

September 2006

Florida Keys Water Quality Improvements Program

Program Management Plan (Final)



**U.S. Army Corps of Engineers
Jacksonville District**



South Florida Water Management District

FLORIDA KEYS WATER QUALITY IMPROVEMENTS PROGRAM

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List of Acronyms

List of Acronyms

The following section references acronyms contained in this PMP and acronyms that may be used in future development of this document.

ATU	Advanced Treatment Unit
AWT	Advanced Wastewater Treatment
BAT	Best Available Technology
BCC	Board of County Commissioners
bls	Below Land Surface
BMPs	Best Management Practices
BOD5	Biochemical Oxygen Demand
CCAM	Carrying Capacity Analysis Model
CEQ	Council on Environmental Quality
CERP	Comprehensive Everglades Restoration Plan
CFR	Code of Federal Regulations
Corps	U.S. Army Corps of Engineers
CWA	Clean Water Act
DBOWMS	Design/Build/Operate Wastewater Management System
DCIA	Directly Connected Impervious Area
EA	Environmental Assessment
EDU	Equivalent Dwelling Unit
EIS	Environmental Impact Statement
ENRCCI	Engineering News Record Construction Cost Index
EPA	Environmental Protection Agency
FAS	Floridan Aquifer System
FBFK	Florida Bay and Florida Keys
FDEP	Florida Department of Environmental Protection
FEMA	Federal Emergency Management Agency
FKAA	Florida Keys Aqueduct Authority
FKTR	Florida Keys Tidal Restoration
FKWQIP	Florida Keys Water Quality Improvements Program
F.L.	Florida Law
FONSI	Finding of No Significant Impact
FY	Fiscal Year
gpd	Gallons per Day
gpm	Gallons per Minute
IGTF	Intergovernmental Task Force
ITR	Independent Technical Review
KCA	Kisinger, Campo and Associates Corp
Keys	Florida Keys
KLWTD	Key Largo Wastewater Treatment District
MCSMMP	Monroe County Stormwater Management Master Plan
MCSWMP	Monroe County Sanitary Wastewater Master Plan
Memorandum	Plan Formulation Memorandum
mgd	Million Gallons per Day

List of Acronyms

mg/l	Milligrams Per Liter
MM	Mile Marker
MOU	Memorandum Of Understanding
NEPA	National Environmental Policy Act
NOI	Notice of Intent
O&M	Operation & Maintenance
OMRR&R	Operation, Maintenance, Repair, Rehabilitation and Replacement
OWNRS	On-site Wastewater Nutrient Reduction Systems
PCA	Project Cooperation Agreement
PDT	Program Delivery Team
PEA	Programmatic Environmental Assessment
PEIS	Programmatic Environmental Impact Statement
PIG	Program Implementation Guidance
PMP	Program Management Plan
Program	Florida Keys Water Quality Improvements Program
QC/QA	Quality Control / Quality Assurances
RFP	Request for Proposal
ROD	Record of Decision
Sanctuary	Florida Keys National Marine Sanctuary
SFWMD	South Florida Water Management District
TMDLs	Total Maximum Daily Loads
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
USGS	U.S. Geological Survey
WWTP	Wastewater Treatment Plant

1.0 Introduction

1.0 INTRODUCTION TO FLORIDA KEYS WATER QUALITY IMPROVEMENTS PROGRAM

1.1 Program Description

The Florida Keys (Keys) are a chain of islands extending from the southern tip of the Florida mainland southwest to the Dry Tortugas in portions of both Miami-Dade and Monroe counties. Among the many conservation areas in the Keys are Biscayne National Park, several National Wildlife Refuges, and the Dry Tortugas National Park, all of which are encompassed within the larger Florida Keys National Marine Sanctuary (Sanctuary) (Figure 1-1). The Sanctuary includes 2,800 square nautical miles of nearshore waters that are part of a complex ecosystem that also includes seagrass meadows, mangrove islands, and the only living barrier coral reef in North America. Consequently, water quality is critical to maintaining the marine ecosystem of the Sanctuary.

