation and are usually smaller and more densely developed (Monroe County 1997a). The Village of Islamorada is known as the "Sport Fishing Capital of the World", and offers many water-related recreational activities, including diving, snorkeling, and fly-fishing. The Village of Islamorada has a city recreation program that includes multi-use parks such as Founder's Park, swimming clubs, and beach volleyball. Windley Key is home to the Theater of the Sea, the second marine attraction of its kind in the world, which was opened in one of Flagler's quarry pits in 1946.

The Lignumvitae Key Botanical State Park is located in the waters north of Upper Matecumbe Key and Lower Matecumbe Key. The San Pedro Underwater Archaeological Preserve is also located in the waters southeast of Lower Matecumbe Key. In addition to these areas, the Windley Key Quarry Geologic State Park is a Geologic Historic Site owned by the State of Florida, located on Windley Key.

The Village of Islamorada is known as the "Sport Fishing Capital of the World."

Table 3-12
Recreation Days in Monroe County: 12-Month Period 1995-1996

Activity	Recreation Days Reported	Percent of Total Days Reported
Boating Activities		
Snorkeling	1,010.8	7.9
SCUBA diving	190.0	1.5
Offshore fishing	859.2	6.7
Personal watercraft	239.8	1.9
Viewing nature & wildlife	796.0	6.2
Non-Boating Activities		
Snorkeling from shore	548.1	4.3
Fishing from shore	359.9	2.8
All beach activities	2,867.6	22.4
Swimming in outdoor pools	2,489.2	19.4
Wildlife & nature studies	1,789.8	14.0
Museums & historic sites	1,665.9	13.0

Leeworthy and Wiley 1996.

3.12 Open Space and Aesthetic Resources

Visual resources are an aesthetic quality of a community. Physical features that make up the landscape include land, water, and vegetation, and other features such as buildings. The

significance of open space and aesthetic resources in the Keys was presented in the PEIS (Section 3.12).

The Village of Islamorada service area consists of four separate islands with bridge crossings and the Theater of the Sea, which provide unique site seeing opportunities for visitors.

✓	✓	✓		✓	

The Village of Islamorada service area consists of four separate islands with bridge crossings, and the Theater of the Sea, which provide unique site seeing opportunities for visitors to the Keys. The service area also includes numerous natural areas with mangrove forests, salt marshes, and upland areas containing hardwood hammocks and pine communities. From the bridges, a view of open water, beaches, and nearshore waters, attracts visitors year round.

Wastewater nutrient loading into the Sanctuary can lead to increased algal blooms and fish kills. These occurrences result in nuisance odors and views, which detract from the otherwise pleasant visual resources of the area.

3.13 Environmental Justice

Proposed facilities for the Village of Islamorada include sewer lines, pumping facilities, and construction of two additional wastewater treatment facilities and expansion of a third facility. The issue of environmental justice is one of fairness in the siting of facilities and the regulation of environmentally hazardous activities, as described in the PEIS (section 3.13). The purpose of this section is to characterize the racial and economic make up of the Village of Islamorada CDP so that environmental justice can be evaluated for the project alternatives.

There are two basic factors to be considered in assessing environmental justice issues stemming from each of the alternatives considered: Alternative 1–*No Action*; Alternative 2-*Proposed Action*; and Alternative 3–*Alternative Funding Sources*:

- Siting and operation of project facilities in neighborhoods occupied by racial minorities or low income residents
- Disproportionate impact on racial minorities or low income residents from user charges occurring as a result of implementing the proposed project or the No-Action Alternative.

Federal EO 12898 (1994), requires a federal agency to make environmental justice a part of the planning process, ensuring greater public participation, and identifying differences in resource consumption patterns of minority and low-income portions of the population. The USEPA Office of Environmental Justice has defined environmental justice as:

The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, policies.

There are no affective barriers to resource use in the Village of Islamorada and the Keys. Most of the population of the Village of Islamorada CDP is white (U.S. Census Bureau 2001) and consequently, race is not an environmental justice issue. In addition, the policy of the FKAA, the implementing entity, is to acquire property for these facilities from willing sellers. Therefore, the property acquisition, construction, and operation of these facilities would have a negligible affect on nearby residents. Finally, the installation and operation of the WWTF is planned for a site adjacent to an existing FKAA facility, and some distance from any residential area.

There are no affective barriers to resource use in the project area: most of the population is white and race is not issue. However, while most residents are financially well-off, there is disparity in wealth and income among residents, raising potential environmental justice concerns.

	✓			✓	✓

Impact on low income residents remains a potential source of concern from the perspective of environmental justice. While the median household income in the Village of Islamorada CDP is above that of Monroe County and well above that of the State of Florida, seven percent of the residents live below the poverty level. This percentage may actually be larger given that the cost of living in Monroe County is about ten percent higher than that of the state, as described in the PEIS (section 3.13). The proportion of residents over the age of 65 in the Village of Islamorada CDP is approximately the same as that of the county and the state. This segment of the population often lives on fixed income and, while their income may not be below the poverty level, they are affected by cost of living changes. These factors suggest that while the majority of the Village of Islamorada residents are financially well-situated, there is considerable disparity in wealth and income among residents, raising potential environmental justice concerns.

3.14 Land Use and Planning

This section addresses the land use patterns and regulations in the Village of Islamorada service area. Many of the water quality issues in the Keys are closely associated with land uses implemented prior to and since existing environmental regulations. Consequently, untreated stormwater runoff and improper wastewater disposal practices continue to adversely affect wetlands and nearshore waters. Greater detail regarding land use regulations and controls in the state of Florida and Monroe County is provided in the PEIS (Section 3.14).

To ensure the sustainability of resources unique to the Keys, Monroe County and Village of Islamorada comprehensive land use planning provisions have been developed and include a Building Permit Allocation System (BPAS) and the Rate of Growth Ordinance (ROGO) to control future growth (explained in further detail in Section 3.14.3). In addition, the FKCCS,

sponsored jointly by the FDCA and the Corps, developed a planning tool to assist in determining the level of development activities that will provide a means to avoid further irreversible and/or adverse impacts to the Keys (Florida Administrative Weekly 1996).

3.14.1 Land Use

Land use classes in the Islamorada service area are listed in Table 3-13 and mapped in Figure 3-4 based on Florida Land Use Cover and Forms Classification System [FLUCFCS] (South Florida Water Management District [SFWMD] 1995). The service area is primarily comprised of residential land uses (36 percent) which accommodate permanent residents as well as seasonal and recreational residents. Residential land uses along the shoreline of Florida Bay or the Florida Straits make the most of the scenic resources and recreational access afforded by these waterfront locations. The service area is also comprised mangrove swamps (26 percent), tropical hardwoods (eight percent), and embayments opening directly into the Gulf of Mexico or Atlantic Ocean (eight percent).

Mangroves, saltwater marshes, and water embayments make up 34 percent of the service area.

The proposed Lower Matecumbe Key WWTF will be constructed on a .94-acre site and is located on the Gulf side of U.S. 1 at approximately MM 74.5. The proposed WWTF is located in land uses designated as Fixed Single Family Units, and Mixed Commercial and Services.

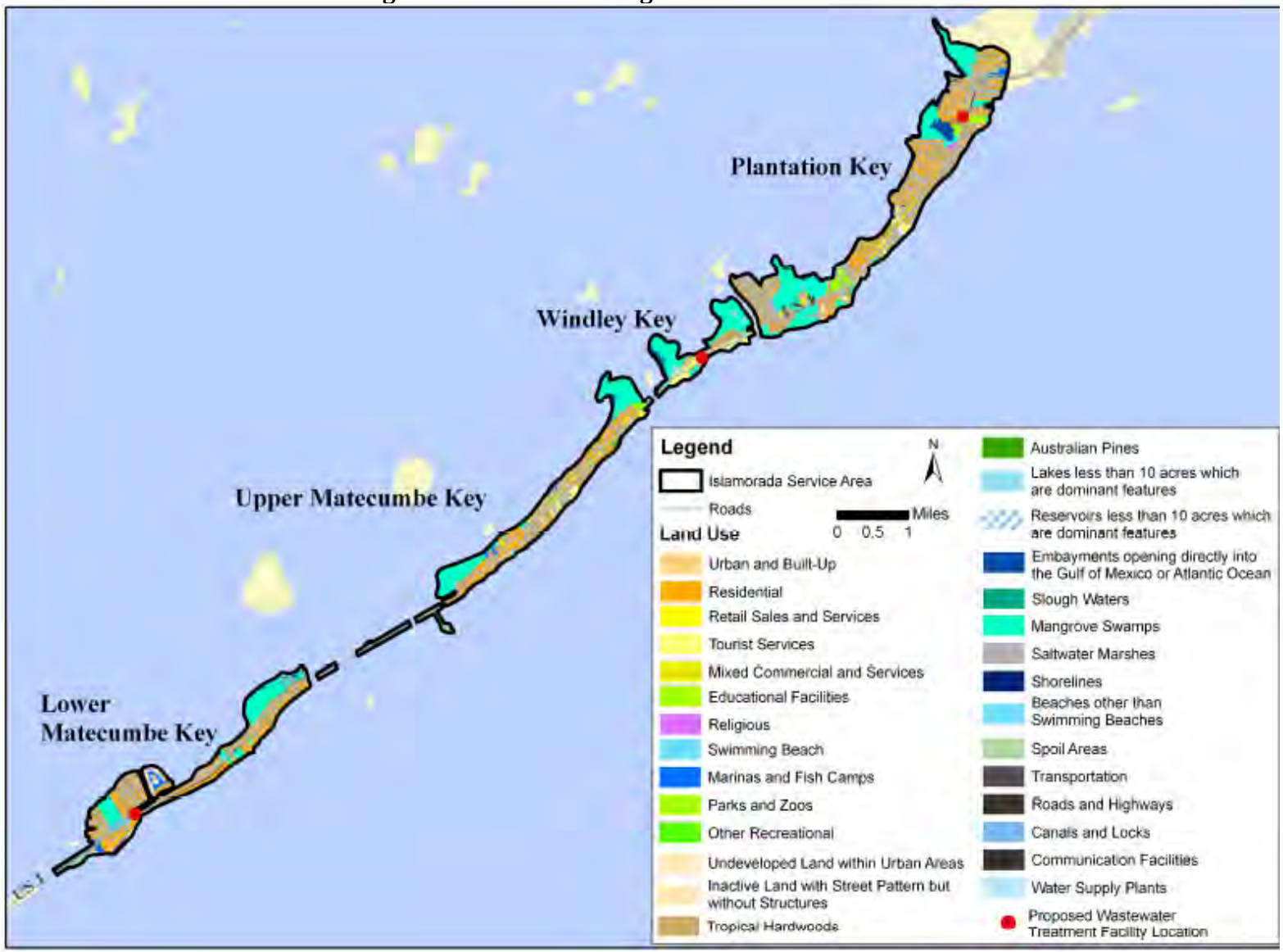
The proposed Windley Key WWTF will be constructed on a .80 acre-site and is located on the Atlantic side of U.S. 1 at approximately MM 84.5. The proposed WWTF is located in land uses designated as Urban and Built Up, and Tourist Services.

The proposed Plantation Key WWTF will be constructed on a .56-acre site and is located on the Gulf side of U.S. 1 at approximately MM 89.5. The proposed WWTF is located in land uses designated as Mixed Commercial and Services, and Residential High Density.

Table 3-13
Islamorada Service Area Land Use

Land Use	Acres	Percent of Total
Residential	1659.1	35.52
Mangrove Swamps	1209.1	25.88
Tropical Hardwoods	376.7	8.07
Embayments opening directly into the Gulf of Mexico or Atlantic Ocean	355.3	7.61
Tourist Services	176.1	3.77
Mixed Commercial and Services	164.0	3.51
Canals and Locks	139.7	2.99
Land Boundary Difference	107.0	2.29
Marinas and Fish Camps	63.9	1.37
Parks and Zoos	62.4	1.34
Urban and Built-Up	59.2	1.27
Spoil Areas	57.8	1.24
Inactive Land with street pattern but without structures	42.6	0.91
Roads and Highways	37.2	0.80
Educational Facilities	30.7	0.66
Slough Waters	25.0	0.53
Lakes less than 10 acres which are dominant features	17.5	0.37
Undeveloped Land within Urban Areas	14.8	0.32
Reservoirs less than 10 acres which are dominant features	10.2	0.22
Australian Pines	9.7	0.21
Shorelines	9.1	0.20
Water Supply Plants	7.6	0.16
Religious	7.1	0.15
Transportation	6.3	0.13
Swimming Beach	5.4	0.12
Saltwater Marshes	5.2	0.11
Beaches other than Swimming Beaches	3.7	0.08
Communication Facilities	3.2	0.07
Retail Sales and Services	3.2	0.07
Other Recreational	2.3	0.05
Total	4671.2	100.00

Figure 3-4
Existing Land Use in the Village of Islamorada Service Area



3.14.2 Conservation Areas

Nearly fifteen percent of the Village of Islamorada is designated as conservation land, either existing or proposed (Table 3-14 and Figure 3-5). Of the total 4,671 acres of land in the service area, there are a total of 216 acres (five percent) of existing conservation lands and an additional 469 acres (10 percent) proposed for future conservation (Source: FNAI and Geoplan Center 1999). Lignumvitae Key Botanical State Park, Windley Key Fossil Reef State Park, and Indian Key Historic State Park, are three of nine state parks in the Sanctuary.

Of the total 4,671 acres of land in the service area, five percent is existing conservation lands and an additional 10 percent is proposed for future conservation.

The Sanctuary surrounds the Keys and the service area and includes the most extensive coral reef in North America and the third largest reef system in the world. Under Public Law 101-605, 2,600 square nautical miles of coastal waters are designated under the Sanctuary.

There are numerous National Wildlife Refuges, Ecological Reserves, Sanctuary Preservation Areas, and Wildlife Management Areas within the Sanctuary primarily located in the upper and lower Keys, four of which are in offshore waters surrounding the Islamorada service area.

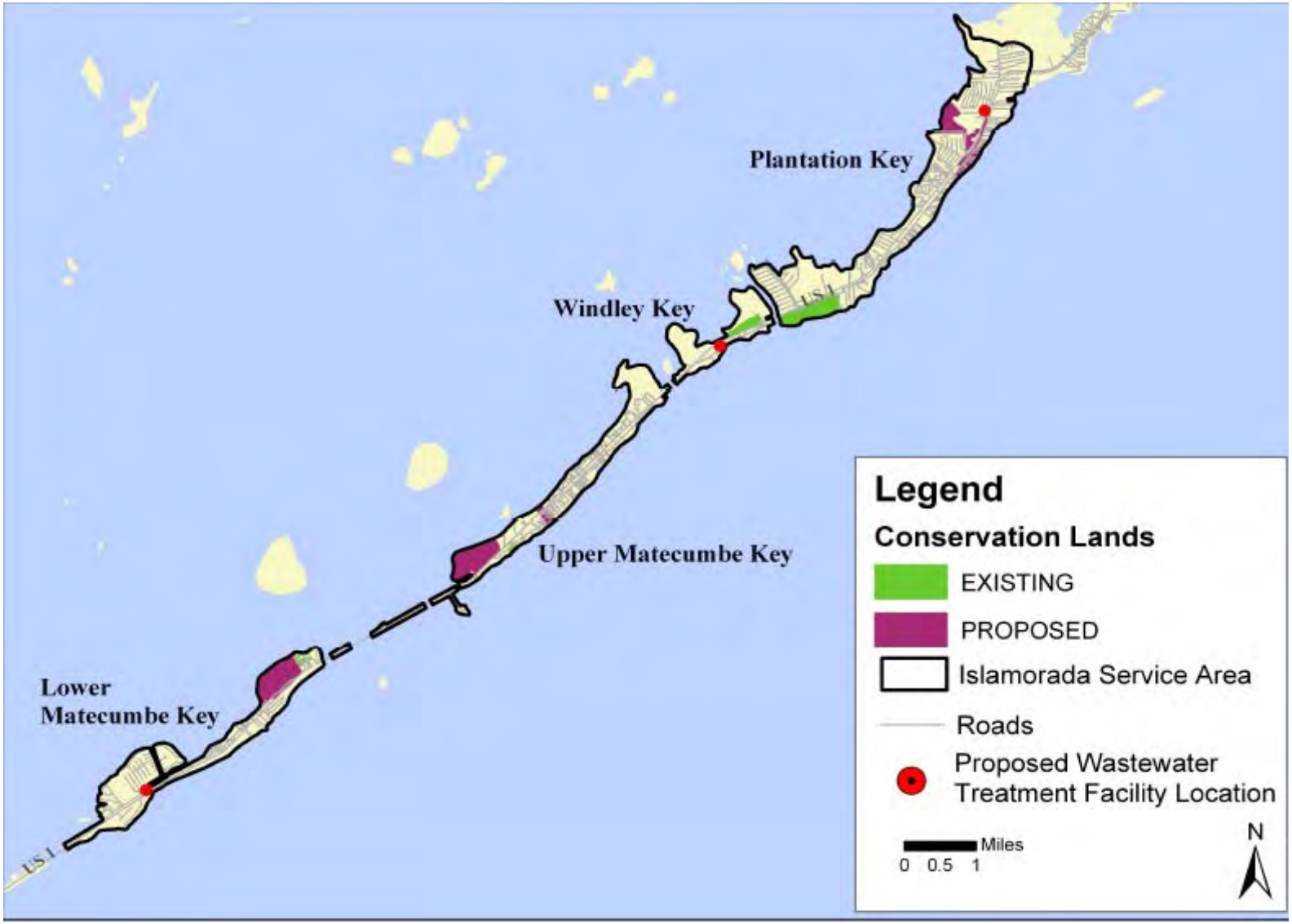
There are also management areas within the Sanctuary, some of which are designated as research-only areas (ROAs) for which a permit is required for entry. The ROAs in the Sanctuary are the Looe Key, Tennessee Reef and Conch Reef ROAs; the Conch Reef ROA is located due south of Key Largo.

Table 3-14
Acres of Conservation Lands in Service Area

Conservation Land Status	Acres	Percent of Total
PROPOSED	468.9	68.42
EXISTING	216.4	31.58
Total	685.3	100.00

Source: Source: FNAI and Geoplan Center, 1999

Figure 3-5
Conservation Lands in Village of Islamorada Service Area



3.14.3 Future Land Use

The comprehensive plans of Monroe County and the incorporated cities of Islamorada, Marathon, Layton, Key Colony Beach, and Key West are specifically structured to control and direct future land use development to areas with sufficient services to accommodate the growth (Chapter 163 F.S. Public facilities must serve the development at the adopted LOS standards (concurrent with the impacts of the development). LOS standards are established for traffic and circulation, potable water, solid waste, sanitary sewer, drainage, and recreation and open space (Monroe County 2000).

Under the Monroe County Comprehensive Plan, the total number of building permits issued per year is limited by Monroe County's ROGO permit allocation system as well as Islamorada's BPAS, not the presence of specific infrastructure. Policy 101.2.13 of the Monroe County Comprehensive Plan established an interim permit allocation system to control growth based on hurricane evacuation, public safety and environmental needs including water quality and habitat protection. To implement this policy, Monroe County has adopted a ROGO that specifically allocates credits towards obtaining building permits. Nutrient reduction credits are necessary to qualify for a building permit. Each year this interim permit allocation system limits the number of building permits issued for new residential development to the number of nutrient reduction credits earned within the same ROGO area.

Future land uses in the Village of Islamorada service area are primarily residential (66 percent) and commercial (12 percent), which together make up 78 percent of the future land use mapped for the service area (Table 3-15, Figure 3-6). The proposed Lower Matecumbe Key WWTF would be located on a site identified as Residential Conservation, Mixed Use/Commercial, and Residential Medium Density on the Future Land Use Map. The proposed Windley Key WWTF would be located on a site identified as Residential Low, Mixed Use/Commercial, and Water Bodies on the Future Land Use Map. The proposed Plantation Key WWTF would be located on a parcel identified as Mixed Use/Commercial on the Future Land Use Map.

Figure 3-6
Future Land Use in the Village of Islamorada Service Area

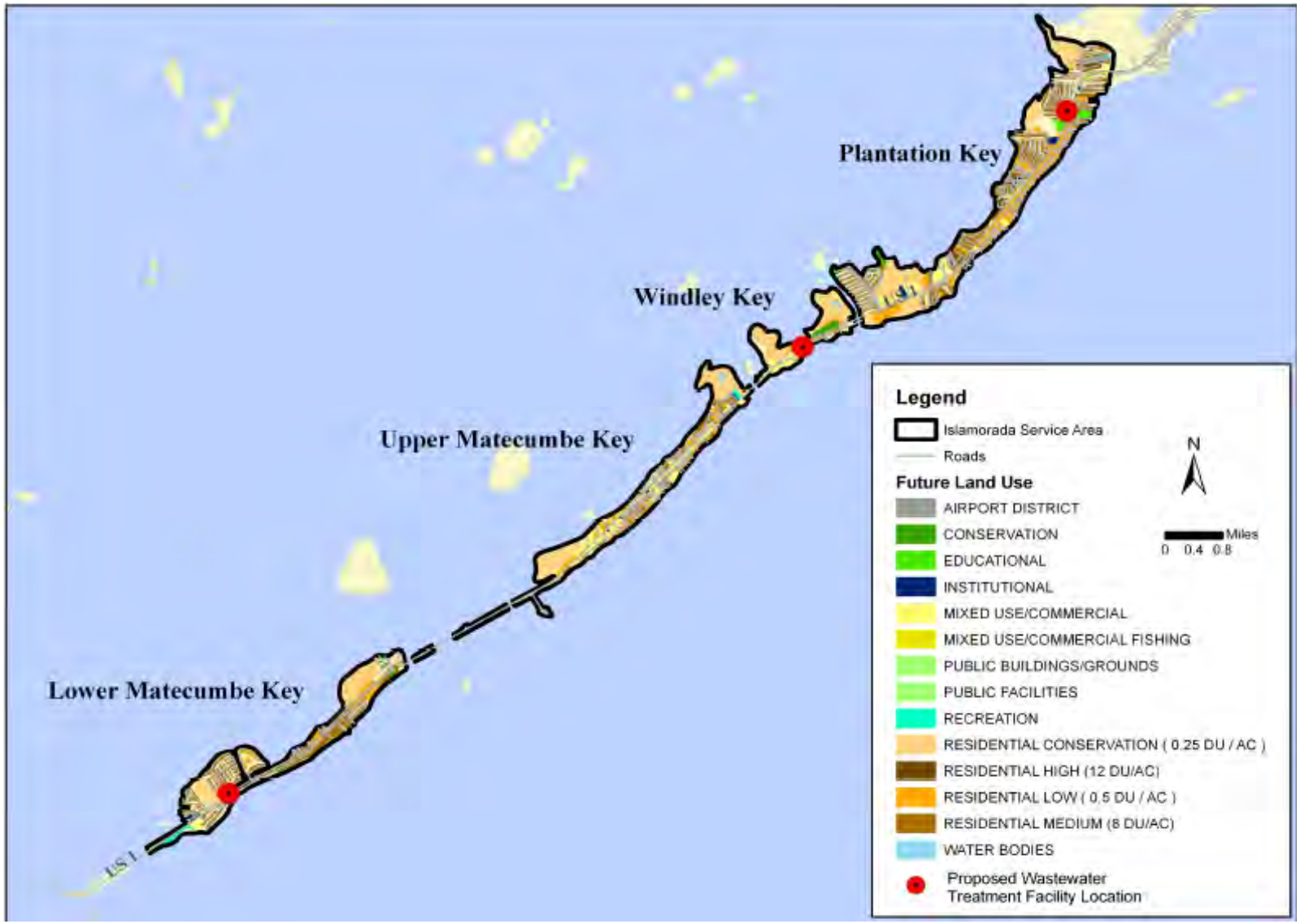


Table 3-15 Future Land Use in the Islamorada Service Area		
Future Land Use	**Acres**	**Percent of Total**
RESIDENTIAL MEDIUM (8 DU/AC)	1169.2	25.03
RESIDENTIAL CONSERVATION (0.25 DU / AC)	1124.3	24.07
Land Boundary Difference	757.3	16.21
RESIDENTIAL LOW (0.5 DU / AC)	669.1	14.32
MIXED USE/COMMERCIAL	566.0	12.12
RESIDENTIAL HIGH (12 DU/AC)	118.6	2.54
CONSERVATION	61.9	1.33
INSTITUTIONAL	54.80	1.17
RECREATION	36.2	0.78
EDUCATIONAL	33.5	0.72
MIXED USE/COMMERCIAL FISHING	30.5	0.65
WATER BODIES	21.8	0.47
AIRPORT DISTRICT	15.0	0.32
PUBLIC BUILDINGS/GROUNDS	7.9	0.17
PUBLIC FACILITIES	5.2	0.11
Total	4671.2	100.00

Source: Source: SFWMD 2003

3.14.4 Coastal Zone Management Act (CZMA)

The Village of Islamorada service area is located in the State of Florida's designated coastal zone. The Florida Coastal Management Program (FCMP), the state of Florida's federally approved management program, was approved by the NOAA in 1981.

The Coastal Barrier Improvement Act of 1990 (CBIA) reauthorizes and amends the Coastal Barrier Resources Act (CBRA) of 1982 (16 U.S.C 3501-3510) and is described in the PEIS (Chapter 3.0). Although the CBIA restricts federal expenditures for coastal barrier development, Section 6(a)(6)(A) contains a broad exemption for projects relating to the study, management, protection, or enhancement of fish and wildlife resources and habitats, including recreational projects. Under the 1990 amendments, the Secretary of the Interior has consultation responsibilities for additional exemptions from funding prohibitions under CBRA, including water resource development projects.

A review of the Coastal Barrier Resource System (CBRS) maps show that two designated CBRS units lie within the Islamorada service area (FL-39 and FL-40, see Figure 3-7,). The Federal CBRS designation has been incorporated into the Monroe County Year 2010 Comprehensive Plan. Monroe County discourages the extension of facilities and services, such as telephone or electricity, to designated coastal barrier areas. Construction of the proposed WWTF and all of the infrastructure and transmission lines needed to convey wastewater to the facility will occur outside the boundaries of these CBRS units.

Figure 3-7
Coastal Barrier Resource System

3.15 Infrastructure

Transportation service and corridor access for conveyance of potable water and electrical service from the mainland are provided to the Keys via U.S. 1. There is one WWTF currently under construction on Plantation Key which will service the North Plantation Key service area, but otherwise there is no centralized WWTF currently serving the Village of Islamorada service area. Consequently, nutrient and other pollutant loadings are discharged into nearshore waters and contribute to the degradation of these waters.

There is no centralized WWTF currently serving the entire Village of Islamorada service area. Consequently, nutrient and other pollutant loadings are discharged into nearshore waters and contribute to their degradation.

	✓				

3.15.1 Transportation

Transportation infrastructure in the service area includes roadways that link the mainland with the Village of Islamorada via the Overseas Highway/U.S. 1. This route allows vehicle traffic, as well as air and boat transportation through the numerous waterways. However, the primary transportation objective of Monroe County is to reduce the time required for hurricane evacuation to 24 hours by the year 2010 (Monroe County 1997b).

Roadways. U.S. 1 is the major roadway connection for the Village of Islamorada. Within Monroe County, the highway stretches 112 miles from Key West to the Miami-Dade County line and provides a means of transporting food, supplies, and tourists between the mainland and the Keys. U.S. 1 functions as a rural state principal arterial, but also as "Main Street" within the Village of Islamorada. U.S. 1 is essentially a two-lane road through the Village of Islamorada with the exception of the northern mile within the village limits (MM 90 to MM 91) which has four lanes. The Monroe County Comprehensive Plan mandates that U.S. 1 be maintained to provide LOS C travel conditions (Monroe County 1997b). The U.S. 1 LOS Task Force, with members from Monroe County, FDOT, and Florida Department of Community Affairs (FDCA), monitors service levels along U.S. 1. Traffic counts are collected during peak tourist season (February–March) and then adjusted to reflect average daily traffic (ADT) conditions. Pursuant to the U.S. 1 LOS Task Force methodology, the LOS on U.S. 1 within the Village of Islamorada ranges from LOS B (Plantation Key and Windley Key) to LOS D (Lower Matecumbe Key).

Public Transportation. The Village of Islamorada service area has no formal public transportation. However, a private transit operator currently provides vanpool services on a fixed schedule.

Air Transportation. There are no commercial airports in the Village of Islamorada service area. The two airports in Monroe County, Key West International Airport and Keys Marathon Airport, have regularly scheduled commercial passenger service and provide services for private

aircraft at the general aviation fixed base operations. Major air carriers include U.S. Airways, Delta, and American Eagle Airlines. The Tavernero Airstrip is located on Plantation Key.

Waterways. There are no deep-water ports in the Village of Islamorada service area. The Coast Guard station at Key West maintains navigational aids, provides emergency search and rescue services, and patrols coastal waters to promote boating safety. The U.S. Coast Guard group in Key West includes the Cutter Nantucket and nine 110-foot island/class patrol boats based at boat stations in Key West, Marathon, and the Village of Islamorada.

The network of waterways, proximity to deep waters, and the numerous marinas and boating facilities makes water transportation an important function in the Keys. Most residents in the service area have easy boating access to open water via a network of canals. Monroe County has 25,862 registered commercial and pleasure boats, or one boat for every three residents.

3.15.2 Utilities and Services

Electrical Power. Two electrical service providers serve the Keys. To the north and east of the Seven Mile Bridge, which includes the Village of Islamorada service area, service is provided by the Florida Keys Electric Cooperative (FKEC). In 2001, FKEC had over 30,000 customers in Monroe County and supplied 639,000,000 kilowatt hours of electricity to those customers (FKEC 2002). FKEC purchased power generated on the mainland by Florida Power and Light. This power is distributed to the Keys by two 138,000-volt transmission lines. A small power plant in Marathon supplies approximately two percent of the FKEC power requirements.

The second electrical service provider is Keys Energy Services (KEYS), which provides electrical power to the southern portion of the Keys. KEYS is a municipal utility operated by a state authorized utility board and imports most of its power from the mainland, but has an on-island emergency generator that can provide 60 percent of its power in case of power interruption (KEYS 2003). KEYS power is distributed along a transmission line paralleling U.S. 1, jointly owned with FKEC to the north of the Seven Mile Bridge.

Potable Water. The FKAA is the sole provider of potable water for the Keys (FKAA 2002). Potable water is transported through a 130-mile transmission pipeline (24 to 36 inches in diameter) and an additional 649 miles of distribution pipeline to over 42,000 customers. The water supply for FKAA is the Biscayne aquifer from a well field west of Florida City in Miami-Dade County. The well field contains some of the highest quality ground water in the state of Florida (FKAA 2002). The water is pumped to the Keys, with diesel pumps as backup. Water storage facilities are located at various locations throughout the Keys in case of a pipeline rupture. Desalination facilities are being constructed in Marathon and on Stock Island.

Wastewater Treatment. There is one WWTF currently under construction on Plantation Key which will service the North Plantation Key service area, but otherwise no centralized wastewater treatment system or facility provides uniform service to the Village of Islamorada service area. Systems currently operating in the Keys are administered by municipal governments or private developments. With the exception of the area to be serviced by the new

WWTF in the North Plantation Key service area, development in the Village of Islamorada service area is served by private systems.

The four basic methods for wastewater management and treatment presently used in the Keys include cesspools, septic tanks, ATUs, and OWNRS. These methods were described in detail in the PEIS (Section 3.15).

At the time a development permit is issued, adequate sanitary wastewater treatment and disposal facilities, including WWTFs and on-site sewage treatment and disposal systems (OSTDS), must be available to support the development at the adopted LOS, concurrent with the impacts of the development (Monroe County 1997b). The Monroe County Comprehensive Plan includes provisions for eliminating cesspools and improving failing septic systems and package treatment facilities (Monroe County 1997b). The Village of Islamorada has adopted these Monroe County Codes (Village of Islamorada Comprehensive Plan 2001).

3.16 Hazardous Materials and Domestic Waste

In August 2005, PBS&J conducted desktop surveys to assess the potential for past or present hazardous materials and waste storage and handling activities on and in the vicinity of the three proposed Village of Islamorada WWTF construction sites. The purpose of these surveys was to identify potential environmental hazards associated with each of the subject properties due to present or past activities at each site and its vicinity. The desktop surveys to assess the potential for past or present hazardous materials and waste storage and handling activities are based on the following information:

- Topographic maps
- Historical aerial photographs
- Site photographs, taken from the perimeter of each site
- Regulatory agency file searches, including federal and state records and lists

Summaries of the desktop surveys are included in this section; more detailed analyses are included as Appendix B.

It is important to note that a site reconnaissance of these properties has not been conducted at this time. Prior to construction of the proposed WWTFs, a full Phase I Environmental Site Assessment will be performed on the properties.

Prior to construction, a full Phase I Environmental Site Assessment will be performed for each of the three proposed WWTF properties.

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Plantation Key Site

A hazardous materials and waste storage and handling survey was conducted for the Plantation Key Site, located west of US-1 at MM 89.8 on Plantation Key, Monroe County, Florida. According to the Monroe County Property Appraiser's Office (MCPA), the property is privately owned. The site is heavily vegetated and unimproved. The existing Plantation Key

Colony/North Plantation WWTP property is located immediately adjacent to the south-southeast of the subject property. The adjacent property north of the Site is occupied by a residential street, followed by vacant, vegetated land and single family residences. The adjacent property east of this site is occupied by US-1, followed by a parking area, S.R. 4A, and a high school. The property adjacent to the west of this site is occupied by a residential street, followed by vacant, vegetated land and single family residences.

Though no site reconnaissance was conducted, photographs of the site were taken from the periphery of the property. Based on the 2003 aerial photograph and site photographs, the Plantation Key Site is heavily vegetated, unimproved property. No structures, roads, utilities, or issues of concern were observed on this site.

Based upon a review of available information, including topographic maps, historical aerial photographs, site photographs, regulatory agency file searches, and previous environmental reports, there do not appear to be any environmental concerns associated with the Plantation Key Site.

Windley Key Site

A hazardous materials and waste storage and handling survey was conducted for the Windley Key Site, located between US-1 and Old S.R. 4A, south of MM 85 on Windley Key, Monroe County, Florida. According to the MCPA, the property is privately owned. Though no site reconnaissance was conducted, photographs of the site were taken from the periphery of the property. Based on the 2003 aerial photograph and site photographs, a one-story building, its associated parking area, and boat and/or vehicle storage are located in the central portion of the Windley Key Site. The eastern portion of the site appears to be grassy vegetation with a billboard and a footpath. Boat and vehicle storage are shown along the southern and western portions of the site. The boat storage was observed on open ground along the southern boundary of the site and a temporary trailer and parked vehicles were observed on open ground along the western portions of the site. The adjacent property north of the site consists of US-1, followed by undeveloped, vegetated land. The intersection of US-1 and Old S.R. 4A lies east of the site. Old S.R. 4A lies south of the site, followed by residential homes and a recreational vehicle park. The property adjacent to the west of the site is vegetated, undeveloped land and the "Theater of the Sea" facility.

Based upon a review of available information, including topographic maps, historical aerial photographs, site photographs, and regulatory agency file searches, environmental concerns have been identified in association with the Windley Key Site. Specifically, the nature of the business currently taking place on the property, Michael's Maintenance and Appliances Service, is unknown and could potentially be cause for environmental concern. This facility was not identified in the EDR report. Additionally, the long-term storage of boats, vehicles, and trailers poses a potential environmental concern. Therefore, prior to construction of the proposed WWTF, a full Phase I Assessment must be performed on the property and potential soil and groundwater testing may be required.

Lower Matecumbe Key Site

A hazardous materials and waste storage and handling survey was conducted for the Lower Matecumbe Key Site, located north of US-1 and north of MM 74 on Lower Matecumbe Key, Monroe County, Florida. According to the MCPA, the property is privately owned. The Lower Matecumbe Site is comprised of undeveloped, vegetated land. The adjacent property north of the site consists of a residential street, followed by a marina and residential homes. The adjacent property east of the site consists of a residential street, followed by cleared land with vehicle parking and a marina. A real estate building is located adjacent to the southeast of the property. US-1, followed by undeveloped land occupied the property south of the site. The property adjacent to the west of the site is occupied by a gasoline service station and vacant, undeveloped property with vehicle parking and materials storage, followed by a residential street and undeveloped land.

Though no site reconnaissance was conducted, photographs of the site were taken from the periphery of the property. Based on the 2003 aerial photograph and site photographs, the Lower Matecumbe Key Site consists of undeveloped, vegetated land. There are no permanent structures, roads, or utilities on the site. Based on a review of the site photographs, an abandoned shed and boat were observed on the northern portion of the site, a cellular tower is located on the parcel adjacent to the northwest corner of the site, and a small, abandoned boat fueling facility (aboveground storage tank and fuel pump) is located north of site, on the north side of Lake View Drive adjacent to the marina.

Based upon a review of available information, including topographic maps, historical aerial photographs, site photographs, and the regulatory agency file searches, environmental concerns have been identified in association with the Lower Matecumbe Key Site. Specifically, the gasoline station located on the property adjacent to the west of the site presents a potential for the presence of groundwater contamination. This gasoline station did not appear in the regulatory agency database search. In addition, there is an abandoned boat fueling facility located north of the subject property, adjacent to the marina. Therefore, prior to construction of the proposed WWTF, a complete Phase I Environmental Site Assessment must be performed on the property and potential groundwater testing may be required.

It should be noted that Monroe County collects solid wastes at three locations: Key Largo, Cudjoe Key and Long Key. Waste material is collected at these locations by four private contractors and then separated and either shipped to a landfill in Broward County, or recycled. Household hazardous wastes are collected at these three locations and handled separately. Hazardous wastes from commercial, institutional, and industrial facilities in the Keys are collected at the generation site and disposed of according to stringent regulations regarding the specific material. Treated wastewater sludge materials are not considered hazardous wastes. Adequate collection, disposal, and resource recovery for solid waste is essential for future developments. No building permits will be issued unless adequate solid waste collection and disposal facilities needed to support the development are available concurrent with the impacts of the development.

4.0 Environmental Consequences

This portion of the Final EA presents an analysis of the environmental consequences anticipated as a result of implementing the alternatives described in *Chapter 2, Description of Alternatives*. The comparative analysis focuses on issues identified as concerns during initial scoping meetings and communications with regulatory agencies and stakeholders. A summary matrix of the alternatives analysis is presented in Table 4-1. The three project alternatives under consideration are briefly outlined below.

- ***Alternative 1: No Action.*** No state or federal agency would provide funding to the Village of Islamorada for implementation of wastewater treatment improvement projects that would address state mandates to meet 2010 Statutory Treatment Standards. Public entities would not construct or operate WWTFs. Islamorada residents, communities, and businesses would be responsible for addressing state mandates aimed at improving water quality in the Sanctuary.
- ***Alternative 2: Proposed Action.*** Provide federal financial and technical assistance from the Corps, as part of the FKWQIP, to develop and implement regional wastewater collection and treatment systems for the Village of Islamorada service area that would address mandatory state wastewater treatment standards.
- ***Alternative 3: Pursue other Sources of Funding for Project Implementation.*** In the absence of federal funding from the Corps, alternative funding sources would be pursued to implement projects for the Village of Islamorada service area that would address state mandates and improve water quality in the Sanctuary. Sources of monies may include other state and federal funding mechanisms.

The vast majority of potential environmental impacts associated with the FKWQIP are beneficial and consistent with the intent of the program.

Like most of the Keys, residents in the Village of Islamorada and associated service area rely primarily on septic tanks and cesspools, resulting in little or no treatment of wastewater that ultimately flows to adjacent nearshore waters. There were 59 package plants in the Village of Islamorada service area in 2004, with a total permitted capacity of 0.91 MGD, and an average daily flow of 0.44 MGD (IWMMP Draft Plan 2005). The remainder of the areas has on-site treatment systems such as septic tanks or cesspools. Continuing research has identified these discharges as major contributors to declining water quality in the canals and nearshore waters in the Keys and Sanctuary.

Application of the Florida Keys Carrying Capacity Study (Corps 2002). Importantly, the Corps' model provided a means of quantifying the affects of wastewater improvement projects, specifically the reductions in nutrient loads, in the Village of Islamorada service area. To apply the KFCCS specifically for FKWQIP projects, an independent contractor from the team who originally developed the FKCCS model coordinated with and assisted the South Florida Regional Planning Council in running the model specifically for this project.

The goal of the FKCCS is to "determine the ability of the Keys ecosystem, and the various segments thereof, to withstand all impacts of additional land development activities." The study focused on establishing relationships between land development activities and carrying capacity indicators and used these relationships to model impacts to terrestrial and marine ecosystems and species, human infrastructure, socioeconomics, fiscal conditions, and water resources. Results were integrated into a spatially explicit automated computer model that then characterized current conditions as a baseline scenario as well as six additional scenarios with varying levels of development and a scenario with the wastewater master plan implemented.

The Alternatives. Implementation of the *No Action* alternative is expected to result in continued adverse impacts to, and the persistence of, existing conditions described in *Chapter 3, Affected Environment*, due to discharges from septic systems (including substandard systems) and cesspools in the service area. The *Proposed Action* and *Alternative Funding Sources* alternatives, call for new WWTFs and associated infrastructure for the Village of Islamorada service area, but vary due to availability of funding and entities that would implement projects. The vast majority of benefits under both alternatives are positive, consistent with the intent of the FKWQIP and other federal, state, and local initiatives to improve water quality in the nearshore waters of the Keys and the Sanctuary.

The Corps' FKCCS provided a means of quantifying the affects of wastewater improvement projects, specifically the reductions in nutrient loads, in the Islamorada service area.

Under the *Proposed Action*, federal financial and technical assistance would be provided to construct three regional WWTFs that would improve wastewater treatment in the Village of Islamorada service area and address state mandates to improve water quality in the Sanctuary. Under the *Proposed Action*, discharges to soils and nearshore waters from septic systems (including substandard septic systems), and cesspools in the service area would be eliminated and TN, TP, and TSS loads would be subsequently reduced by 89, 75, and 80 percent, respectively.

In contrast, under *Alternative Funding Sources*, Village of Islamorada residents and businesses would pursue alternate funding options for wastewater treatment improvements and implement projects as funding becomes available. Although long-term benefits under *Alternative Funding Sources* are the same as those described for the *Proposed Action*, the absence of Corps funding may delay the implementation of projects, impede the integration of individual wastewater components, and decrease cost affectiveness. Potential adverse impacts due to implementation of the *Proposed Action* are relatively minor and are related to environmental justice and protected species and associated habitat.

Potential Issues of Concern. Potential issues addressed in this Final EA include environmental justice and protected species and associated habitat. Approximately seven percent of the population of the Village of Islamorada was living below the poverty level in 2000, and the proportion of residents over the age of 65 is approximately the same as that of the county and state (14.7 percent and 17.6 percent, respectively). Consequently, the capital costs and monthly

service fees for wastewater treatment improvements may be disproportionately large for this group and may require mitigation.