As population and tourism in the Keys have increased over the years, improvements in wastewater treatment and stormwater management practices have not kept pace with this growth. Ongoing research has suggested that this trend has resulted in a significant degradation of water quality in canals and nearshore waters surrounding the Keys and that nutrients commonly found in wastewater and stormwater are one of the major contributors to the decline of water quality.

For these reasons, the U.S. Congress has directed the U.S. Army Corps of Engineers (Corps) to assist local municipalities in Monroe County, Florida, with the development and implementation of wastewater and stormwater improvements as part of the Florida Keys Water Quality Improvements Program (FKWQIP or Program). The Program is designed to:

- Reduce nutrient loading to nearshore waters of the Sanctuary
- Improve water quality throughout waters of the Sanctuary
- Meet relevant Federal and State regulatory standards.

The FKWQIP is to be accomplished through the implementation of several wastewater and stormwater master plans that have been prepared, or are in the process of being prepared, for Monroe County and other local municipalities in Monroe County. These plans are designed to provide cost-effective, environmentally sound, and feasible programs for managing pollutants that are now, or have the potential to, adversely impact the water quality of the Keys and the Sanctuary. The FKWQIP is intended to provide the technical and financial assistance for planning, engineering, and construction of wastewater and stormwater treatment improvement projects.

1.2 Program Authorization

Under authority of Public Law 106-554 dated December 21, 2000, (Appendix A) 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 that are owned by public entities. Typically, large programs of this nature are not in accordance with Administration Program priorities (i.e., navigation, flood control or environmental restoration) of the Corps; however, non-traditional projects are also routinely undertaken by the Corps as “work for others.”

1.3 Program Location

The Sanctuary includes 2,800 square nautical miles of nearshore waters that begin just south of Miami, Florida and extend to the Dry Tortugas (Figure 1-1). The Sanctuary is part of a complex ecosystem that includes the Everglades, Florida Bay, and adjacent areas. The Keys are a chain of more than 800 islands extending approximately 220 miles southwest from the southern tip of the Florida peninsula and through the Sanctuary. The FKWQIP targets the portion of the Keys connected by U.S. Highway 1, a 110-mile stretch of roadway extending from Key Largo to Key West, and the remaining developed portion of the Keys. For clarity, the Keys have been divided into the Upper, Middle, and Lower Keys, as presented in Figure 1-1.