Any action by the Village of Islamorada that results in the loss of natural areas is likely to impact protected species due to the few remaining natural areas in the Keys. Protected species that occur or may occur in the service area, associated habitats, and regulatory framework affecting these species, are addressed in this Final EA. Although formal consultation has not occurred, one component of this project (Plantation Key) is adjacent to a wastewater improvement project for which consultation with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Services (NOAA Fisheries) was previously initiated due to FEMA funding (Plantation Key). Three state-listed species (Florida thatch palm, West Indian Mahogany, and barbed-wire cactus) were identified on the proposed FEMA sites. Based on the information provided to USFWS, including proposed mitigation measures, the USFWS concurred with the "not likely to adversely affect" finding.

Table 4-1
Comparison of Environmental Consequences for Village of Islamorada Wastewater Improvement Alternatives

Alternative		Alternative 1 *No Action*	Alternative 2 *Proposed Action*	Alternative 3 *Alternative Funding Sources*
Issue		No implementation of wastewater improvements in the Keys. Pollutant inputs to the Sanctuary would continue.	Integrated, centrally managed, cost affective implementation of area-wide storm and wastewater improvement projects in the Keys. Pollutant inputs to the Sanctuary would be reduced and water quality improved.	Pursue other funding to implement water quality improvements. Projects would be smaller and fragmented in terms of time (2-3 years) and area. Improvements may occur more slowly.
Physical Environment				
Soils		Continued adverse impacts of contamination of soils due to inputs from untreated wastewater.	Reduced wastewater surface discharges and commensurate reduction in pollutants entering soils. Small increase in impervious surfaces.	Delayed and smaller reductions in pollutant inputs into soils may be anticipated.
Aquifers	Biscayne	Continued contamination due to disposal and seepage of untreated wastewater.	No impacts anticipated from shallow well injection of effluent disposal. Centralized WWTF will expedite the removal of cesspools and associated pollutants in hot spots in the Keys.	Similar to the *Proposed Action* except benefits could be delayed and/or reduced due to fragmented implementation process.
	Floridan	No adverse impacts due to confined nature of this aquifer.		
Water Resources		Continued alterations to flow regimes due to wastewater discharges into surface waters.	Improved flow regimes due to decrease in runoff and discharge volumes entering nearshore waters and canals.	Similar to the *Proposed Action* except that altered flows may continue until implementation is complete.
Water Quality	Nearshore Waters, Canals	Continued water quality degradation due to nutrient inputs from untreated wastewater.	No adverse impacts anticipated. Benefits include decreased waste and discharges and improved AWT would reduce nutrient discharges.	Continued degradation of water quality until funding is obtained to implement priority projects.

Table 4-1
Comparison of Environmental Consequences for Village of Islamorada Wastewater Improvement Alternatives

Alternative		Alternative 1 *No Action*	Alternative 2 *Proposed Action*	Alternative 3 *Alternative Funding Sources*
	Centralized Sewer	Elimination of cesspools and associated nutrient and contaminants. Cesspool elimination will progress slowly.	Expedited removal of cesspools and associated pollutants in pollutant hot spots throughout the Keys.	Treatment will be less affective due to fragmented approach to implementation and delayed construction.
	Effluent Disposal	Effluent disposal practices will essentially remain the same.	WWTFs would have shallow well injection of treated water, reducing untreated effluent discharged to the Sanctuary. Disinfection would reduce bacteria concerns.	Fewer and smaller WWTFs without central management, potentially greater reliance on injection wells.
Air Quality		Continued odors associated with existing or new treatment facilities, cesspools and septic tanks.	Temporary, minor adverse impacts due to construction, primarily industrial areas. Air permit required for sludge incinerator or auxiliary generator operating > 25 percent of time.	Reduced impacts due to fewer WWTFs. Remaining cesspools, septic tanks, and odors would be less when compared with the *Proposed Action.*
Biological Environment				
Habitats, Fish and Wildlife Resources		Continued pollutant inputs may alter soils and habitat and adversely impact vegetation and wildlife, through toxins and bioaccumulation and food chain transfer. Phosphorus additions may benefit mangrove.	Potential adverse impacts to 0.35 acres of hammock. Avoidance, minimization, and mitigation will result in no significant adverse impacts to protected species' habitat. Net environmental benefits to seagrasses and corals due to fewer algal blooms, improved water clarity and light penetration.	Conditions for Alternative 1 would continue until projects are implemented. Delays and smaller scale projects anticipated under this alternative may result in similar, but less expansive benefits, when compared with those for the *Proposed Action.*
Protected Species		Potential adverse impacts due to continued habitat degradation related to cesspools and septic tanks, and subsequent nutrient and other pollutant inputs into nearshore coastal waters.	Minimal adverse impacts due to facilities siting. Section 7 USFWS consultation and review by FFWCC for state protected species is on-going.	Potential adverse affects as described under *No Action* would continue until water quality improvement projects are implemented.
Essential Fish Habitat		Adverse impacts due to continued pollutant discharges into canals and nearshore waters.	Anticipated reductions in nutrient loadings and discharge volumes and improved nearshore habitats, directly benefiting EFH. NMFS supports development of AWT. Impacts due to SGD unknown.	Potential adverse impacts as described under *No Action*, until projects are implemented.
Coastal Barrier Resources		Continued pollutant inputs and water quality degradation would adversely impact benthics, corals, and seagrasses.	No adverse impacts anticipated. Benefits include improved water quality and improvements in associated benthic, coral, and seagrass habitats.	Continued nearshore water quality degradation as described under *No Action* until project implementation.
Human Environment				

Table 4-1
Comparison of Environmental Consequences for Village of Islamorada Wastewater Improvement Alternatives

Alternative	Alternative 1 *No Action*	Alternative 2 *Proposed Action*	Alternative 3 *Alternative Funding Sources*
Cultural Resources	No impacts to unidentified cultural resources are anticipated.	No documented occurrences of archaeological or historic sites on the proposed WWTF sites. Potential impacts to buried, undocumented resources. SHPO coordination and compliance with NHPA Section 106 is on-going and will be completed upon purchase of proposed sites.	Potential impacts to buried, undocumented, archaeological and historical resources. SHPO coordination and compliance with NHPA Section 106 is on-going and will be completed upon purchase of proposed sites.
Demographics	Constrained growth in land development and population.	Modest growth in development and population anticipated. Moderate growth expected for wastewater improvements for current residents as well.	Constrained growth in land development and population.
Environmental Justice	Residents may be responsible for WWTF project costs. Potential impacts to the number of residents > 65 on a fixed income.	Corps funding would alleviate some costs for implementing WWTF projects, although additional costs of infrastructure would be greater for residents >65 on a fixed income.	Similar to the *No Action* alternative if alternative funding sources not obtained. Once alternate funding sources are available, impacts would be similar to those under the *Proposed Action.*
Tourism	Beach health advisories due to poor water quality would continue, adversely affecting immediate recreational and tourist opportunities.	Improved water quality, fewer beach advisories and closings, and increased opportunities for saltwater-based recreation. Temporary transportation delays due to construction activities.	Some growth in tourism due to improved nearshore water quality could be expected, however, at a slower rate as compared with the *Proposed Action.*
Wastewater Management Costs	Existing wastewater management costs will remain the same.	Increased utility service costs due to connection charges and monthly fees, particularly for low-income households. Potential mitigation would include low-cost financing and subsidies.	Cost of wastewater management would increase at a slower pace as compared with the *Proposed Action*.
Public Health	Potential decrease in public health due to higher levels of bacteria.	Reduced incidences of water borne disease, health advisories, and beach closings related to wastewater discharges.	Similar to the *Proposed Action*, except beach health advisories and closings would continue until project implementation.
Infrastructure	No impacts to transportation or utilities and services would occur.	Minor, temporary impacts to traffic and utilities and services could occur during construction of WWTFs and associated infrastructure.	Impacts would be similar to those under the Proposed Action, but impacts would be staggered (construction activities would occur at a slower pace).
Land Use and Planning	No impacts anticipated. Future land use would be delayed or limited to developments with approved on-site wastewater facilities.	No adverse impacts due to compatibility with land use designations. Future development would proceed per BPAS/ROGO and Islamorada Comprehensive Plan.	Impacts of *Alternative Funding Sources* on land use would be similar to those of the Proposed Action, occurring more slowly and possibly at a lower level.
Regulatory	Florida Statutory Treatment Standards of 2010 would not be met.	Florida Statutory Treatment Standards mandated for 2010 compliance would likely be met.	Difficult for County to meet the treatment standards mandated by Florida Statute.

4.1 Climate

Climate is a regional environmental characteristic and would not be affected by the proposed Village of Islamorada WWTFs and associated infrastructure. Climate was discussed in Chapter 3, Affected Environment to describe the environmental setting for the service area and seasonal rainfall patterns.

4.2 Topography, Geology, and Soils

Topography and geology would not be affected by the project alternatives. Potential impacts to soils are important in the Keys due to the relative absence of topsoil and seepage of untreated wastewater into the limited amount of topsoils in the Keys and the Village of Islamorada service area would be minor.

4.2.1 Alternative 1 (*No Action*)

Impacts to geology and soils under the *No Action* alternative would continue as described under *Chapter 3, Affected Environment*. Existing wastewater and associated seepage from cesspools and septic tanks in the Village of Islamorada service area would continue to elevate soil nutrient levels. Under the *No Action* alternative, the transport of accumulated soil contaminants such as heavy metals, polychlorinated biphenyls (PCBs), pesticides, and herbicides in surface water runoff to marine, estuarine, and freshwater environments would continue and may be long-term.

Sinkhole formation is infrequent in south Florida as a result of the relative absence of soil and overlying sediments, compared with mainland areas with 50 to 100 feet of overlying soils, in addition to declining water tables. Sinkholes occur when underlying limestone is dissolved by acidic rainfall moving through soil, especially along the fractures and weak layers. A cavity forms and subsequently collapses under the weight of the overlying soils. Water also exerts hydrostatic pressure on the clay layers that separate the shallow surficial aquifer from the deeper Floridan aquifer and supports the limestone matrix. The direct connection of the aquifer to, and interaction with, the marine environment via the porous limestone in the Keys makes the water source non-potable and maintains the hydrostatic pressure.

4.2.2 Alternative 2 (*Proposed Action*)

Under the *Proposed Action*, the proposed WWTFs and associated collection, treatment, and disposal facilities would be constructed and discharges from cesspools and septic systems into soils, and subsequently into wetlands and nearshore waters, would decrease or be eliminated. Consequently, water quality in the service area and in the Sanctuary would be improved.

Under the *Proposed Action*, soils would be disturbed during construction and other activities associated with the proposed WWTFs in the Village of Islamorada service area. The Pennekamp gravelly muck that dominates the Plantation Key WWTF site is a well-drained soil typical of tropical hammocks in the Upper Keys. Clean, suitable fill would be applied to the WWTF site and excavation of soils in ROWs would be required to install sewer mains, vacuum pits, buffer tanks, gravity service laterals, and lift stations. Excavated material would be used for backfill and remaining material would be transported to an appropriate offsite disposal facility.

The Udorthents-Urban Land soils complex that dominates the proposed WWTF site on Lower Matecumbe Key is gravelly sand and limestone typically used as fill on constructed lands and does not generally support vegetation. Clean, suitable fill would be applied to the WWTF site and excavation of soils in ROWs would be required to install sewer mains, vacuum pits, buffer tanks, gravity service laterals, and lift stations. Excavated material would be used for backfill and remaining material would be transported to an appropriate offsite disposal facility.

The WWTF site on Windley Key is characterized by Matecumbe mucky soils. These mucks are generally less than 15 absl and subject to occasional flooding. Due to their excessive amounts of humic soils and depth to bedrock, in general these areas are not suitable for development of residential, recreational and sanitary facilities. For the WWTF clean, suitable fill would be applied and excavation of soils in ROWs would be required to install sewer mains, vacuum pits, buffer tanks, gravity service laterals, and lift stations. Excavated material would be used for backfill and remaining material would be transported to an appropriate offsite disposal facility.

Increases in impervious surface would occur commensurate with the construction of WWTFs. Soil disturbance would be temporary and standard construction BMPs for erosion and sedimentation control would decrease the potential for long-term surface soil erosion. Cumulative increases in impervious surface would be regulated by growth ordinances and comprehensive plans. Effluent injected into the porous limestone substrate becomes part of the fluid component of the aquifer and, in south Florida, is hydraulically connected to the marine environment. However unlikely, frequent fluxes in effluent discharges to shallow wells where fractures are present and wells are poorly constructed could result in sinkhole collapse.
Adverse impacts to groundwater from or geology are not anticipated. The design capacity of the three proposed WWTFs is less than 1.0 MGD; therefore, deep well injection is not required. Effluent will be disposed of through shallow well injection. Disinfection is not required for deep well injection, but is part of the proposed WWTF and would protect groundwater resources.

The applicant is responsible for obtaining all applicable FDEP permits for injection wells (Table 4-2). Shallow injection wells are governed by Chapter 62-528 F.A.C. and would meet Class V construction standards.

Table 4-2
Applicable FDEP Permits for Disposal Well Construction

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)

4.2.3 Alternative 3 (*Alternative Funding Sources*)

Affects on the soils under this alternative would be similar to those described under the *No Action* alternative until the Village of Islamorada acquires sufficient alternative funding sources to implement the proposed WWTF systems. The delay would result in continued water quality

impacts, as described under the *No Action* alternative. Once the proposed wastewater project is implemented, the affects would be similar to those described under the *Proposed Action*.

4.3 Water Resources

The proposed WWTF project for the Village of Islamorada would improve water quality in wetlands, groundwater, and nearshore waters of the service area and the Sanctuary by reducing or eliminating nutrient inputs and bacteria from inadequately and untreated wastewater. No adverse impacts to potable water supplies are anticipated with respect to the proposed project due to AWT for nutrient reduction and additional disinfection of effluent. Potential impacts to water resources under the *No Action* alternative are the same as those described in detail in *Chapter 3, Affected Environment* and the PEIS (Section 4.3).

4.4 Water Quality

Water quality improvements in the Sanctuary are the primary objective of the Village of Islamorada wastewater improvement project specifically and the FKWQIP in general. Importantly, any of the proposed projects, whether shallow well or deep well injection disposal is applied, will decrease the nutrients discharged into the environment once implemented. This section makes a clear distinction between the environmental consequences of the *No Action* alternative (continued reliance on septic tanks and cesspools and inadequate wastewater treatment) and the benefits of implementing the proposed WWTF systems in the Village of Islamorada service area. The *Proposed Action* would eliminate the most significant sources of nearshore contamination.

4.4.1 Alternative 1 (No Action)

Under the *No Action* alternative, the residents of the Village of Islamorada service area would continue to rely on individual treatment systems (septic tanks and cesspools) and privately owned cluster or package treatment facilities, as described under *Chapter 3, Affected Environment*. Individual property owners and businesses would be responsible for meeting the water treatment standards prescribed by county ordinance or state regulation.

Ground Water Quality. Under the *No Action* alternative, continued adverse impacts to the shallow waters of the Biscayne Aquifer due to existing wastewater practices are anticipated. Seepage from cesspools and septic tanks would continue to elevate nutrient levels and negatively impact the water quality of the canals and nearshore waters of the service area and surrounding Sanctuary. Effluent disposal through shallow well injection into the underlying aquifers would continue. As a result, compliance with 2010 water quality mandates would be unlikely.

Inland Waters, Nearshore, and Offshore Water Quality. Under the *No Action* alternative, continued adverse impacts to nearshore water quality are anticipated as a result of existing inadequate wastewater practices and subsequent SGD into canals and nearshore waters. The affects of continued nutrient inputs to the nearshore system may extend to offshore areas (Kruczynski and McManus 2002) and can only exacerbate historic problems related to coral reef health in the Sanctuary.

Under the No Action alternative, the affects of continued nutrient inputs to the nearshore system may extend to offshore areas (Kruczynski and McManus 2002) and can only exacerbate historic problems related to coral reef health in the Sanctuary.

4.4.2 Alternative 2 (*Proposed Action*)

Under the *Proposed Action*, the proposed WWTFs and associated infrastructure would be constructed and discharges from cesspools and septic systems would be reduced or eliminated, resulting in improvements in water quality in the Sanctuary. Impacts to offshore water quality as a result of deep well or shallow well injection and the subsequent potential discharge of nutrients via SGD are possible. Importantly, any of the proposed projects, whether shallow well or deep well injection disposal is applied, will cumulatively decrease the nutrients discharged into the environment.

Ground Water Quality. Replacing existing cesspools and septic systems with WWTFs in the Village of Islamorada service area would allow residents and business to comply with Florida Statutory Treatment Standards and reduce the nutrient and contaminant loads seeping or discharged into the aquifer. Subsequent benefits would include improved water quality in canals and nearshore waters and a reduced potential for human health concerns. Improvements in water quality would be on the order of 85, 79, and 80 percent reductions in TN, TP, and TSS loadings, respectively (FKCCS 2004, Table 4-3) following implementation of the proposed WWTFs. Construction of the transmission system for the WWTFs would minimally and temporarily impact groundwater resources due to construction disturbances.

Improvements in water quality would be on the order of 85, 79, and 80 percent reductions in TN, TP, and TSS loadings, respectively, following implementation of the proposed WWTFs.

Table 4-3
Reductions in Wastewater Load (pounds/day) Under Existing and Proposed WWTF Conditions for the Village of Islamorada Service Area

Parameter	Current Conditions	Proposed Conditions	Percent Change
TN	208	30	85
TP	20	4	79
TSS	220	45	80
Flow (gpd)	1,213,790	1,214,207	<1

Since completion of the scoping process and issue of the final PEIS, concerns have been expressed regarding the disposal of treated wastewater effluent via deep well injection. The design capacity of each of the three proposed WWTFs is less than 1.0 MGD therefore deep well injection would not occur as part of this Village of Islamorada wastewater improvement project.

The disposal would be limited to shallow well injection, and no impacts to the Floridan Aquifer are anticipated. The effluent will be disinfected with chlorine prior to injection. Disinfection will eradicate any residual bacterial or viral strains in the effluent. Nutrient loadings into the system through injection will be significantly less than current loadings via untreated discharge from septic tanks and cesspits (85, 79, and 80 percent reductions in TN, TP, and TSS, respectively). Because potable water is supplied to Islamorada via pipeline from the mainland, no drinking water supplies will be injected.

Inland, Nearshore, and Offshore Water Quality. Improved water quality in the service area, particularly canals, would be expected under the *Proposed Action*. The environmental consequences to inland, nearshore, and offshore waters are closely related to those described above for groundwater because of the direct link between groundwater, canal, and nearshore waters. As described for groundwater, 85, 79, and 80 percent reductions in loadings of TN, TP, and TSS, respectively (FKCCS 2004), are anticipated. Affects of the WWTFs also include 100 percent reductions in TN, TP, and TSS to canals (FKCCS 2004). Parameters including length of flush time, localized hydrogeological characteristics, and affectiveness of limestone in removing phosphorus from injected effluent would affect the exact extent of anticipated improvements.

The proposed WWTFs would reduce nutrient loading, improve human health and welfare concerns in canals, meet federal and state regulatory water quality standards, and ultimately assist in protecting water quality in the Sanctuary. Nutrient and TSS reductions would reduce the potential for algal blooms, and water clarity and dissolved oxygen (DO) concentrations would improve, possibly improving the overall health of seagrass habitats of nearshore and offshore communities. Although implementation of the *Proposed Action* would not provide quantifiable improvements to the quality of offshore waters, the benefits would contribute to a healthier coral reef system due to improved water clarity and increased oligotrophic (nutrient poor) conditions necessary for a healthy coral reef system.

No wetlands would be disturbed for the construction of the proposed WWTFs. Undisturbed salt marsh and mangroves would remain intact and undisturbed. Erosion control BMPs would be employed during construction to reduce soil erosion and prevent discharge of sediments to nearshore waters. NPDES permits would be required from the FDEP to control treated effluent during operations.

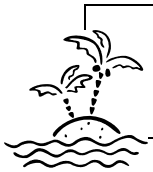
Potential impacts to offshore water quality as a result of deep well or shallow well injection and the subsequent potential discharge of nutrients via SGD are possible. Patterns of potential groundwater input into Florida Bay from shallow wells have been established using natural tracers of SGD (Burnett and Chanton 2000). A groundwater velocity estimate of approximately 1.9 cm day-1 was estimated for three sites and results suggest that the interactions between groundwater and surface water are greatest nearshore along the Florida Bay side of the Keys. Other studies of discharges from shallow injection wells indicate that the nutrients are taken up by seagrasses and phytoplankton before reaching the coral reefs.

4.4.3 Alternative 3 (*Alternative Funding Sources*)

Benefits under *Alternative Funding Sources* would be similar to those described under the *Proposed Action*, albeit with possible delays while the Village of Islamorada secures other funding sources. This time delay would affectively allow further water quality degradation, particularly of nearshore waters, increasing the cost and time to implement recovery. The delay in implementing water quality improvements may also reduce the likelihood of meeting 2010 treatment standards.

4.5 Ecological Habitats

Implementation of the *Proposed Action* (Alternative 2) and subsequent water quality improvements will reduce nutrient loadings and improve water quality in terrestrial and nearshore environments in the Keys. A total of 2.30 acres of upland habitat would be impacted from construction of the proposed WWTFs. The long-term benefits of this program would substantially offset any unavoidable impacts to habitat. Importantly, the *No Action* alternative will continue to adversely impact ecological habitats. Under *Alternative Funding Sources* (Alternative 3), water quality degradation will continue until alternate funding is available to implement the proposed wastewater treatment improvements.



Implementation of the Proposed Action (Alternative 2) and subsequent water quality improvements will reduce nutrient loadings and improve terrestrial and nearshore environments in the Keys.

✓	✓	✓		✓	

The habitat categories addressed here include upland, freshwater and estuarine wetlands, marine and benthic habitats, coral reefs, and floodplains. The importance of each of these habitats was discussed in detail in *Chapter 3, Affected Environment*. Potential environmental consequences of implementing the alternatives presented in this document are described in detail in this chapter.

There are no wetlands on the proposed WWTF sites, and no Corps 404 Permits or state Environmental Resource Permits (ERP) would be required. Relevant county regulations are addressed in this section.

4.5.1 Alternative 1 (*No Action*)

Upland Habitats. Under the *No Action* alternative, adverse impacts to upland habitats described in *Chapter 3, Affected Environment* would continue. Adverse impacts to the upland habitats within the Village of Islamorada service area (ridge/hammock and hammocks) would be limited to locations with direct upland discharges and seepage and increased nutrient levels would stimulate plant growth and lead to changes in plant species composition over time.

Estuarine and Freshwater Wetlands. Untreated wastewater from adjacent uplands would continue to flow or seep into mangroves, buttonwoods, salt marsh, freshwater hardwoods, and canals in the service area under this alternative. Elevated nutrient inputs from terrestrial runoff would initially enhance the growth (height and biomass) of mangroves (Lugo and Snedaker 1974), as discussed in Section 3.5.3 of the PEIS. However, nutrient rich conditions can also inhibit growth and resistance to infection in plants. Sediment from terrestrial runoff could lead to changes in estuarine wetlands elevations and subsequent shifts in species composition, including replacement of salt marsh by upland invasive native and non-native plants. Changes in vegetation composition would directly affect wildlife habitat and use. For example, increased nutrient loading from groundwater and commensurate increases in macroalgal growth have been shown to decrease eelgrass cover and impact benthic fauna composition in Waquoit Bay, Massachusetts (Valiela *et al.* 1992).

Freshwater hardwoods would continue to experience indirect impacts such as altered hydrology, increased pollutant loading, and/or altered natural vegetation, resulting from continued wastewater discharges in the service area. As described in Section 3.5.3 of the PEIS, increased nutrients and toxins would likely adversely affect freshwater wetland vegetation and could lead to bioaccumulation and biomagnification of toxins in aquatic and marine organisms. Elevated nutrient levels could be exploited by opportunistic species and species composition may shift. Sedimentation from terrestrial runoff could potentially change the elevation of freshwater wetlands and possibly displace or shift the species composition.

Marine and Benthic Habitats. Marine and benthic habitats in the service area include seagrass beds, hardbottom communities, and bare substrate. These communities are sensitive, complex ecosystems influenced by many different sources. Under the *No Action* alternative, continued adverse impacts to marine habitats, including seagrasses, are anticipated as a result of continued wastewater practices in the service area. Nutrients that are transported from cesspools and septic tanks to nearshore waters in the service area would increase existing nutrient levels and subsequently adversely affect water quality in the nearshore waters of the Sanctuary.

Changes in water temperature, pH, and clarity affect the health and survival of marine and benthic communities. With respect to the proposed wastewater improvements, adverse impacts to benthic and marine habitats would occur as a result of land-based activities and changes in water quality through discharges to inland and nearshore waters. While direct impacts of diver contact, overfishing, or boating contribute to the decline of seagrasses, indirect impacts, such as nutrification of local waters, result in the increased growth of algae and subsequent shading and gradual decline of seagrass beds.

As described in Section 4.5.1 of the PEIS, elevated nutrient levels can lead to algal blooms which in turn reduce water clarity, decrease light penetration, and potentially result in hypoxic (low oxygen) or anoxic (oxygen depleted) conditions in shallow, poorly flushed locations. These conditions would adversely affect light-dependent organisms such as seagrasses, and can result in adverse impacts such as fish kills and species shifts. In addition, the release of contaminants and pathogens from wastewater can result in pollutant bioaccumulation and biomagnification in the food chain, affecting human heath and safety concerns.

The impact to marine habitats as a result of the lack of adequate wastewater treatment in the Keys has not been and may never be quantified. However, water quality degradation in the nearshore waters and the substantial decline of these habitats are well documented. For the most part, impacts to the marine habitats as a result of the implementation of the proposed project would be highly beneficial, indirect, and long-term.

Coral Reefs. As discussed in Section 3.5.5, no coral reefs were identified within the 1,500-foot buffer zone surrounding the service area. However, coral reefs are located within the Sanctuary and will be affected by this FKWQIP project. Under the *No Action* alternative, continued adverse impacts to nearshore waters in which coral reefs occur are anticipated as a result of nearshore water quality degradation associated with nutrients from untreated wastewater. Corals typically thrive in marine environments where oligotrophic (nutrient poor) conditions include clear waters and low turbidity. Excess nutrients, whether from natural or anthropogenic sources, may negatively impact marine and coral reef ecosystems in several ways. Consequently, coral reefs would be adversely affected by continued nutrient loading to nearshore waters of the Sanctuary caused by continued use of septic tanks and cesspools for wastewater treatment in the service area.

Excess nutrients in the water column can increase the growth of phytoplankton and result in algal blooms that reduce water clarity, decrease light penetration, and decrease seagrass and coral growth. Additionally, high nutrient concentrations tend to favor the growth of non-symbiotic mat-forming macroalgae that are not symbionts with the coral and will shade the coral, eliminating the ability of the zooanthellae to photosynthesize, causing bleaching and eventual death of corals.

Floodplains. Continued adverse impacts to habitats in floodplains (as described above) as a result of inadequately treated wastewater are anticipated under the *No Action* alternative. Without the implementation of the Village of Islamorada WWTF and associated infrastructure, water quality degradation in the habitats described above would continue. In addition, EO 11988 and 11990 would not apply under this alternative and compliance with wastewater system designs with Monroe County Floodplain Ordinance would be required to protect the 100-year flood plain.

4.5.2 Alternative 2 (*Proposed Action*)

Upland Habitats. Vacant lands are scarce in the Keys and potential sites for WWTFs may include sensitive or critical habitat for protected species (see Section 4.6). In addition, sewer collection systems may cross sensitive natural lands. Three proposed WWTFs would be constructed: Plantation Key Site, Windley Key Site, and Lower Matecumbe Key Site. The Plantation Key Site consists of a 0.56-acre parcel, located adjacent to a WWTF under construction on the Florida Bay side of US-1, in the vicinity of MM 90. The Windley Key Site consists of a 0.80-acre parcel, located between US-1 and Old SR 4A in the vicinity of MM 85. The Lowe Matecumbe Key Site consists of a 0.94-acre parcel, located on the Florida Bay side of US-1, in the vicinity of MM 74 (Figure 1-1).

All three proposed sites are comprised entirely of upland habitat. Of the three sites, only the Plantation Key Site contains upland habitat other than developed land (Table 4-4). The Plantation Key Site is occupied by 0.35 acres of hammock habitat (62.5 percent) and 0.21 acres of developed land (37.5 percent). Hardwood hammocks are protected under the Village of Islamorada's Land Development Regulations (Section 30-1611-17). The Village of Islamorada requires that a habitat analysis be submitted for lands containing hardwood hammocks (Section 30-1613). Based on the size of the hammock (0.35 acres) and the surrounding land use, the hammock habitat on the Plantation Key Site is likely low quality hammock. Any native vegetation that is removed for the proposed development must be replaced, mitigated, or restored. In addition, any species listed as endangered, threatened, or regionally important must be replaced at a minimum ratio of 1:1 of similar size and maturity.

Based upon scientific literature the Village of Islamorada would mitigate for up to 100 native hardwood trees. A habitat analysis and specific native hardwood re-vegetation plan would be implemented pursuant to Monroe County and Village of Islamorada requirements once the property is purchased by the Village. Mitigation for hardwood hammock plant species is anticipated to be completed within 30 days of completion of the facility construction.

No wetlands occur on any of the proposed three sites for development, consequently no wetlands mitigation will be required.

Table 4-4
Upland Habitats Located on the Proposed WWTF Sites

Site	Total Site Acreage	Upland Habitat	Upland Acreage	Percent
Plantation Key	0.56	Hammocks	0.35	62.5%
		Developed Land	0.21	37.5%
Windley Key	0.80	Developed Land	0.80	100%
Lower Matecumbe Key	0.94	Developed Land	0.94	100%

Prior to construction on the Plantation Key site, the Village of Islamorada requires a habitat analysis of the 0.35 acres of hammock be conduted. Due to its size, the hammock on the site is likely low quality. The Village of Islamorada open space requirements include replacement at a 1:1 ratio, transplanting, and/or mitigation for endangered, threatened, and regionally important plant species removed. Plantings will include wild lime and torchwood, which are food sources for the federally listed Schaus swallowtail butterfly.

Implementation of the proposed WWTFs and associated infrastructure would decrease or eliminate the seepage of nutrients and contaminants from cesspools and septic systems. In addition, a reduction in the seepage of nutrients and contaminants to the Sanctuary would improve water quality.

Under this alternative, minimal adverse impacts to upland communities are anticipated due to construction activities associated with the new WWTFs and associated infrastructure. The proposed WWTFs will impact 1.95 acres of developed lands and 0.35 acres of hammock habitat.

As described in the PEIS (Section 4.2.1.2*)*, the USFWS recommended that project applicants avoid certain habitat types during the siting of wastewater improvements. These habitat types include tropical hardwood hammock, pine rocklands, buttonwood grasslands, and freshwater marshes. Of the upland habitat types in this list, only hammocks occur in the service area. As mentioned above, the proposed WWTFs would impact 0.35 acres of low quality hammock habitat, at the Plantation Key site. Based on this acreage, the proposed impact to hammocks from construction of the WWTF should not be the considered a "significant area of tropical hardwood hammock." Thus, this project abides by the USFWS recommendation for wastewater improvement sitings, and impacts to important vegetation habitats have been minimized.

The FFWCC Integrated Wildlife Habitat Ranking System (System) was developed by the FFWCC Office of Environmental Services (FFWCC 2002a) and the analysis was applied as part of the PEIS. The System ranks habitat areas important to a broad array of wildlife species, including many protected and/or rare mammals, birds, amphibians, and reptiles. Corresponding habitat values are based on a composite score of several variables, including, but not limited to, land cover, protected species occurrences/habitat, (SHCAs and species richness (Endries *et al.* 2001). The System is intended to assist in long-range planning efforts by targeting sensitive or rare habitats. Ranks of one (lower value) to ten (higher value) would be assigned to each land cover class represented in the service area.

The vast majority of the service area has a low habitat value (value of four or lower based on the System). The remainder of the service area was assigned a value of five through eight. Habitat values of five through seven are found in northern and southern Plantation Key and southern Upper Matecumbe Key. One small patch of land with a habitat value of eight is found in northern Lower Matecumbe Key. All three of the proposed WWTF sites are located in areas with a low habitat value (value of two). Thus, the proposed project should not adversely impact high quality habitat in the service area. Adverse impacts from the associated wastewater infrastructure will be avoided and/or minimized as the improvements will be located within existing ROW corridors. In addition to mapping data, model output from the FKCCS (2004) indicates no direct impacts to habitat, i.e. habitat loss, in the upper Keys (Islamorada) as a result of implementing planned wastewater improvements.

Estuarine and Freshwater Wetland Habitats and Coastal Dune. Implementation of the proposed WWTFs and associated infrastructure would decrease or eliminate nutrient and contaminant seepage from cesspools and septic systems into wetlands in the service area and consequently decrease pollutant loadings into adjacent nearshore waters. Commensurate decreases in pollutant loadings into the aquifer, both directly and indirectly, would also improve water quality and habitat in general in the service area, as discussed in the PEIS (Section 3.5.3). ADID data indicated no wetlands or coastal dune habitat on any of the proposed WWTF sites. Therefore, no adverse impacts to wetlands and coastal dunes as a result of the construction and implementation of the proposed WWTFs are anticipated. However, wetlands such as mangroves, buttonwoods, salt marsh, and freshwater hardwoods cover approximately 28 percent

of the Village of Islamorada service area and are located predominantly in the undeveloped areas. Impacts to wetlands from the proposed wastewater infrastructure will be avoided and/or minimized as the improvements will generally occur within existing ROW corridors.

Mangroves comprise approximately 91 percent of the wetlands and coastal dune habitats identified within the service area. Although mangrove productivity and growth may benefit from increased nutrient levels, there is no evidence to support that mangrove communities are nutrient limited (Odum and McIvor 1990). Thus, mangroves should not be adversely affected by the reduction in nutrient levels that is expected to occur as a result of the implementation of the *Proposed Action*.

As described in the PEIS (Section 4.2.1.2*)*, the USFWS recommended that project applicants avoid certain habitat types during the siting of wastewater improvements. These habitat types include tropical hardwood hammock, pine rocklands, buttonwood grasslands, and freshwater marshes. Of the wetland habitat types in this list, buttonwoods may occur in the service area. However, the proposed WWTF sites do not include any buttonwood. Thus, this project abides by the USFWS recommendation for wastewater improvement sitings, and impacts to important vegetation habitats have been minimized.

Marine and Benthic Habitats. No adverse impacts to marine and benthic habitats are anticipated as a result of the *Proposed Action*. Under the *Proposed Action*, construction of proposed WWTFs and associated infrastructure to service the Village of Islamorada service area would decrease or eliminate existing inputs of contaminants, nutrients, and other pollutant inputs from cesspools and septic systems into nearshore waters surrounding the service area. Consequently, water quality in nearshore waters of the Sanctuary would be improved.

Substantial benefits to the marine habitats in the service area would be anticipated under this alternative. Reductions in nutrients would reduce the potential for algal blooms. Likewise, water clarity and DO concentrations would improve, and commensurate improvements in the overall health of benthic marine communities would be expected. No mitigation would be required due to the positive affects of this program.

Coral Reefs. As discussed in Section 3.5.5, no coral reefs were identified within the 1,500-foot buffer zone surrounding the service area. However, coral reefs are located within the Sanctuary and will be affected by this FKWQIP project. No adverse impacts to corals reefs in the Sanctuary are anticipated as a result of the proposed project. Benefits of the *Proposed Action* include improved water quality of nearshore waters in the service area and commensurate improvements in ecosystem health in the Sanctuary.

As described in Section 4.5.2 of the PEIS, marine flora and water quality dependent marine organisms, including corals, in nearshore waters of the Sanctuary will benefit from reduced nutrient levels. Implementation of the proposed project would potentially contribute to the recovery of the only living coral barrier reef system in North America. Consequently, implementation of this alternative would benefit the coral reef tract of the Keys and contribute to recovery of this important national treasure.

Floodplains. Under the *Proposed Action*, potential temporary adverse impacts to floodplains in the service may occur as a result of temporary construction activities. Habitat loss in the floodplain is addressed above for each habitat.

Construction and implementation of the proposed WWTFs and associated water treatment improvements are anticipated to benefit the habitats associated with these floodplains (as described above). However, there is public concern that the proposed WWTFs and associated improvements under the *Proposed Action* would lead to further floodplain development. The Monroe County ROGOs and Village of Islamorada BPAS are based on hurricane evacuation times, public safety, and environmental needs (including water quality and habitat protection) (Section 4.14 in). Since the primary limiting factor in these ordinances is hurricane evacuation time, the permit allocation should not change as a direct result of construction of a new WWTF.

The proposed WWTFs will provide a means to affectively treat existing wastewater flows, not a means to introduce or support floodplain development. Therefore, if growth and development in the floodplain occur after implementation of either alternative, they are the result of established municipal planning and are not directly related to this proposed wastewater project. Because much of the Keys is in the 100-year floodplain, there are no other practical alternatives for these facilities.

4.5.3 Alternative 3 (*Alternative Funding Sources*)

Upland Habitats. Affects on upland habitats under this alternative would be similar to those described under the *No Action* alternative until alternative funding is acquired for the proposed WWTFs and associated infrastructure. Once alternative funding sources are available and the proposed wastewater improvement project is implemented, the benefits would be similar to those described under the *Proposed Action*.

Estuarine and Freshwater Wetland Habitats and Coastal Dune. Adverse impacts to wetland and coastal dune habitats under this alternative would be the same as those described under the *No Action* alternative until alternative funding is acquired and the wastewater improvement project is implemented. The delay in implementation would allow continued wetland habitat degradation with potential adverse affects as described under the *No Action* alternative. Once the proposed wastewater improvement project is implemented, the benefits would be similar to those described under the *Proposed Action*.

Marine and Benthic Habitats. Adverse impacts to marine habitats under this alternative would be the same as those described under the *No Action* alternative until the proposed wastewater improvement project is implemented with alternative funding sources. The time delay would allow continued marine habitat degradation with potential adverse affects as described under the *No Action* alternative. Once alternative funding sources are available and the proposed wastewater improvement project is implemented, the benefits would be similar to those described under the *Proposed Action.*

Coral Reefs. Delayed implementation of the FKWQIP under this alternative would result in continued adverse impacts to water quality in nearshore environments and associated coral reefs.

Once alternative funding sources are available and the proposed wastewater improvement project is implemented, the benefits would be similar to those described under the *Proposed Action*.

Floodplains. Under *Alternative Funding Sources*, implementation of the proposed WWTFs associated infrastructure would not occur until alternative funding is acquired. Consequently, water quality degradation in the habitats described above would continue until proposed wastewater treatment improvements are made and floodplains would be protected under the Monroe County Floodplain Ordinance.

4.6 Protected Species

Existing adverse impacts to protected species and their habitat that have occurred due to nutrient and other pollutant inputs into nearshore waters in the Sanctuary are anticipated to continue under the *No Action* alternative. Minimal adverse impacts to protected species or their habitat may occur under the *Proposed Action* as a result of proposed WWTFs and associated infrastructure that would serve the Village of Islamorada service area. However, the long-term benefits of this program would substantially offset the unavoidable impacts to habitat. Consultation with federal, state, and local agencies is an integral part of the planning process for this project.

There are 216 acres (five percent) of existing conservation lands in the Village of Islamorada service area and an additional 469 acres (ten percent) proposed for conservation (Section 3.14.2). Consequently, any construction on natural lands could potentially impact a protected species or associated habitat. Protected species in the service area include a minimum of 48 federally or state protected plants and animals, as described in Section 3.6.2. Protected species can be impacted directly through a "take" or actual loss of an organism or loss of federally designated critical habitat. Indirect impacts would include the loss or degradation of the habitat that the organism requires to sustain its population.

4.6.1 Alternative 1 (*No Action*)

Adverse impacts to protected species are not expected to occur within the service area under the *No Action* alternative. However, protected species that rely on or live in nearshore waters of the Sanctuary adjacent to the service area may be adversely affected as a result of continued discharges of untreated wastewater into nearshore habitats. As described previously, continued nutrient and other pollutant discharges into local canals and nearshore waters would likely increase the potential for algal blooms, impair water clarity and light penetration, decrease dissolved oxygen, increase the likelihood of fish kills, and encourage macroalgal growth. This would in turn decrease light penetration and adversely affect benthic habitats and those protected species using them.

4.6.2 Alternative 2 (*Proposed Action*)

Under the *Proposed Action*, beneficial and minimal adverse impacts (if any) to protected species are anticipated due to the construction and implementation of the proposed wastewater improvement project. The WWTF sites within the Village of Islamorada service area are

proposed to be built on developed land. Reductions in nutrients, contaminants, and other pollutants would improve water quality and result in commensurate improvements in habitat in the nearshore waters surrounding the service area. These improvements would directly benefit the health and status of protected species in these nearshore habitats.

Among the species of wildlife that would benefit under the *Proposed Action* are numerous state listed piscivorous birds and the Florida manatee. The long-term benefits of the proposed water quality improvements would substantially offset the unavoidable impacts to habitat.

There is the potential for adverse impacts to occur, but are not anticipated as a result of construction of the proposed WWTFs and associated infrastructure. Based on FNAI database records, 49 protected species may occur within the Village of Islamorada service area. Based on FFWCC BBA survey data, 41 species were recorded in the Tavernier Quad, 40 species in the Upper Matecumbe Quad, and 16 species in the Lower Matecumbe Quad (exact location unavailable). Of these, the bald eagle is federally protected and eight species are state protected. Adverse impacts to these species could potentially occur as a result of the *Proposed Action*. However, construction for the WWTFs and associated infrastructure will be aligned within existing ROW corridors and, consequently, impacts to protected species from the proposed wastewater infrastructure will be avoided and/or minimized.

Coordination with the appropriate local, state, and federal agencies will occur for this project. Compliance with USFWS recommendations for avoiding areas of tropical hardwood hammock, pine rocklands, buttonwood grasslands, or freshwater marshes would also occur. As discussed in Section 3.5.1 of this document, the proposed WWTF sites are dominated by developed lands within the Village of Islamorada service area and therefore protected species impacts are expected to be minimal.

Any action by the Village of Islamorada that results in the loss of natural areas has the potential to impact protected species due to the few remaining natural areas in the Keys. Biological surveys for the three proposed WWTFs (Plantation Key, Windley Key and Lower Matecumbe Key) will be conducted prior to project initiation to provide observational field data.