1.4 Program Management Plan (PMP)

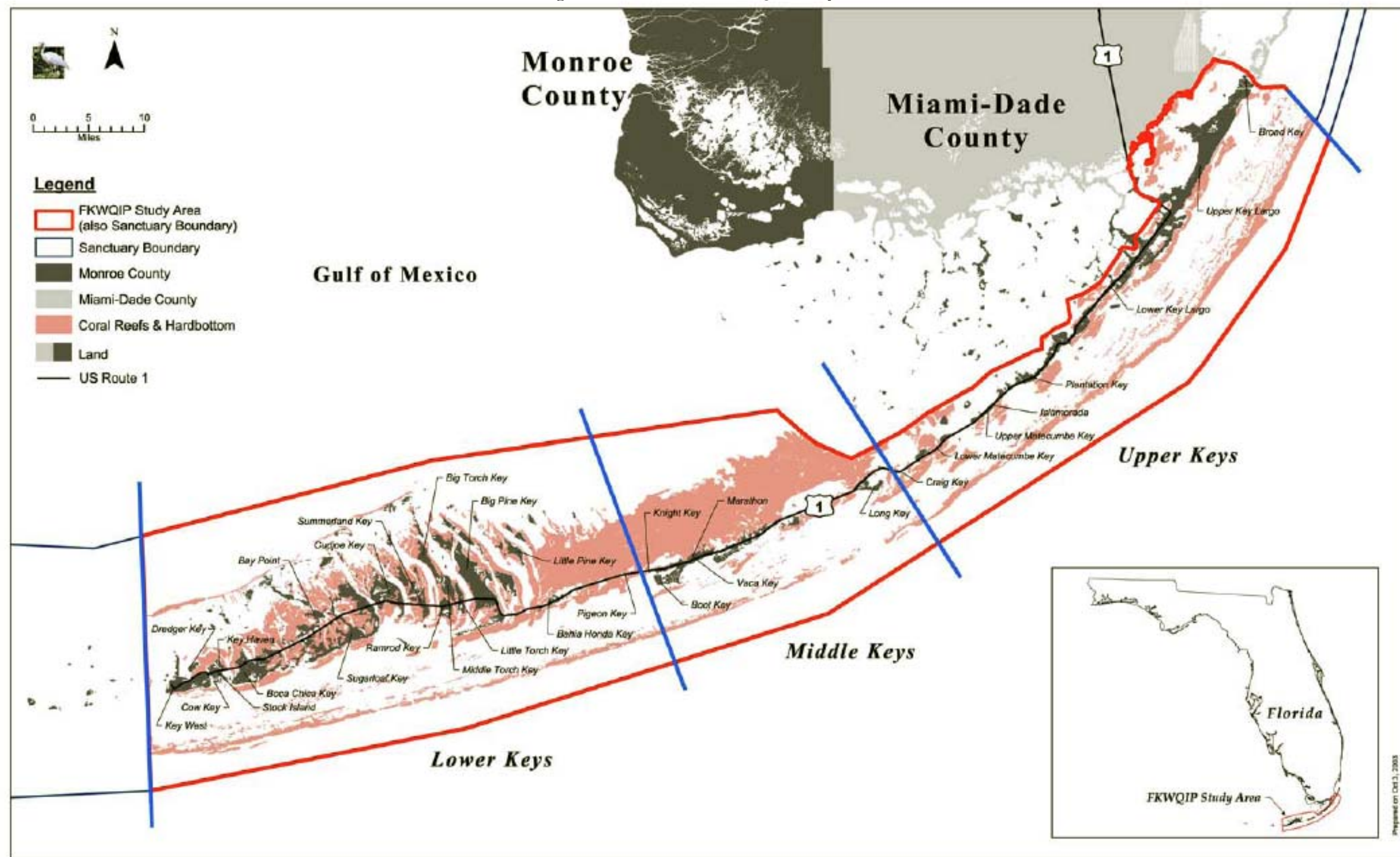
The purpose of this PMP is to establish the framework for development of projects slated for implementation under Federal Authority. The PMP will:

- Outline the specific projects to be initially funded
- Identify required resources
- Establish preliminary budgets and construction schedules

The PMP will describe the rationale used by the FKWQIP Program Delivery Team (PDT) to prioritize specific wastewater treatment and stormwater management projects designated to receive federal funding. These projects were initially identified within various master plans prepared by Monroe County or municipalities within Monroe County.

This PMP is intended to be a dynamic document used to define expected outcomes as well as guide execution and control of the FKWQIP. Primary uses of the PMP are to facilitate communication among participants, assign responsibilities, define assumptions, and document decisions. This PMP establishes baseline plans for scope, cost, schedule and quality objectives against which performance can be measured, and to adjust plans as monies are appropriated by Congress. The FKWQIP PDT is responsible for development of the PMP, which will be updated as required throughout the life of the program. Updates are defined as changes to the PMP that occur on a regular basis and do not substantially modify the schedule, cost, or annual management plan for the program. Scheduled revisions, after the completion of key major project development products, will reflect the changes in the project's development resulting from the completion of a decision document or design/acquisition document. This current version of the PMP represents the third update since the initial publication of the PMP in March 2004. These revisions provide additional levels of detail for upcoming project development and execution of Project Cooperation Agreements (PCAs) with municipalities of Monroe County.

Figure 1-1 Location of FKWQIP Study Area



1.5 Program Delivery Team (PDT)

The PDT is responsible and accountable for ensuring that effective, coordinated actions are combined for successful implementation of the FKWQIP. Membership of the PDT consists of one representative from each municipal governmental agency in Monroe County as well as state and federal agency representatives (Appendix B). A program manager from the Corps (federal sponsor) and municipalities of Monroe County (non-federal sponsor) will be assigned to the PDT to be responsible for the successful implementation of the FKWQIP and to ensure that projects are planned, designed, and constructed consistent with the conditions outlined in the PMP. South Florida Water Management District (SFWMD) Florida Keys Field Office staff will serve as liaison between the Corps and local municipalities. The PDT is also responsible for budgeting, evaluating procurement options during project planning and execution, and identifying potential conflicts and addressing these conflicts in a collaborative manner to reach consensus.