The proposed Plantation Key site is located adjacent to a WWTF currently under construction. Environmental impacts to this site were documented in the FEMA SEA for Plantation Key Colony/Plantation Key (URS 2003). Biological resource surveys were conducted as part of the SEA, and findings of the site visit for the preferred site are reported regarding protected species (URS 2003). No federally listed species and no protected animal species were found at the FEMA Preferred Alternative Site. Protected species on this site consisted of state listed threatened and endangered plants only, including several representatives of the state threatened Florida thatch palm (*Thrinax radiata*) and the state endangered West Indian mahogany (*Swietenia mahagonia*). No federally listed plants or animals were documented on the site. Due to the proximity and similar nature of the proposed Corps Plantation Key site, no impacts to federally listed species are anticipated at this site. The existing conditions (disturbed) and surrounding land uses of the Windley Key and Lower Matecumbe Key sites are not conducive to protected species habitat, therefore no impacts to federally listed species are anticipated at these sites as well. Based on the information available for the proposed sites the Corps, at this time,

has determined the proposed action may affect but is not likely to adversely affect federally listed threatened or endangered species or critical habitat under the jurisdiction of the USFWS. Once the three proposed WWTF properties are purchased by the Village of Islamorada, biological surveys of all of the sites will be conducted to ensure an accurate description of protected species impacts. Consultation with the USFWS is on-going and would be completed upon purchase of the properties (and completion of the biological surveys) by the Village of Islamorada.

Because construction activities are terrestrial and there would be no adverse impacts to marine resources, the Corps has determined there would be no affect to federally listed threatened or endangered species or critical habitat under the jurisdiction of National Marine Fisheries Service.

Approximately 70 percent of the service area was assigned a low habitat value (value of four or lower out of ten). The three proposed WWTFs are all located on developed lands with even low habitat values (2). The areas with higher habitat value that exist within the service area were assigned values of five, six, or seven. Thus, the proposed project should not adversely impact high quality habitat in the service area.

4.6.3 Alternative 3 (*Alternative Funding Sources*)

Under *Alternative Funding Sources*, nutrient and other pollutant discharges into local canals and nearshore waters, as described under the *No Action* alternative, would continue until alternative funding sources are available and water quality improvements are implemented. With the delay in implementation, the discharge of untreated wastewater and associated water quality degradation in nearshore waters of the Village of Islamorada service area and the Sanctuary would continue. The affects on protected species would be similar to those described in the *No Action* alternative. However, once the proposed wastewater project is implemented with funds from alternative sources, the benefits to protected species would be similar to those described under the *Proposed Action*. Mitigation, if necessary, would also be similar to that recommended with the *Proposed Action*.

4.7 Essential Fish Habitat

The MSA requires federal agency consultation with the NMFS on activities that may adversely affect EFH. Informal consultation was initiated as part of the preparation effort of the PEIS (Section 3.7) and several relevant species and associated habitats were identified.

4.7.1 Alternative 1 (*No Action*)

Until the wastewater improvement projects are implemented, adverse impacts to nearshore waters and dependent fisheries would continue as described under the *No Action* alternative.

4.7.2 Alternative 2 (*Proposed Action*)

Under the *Proposed Action*, beneficial and minimal adverse impacts (if any) to Essential Fish Habitat are anticipated due to the construction and implementation of the proposed wastewater

improvement project. The WWTF sites within the Village of Islamorada service area are proposed to be built on developed land. Reductions in nutrients, contaminants, and other pollutants would improve water quality and result in commensurate improvements in habitat in the nearshore waters surrounding the service area. These improvements would directly benefit the health and status of EFH in these nearshore waters.

4.7.3 Alternative 3 (*Alternative Funding Sources*)

Under *Alternative Funding Sources*, nutrient and other pollutant discharges into local canals and nearshore waters, as described under the *No Action* alternative, would continue until alternative funding sources are available and water quality improvements are implemented. With the delay in implementation, the discharge of untreated wastewater and associated water quality degradation in nearshore waters of the Village of Islamorada service area and the Sanctuary would continue. The affects on EFH would be similar to those described in the *No Action* alternative. However, once the proposed wastewater project is implemented with funds from alternative sources, the benefits to EFH would be similar to those described under the *Proposed Action*.

4.8 Air Quality and Noise

Noise and air quality impacts resulting from the construction and operation of the facilities proposed for the FKWQIP would not differ from any other typical WWTF and associated infrastructure. The operation and maintenance of these facilities would have less impact than the construction.

4.8.1 Alternative 1 (*No Action*)

No additional impacts to air quality or noise levels would occur as a result of implementing the *No Action* alternative. Under this alternative, conditions would continue as described for the affected environment.

4.8.2 Alternative 2 (*Proposed Action*)

Air Quality. The construction of the new WWTFs would result in minor, temporary impacts to the air quality in the vicinity of construction sites. The operation of heavy equipment during construction may result in minor, temporary adverse impacts to local air quality from heavy equipment engine exhaust. In addition, heavy equipment operation during construction can also result in windblown dust and particles. Dust can be minimized by adding moisture to the soil, mulching, and landscaping soon after construction completion. The *Proposed Action* consists of the construction of three WWTFs. The schedule for construction of these facilities would be dependent upon available funding. Operation of the facilities would also produce minor, long-term impacts and mitigation would consist of odor abatement measures integrated into the design of each facility. Monroe County is an air quality attainment area. Consequently, anticipated air emissions from construction activities are minimal.

Noise. The construction of the new WWTFs would result in temporary noise impacts to land uses in the vicinity of the construction sites. Heavy equipment operation and heavy trucks

accessing construction sites would add additional noise to the ambient noise levels described in Section 3.8 of this Final EA. Construction would only occur during daylight hours, and the WWTFs are located on three separate islands, so even if construction occurs simultaneously, the cumulative disturbances due to noise would be minimal. Operation of the facilities would also produce minor, long-term impacts and mitigation would consist of the noise abatement measures appropriate for each specific treatment facility or pump station.

4.8.3 Alternative 3 (*Alternative Funding Sources*)

Air Quality. Under the *Alternative Funding Sources*, impacts would be similar to the *Proposed Action*. However, impacts would be staggered (construction activities would occur at a slower pace, and may be drawn out for an extended period of time).

Noise. Under *Alternative Funding Sources*, impacts would be similar to the *Proposed Action*. However, potential impacts would be staggered (construction activities would occur at a slower pace, and may be drawn out for an extended period of time).

4.9 Cultural Resources

The protection of cultural, archaeological, and historical resources in the Keys is described in the PEIS (Section 3.9). Major federal laws protecting cultural resources include the NHPA, ARPA, NAGPRA, and the AIRFA of 1978. Section 106 of the NHPA requires federal agencies to consider the affects of the *Proposed Action* on identified and potentially present cultural resources. In addition, the State Historic Preservation Office (SHPO), Tribal Historic Preservation Officers, and the ACHP, would review and comment on a *Proposed Action*.

4.9.1 Alternative 1 (*No Action*)

Under this alternative, impacts to historic, archaeological, and cultural resources would only occur as described for the existing environment in *Chapter 3, Affected Environment*. Implementation of projects by individual residents or businesses may disturb buried and undocumented historical resources. Those individuals or business owners would be responsible for compliance with relevant federal, state, and local regulations.

4.9.2 Alternative 2 (*Proposed Action*)

To ensure the protection of archaeological or historical resources, construction activities in the vicinity of documented occurrences of cultural and historical resources would be supervised at all times by a qualified archaeologist who meets criteria set forth in the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation and 36 CFR. Appropriate steps would be taken in accordance with applicable federal and state laws and the procedures recommended by the SHPO during construction in potentially sensitive areas.

A review of the Florida Master Site Files indicates the presence of thirty-one historic properties in the Village of Islamorada service area (Section 3.9). Only one cultural resource site was identified within 0.25 miles of a proposed WWTF site (proposed Plantation Key WWTF site).

The site adjacent to our proposed site is currently under construction for a similar WWTF funded by FEMA. As part of FEMA's NEPA compliance, a Cultural Resources Assessment was completed on the Plantation Key site (FEMA 2003). SHPO concurred with FEMA's finding of 'no affect' to cultural resources (FEMA 2002).

Consultation with SHPO is on-going and would be completed upon purchase of the properties by the Village of Islamorada. The Village of Islamorada would be advised to avoid sensitive archaeological features, have professional onsite archaeological monitoring during collection system work, and further coordinate activities with the SHPO. Should any unanticipated historic or archeological materials be discovered during project work, all activities on the sites shall be halted immediately and the Village of Islamorada shall consult with the Corps and other concerned parties, SHPO, and other appropriate agencies for further guidance.

4.9.3 Alternative 3 (*Alternative Funding Source*s)

Under this alternative, the proposed WWTFs and associated infrastructure would not be constructed and implemented until alternative funding is acquired. If funding is obtained through non-federal entities to comply with Florida Statutory Treatment Standards, compliance with Section 106 of the NHPA would not be required. Once FKAA secures funding and the project proceeds, affects on cultural resources would be similar to those described under the *Proposed Action*.

4.10 Demographics and Socioeconomics

The economy of the Keys is based on a tourist industry that attracts 2.2 million visitors per year and is dependent on water related recreation. Implementation of the Village of Islamorada WWTFs and associated transmission facilities is one of the many FKWQIP projects that will improve the quality of nearshore waters and reduce public health concerns. This section describes potential demographic and socioeconomic impacts of implementing project alternatives.

4.10.1 Alternative 1 (*No Action*)

Under the *No Action* alternative, the Village of Islamorada WWTFs and associated transmission facilities would not be implemented and declines in the economy and population may occur. Development would depend on on-site treatment facilities, many of which would be adequate only through the year 2010. Consequently, growth in land development and permanent population could be constrained.

Employment and Income. Very slow development and population growth combined with a reduced ability to serve visitors would be expected to decrease employment and wages in the Village of Islamorada CDP under this alternative. While the economy of the Village of Islamorada area and the Keys is largely driven by tourism, the demand for goods and services by the permanent population is also an important economic force. The sector of the county economy that supports permanent residents would slow, and the overall economy would rely more heavily on the tourism industry.

Home Ownership. Reduced home ownership may occur due to inadequate wastewater infrastructure and limited growth in the housing market. The high price of real estate may have already contributed to a lower incidence of home ownership in the Village of Islamorada, further reducing home ownership, and could increase the average number of persons per household in the Village of Islamorada DCP.

Tourism. Tourism in the Village Islamorada and throughout Keys centers around local marine resources, which are dependent on water quality. Under the *No Action alternative*, declines in nearshore water quality would continue to adversely impact recreation and tourism. However, a significant decline in visitation to the Keys in general is unlikely under the *No Action* alternative. The demand for tourism activity is largely a function of the level of population and economic growth in south Florida, which is not expected to slow in the foreseeable future. As a result, growth in tourism in the Village of Islamorada area and the Keys can be expected to grow regardless of water quality or infrastructure constraints.

Wastewater Management Costs in the Village of Islamorada. Under the *No Action alternative*, wastewater improvement projects would not be implemented. Therefore, wastewater management costs would not be affected by this alternative.

Cost of Living. An increased cost of living in the Village of Islamorada would be anticipated as a result of implementing the *No Action alternative*. The absence of adequate wastewater infrastructure could constrain the already limited allowable development. Continued slow development and the continued demand for housing and commercial services would increase the cost of real estate. Housing cost is a principal component of the cost of living in the county and consequently, the difference between the supply and demand for housing could impact the local cost of living. The affects of a growing difference are apparent in the rapidly escalating price of real estate in the Village of Islamorada and throughout Monroe County in the last few years. The *No Action alternative* would exacerbate these affects.

Public Health Conditions. Under the *No Action alternative*, the FKWQIP would not be implemented and continued discharge of inadequately treated wastewater would potentially adversely affect public health. Public health indicators suggest that the level of the connection between water quality and public health is high in the Keys when compared with the state of Florida as a whole. Higher levels of fecal coliform bacteria and commensurate health impacts would be expected to be minor, however, due to existing provisions that protect the public from contaminated waters.

4.10.2 Alternative 2 (*Proposed Action*)

The *Proposed Action* alternative would result in the implementation of a service area-wide, integrated managed wastewater management system necessary for continued land development at a modest rate in accordance with Monroe County ordinances.

Employment and Income. Implementation of the wastewater improvement projects may result in increased employment and income in the Village of Islamorada as a result of federal funding of the proposed project, and a potential increase in the rate of land development. Consequently,

the local economy would continue to grow modestly, maintaining a stronger demand for employment and steady increases in wages and salaries. As a result, tourism may grow in the Village of Islamorada and support further economic growth, employment, and income. In addition to tourism, there would be an increase in the number of jobs available during the period of construction.

Home Ownership. The *Proposed Action* may result in reduced home ownership due to increased cost of utility services necessary to implement the wastewater improvement projects, subsequently increasing the cost of living for many residents and businesses. Although the cost of implementation to residents would be equal, the increased cost of wastewater management would have a greater (disproportionate) impact on lower income residents.

Tourism. The *Proposed Action* alternative would be expected to improve the tourism industry by allowing continued development in visitor related economic sectors and improving the quality of nearshore waters, thereby maintaining or increasing recreation opportunities. Adverse impacts to tourism from the *Proposed Action* alternative include temporary road closings and detours for construction of sewer lines.

Wastewater Management Costs. Under the *Proposed Action*, an increase in the cost of utility services to the residents of Islamorada is anticipated. Although federal funding would provide a portion of the total wastewater infrastructure cost, the local utility would be required to fund, and recover, costs for some development, including land acquisition and all associated O&M expenses. These costs would be substantial and would be passed on to residents and businesses as connection and recurring service charges.

In the Keys, the costs of system development and O&M are recovered from the customers in the service area, except where subsidies are available. Therefore, the charge to a new customer depends on the cost of developing the system, the extent to which the costs are subsidized, and whether a customer is eligible for individual assistance.

The cost of constructing wastewater treatment and transmission facilities for the entire Islamorada service area (including additional WWTFs outside the scope of the proposed project) is estimated to be $109 million (IWMMP Draft 2005). The Corps funding would provide $29.5 million of that, potentially reducing the total cost to $52 million; some of the financial needs have been covered by FEMA (Plantation Key WWTF currently under construction).

Cost of Living. An increase in the cost of utility services to most residents in the Village of Islamorada service area is anticipated under the *Proposed Action* alternative due to implementation of the wastewater management improvements. Although federal funding would provide a significant portion of the total cost of developing wastewater infrastructure, the local utility would be required to pass along the remaining costs to residents and businesses in the form of utility service charges. The increased charges would substantially raise the cost of living to the Village of Islamorada residents.

Public Health Conditions. Because of the water quality improvements in nearshore waters under the *Proposed Action* alternative, reductions in the incidence of water borne disease would

potentially result in a modest improvement in public health. Any such improvement would be expected to be quite small, however, because most public health indicators in Monroe County suggest that the overall level of public health is currently very good.

4.10.3 Alternative 3 (Alternative Funding Sources)

Under *Atlternative Funding Sources*, the anticipated delay in the installation of wastewater management infrastructure would slow land development and population growth in the service area. Depending largely on local funding, the residents and business operators in the Village of Islamorada would be poorly prepared to fund all or proportions of the facilities needed to allow any significant additional development. Similarly, growth in visitor population levels would be reduced with the delayed implementation of wastewater improvements.

Employment and Income. Under *Alternative Funding Sources*, implementation of wastewater improvements would be delayed until adequate funding was acquired. The installation of infrastructure improvements needed to support continued residential and commercial growth would be delayed. This alternative would, in turn, slow the rate of residential and commercial growth and result in modest growth in employment and income.

Home Ownership. Under *Alternative Funding Sources*, the delay in implementing wastewater infrastructure may reduce home ownership. Slower economic growth would result from delayed project implementation and slower increases in utility services costs. Combined with the existing demand for housing and business locations in the Keys, this would increase the cost of real estate, further increasing the cost of living in the Village of Islamorada, and subsequently decrease home ownership.

Tourism. Under *Alternative Funding Source*s, slower growth in tourism in the Village of Islamorada service area is anticipated in comparison with the *No Action* alternative. By funding wastewater improvements needed to improve nearshore water quality, additional permanent residents and visitors would be accommodated, providing a boost to recreation and tourism. Some minor adverse impact might result from temporary road closings during construction and installation of wastewater transmission systems.

Wastewater Management Costs in the Village of Islamorada. Under *Alternative Funding Sources*, the cost of wastewater utility services would increase as the necessary improvements were implemented. Utility cost increases would be incrementally passed along to Islamorada residents and businesses.

Cost of Living. Under *Alternative Funding Sources*, the cost of wastewater management utility services would increase as the necessary improvements were implemented. Cost increases would be passed along to residents and businesses, thereby increasing the cost of living.

Public Health Conditions. *Alternative Funding Sources* alternative would result in delayed improvements in water quality, in turn delaying potential improvements in public health conditions. However, any improvement would be minor, as overall public health relating to water quality is currently good.

4.11 Recreation

The 2.2 million annual visitors to the Keys provide the basis of the tourism industry on which the economy relies. Tourism is based on clean water and beaches as well as the abundant fish and wildlife that characterize this popular vacation destination. Consequently, potential impacts of the proposed project on recreation amenities are examined below.

4.11.1 Alternative 1 (*No Action*)

Under the *No Action* alternative, a decline in recreation opportunities would be expected as inadequately treated wastewater discharges to nearshore waters of the Sanctuary and subsequent water quality impacts continue, as described in *Chapter 3, Affected Environment*. Anticipated adverse impacts include additional beach advisories and closings and, potentially, further damage to coral reefs.

4.11.2 Alternative 2 (*Proposed Action*)

Most of the outdoor recreation in Monroe County (and the Village of Islamorada service area) relates directly to marine resources. Implementation of the *Proposed Action* would decrease loadings of nutrients and other pollutants into nearshore waters, improve water quality, and subsequently, benefit recreation resources. Improvements in nearshore water quality, combined with fewer incidences of beach advisories and closings, would increase recreation opportunities as well as the perception of these opportunities, thereby improving the local economy in the Islamorada service area.

Improvements in nearshore water quality, combined with fewer incidences of beach advisories and closings, would increase recreation opportunities as well as the perception of these opportunities, thereby improving the local economy in the Village of Islamorada service area.

Construction activities associated with completing the proposed project would result in minor, temporary impacts to recreation activities. Discontinuing use of septic tanks and cesspools and construction of the WWTFs and infrastructure would result in temporary traffic delays and construction disturbances (e.g. staging sites, equipment). All of these construction related impacts would be temporary and minor, and state parks and other recreation areas would remain open during these activities. Reducing nuisance odors (by discontinuing use of septic tanks and cesspools) in Islamorada would enhance the recreation opportunities as well.

4.11.3 Alternative 3 (*Alternative Funding Sources*)

Under Alternative *Funding Sources*, delayed implementation of the proposed project would delay improvements in nearshore water quality, beach health and recreational opportunities in the service area described under the *Proposed Action*. The eventual benefits would be significant because of the importance of the marine environment to recreation in the Keys.

Construction related impacts would also occur over an extended period of time under this alternative.

4.12 Open Space and Aesthetic Resources

Visitors to the Keys enjoy a unique sight seeing experience over the miles of U.S. 1 that link the numerous islands across open water. Water quality is important to the maintenance of healthy ecosystems and the open spaces of the Keys and the Village of Islamorada service area.

4.12.1 Alternative 1 (*No Action*)

Under the *No Action* alternative, wastewater treatment would continue to rely primarily on individual treatment systems and no impacts to aesthetic resources beyond those described in *Chapter 3, Affected Environment* are anticipated. Nuisance odors and views associated with increased algal blooms and fish kills caused by continued nutrient loading from wastewater discharges would continue.

4.12.2 Alternative 2 (*Proposed Action*)

The three proposed WWTFs would have minimal impacts to aesthetic resources under the *Proposed Action*. Local ordinance setbacks would be adhered to in order to provide buffers to adjacent lands. The construction of WWTFs would be beneficial to the Village of Islamorada service area by reducing the water quality degradation of the nearshore waters of the Marine Sanctuary.

Plantation Key
The proposed WWTF site is a forested natural site that can be considered a mixed urban commercial/residential area along a major roadway. The site is located adjacent to a WWTF currently under construction. Other features in the vicinity include residential homes, commercial structures, and two schools (Plantation Elementary School and Coral Shores High School). Impacts to the open space and aesthetic resources at this site would be minimal.

Windley Key
The proposed WWTF site on Windley Key is located at the intersection of U.S. 1 and Old S.R. 4A. Features in the vicinity include residential homes, commercial structures including hotels, and the tourist attraction "Theater of the Sea". Because of its location at the intersection (where the site comes to a 'point') with no visual buffer, the proposed WWTF could have minor impacts to aesthetic resources. The conceptual site design shows stormwater retention ponds on the perimeter of the site (Figure 2-2), with the infrastructure of the WWTF centrally located on the site. By providing a visual buffer of ponds, this design would help to offset the minor impacts to the aesthetic resources.

Lower Matecumbe Key
The proposed WWTF site on Lower Matecumbe Key is located adjacent to a realty office, a cell phone tower (under construction) and a gas station. Other features in the vicinity include canals, boat docks, and residences. The proposed WWTF could have minor impacts to the aesthetic

resources of the area (particularly to the realty office and the residences), however it would be compatible with the gas station and cell phone tower adjacent to the site.

4.12.3 Alternative 3 (*Alternative Funding Sources*)

Under *Alternative Funding Sources*, benefits to open space and aesthetic resources would be delayed until alternative funding is acquired and wastewater improvement projects could be implemented. However, once projects are implemented, benefits would be similar to those under the *Proposed Action*, albeit at a slower pace. Nuisance odors and sights due to algal blooms and fish kills would be reduced over time.