In short, the PDT is an interdisciplinary group formed from the staff of the implementing agencies to develop the products necessary to ensure program success.

1.6 Funding Sources for the FKWQIP

The Florida Keys Water Quality Improvement Act (FKWQIP Act) initially allocated \$420,000 for the Corps to begin coordination activities with the non-federal sponsor and authorized Congress to appropriate up to \$100 million for the FKWQIP (representing 65 percent of program costs). The non-federal sponsor (individual municipalities of Monroe County) will be responsible for 35 percent of the total project cost. The non-federal sponsor will receive credit for the reasonable costs of design work completed for all projects prior to entering into an agreement with the Government, and after passage of the FKWQIP Act.

The enabling legislation states that the Secretary of the Army “may provide technical and financial assistance to carry out projects for the planning, design and construction of treatment works to improve water quality in the Florida National Marine Sanctuary.” While this legislation authorizes federal interest in the program, it does not authorize any construction activity by the Secretary of the Army. The non-federal sponsor is responsible for providing all lands, easements, rights-of-way, and relocations required for the project and for obtaining any necessary permits. The non-federal sponsor is responsible for 100 percent of the operation, maintenance, repair, rehabilitation, and replacement costs associated with a completed construction project; these costs are not part of the cost share.

1.7 Regulatory Requirement

A historical chronology of applicable regulations related to the construction of wastewater treatment improvements and stormwater best management practices (BMPs) in the Keys is discussed below to inform the reader of the more stringent Florida Treatment Standards that will confront residents and commercial entities of Monroe County in the coming years.

As a result of concerns regarding water quality in the Keys, the *Monroe County Year 2010 Comprehensive Plan* (1997) mandated nutrient loading levels be reduced in the Keys marine

ecosystem by the year 2010. In 1998, the Florida Governor issued Executive Order 98-309, which directed local and state agencies to coordinate with Monroe County to implement the *Year 2010 Comprehensive Plan* and eliminate cesspits, failing septic systems, and other substandard on-site sewage systems.

Additionally, in 1998, the Florida Legislature amended the enabling legislation of the Florida Keys Aqueduct Authority (FKAA), the principal potable water supplier for the Keys. Legislation was passed (Florida Law [F.L.] 76-441) to strengthen FKAA involvement in wastewater management for Monroe County. A Memorandum of Understanding (MOU) between Monroe County and the FKAA was signed to “request that the FKAA exercise its authority to purchase, finance, construct, and otherwise acquire and to improve, extend, enlarge, and reconstruct a wastewater collection, transmission, treatment, and disposal system or systems in the Florida Keys.”

In 1999 the Florida Legislature set statutory effluent standards and associated compliance schedules for existing and new wastewater treatment systems in Monroe County. These standards address treatment for several water quality constituents and require best available technology (BAT) standards for flows less than 100,000 gallons per day (gpd) and advanced wastewater treatment (AWT) standards for design flows greater than 100,000 gpd. Table 1-1 includes a list of adopted water quality standards.

Table 1-1 Water Quality Standards

Constituent	BAT milligrams per liter (mg/L)	AWT (mg/L)
Biochemical Oxygen Demand (BOD5)	10	5
Total Suspended Solids (TSS)	10	5
Total Nitrogen (TN)	10	3
Total Phosphorus (TP)	1	1

Statutory compliance schedules for wastewater treatment systems in the county are listed below.

- All unknown or unpermitted on-site systems in non-designated high polluting areas of the Florida Keys, known as “Cold Spots”, and new installations shall be replaced or upgraded with an On-site Wastewater Nutrient Reduction System (OWNRS) by July 12, 2003.
- All existing on-site systems shall cease discharging or shall be upgraded to an OWNRS by July 1, 2010.
- All existing on-site wastewater treatment facilities must be upgraded to either BAT or AWT effluent standards by July 1, 2010.

A chronological summary of these and other events relevant to wastewater management in the Keys is presented in Table 1-2.