4.13 Environmental Justice

As required by EO 12898, this section focuses on potential impacts to minority and low income residents as they relate to environmental justice (see *Section 3.13* for a description of federal requirements). Impacts to minority and low income populations that may occur as a result of the proposed alternatives include:

- Siting of wastewater and stormwater improvements, especially treatment facilities, in minority or low income neighborhoods.
- Increased costs for wastewater management services in the form of sewer charges and property taxes that disproportionately impact low income residents.
- Abandonment fees for outdated onsite treatment facilities.

Under both state of Florida statutes and Monroe County ordinances, residents of the Keys are required to replace existing cesspools and failing septic tanks with adequate wastewater treatment facilities. The financial impact to residents for these improvements would be uniformly applied in accordance with Monroe County Codes and Tax Structure.

4.13.1 Alternative 1 (*No Action*)

Under the *No Action alternative*, residents would make wastewater improvements in the form of on-site treatment systems sufficient to meet the county 2010 wastewater treatment requirements. Estimated costs for these on-site treatment systems range from $2,500 to $8,200 per household, and monthly costs range from $63 to $118 (FEMA 2002). In addition, each residence would incur a system connection cost of approximately $5,000. Due to a lack of discretionary income, low income and fixed income residents would be adversely impacted by these costs

Residents who comply with the 2010 requirements by meeting interim requirements would partially offset the costs of implementing the *Proposed Action* alternative.

4.13.2 Alternative 2 (*Proposed Action*)

The *Proposed Action* would impose an adverse economic impact on residents of the Village of Islamorada service area, particularly on lower income residents. While facility siting is not considered an environmental justice issue under the *Proposed Action*, the increased costs to

lower income residents under the *Proposed Action* does constitute a potential environmental justice issue.

The implementation schedule for the proposed wastewater improvement project is accelerated in comparison with the *Alternative Funding Sources* alternative (below) and would therefore eliminate the need to install costly interim treatment facilities and allow residents to connect directly to a central sewer system. Once the proposed facility is completed, residents would be connected to the new facility over an anticipated two to three year period of time. The potential to reduce, or address, the financial impact imposed on residents to replace cesspools and any other substandard wastewater management system could benefit all residents, regardless of income.

Under the *Proposed Action* alternative, residents and businesses in the Village of Islamorada service area would be subject to higher utility costs in comparison with the *No Action alternative*. Residents and businesses connecting to the central wastewater system would incur a system development charge as high as $5,000 per residence or EDU in addition to a connection cost that could cost as much as $6,000 per residence. Finally, the approximate recurring service cost could be as high as $60 per month per residential unit. While this cost is generally comparable to that for an on-site wastewater treatment system, the initial costs to residents and businesses would be significantly greater.

The system development costs and cost of connecting to the wastewater transmission system would be an especially difficult financial burden for lower income residents in the Village of Islamorada regardless of whether the cost is evaluated alone or compared with on-site wastewater treatment system costs. This is an important consideration, even though the residents of the Village of Islamorada enjoy a median household income greater than that of Monroe County as a whole and considerably higher than the State of Florida. While the median household income in the Village of Islamorada CDP is relatively high, about seven percent of the residents of the Village of Islamorada live below the poverty. This percentage may actually be larger given that the cost of living in Monroe County is about ten percent higher than that of the state, as described in the PEIS (*Section 3.13*) and in this document (*Section 3.13*).

The Village of Islamorada has a proportion of residents over the age of 65 comparable to the county and the state. This segment of the population often lives on fixed income and, while their income may not be below the poverty level, they are more affected by cost of living changes. These factors suggest that while the majority of the Village of Islamorada residents are financially secure, there is considerable disparity in wealth and income among residents, raising potential environmental justice concerns. Three potential approaches that the Village of Islamorada may use to address this issue are presented below, as previously outlined in the PEIS.

Subsidize Initial Connection Costs. With other central wastewater systems previously constructed in the Keys, lower income residents have received subsidies, mainly from two sources: Community Development Block Grants (CDBGs) and the FEMA. For certain projects, Monroe County made CDBG funds available to help defray the combined cost of service development fees and connecting residences to the wastewater transmission system (Mark Bell 2004). These subsidies have been in the range of $5300 per qualifying resident. For projects

receiving funding from FEMA, grant funds have themselves been used to subsidize residents' initial costs, and utility systems have pursued other funds, such as general fund revenues, to provide the remaining system development costs. Presently, the only known funding source is the federal government through the Corps. No CDBG funding is currently available.

Subsidize Cost of Sewer Service. While the *Proposed Action* alternative will not have a significant net impact on recurring charges for wastewater services, lower income residents will be faced with a major financial burden from those charges regardless of whether they are incurred for on-site treatment facilities or the central facilities developed under the *Proposed Action* alternative. The only known source of funding for subsidizing those costs is Monroe County general fund revenues. Such funding would probably not be practical over an extended period of time, however.

Implement an Increasing Block Rate Structure. Generally viewed as another form of subsidy, a graduated rate structure can also provide water conservation benefits when it is based on metered water use. A rate structure that provides a lifeline sewer bill would include a lower base charge and volume charge for the first 3,000 gallons, for example, of water use per month, with an increasing charge for more water use. Such a rate structure links sewer charges to metered water use, a common method for charging for sewer services. This type of rate structure has several drawbacks. First, it runs counter to the prevailing practice of charging on the basis of the cost of service. Under most conditions, the cost of providing sewer service is relatively fixed, especially in an older system with significant amounts of inflow and infiltration, so a cost of service based rate normally has a high base charge and flat volume charge. Second, a low base charge and low charge for the first two or three thousand gallons of water use places the sewer utility at financial risk because its revenue is tied to water use by larger customers. Any significant reduction in water use has a magnified affect on sewer utility revenues and, equally important, the very factors that lead to a decline in water use often cause increased wastewater management expenses. Third, higher rates for larger water users are arbitrary and discriminatory, with no basis other than providing a subsidy for low volume customers. Finally, such a rate structure subsidizes all low volume water customers, regardless of ability to pay.

4.13.3 Alternative 3 (Alternative Funding Sources)

With delayed implementation of central wastewater systems, *Alternative Funding Sources* alternative would result in many of the same impacts described for the *No Action* alternative, albeit more slowly. However, similar to the *No Action* alternative, any such impacts would not be related to the proposed federal action.

4.14 Land Use and Planning

The *Proposed Action* directly addresses the Monroe County Year 2010 Comprehensive Plan (1997) mandated reductions in nutrient loadings to the marine ecosystem by the year 2010, and EO 98-309, which directed local and state agencies to coordinate with Monroe County in the implementation of the Year 2010 Comprehensive Plan to eliminate cesspools, failing septic systems, and other substandard on-site sewage systems. It also addresses the Village of Islamorada Comprehensive Plan and the IWMMP (Draft 2005).

4.14.1 Alternative 1 (*No Action*)

Land use and planning in the service area would continue as described in *Chapter 3, Affected Environment*. The absence of federal funding for implementation of improved wastewater treatment infrastructure under the *No Action* alternative is not anticipated to impact existing land uses. However, planned future land use development would be limited under the *No Action* alternative. Without wastewater treatment improvement projects, the Village of Islamorada risks non-compliance with EO 98-309, the Year 2010 Comprehensive Plan, as well as local plans including the Village of Islamorada Comprehensive Plan and the IWMMP (Draft 2005).. In turn, noncompliance with these plans could jeopardize the allocation of credits for new development.

4.14.2 Alternative 2 (*Proposed Action*)

No adverse impacts to land use are anticipated under the *Proposed Action*. The proposed WWTF parcels are designated on the Future Land Use Map as mixed use/commercial and residential future land use categories (Figure 3-6).

The proposed project is consistent with the Village of Islamorada BPAS and Monroe County ROGOs developed to control growth and maintain a high standard of living while protecting remaining natural resources. Although the proposed WWTFs would support and facilitate planned growth, it would not induce growth, increase permit allocations, or facilitate floodplain development beyond that which is already planned. While county and city BPAS/ROGO considerations include public safety and environmental needs (including water quality and habitat protection), the primary limiting factor in the BPAS/ROGO is hurricane evacuation time. Consequently, the proposed project would not affect permit allocation and associated development in the service area.

The proposed WWTS site on Plantation Key would be compatible with adjacent land uses, as the adjacent site is a WWTF currently under construction. The proposed site on Windley Key could have minor incompatibilities with the adjacent land use, a large tourist attraction (Theater of the Sea). It is not anticipated the proposed WWTF would negatively impact the tourist attraction. The proposed Lower Matecumbe Site could have minor incompatibilities as the site is between a gas station and a realty office. Coastal Barrier Resources System (CBRS) units in the Village of Islamorada service area would not be affected by the *Proposed Action* or served by the proposed WWTFs.

While BPAS/ROGO considerations include public safety and environmental needs, the primary limiting factor in the ROGO is hurricane evacuation time. Consequently, the proposed project would not affect permit allocations and associated development in the service area.

Construction activities would result in minor, temporary impacts to land use (anticipated to last 12 months). Short-term traffic delays as well as general construction disturbances would occur during construction.

4.14.3 Alternative 3 (*Alternative Funding Sources*)

Under *Alternative Funding Sources*, impacts on land use would be similar to those described for the *Proposed Action* once alternative funding is acquired and wastewater improvement projects are implemented. However, potential impacts would occur at a slower pace. Prior to implementation, residents and businesses in the Village of Islamorada service area remain at risk of non-compliance with the 2010 treatment standards.

4.15 Infrastructure

The affects of the *Proposed Action* and other alternatives on transportation and utilities and services in the Islamorada are discussed in this section.

4.15.1 Alternative 1 (*No Action*)

Under the *No Action* alternative, the residents of the Village of Islamorada would continue to rely on individual treatment systems (septic tanks and cesspools) and privately owned cluster or package treatment facilities, as described under *Chapter 3, Affected Environment*. Individual property owners and businesses would be responsible for meeting the state or county defined LOS standards. Residents and businesses would risk non-compliance but have no impacts to transportation or infrastructure; or they would implement many smaller projects, which would in turn result in larger numbers of small traffic and infrastructure disruptions.

4.15.2 Alternative 2 (*Proposed Action*)

Transportation. The construction of three new WWTFs would result in minor, temporary impacts to traffic in the vicinity of the proposed projects due to heavy equipment and trucks accessing the construction site. In addition, the construction of the wastewater collection systems could affect traffic patterns. Depending on available ROWs, transmission lines are generally constructed under roadways, and segments of U.S. 1 would be closed during construction. A traffic maintenance plan would be prepared to accommodate residential and business traffic during construction of the WWTFs, pump stations, and associated sewer lines for approximately one year.

The operation of the WWTFs would result in additional traffic due to workers traveling to the facility site. It is estimated that four to seven workers would be employed at each of the WWTFs (Furland 2003), resulting in less than 30 trips per day at each site. The impact on the area roadway system of the trips produced by the WWTFs would be insignificant.

Utilities and Services. The construction of centralized WWTFs and collection systems would result in minor, temporary impacts to utilities at various locations and times throughout the service area. Utility transmission lines are often constructed under roadways or in roadway

ROWs. Consequently, it may be necessary to relocate buried transmission lines during construction thus impacts would be localized and short in duration.

4.15.3 Alternative 3 (*Alternative Funding Sources*)

Transportation. Under *Alternative Funding Sources*, impacts would be similar to those described for the *Proposed Action*. Although potential impacts would be delayed while alternative funding is acquired to implement the proposed project, delayed funding could result in a larger number of smaller projects and therefore greater traffic disruptions.

Utilities and Services. Under *Alternative Funding Sources*, wastewater treatment improvement projects would not be constructed until alternative funding is acquired. Consequently, impacts would be similar to those described for the *Proposed Action* but would be delayed (construction activities would occur at a slower pace, and may be drawn out for an extended period of time).

4.16 Hazardous and Toxic Materials

This section addresses the potential impacts of hazardous and toxic materials relevant to the proposed project. Specifically, known areas of hazardous contamination would be avoided and mitigation necessary should hazardous contamination be encountered and identified.

4.16.1 Alternative 1 (*No Action*)

Without federal funding for the *Proposed Action*, responsibility for implementing wastewater treatment improvement projects would remain with individual property owners and businesses. Disturbance of lands would be limited to individual actions and conditions would continue as described in *Chapter 3, Affected Environment*.

4.16.2 Alternative 2 (*Proposed Action*)

Under the *Proposed Action*, construction and implementation of the three proposed WWTF sites and the associated transmission lines and pump stations would include soil disturbance, grading, and moving, and may, as a result, uncover or expose hazardous materials. For individual infrastructure improvement projects, the non-federal sponsor would be responsible for investigating the potential presence or extent of a hazardous substances regulated under the CERCLA.

During the hazardous materials and waste storage and handling desktop survey for the Plantation Key Site, no signs of improper storage or handling of hazardous materials were observed. The desktop survey for the Windley Key Site revealed environmental concerns relating to the long-term storage of boats, vehicles, and trailers on the property and the business that is currently occupying the property (Michael's Maintenance and Appliances Service). The desktop survey for the Lower Matecumbe Key Site revealed environmental concerns relating to the gasoline station located on the property adjacent to the west of the site and the abandoned boat fueling facility located north of the site, adjacent to the marina. Prior to construction of the proposed

WWTFs, soil and/or groundwater testing may be required, based on the findings of a full Phase I Environmental Site Assessment.

The construction of the proposed wastewater treatment facilities and the infrastructure and normal O&M of the treatment facilities would not generate hazardous wastes under normal circumstances. Contractors would be required to provide pollution prevention plans and contain any petroleum spills that may occur during construction. If hazardous wastes should enter the system, a monitoring system typically identifies the malfunction and corrective actions are taken to prevent the discharge.

Effluent disposal via shallow well injection would not generate hazardous wastes during the operation of the WWTF, nor would it result in the discharge of hazardous wastes into the ground water. Treated effluent would be monitored for hazardous material contamination.

4.16.3 Alternative 3 (*Alternative Funding Sources*)

Impacts would be similar to those described under the *No Action Alternative* until the Village of Islamorada acquires sufficient alternative funding sources to implement the proposed WWTFs. Once the proposed wastewater project is implemented, the impacts would be similar to those described under the *Proposed Action.*

4.17 Predicted Attainment of the Program Objectives

The primary goal of the FKWQIP is to provide federal funding for local municipalities to implement wastewater treatment projects that would result in commensurate water quality improvements in the Sanctuary. The proposed Village of Islamorada WWTFs and associated infrastructure would provide improved wastewater treatment for the Village of Islamorada and associated service area and decrease pollutant loads to local canals and nearshore waters. As a result, water quality improvements in the nearshore waters of the Sanctuary would be anticipated, thereby meeting federal, state, and local goals and objectives.

4.18 Predicted Cumulative Impacts

Cumulative impacts are those that "result from the incremental consequences of an action when added to other past and reasonably foreseeable future actions." The cumulative impacts of an action may be undetectable, but can add to other disturbances and eventually lead to a measurable environmental change.

Potential cumulative impacts of the proposed project are primarily beneficial and should be considered in the spatial and temporal context of the wastewater and stormwater improvement projects funded by federal, state, and local sources. Multiple wastewater projects in the Keys would be located closely both spatially and temporally and the cumulative impacts of these facilities would be beneficial in terms of improved water quality in the Sanctuary. Improved water quality would in turn enhance marine habitats, and would increase recreation and tourism opportunities.

Multiple wastewater projects in the Keys would be located closely both spatially and temporally and the cumulative impacts of these facilities would be beneficial in terms of improved water quality in the Sanctuary.

Due to construction activities, minor cumulative adverse impacts to protected species or protected habitat, terrestrial habitat loss, or both, may occur, depending on the locations of the individual projects. Appropriate measures would be taken to minimize or mitigate for these impacts at the individual project level. Implementation of multiple FKWQIP projects would not have a cumulative environmental justice impact, since each community's financial impact would be limited to its individual project.

While there is an overall trend to balance development and resource protection, development trends continue to pressure south Florida. These trends include increased development within the constraints of ROGOs, transportation corridor widening, and changes in land uses from trailer parks to single family homes and multi-family units. Consequently, this cumulative impacts analysis addresses the affects of the proposed FKWQIP projects in the context of larger trends in south Florida, including the Comprehensive Everglades Restoration Plan (CERP), anticipated development, as well as other wastewater improvement projects. Issues and potential impacts are outlined in Table 4-5 and described below.

CERP. Importantly, the Islamorada WWTF and other proposed FKWQIP projects are consistent with the efforts of the CERP, and in combination with the CERP, would cumulatively benefit the restoration, protection, and preservation of water resources in south Florida. The CERP covers 16 counties in central and south Florida, including the Everglades and the Keys, addresses water quality through the multi-step Everglades Construction Project, and also focuses on species diversity and habitat protection.

Cumulative adverse impacts to water quality and habitat would be greatest under the *No Action* alternative due to the continued discharge of inadequately and untreated wastewater into the shallow aquifer, canals, and nearshore waters in the service area and in the Keys in general. Under the *No Action* and *Alternative Funding Sources alternatives*, the conservation of relatively larger, contiguous habitats would be unlikely in the absence of regional planning and facilities. In contrast, conservation of sensitive lands would be more likely as part of a regional plan under the *Proposed Action*. Cumulative adverse impacts to water quality would be reduced under the *Proposed Action* as a result of reduced discharges of nutrients, suspended solids, and pathogenic organisms into the aquifer, canals, and nearshore waters of the Keys.

Urban Growth and Development. Cumulative adverse impacts of urban development include increased impervious surface and stormwater runoff and fragmented habitat. Adverse cumulative impacts of wastewater loads, although stormwater runoff and habitat fragmentation are not expected to change as a direct result of the proposed project, would be reduced under the *Proposed Action* and *Alternative Funding Sources* due to improved wastewater treatment.

Although the proposed Islamorada WWTFs, as well as other FKWQIP projects, would support and facilitate planned growth, they would not induce growth and no specific future development activities are currently identified that would not proceed without the proposed project. The

FKWQIP is consistent with Monroe County ROGOs developed to control growth and maintain a high standard of living while protecting remaining natural resources. ROGOs are based on several conditions, including hurricane evacuation times, public safety, and environmental needs (including water quality and habitat protection). FKWQIP implementation would not increase permit allocations and would not contribute to or support floodplain development beyond that which is already planned. Cumulative adverse impacts to land use and planning in the Keys are not anticipated under any of the alternatives.

Ecological Habitats and Protected Species. Beneficial cumulative affects of the proposed wastewater improvement projects on marine biological resources are anticipated due to reduced nutrient and pathogen inputs and subsequent improvement in quality of groundwater, surface water, and nearshore waters, as discussed in Sections 3.3 and 3.4 of this Final EA.

Under the *Proposed Action*, approximately 0.35 acres of low quality hardwood hammock habitat would be eliminated. In combination with other development in the Village of Islamorada service area, this would result in minor negative cumulative impacts to terrestrial biological resources. However, mitigation measures would reduce the net loss of hammock habitat. In addition, mitigation will include plantings of wild lime and torchwood, both of which are food sources of the federally listed Schaus swallowtail butterfly, and will therefore enhance on-site conditions for the butterfly. Other habitat and special status species cumulative impacts mitigation measures include: USFWS review of Monroe County Building Permits would occur through a formal consultation for ESA compliance; avoidance of development in Tier I (Conservation, Restoration, Protection) and Tier II Transition; Reduce Sprawl) lands; and target Tier III lands (Redevelopment, Infill Development) for development.

Cultural Resources. Cumulative impacts to cultural resources are not anticipated as a result of the *Proposed Action* because federally funded actions would include coordination and review of projects at the state (SHPO) and local (Monroe County Historic Preservation Society) levels. Under the *No Action* alternative, projects would not be reviewed for potential impacts to cultural resources and cumulative impacts to these resources would be anticipated. Potential affects on cultural resources and potential cumulative affects on historic and cultural resources may occur.