Table 1-2 Recent Chronology of Regulatory Milestones for Wastewater Management in the Florida Keys

1993	<ul style="list-style-type: none"> Initial adoption of Monroe County Year 2010 Comprehensive Plan.
1997	<ul style="list-style-type: none"> Monroe County Comprehensive Plan Amended to comply with Florida Statutes. Administration Commission adopts amendments to Monroe County Year 2010 Comprehensive Plan and established Five-year Work Program (Rule 28-20.100). Monroe County established original Identification and Elimination of Cesspools Ordinance, 03-1997; this ordinance was unsuccessful and was later rescinded.
1998	<ul style="list-style-type: none"> Governor’s Executive Order 98-309 (State and Local Agency Participation in Carrying Out Monroe County Year 2010 Plan). Florida Legislature amends the enabling legislation of the FKAA (F.L. 76-441) to reinforce the FKAA’s involvement in wastewater for Monroe County. Monroe County enters into a MOU with the FKAA requesting that the FKAA exercise its authority to finance, construct, and operate wastewater systems in the Keys.
1999	<ul style="list-style-type: none"> Governor Bush and his cabinet amend the 1997 Five-Year Work Program (Rule 28-20.100) to accelerate pace of program, identify “Hot Spots,” and initiate cesspool identification outside of “Hot Spot” areas. Monroe County passes ordinance 031-1999 (Revised Identification and Elimination of Cesspools) to comply with the Governor’s revised Five-Year Work Program. F.L. 99-395 passed (New requirements for all sewage treatment, reuse and disposal facilities, and all on-site systems in Monroe County; prohibits new or expanded discharges into surface waters, and requires existing surface water discharges be eliminated before July 1, 2006).
2001	<ul style="list-style-type: none"> The Florida Keys Water Quality Act approved by the U.S. Congress, authorizing the Corps to provide technical and financial assistance to carry out projects for the planning, design and construction of wastewater treatment and stormwater management to improve water quality of the Florida Keys National Marine Sanctuary.
Source: Modified from Monroe County, 2000	

In addition to local regulations, Section 303(d) of the Clean Water Act (CWA) requires all states to develop a list of priority surface waters that do not meet applicable water quality standards (impaired waters) after implementation of technology-based effluent limitations. States are required to establish Total Maximum Daily Loads (TMDLs), which designate the maximum amount of a pollutant a water body can assimilate without exceeding water quality standards.

Chapter 99-223, Laws of Florida, sets forth the process by which the 303(d) list is refined through more detailed water quality assessments. It also establishes the means for adopting TMDLs, allocating pollutant loadings among contributing sources, and implementing pollution reduction strategies. Implementation of TMDLs can include any combination of regulatory, non-regulatory, or incentive-based actions necessary to reduce pollutant loading. Non-regulatory or incentive-based actions may include development and implementation of BMPs, pollution prevention activities, and habitat preservation or restoration. Regulatory actions may include issuance or revision of wastewater, stormwater, or environmental resource permits necessary for consistency with the TMDL. Permit conditions may be quantitative effluent limitations or, for technology-based programs, a combination of structural and non-structural BMPs necessary for achieving the desired pollutant load reduction.

Florida is comprised of 52 major hydrologic basins, which have been categorized geographically into TMDL groups, and will be assessed for pollutant levels. The five phases of the study for each group are as follows:

- Phase I Preliminary Basin Assessment
- Phase II Strategic Monitoring
- Phase III Data Analysis and TMDL Development
- Phase IV Management Action Plan
- Phase V Implementation

The Keys are in the fifth group of water bodies to undergo TMDL implementation and are scheduled to undergo Phase I from fiscal year (FY) 2005 to FY 2009. The results of the five phases for Group 5 cannot be predicted at this early date and as such, this Program has not given consideration to TMDLs.

1.8 Agency Coordination/Cooperation

The FKWQIP is a cooperative effort between the Corps (lead federal agency) and municipalities of Monroe County located in the Florida Keys (non-federal sponsors). Staff of the SFWMD Florida Keys Field Office will function as a liaison between the Corps and local municipalities to facilitate implementation of the program. During implementation of Section 109, planning activities, the Corps will consult with the Water Quality Steering Committee established under Section 8(d)(2)(A) of the Florida Keys National Marine Sanctuary and Protection Act; the South Florida Ecosystem Restoration Task Force established by Section 528(f) of the Water Resources Development Act of 1996; and the Commission on the Everglades established by Executive Order of the Governor of the state of Florida.