Table 4-5
Potential Cumulative Impacts as a Result of the Proposed Wastewater Improvement Projects

Issue	No Action: No Federal Funding for FKWQIP	Proposed Action/ Alternative 2: Implementation of FKWQIP	Alternative 3: Alternative Funding Sources
Water Quality			
Nutrients	Cumulative increases in nutrient loads to soils, aquifer, canals, and nearshore waters that reduce water clarity and may adversely impact offshore coral reefs.	Anticipated nutrient reductions are 69 and 73 percent in TN and TP loadings, respectively, using AWT. Post-treatment nutrient levels may pose ecological risks for surface water, but cumulative reductions in nutrients are anticipated. Deep well injections are not expected to migrate quickly to the nearshore waters.	Cumulative water quality (WQ) benefits, similar to Alternative 2, except that there may be delays in improvements until alternative funding is required, as well as less affective implementation due to fragmented approach.
Bacteria, viruses, pathogens	Potential long term and cumulative adverse impacts to human and ecological health in absence of wastewater disinfection and treatment and continued discharges of untreated or inadequately treated effluent.	Cumulative improvements in WQ in soils, canals, and nearshore waters, and possibly offshore marine waters anticipated due to combined wastewater and stormwater improvements throughout the Keys as well as the CERP.	
Metals, organics	Potential release from aquifer matrix and discharge into nearshore environment via SGD due to injected freshwater effluent. However, no tracer studies available for evaluation..	Unknown, but potential release from aquifer matrix due to interaction of injected freshwater effluent with saline aquifer and subsequent discharge into nearshore environment is possible.	
Overall risk to human health	No USDWs, therefore no risk to potable water supplies. However, cumulative adverse impacts to soils, canals, and nearshore waters. Potential non-compliance with 2010 treatment standards.	No USDWs present. Also, proper siting, construction, and operation restrict fluid movement and physically isolate potential stressors, In all cases, the risk would be further reduced with disinfection and treatment to AWT standards.	
Habitat and Protected Species			
Protected species	Continued cumulative decrease in habitat for protected species anticipated due to habitat loss and fragmentation, within constraints of county regulations.	Cumulative loss of habitat associated with construction of projects, although minor. Coordination with federal, state, and local agencies will ensure avoidance, minimization, and mitigation.	Cumulative habitat loss, as in Alternative 2, but impacts greater when compared with other alternatives due to less centralization, greater habitat fragmentation.
Hardwood Hammock	Continued cumulative loss and fragmentation of hammock under existing county regulation (20 percent clearing of properties permitted with replacement of trees and removal of non-native species).	Short term cumulative reduction in amount of hardwood hammock, however, conservation areas will decrease fragmentation and guard against future losses that may occur, consistent with county regulations.	
Growth and Development Requirements			
Land Use	Existing land uses may be inconsistent with future conservation areas and may be incompatible with adjacent resource protection efforts.	Cumulative increase in conservation lands, consistent with future land uses. Proposed projects are outside existing conservation areas, e.g. CARL and CBRS units, therefore adverse impacts to these lands are not anticipated. No cumulative impacts in combination with CERP, Comprehensive Plans.	Cumulative increases in development and impervious surfaces, similar to other alternatives, consistent with ROGO. Multiple projects could result in multiple road closures and subsequent

Table 4-5
Potential Cumulative Impacts as a Result of the Proposed Wastewater Improvement Projects

Issue	No Action: No Federal Funding for FKWQIP	Proposed Action/ Alternative 2: Implementation of FKWQIP	Alternative 3: Alternative Funding Sources
Future Development	New development would remain limited by existing ROGOs. Existing residences and businesses would continue to operate without centralized WWTFs. Would not comply with 2010 Treatment Standards.	Consistent with Monroe County ROGO and Floodplain Ordinance. Would facilitate planned growth, but would not induce growth and no specific future development activities are currently identified that would not proceed without the proposed project.	impacts to tourism. Also, adverse impacts more likely due to less coordination with state and federal agencies and larger number of smaller, less centralized facilities and greater disruption of existing or proposed land use plans
Water Use	No impacts to potable water supplies. Little change in number of EDUs to be treated anticipated.	No impacts to potable water supplies. Changes in land use, e.g. from trailer park to multi-family residential, may change EDU volumes and improve connection/treatment efficiency.	
Impervious surfaces	Continued cumulative increase in impervious surfaces, as permitted under County regulations, and commensurate nutrient and pathogen loadings to canals, surface waters, and shallow aquifer.	Cumulative increases in impervious surfaces, as permitted under County regulations. However, cumulative improvements in treatment of associated stormwater runoff anticipated.	
Cultural Resources	No state and federal coordination required and disturbance and/or removal of cultural resources during construction and development activities could occur.	Increased protection due to compliance with state and federal agencies during construction and development activities.	
Tourism Economy			
Recreation	Continued health advisories and beach closings, and subsequent decreases in beach visitors, potential for adverse cumulative impacts to related economy. Loss of recreational opportunities under some scenarios.	Cumulative improvements to tourism and related economy due to reduced numbers of health advisories and beach closings. Improved fisheries. Cumulative affects of strong tourism on the Keys economy would be positive, with a commensurate increase in demand for goods and services.	Similar to Alternative 2, with potential delays until funding is acquired.
Environmental Justice			
Minority and Low Income	No impacts beyond those presently occurring.	Cumulative WQ improvements would benefit all demographics. Cost may pose economic hardships in some municipalities and, to help local municipalities address low income and fixed income issues, approaches have been proposed to assist with the capital costs associated with 2010 treatment standards compliance. Cost may pose economic hardships in some municipalities.	Overall impacts to employment, income, population and housing would be minor. Short-term construction gains would be greater due to larger number of facilities being constructed.
Economy	Short-term economic gains from construction activities. Long-term gains dependant on intensity of development.	Both short-term and long-term beneficial economic affects would be expected from project construction, although minor.	

4.19 Irreversible and Irretrievable Commitment of Natural and Depletable Resources

Construction of the Village of Islamorada project may irreversibly impact 0.35 acres of hardwood hammock that would, however, be mitigated through restoration actions described previously. The proposed facility is necessary to address nutrient and other pollutant loading to the nearshore waters of the Keys and improve water quality in the Sanctuary.

Resources committed as a result of the proposed projects would include local, state, and federal funding to purchase lands and labor as well as energy and project materials to build, operate, and maintain each individual wastewater or stormwater improvement project.

4.20 Unavoidable Adverse Environmental Impacts

The Village of Islamorada WWTFs would be constructed on sites on Plantation Key, Windley Key, and Lower Matecumbe Key. Fugitive dust from vehicle traffic and earth moving would be unavoidable but temporary and short-term in nature. Temporary disruption of soils is expected from the construction of sewer systems and clearing and grubbing of new WWTF and VPS sites. Unavoidable adverse environmental impacts would also include the loss of the existing habitat in the footprint of the WWTF. Mitigation for these impacts is addressed in Section 4.5.

No historic or archeological sites are documented to occur on the proposed WWTF sites. The protection of potentially occurring cultural, archaeological, and historical resources is ensured via major federal laws including the NHPA, ARPA, NAGPRA, and AIRFA of 1978. In addition, the SHPO, relevant tribal historic preservation officers, and if necessary, the Advisory Council on Historic Preservation, would review and comment on a *Proposed Action*.

4.21 Indirect Affects

Substantial environmental benefits are anticipated due to indirect affects of the proposed project on physical, human, and biological environments, primarily due to improved water quality in nearshore waters of the Sanctuary. The only identified negative indirect consequence of program implementation is increased potential growth as a result of constructing centralized sewer and wastewater treatment systems. However, a number of local ordinances regulate growth, both for private residences and new businesses. Advocates for property rights are very active in the Keys and support continued growth and development of private property. Changes to the rate of growth and building permit allocation system are at the discretion of the Village of Islamorada Council, Monroe County Board of County Commissioners (BOCC) and the FDCA.

4.22 Compatibility with Federal, State and Local Objectives

As a result of declining nearshore water quality in the Keys, a number of federal, state, and local laws and regulations have been implemented to improve wastewater management, monitor water quality, assist in financing water quality improvements, and establish new water quality monitoring standards. In particular, the Monroe County 2010 Comprehensive Plan, as well as Florida EO 98-309 and F.A.C. 99-395, mandate that nutrient loading levels be reduced in the marine ecosystem of the Keys by the year 2010. Specific actions include eliminating cesspools,

failing septic systems, and other substandard on-site sewage systems as well as requiring all wastewater discharge be treated to Florida Statutory Treatment Standards. In response to the mandated water quality improvements, a number of master plans have been prepared by Monroe County and municipalities within Monroe County and these have been compiled into the Master List of Projects provided in Appendix C of the PEIS.

The proposed project is part of the FKWQIP and therefore directly supports federal, state, and local objectives for improvement of water quality in the Keys. The program is a direct result of the Act of 2001 that directed the USEPA and the state of Florida to develop a water quality protection plan for the Sanctuary.

4.23 Conflicts and Controversy

Controversial issues associated with FKWQIP are the cost of program implementation, the means of recovering initial capital investment, and the means of generating revenues to support maintenance and operational activities. New urban development in the Keys is limited by the ROGO, consequently the number of new users would increase too slowly to share the cost of new and improved wastewater infrastructure. A significant portion of the population in the Keys is classified as low-income and/or fixed income. Many of the typical measures of affordability are based on median family income which does not adequately reflect the abilities of those least able to afford the capital costs associated with the installation of new treatment systems or connecting to a new public sewer system.

Some users may be subject to the cost of immediate replacement of individual systems as well as future sewer connections. Users with cesspools or septic tanks may be required to replace existing systems with an OWNRS before a public sewer system can be made available to their neighborhood. However, once a public sewer system is available, the user would be required to connect to the public system, adding additional costs to the user. Under this scenario, the user would be required to pay for both an OWNRS and for connection to the sewer system.

The disposal of wastewater effluent into the groundwater through deep well injection and the potential for groundwater contamination is of concern to the public. Most wastewater in the service area remains untreated or inadequately treated. Disinfecting and treating the effluent to AWT standards and disposing of it via deep injection wells is an acceptable alternative. The proposed wastewater improvements for the Village of Islamorada would use shallow well injection (not deep well injection).

The potential for groundwater contamination through deep well injection is of concern to the public. Disinfecting and treating the effluent to AWT standards and disposing of it via deep injection wells is an acceptable alternative. The proposed wastewater improvements for the Village of Islamorada would use shallow well injection (not deep well injection).

There is one centralized wastewater treatment system (currently under construction) in the Village of Islamorada, located on Plantation Key, which will serve the North Plantation Key

service area. There were 59 package plants in the Village of Islamorada service area in 2004, with a total permitted capacity of 0.91 MGD, and an average daily flow of 0.44 MGD (IWMMP Draft 2005). The remainder of the areas has on-site treatment systems such as septic tanks or cesspools.

Average estimated reductions in wastewater loading to nearshore waters in the Keys due to implementation of FKWQIP are on the order of 69 and 73 percent in total nitrogen (TN) and total phosphorus (TP) loadings, respectively, using advanced water treatment (AWT) standards. Reductions in TN, TP, and total suspended solids (TSS) loadings of 85, 79, and 80 percent, respectively, are anticipated for the Islamorada service area as a result of implementing the proposed wastewater improvements.

Another prevailing issue, primarily within the scientific community, is whether the improvement of wastewater treatment and the installation of centralized sewers would improve the health of the coral reef within the Sanctuary. Conflicting scientific evidence would seem to indicate that improving nearshore water quality would, at a minimum, have a positive, albeit indirect, impact on the coral reef. Excessive nutrient loading in nearshore waters of the Sanctuary can only exacerbate historic problems related to coral reef health. Implementing wastewater treatment projects would alleviate the excessive nutrient loading to estuarine and marine habitats in the Sanctuary to the greatest extent feasible.

4.24 Uncertain, Unique, or Unknown Risks

The Act (2001) was passed with an authorization of up to $100 million to implement the program. To date, however, limited funding has been appropriated for program implementation. Without Congressional appropriation or identification of other funding sources, water quality degradation would continue within the Sanctuary and the Keys would not meet state mandated statutory effluent standards for wastewater treatment systems. Without program implementation, the number or health advisories in beaches and canals in the Keys can be expected to increase. Local municipalities must also identify how they plan to raise the necessary funding to meet the cost requirements (i.e. the 35 percent match required for the non-federal sponsor).

4.25 Energy Commitments and Conservation Potential

Implementation of the *Proposed Action* would result in the expenditure of energy resources to construct treatment facilities, pump stations, and central sewers. These energy resources would include fuel for construction vehicles and equipment. Once the facilities are built and placed into operation, there would be an increase in energy demands to operate the treatment and pump stations. Energy available within the service area is adequate to accommodate the minimal increase in energy demand required for the *Proposed Action*. Conservation potential for any of the alternatives would be minimal.

4.26 Relationship between Short-Term Uses and Long-Term Productivity

While water quality improvements in the Sanctuary are anticipated as a result of the proposed project, short-term, or localized, adverse impacts would undoubtedly occur. For example, the

construction of centralized sewer systems throughout the Keys would disrupt local traffic conditions. These construction activities would be sequenced to minimize traffic congestion.

4.27 Environmental Commitments

Habitat and protected species surveys have not been conducted on the proposed WWTF sites, but would be conducted prior to implementation of the project (this is addressed under Sections 4.6 and 4.7 in this document). Appropriate measures would be implemented to minimize adverse affects.

4.28 Compliance with Environmental Requirements

This section of the Final EA addresses compliance with applicable laws and regulations under the *Proposed Action*. All environmental regulatory requirements are being addressed as part of this NEPA documentation, as described in individual sections pertaining to protected species, habitats, wastewater treatment, and other relevant issues.

National Environmental Policy Act of 1969. A scoping letter for the Village of Islamorada WWTF was mailed to federal, state, and local agencies; Native American Tribes; private organizations and interested parties to solicit their views, comments, and information about resources, study objectives, alternatives, and important features within the study area by Scoping Letter dated September 9, 2005. Comments received were reviewed and incorporated in project planning. Early identification of issues was conducted as part of the FKWQIP, of which the Village of Islamorada wastewater project was a component. Scoping, a Notice of Intent to prepare a draft Programmatic EIS, and a draft and final PEIS were all released for the FKWQIP between September 2002 and September 2004.

Environmental information on the Village of Islamorada WWTF project has been compiled and an EA has been prepared and released for public and agency review. The project is in compliance with the National Environmental Policy Act.

Endangered Species Act of 1973. Coordination with the USFWS under Section 7 of the ESA will occur during the NEPA review of the Draft EA. The Draft EA will constitute the Corps' Biological Assessment and Section 4.6 addresses the affects to threatened and endangered species. Section 7 coordination will be completed prior to construction. Because construction activities are terrestrial and there would be no adverse impacts to marine resources, the Corps has determined there would be no affect to federally listed threatened or endangered species or critical habitat under the jurisdiction of National Marine Fisheries Service. No further coordination with NMFS is required. The project will be in compliance with the Act.

Fish and Wildlife Coordination Act (FWCA) of 1958. The FKWQIP PEIS has been coordinated with the USFWS and the protection of sensitive ecological resources, federal land resources, protected species and critical habitat have been addressed in Sections 3.5, 3.6, 4.5, and 4.6 of this Draft EA. Coordination under the FWCA will be conducted during the NEPA review of the Draft EA. This project is in full compliance with the Act.

National Historic Preservation Act of 1966 (Inter Alia) (PL 89-665, the Archeology and Historic Preservation Act [PL 93-291] and Executive Order 11593). A review of the Master Site Files was completed for the proposed WWTF sites and is addressed in Sections 3.9 and 4.9 of this Draft EA. Consultation with the SHPO is on-going and will be completed upon purchase of the properties by the Village of Islamorada).

Clean Water Act of 1972. All state water quality standards will be met. The project is in compliance with this Act. There are no wetlands on the proposed facility sites therefore, a 404 Permit is not required..

Clean Air Act of 1972. The service area is in a Clean Air Act compliance area. No air quality permits would be required for this project. To comply with Section 309 of the Act, this Draft EA will be reviewed by concerned agencies including the USEPA, other stakeholder agencies, and the public.

Coastal Zone Management Act of 1972. A federal consistency determination in accordance with 15 CFR 930 Subpart C has been included in this Draft EA as Appendix A. The consistency review, delegated to the state of Florida, was performed during the public review of this Draft EA. The state has determined that at this stage, the project is consistent with the Florida CZMP.

Farmland Protection Policy Act of 1981. Implementation of the proposed project would not impact any prime or unique farmland. The proposed project is in compliance with the Act.

Wild and Scenic River Act of 1968. No designated wild and scenic river reaches would be affected by project related activities.

Marine Mammal Protection Act of 1972. The West Indian manatee and other marine mammals do occur in the nearshore waters near the proposed WWTF site. No construction work would be conducted in the water. Therefore, project related activities would not result in take as defined by Marine Mammal Protection Act.

Estuary Protection Act of 1968. Implementation of the proposed WWTF and associated infrastructure would decrease or eliminate nutrient and contaminant seepage from cesspools and septic systems within the service area and consequently decrease pollutant loadings into adjacent estuarine habitats. This project is in full compliance with the Act.

Fishery Conservation and Management Act of 1976. The proposed project has been coordinated with the National Marine Fisheries Service and is in compliance with the Act.

Submerged Lands Act of 1953. The proposed project would not occur on submerged lands of the state of Florida. This Act is not applicable.

Coastal Barrier Resources Act and Coastal Barrier Improvement Act of 1990. A review of the Coastal Barrier Resource System (CBRS) maps show that two designated CBRS units lie within the Islamorada service area (FL-39 and FL-40). Construction of the proposed WWTFs and all of the infrastructure and transmission lines needed to convey wastewater to the facilities

will occur outside the boundaries of these CBRS units. The project will be in compliance with these Acts.

Rivers and Harbors Act of 1899. The proposed work would not obstruct navigable waters of the United States. The proposed project is in full compliance.

Anadromous Fish Conservation Act. Anadromous fish species would not be affected. The project has been coordinated with the National Marine Fisheries Service and is in compliance with the Act.

Migratory Bird Treaty Act and Migratory Bird Conservation Act. Migratory birds do not currently use the proposed WWTF site and therefore would not be affected by proposed activities. The project is in compliance with these Acts.

Marine Protection, Research and Sanctuaries Act. The term "dumping" as defined in the Act (3[33 U.S.C. 1402][f]) does not apply to this project. Therefore, the Marine Protection, Research and Sanctuaries Act does not apply to this project.

Resource Conservation and Recovery Act of 1976. A preliminary records search completed for the service area during the preparation of this Draft EA found limited potential for hazardous, toxic or radioactive waste substances to be encountered during implementation of the proposed project. Hazardous waste for this project is addressed under Sections 3.16 and 4.16 of this Draft EA. The project is in compliance.

Toxic Substances Control Act of 1976. No substances regulated under this Act and related laws have been identified in project lands. The project is in compliance.

Magnuson-Stevens Fishery Conservation and Management Act. No adverse affects to Essential Fish Habitat (EFH) are anticipated by implementing the proposed project. Implementation of the proposed WWTFs and associated infrastructure would decrease or eliminate nutrient and contaminant seepage from cesspools and septic systems within the service area and consequently decrease pollutant loadings into adjacent marine and estuarine habitats, therefore benefiting EFH. This Draft EA will be coordinated with the NMFS for concurrence. The project is in full coordination of the Act.

E.O. 11990, Protection of Wetlands. There are no wetlands on the proposed WWTF sites Overall, implementation of the proposed WWTFs and associated infrastructure is anticipated to benefit wetland habitat throughout the service area by decreasing or eliminating nutrient and contaminant seepage from cesspools and septic systems. This project is in compliance with the goals of this Executive Order.

E.O. 11988, Flood Plain Management. The project has been evaluated in accordance with this Executive Order. This project is in compliance.

E.O. 12898, Environmental Justice. Executive Order 12898 requires the Federal Government to achieve environmental justice by identifying and addressing disproportionately high adverse

affects of its activities on minority or low-income populations, and by involving potentially affected minorities in the public coordination process. Environmental justice is specifically addressed in Sections 3.13 and 4.13 of this Draft EA. The project is in compliance with the Executive Order.

E.O. 13089, Coral Reef Protection. This Executive Order applies to coastal projects that might directly or indirectly impact coral reefs. The Executive Order refers to "those species, habitats, and other natural resources associated with coral reefs." This project will not adversely impact coral reefs or coral reef resources and may, in fact, benefit these resources by improved water quality of the nearshore waters adjacent to the service area. The project complies with this Executive Order.

E.O. 13112, Invasive Species. Much of the vegetation within the WWTF footprints consist of non-native invasive species, which will be removed within the immediate footprint as a consequence of construction of the impoundment. Construction equipment will use standard measures to avoid the spread of invasive species. This project will not authorize, fund, or carry out any action that might spread or introduce invasive species. Therefore, this project complies with the goals of this Executive Order.

5.0 Public Involvement

The topics of wastewater degradation in the Sanctuary and the need to reduce nutrient loading in the nearshore waters of the Keys are of particular interest to regulatory agencies and citizens alike. For this reason, public participation throughout the previously prepared PEIS included actions by the Corps to accomplish the goals listed below.

- Comply with the intent of NEPA and other applicable statutes
- Solicit and address public and agency opinions during this process
- Document the process and characterize the project accurately

5.1 Public Involvement for Master Plans

As described in Chapter 1, the Corps did not undertake planning activities to delineate alternatives in this Final EA, but rather relied upon results of planning initiatives of Monroe County municipalities. Thus, it is important to recognize the extensive public outreach and involvement associated with these efforts.

Public involvement was an integral component of the Monroe County wastewater planning process and the development of the MCSWMP. Public involvement activities conducted as part of this master plan included over 30 meetings with key stakeholders and the public, hosted by the FKAA and the County between 1998 and 2000. Public forums in the Upper, Middle, and Lower Keys were held to allow key stakeholders and interested citizens of Monroe County the opportunity to participate in, and influence, the outcome of the Master Plan. Interaction with the public throughout the development process significantly assisted in the development of the contents of the Master Plan. Numerous public involvement efforts were implemented as part of the Master Plan development process and are outlined below.

- Public forums and workshops
- Meetings with civic, business, and environmental groups throughout the Keys
- Preparation and distribution of project fact sheets and brochures
- Media coordination
- Production of two videos
- Development of a project web site

Interested citizens and key stakeholders directly influenced the development of the decision and evaluation processes, identified key issues to be addressed, and defined the elements of the wastewater master plan guiding Monroe County to achieve compliance with the Florida Statutory Treatment Standards of 2010. Comments provided by participants generally expressed concerns regarding:

- Implementation costs
- Extent of improved water quality
- Implementation approaches
- Alternative wastewater conveyance/treatment technologies
- Measure of project performance
- County responsiveness to public input

5.2 Public Involvement for PEIS

Applicable regulatory agencies, affected stakeholders, and interested members of the Keys community have been provided opportunities to participate in the decision-making process during the development of this Final EA. The Notice of Intent (NOI), scoping letter, and the responses to the scoping process can be found in Appendix G of the PEIS. A public meeting was held in Marathon, Florida, on February 27, 2003 to solicit comments and input on issues to be addressed during the NEPA documentation process. Issues raised at this public meeting are listed below.

- Need for federal funding to support wastewater infrastructure development in the Keys
- Engineering and environmental issues associated with specific projects
- Cost of implementing wastewater improvements to residents of the Keys

5.3 Scoping and Public Involvement for Village of Islamorada EA

A scoping letter was issued to various stakeholders and interested parties on September 9, 2005, and comments were received through October 10, 2005. Copies of the Draft EA were mailed out on February 16, 2006, to numerous local, state and Federal agencies, private interest groups, and interested public for review and comment. Public libraries in the project area were provided copies to maintain in their reference sections for public review. The Draft EA was also posted on the www.evergladesplan.org for web viewing. The comment period ended on April 3, 2006. Comments received during the review period were considered in preparing the Final EA. Comment letters received during the scoping process and review of the Draft EA, as well as other pertinet correspondence, are included in Appendix C of this Final EA.

6.0 Conclusion

This Final EA provides the basis for examining and evaluating potential environmental impacts of the proposed Village of Islamorada regional WWTFs on the physical, biological, and human environment in the Sanctuary. Three project alternatives were evaluated as part of this Final EA, premised on the need to implement water quality improvement projects that would reduce nutrient loadings to nearshore waters and result in commensurate improvements in water quality of the Sanctuary. The three alternatives are briefly summarized below.

- ***Alternative 1: No Action.*** No state or federal agency would provide funding to the KLWTD for implementation of wastewater treatment improvement projects to address state mandates to meet wastewater treatment standards. Public entities would not construct or operate the WWTF. Village of Islamorada residents, communities, and businesses would be responsible for addressing state mandates aimed at improving water quality in the Sanctuary.
- ***Alternative 2: Proposed Action.*** Provide federal financial and technical assistance from the Corps, as part of the FKWQIP to develop and implement a regional wastewater collection and treatment systems for the Village of Islamorada that would address mandatory state wastewater treatment standards.
- ***Alternative 3: Pursue other Sources of Funding for Project Implementation.*** In the absence of federal funding from the FKWQIP through the Corps, alternative funding sources would be pursued to implement projects for the Village of Islamorada that would address state mandates and improve water quality in the Sanctuary. Sources of monies may include other federal and state funding mechanisms.

The preferred alternative, based on an analysis of potential environmental impacts associated with each alternative discussed in detail in Chapter 4, is the *Proposed Action* (Alternative 2), under which regional WWTFs would be constructed to serve the Village of Islamorada service area. The WWTFs are designed to reduce nutrient loading to nearshore waters and subsequently improve water quality in the Sanctuary.

Importantly, the Corps' previously developed FKCCS model provided a means of quantifying the affects of wastewater improvement projects, specifically the reductions in nutrient loads, in the Village of Islamorada service area. To apply the FKCCS model specifically for FKWQIP projects, an independent contractor from the team who originally developed the FKCCS model coordinated with and assisted the South Florida Regional Planning Council in running the model specifically for this project. Improved treatment technology is anticipated to reduce TN, TP, and TSS loads by an estimated 85, 79 and 80 percent, respectively. The use of federal funds to assist in the construction of the WWTF is the best means to reduce this nutrient source and protect the Sanctuary.

Most of the residents and businesses in the Village of Islamorada are connected to septic tanks and outdated on-site package plants that, if not properly operated, can result in harmful bacteria and nutrient inputs to nearshore waters. Under the *No Action* alternative, wastewater inputs and commensurate water quality degradation of the Sanctuary would continue. As a result, businesses, property owners, and residents of Village of Islamorada may risk non-compliance

with federal and state regulatory treatment standards for wastewater. Under *Alternative Funding Sources*, federal funding would be unavailable and the Village of Islamorada would pursue alternate funding for water quality improvement projects. Consequently, project implementation, management, and expenditures would be less affective.

The *Proposed Action* addressed by this Final EA is the construction of three centralized wastewater treatment systems to service residents and commercial businesses located in the Village of Islamorada, Florida. All three of the WWTFs would use Immersed Membrane Bioreactor (IMB) technology, which is a common type of extended aeration process capable of meeting the Monroe County effluent standards. This technology is considered appropriate for the Village of Islamorada because land use and sludge handling are reduced, and IMB systems are able to operate over a range of influent flow rates, which is important in consideration of the Village of Islamorada's seasonal fluctuations in population and tourism. The anticipated plant capacities are less than one million gallons per day (MGD), so all of these WWTFs will use shallow well injection for effluent disposal.

- Meet objectives of the Act
- Address regional water quality issues
- Achieve reductions in nutrient loadings and commensurate improvement in water quality in the nearshore waters of the Sanctuary associated with the Village of Islamorada service area
- Comply with federal and state regulatory water quality treatment standards in a timely manner

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9.0 Glossary of Terms

Adsorption. Adhesion of molecules of gases or of ions or molecules to the surfaces of solid bodies with which they are in contact.

Advanced Wastewater Treatment (AWT). Also known as **tertiary treatment**, AWT follows Secondary Treatment. Removal of soluble nitrogen and phosphorus compounds is a common application of AWT. AWT may involve chemical addition, filtration, or activated carbon processes. As referred to in the MCSWMP, effluent treated to AWT standards meets 5 mg/L BOD, 5 mg/L TSS, 3 mg/L TN, and 1 mg/L TP.

Anthropogenic. Relating to humans and their impact on the natural environment.

Benthic Algae. Algae relating to the bottom of a water body.

Best Available Technology (BAT). The level to which wastewater treatment systems are designed. As referred to in the MCSWMP effluent treated to BAT standards that 10 mg/L BOD, 10 mg/L TSS, 10 mg/L TN, and 1 mg/L TP.

Best Management Practices (BMP). A set of minimum practices developed and implemented to improve the physical, chemical, and biological integrity of the nation's waters. Examples include installation of silt fencing at a construction site to prevent eroded soils from entering a nearby waterway.

Biochemical Oxygen Demand/Biological Oxygen Demand (BOD). The oxygen that is needed and used by aerobic organisms living in water that is rich in organic material (such as waters polluted by sewage).

Boulder Zone. A very permeable, cavernous zone in the lower Floridian Aquifer System that is about 2800 to 3300 feet below ground surface.

Calcareous. Containing calcium carbonate. As applied to rock, the predominant percentage of the rock is calcium carbonate.

Cesspool/Cesspit. An unregulated and unpermitted effluent disposal method that consists of an excavated area (100 to 1000 cubic feet, to eight feet deep) into the ground surface. The area is covered with a slab of concrete, and untreated sewage is then deposited into the pit. Liquid wastes are discharged through the porous limestone formations and ultimately to the nearshore areas. Solid wastes are retained in the pit, which is often abandoned after it becomes full.

Class B Lime Stabilization. The process used to reduce harmful bacteria and odors in sludge or biosolids. Lime is added to untreated sludge in sufficient quantity to raise the pH to 12 or higher. The high pH creates an environment that is not conducive to the survival of microorganisms. Class B Lime Stabilization refers to the USEPA classification for the safe treatment, beneficial use, and disposal of biosolids that contain pathogen concentrations levels low enough for some beneficial uses, such as land application with restrictions.

Class I Injection Well. The first of five well classifications developed by the U.S. Environmental Protection Agency under their underground disposal control program to categorize the injection of various types of liquid wastes. Class I wells are typically used by hazardous waste generators and operators, as well as industrial and municipal disposal systems, to inject fluids into a geologic formation that is beneath the lower-most formation containing an underground source of drinking water within one quarter mile of the well bore. A Class I Well must meet siting, construction, operation, and maintenance criteria specific to this well class, as established by the U.S. Environmental Protection Agency and the Florida State regulating agency.

Class V Injection Well. Similar to a Class I Injection Well, the U.S. Environmental Protection Agency established this well category for a broad range of specialty applications to dispose liquid wastes, which are not categorized under the other four injection well classes. For example, a Class V well could be used to drain stormwater runoff into an aquifer.

Cluster System (of OWNRS). An OWNRS that serves multiple homes. Clusters can be composed of small groups (such as two homes), which share one treatment system, or of large groups (50 homes), which use low-pressure sewers to connect the cluster to a centralized OWNRS.

Effluent. The waste stream from a wastewater treatment system collection unit.

Enteric. Relating to the intestines. Over 100 different human enteric pathogens, including viruses, parasites, and bacteria may be found in municipal wastewater and surface runoff.

Enterococci. A bacterium whose presence indicates Fecal Coliform.

Environmental Impact Statement (EIS). A public document prepared pursuant to NEPA containing a detailed analysis and evaluation of all the impacts of a proposed major federal action and all its reasonable alternatives that has the potential to significantly affect the quality of the human environment. This is a more rigorous analysis than an Environmental Assessment and provides for formal public involvement.

Epiphyte. A plant growing on another plant but getting little nutrition from its host.

Equivalent Dwelling Unit (EDU). A household of 2.3 persons generating about 168 gallons of effluent per day.

Eutrophication. The process by which a body of water becomes nutrient -rich and oxygen-deficient.

Executive Order (EO). A Presidential mandate that directs a federal agency to consider certain issues as an agency plans their actions. For example, former President Jimmy Carter directed all agencies to “minimize the destruction and loss or degradation of wetlands” under EO 11990, “Protection of Wetlands.”

Facility Siting. The process of determining the best location for a treatment facility. The siting decision model resembles an organization chart, and is broken into three levels. At the top level is the principal project objective of maximizing facility siting benefits. The second level lists a series of key issues that were identified by the stakeholder groups and the third level presents a series of performance criteria that measure how well a specific alternative will accomplish program objectives.

Fecal Coliform. A bacterium used as an indicator of total sewage biological contamination.

Florida Statutory Treatment Standards. Quality standards for discharged wastewater effluent as promulgated in F.A.C. 99-395. Treated effluent generated by sewage facilities with design capacities greater than 100,000 gpd must meet 5 mg/L TP. Sewage facilities with design capacities less than 100,000 gpd must meet 10 mg/L BOD, 10 mg/L TSS, 10 mg/L TN, and 1 mg/L TP. On-site sewage treatment and disposal systems must meet 10 mg/L BOD, 10 mg/L TSS, 10 mg/L TN, and 1 mg/L TP.

Gravity Sewers. Gravity sewers are sewer lines that "run with the lay of the land" and may be variable-grade effluent sewers (VGES), minimum grade effluent sewers (MGES), or septic tank effluent pump (STEP) sewers. The pipe system works like a sink trap through the low sections. VGES is designed to assure that the hydraulic grade line is below all septic tank outlets by increasing pipe sizes as required to lower the hydraulic grade line. MGES sewer lines generally run constantly downhill, but with no solids to transport, no set minimum velocity must be maintained and the line is much easier to lay than conventional gravity sewers. Septic tank outlets must be above the hydraulic grade line for both VGES and MGES. STEP sewers have septic tank outlets below the hydraulic grade line, so a pump is required to move effluent through the sewers. Since wastewater is pumped, line grade is irrelevant, making STEP sewers very easy to lay. The system may be designed with a pump tank at the outlet of each septic tank, or flow from several septic tanks may be routed through effluent gravity sewers to a collective pump tank.

Hydraulic Communication. Water movement from one area to another (such as from the Boulder Zone to the ocean).

Hydraulic Conductivity. An aquifer's water transmission rate; similar to transmissivity.

Hydraulic Head. The driving force influencing groundwater movement, water's total energy at a given location.

Injection Well (shallow and deep). An underground well designed to pump treated effluent (or other materials) into shallow (e.g., 90 feet) or deep (e.g., 2,100 feet) geologic locations. Injection wells are designed to account for physical and chemical characteristics of the injection matrix, and require monitoring to ensure mechanical integrity of the well.

Lithologic. A rock's descriptive characteristics, including color, structure, mineral composition, and grain size.

Median Family Income (MFI). As defined by the U.S. Census Bureau, refers to the income of a family where a family is defined as two or more people (one of whom is the householder) related by birth, marriage, or adoption residing in the same housing unit.

Median Household Income (MHI). As defined by the U.S. Census Bureau, refers to the income of a household where a household is defined as all people who occupy a housing unit regardless of relationship. A household may consist of a person living alone or multiple unrelated individuals or families living together.

Microkarst. Karst features on the scale of millimeters. Karst is a type of landform developed over limestone, dolomite, or gypsum through solution of the rock, typified by closed depressions, caves, and underground drainages.

National Environmental Policy Act (NEPA). A Congressional act established in 1969 that directs all federal agencies to consider the environmental affects of their programs, projects, and funding decisions. NEPA considers the affects on all resources of natural and built environments and includes compliance requirements with all other applicable federal laws, such as the Endangered Species Act and the Environmental Justice Executive Order.

Nearshore Waters. Technically, nearshore waters include the area between mean low tide and the seaward extent of the longshore bar and trough topography; it is approximately equal to the maximum width of the breaker zone. However, in the Keys and most of Florida, nearshore waters are the narrow band of waters that form the mixing zone of freshwater terrestrial runoff and saline ocean waters. The Carrying Capacity Model uses a width of 500 meters, others have defined nearshore as < 1 km from shore.

Norwalk Virus. Norwalk viruses (and related caliciviruses) are important causes of sporadic and epidemic gastrointestinal disease in the United States, and have typically been associated with eating contaminated shellfish. Water and ice are other sources of infection. Symptoms of Norwalk virus infection include nausea, vomiting, diarrhea, headache, low-grade fever, and abdominal cramps. Persons with this infection usually recover within 2-3 days without serious or long-term health affects.

Offshore Waters. Offshore waters include the generally flat area extending from the seaward edge of the breaker zone to the edge of the continental shelf (Davis 1972). However, in the Keys, offshore waters extend beyond the nearshore waters where mixing of freshwater and saline waters is not significant.

Oligotrophic. A body of water that is nutrient-poor.

On-Site Wastewater Nutrient Reduction System (OWNRS). An on-site wastewater treatment system that meets a minimum level of BAT treatment, or 10 mg/L BOD, 10 mg/L TSS, 10 mg/L TN, and 1 mg/L TP.

On-Site Wastewater Treatment System (OWTS). Any of several wastewater treatment types that are located on the property they serve. Examples include septic systems, cesspools, aerobic treatment units (ATU), and On-Site Wastewater Nutrient Reduction Systems (OWNRS).

Oolites. Rocks consisting mostly of small, spherical calcium carbonate grains.

Operation and Maintenance (O&M) Costs. These include the monthly or annual costs incurred by service recipients for long-term operation and maintenance of the wastewater management system.

Permeability. The capacity of porous material to transmit water or other fluid. In bedded sediments, horizontal permeability is measured parallel to the bedding direction, and vertical permeability is measured transverse to the bedding.

Phytoplankton. Plant plankton, which float or weakly swim, are often microscopic (e.g., many algae species), and are the primary food source in most aquatic and marine ecosystems.

Primary Treatment. The first level of wastewater treatment that removes solids, greases, oils and other floatable solids from the waste stream, partially clarifying the effluent. Suspended solids, dissolved organic materials, and other pollutants are not removed from the effluent.

Programmatic Environmental Impact Statement (PEIS). A concise public document prepared pursuant to NEPA. It contains sufficient analysis to determine the likely significance of a group of similar *Proposed Actions* (projects) and alternatives' impacts, to aid decision making. A project- and site-specific affects evaluation document supplements the PEIS, generically called a Supplemental NEPA documentation.

Protected Species. In this document, protected species refers to any plant or animal that has been designated as threatened or endangered, species of special concern, or who's designation as threatened or endangered is encouraged, by the federal government (under the Endangered Species Act) or the state of Florida. The purposes of the Endangered Species Act is to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species, and to take such steps as may be appropriate to achieve (these purposes).

Readiness to Proceed Criteria. These criteria were prepared to "define when a recipient is eligible to receive a percentage of their share of any federal or state appropriation for wastewater and stormwater improvements authorized under the Act of 2001." Readiness to proceed occurs when all planning (including the selection of sites and wastewater/stormwater systems to be implemented, reclaimed water evaluation, and financing) are complete. This means that sites are established as available for the intended purposes, public participation is documented, and construction (design/build/operate or design/build) or a construction contract is either executed or authorized for execution by the project sponsor's governing body.

Scoping Issues. "Scope" consists of the range of actions, alternatives, and impacts to be considered in an EIS. To determine the scope of an EIS, agencies shall consider 3 types of actions (connected, cumulative, and similar), three types of alternatives (*No Action*, other reasonable courses of action, and mitigation measures), and three types of impacts (direct, indirect, and cumulative).

Secondary Treatment. Used in concert with Primary Treatment. This second level of treatment removes dissolved organic materials and more suspended solids, however nutrients such as nitrogen and phosphorus remain in the effluent.

Septic Tank. An OWTS using a tank and drainfield to capture waste, separate solids from liquids, and drain liquid to adjacent soils.

Significantly. In the NEPA context, this term is used to describe both the context and intensity (severity) of impacts. For a detailed description of this term, see Section 1508.27 of the President's Council on Environmental Quality's regulations implementing NEPA.

Slurry. Mixture of coarsely ground solids and liquid.

Specific Gravity. Ratio of a given mass to the mass of an equal volume of water at a specified temperature.

Stakeholder. The stakeholder on any issue represents the parties or individuals that the expert source or sources believe are trying to shape the resolution of the issue(s) in question.

Submarine Groundwater Discharge. The discharge of groundwater directly into marine waters is called submarine groundwater discharge (SGD).

Supplemental NEPA Documentation. A generic phrase used herein for referencing the site- and project-specific NEPA document that would be prepared following issuance of a final PEIS. This document would be either an environmental assessment or environmental impact statement depending on the significance of the specific project impacts.

System Capital Costs. These include expenses associated with planning, designing, engineering, purchasing, building, and installing a wastewater treatment system, and its wastewater conveyance piping in public rights-of-way and selected effluent disposal method (e.g., injection wells, subsurface drip irrigation system [SDI], reuse).

Tiering. "Tiering" refers to the coverage of general matters in broader EISs with subsequent narrower statements or environmental analyses incorporating by reference the general discussions and concentrating solely on the issues specific to the statement subsequently prepared. Tiering is appropriate when it helps the lead agency to focus on the issues which are ripe for decision and exclude from consideration issues already decided or not yet ripe.

Total Nitrogen/Nitrogen (TN/N). Nitrogen is a common element found in nature and in wastewater. Nitrogen is an essential nutrient for plants, but contributes to water body eutrophication when more abundant. "Total nitrogen" describes nitrogen in four oxidation states: organic nitrogen, ammonia nitrogen, nitrite nitrogen, and nitrate nitrogen. Removal or reduction of TN from wastewater effluent involves nitrification (where organic N and ammonia N are converted to nitrite N, which easily converts to nitrate N) and denitrification (where nitrate N is converted to nitrogen gas).

Total Phosphorus/Phosphorus (TP/P). Phosphorus is a natural element, however most phosphorus enters waterways via human activities (i.e., untreated wastewater or fertilizer runoff). Similar to nitrogen, phosphorus is an essential nutrient for plants, but eutrophication occurs when phosphorus is more abundant. "Total phosphorus" is in organic and inorganic forms and can occur in solution, particles, or micro-organisms (such as polyphosphates, which account for 70 percent of wastewater phosphorus). TP removal or reduction from wastewater effluent typically involves biological treatment (to convert P to the orthophosphate forms), which are then removed via chemical processes.

Total Suspended Solids (TSS). TSS are solids in water, such as silt, decaying plant and animal matter, and sewage that can be trapped by a filter. High concentrations of suspended solids can cause many problems for water body health and aquatic life. For example, high TSS can block light from reaching submerged vegetation.

Turbidity. A measure of the water clearness as a function of suspended sediment.

Vacuum Sewer. Sewage flows by gravity from homes into a collection sump. When 10 gallons (40 liters) accumulates in the sump, the vacuum interface valve located above the sump automatically opens and differential air pressure propels the sewage through the valve and into the vacuum main. Sewage flows through the vacuum lines and into the collection tank at the vacuum station. Sewage pumps transfer the sewage from the collection tank to the WWTF or nearby gravity manhole. There are no electrical connections required at the home. Power is necessary only at the vacuum station.

Wastewater Treatment Facility (WWTF). An effluent collection, treatment, and disposal system that collects waste from homes and businesses, and transports collected waste through a series of sewers to a centralized treatment plant. Physical, chemical, and biological processes clarify the effluent at the WWTF so that the treated water can be safely released into the environment via water reuse, deep or shallow well injection, or other permitted methods.

Water Quality Cold Spots. Defined as areas where on-site systems will continue to operate. Cold Spots fall into two categories: 1) properties with unknown systems that must replace or upgrade their systems immediately with an on-site wastewater nutrient reducing system (OWNRS) by July 12, 2003 and 2) properties that currently have permits for their on-site systems and will not be required to upgrade or replace them until 2010, when all on-site systems must be upgraded or replaced with nutrient reduction OWNRS to meet the regulatory effluent limits.

Water Quality *Hot Spots.* These areas have been identified as sites of known or suspected water quality degradation, based upon workshops and discussion groups. The list was increased to 88 *hot spots* in 1996, primarily as a result of water quality issues and wastewater influences. *Hot spot* locations correspond with higher-density urban areas, representing neighborhoods and subdivisions with the poorest sewage treatment and strongest need for central sewage facilities.

Water Reuse (or reclamation). Treatment and management of municipal, industrial or agricultural wastewater to produce water of suitable quality for additional beneficial uses.