1.9 Non-federal Sponsorship

Municipalities in the Florida Keys will function as the non-federal sponsor for their respective projects funded by the FKWQIP. Staff of the SFWMD Florida Keys Field office will coordinate and facilitate interaction with the Corps for the municipalities of Monroe County.

1.10 Related Projects

Discussed below are ongoing federally sponsored projects in the Keys related to the FKWQIP:

Federal Emergency Management Agency (FEMA) Programmatic Environmental Assessment (PEA) for Wastewater Improvements in the Florida Keys. On December 23, 2002, FEMA finalized a PEA for a project with the Village of Islamorada and three additional projects with the FCAA. Under these four projects, FEMA will issue approximately \$11 million in grants for construction of wastewater systems. Matching funds will be provided through the Florida Division of Emergency Management and local government applicants. This PEA broadly addresses the purpose and need for wastewater improvements in the Keys and presents alternative wastewater management options along with their anticipated environmental consequences. Project and site specific Supplemental Environmental Assessments (EA) currently being prepared were required for the following projects.

Florida Keys Carrying Capacity Study. This study was recently conducted to assess the ability of the Keys ecosystem to support continued growth. The study examined past, present, and future impacts to the ecosystem and developed a database and analysis of consequences that may be used to determine the level of land development activities that could cause further irreversible and/or adverse impacts to the Keys ecosystem. This was accomplished using an interactive, spatially explicit Carrying Capacity Analysis Model (CCAM) that simulates the conditions of land development activities and population growth through time to determine and inventory the impacts on the natural resources and infrastructure in the Keys.

Comprehensive Everglades Restoration Plan (CERP) Related Projects. A number of efforts to restore the south Florida ecosystem are currently underway, including two CERP projects directly related to the FKWQIP. These projects are: (1) the Florida Bay and Florida Keys (FBFK) Feasibility Study and (2) the Florida Keys Tidal Restoration (FKTR) Project. Although the FKWQIP is not a component of CERP, it is extremely important to ecosystem restoration in the Keys.

Project 1. FBFK Feasibility Study will examine the FBFK marine environments, and the actions and land uses upstream, to determine modifications necessary to successfully restore water quality and ecological conditions of the Bay. The study may also include analyses of alternatives for restoration of the marine environment in the Keys if there are positive impacts on Florida Bay. The study goal is to evaluate Florida Bay and its connections to the Everglades, the Gulf of Mexico, and the Florida Keys marine ecosystem in order to determine the modifications needed to successfully restore water quality and ecological conditions, while maintaining or improving these conditions in the Keys' marine ecosystem.

Project 2. FKTR Effort. This project addresses the use of bridges or culverts to restore tidal connections between Florida Bay and the Atlantic Ocean in Monroe County. The four potential sites are located in the Middle Keys near Marathon and include: 1) Tarpon Creek, just south of Mile Marker (MM) 54 on Fat Deer Key (width 150 feet); 2) unnamed creek between Fat Deer Key and Long Point Key, south of MM 56 (width 450 feet); 3) tidal connection adjacent to Little Crawl Key (width 300 feet); and 4) tidal connection between Florida Bay and Atlantic Ocean at MM 57 (width 2,400 feet). Only one of the four sites will be restored as part of this project.

The purpose of this project is to restore tidal connection in a section of the Middle Keys that was eliminated in the early 1900s during the construction of the Flagler railroad. Restoring tidal circulation to areas of surface water that have been impeded and stagnant for decades will significantly improve water quality, benthic floral and faunal communities, and larval distribution of both recreational and commercial species (e.g. spiny lobster) in the nearshore waters in the vicinity of these restoration sites.

2.0 Program Scope

2.0 PROGRAM SCOPE

2.1 Problems and Opportunities

The Keys is home to a complex and dynamic ecosystem and offers a natural beauty that has drawn visitors from around the world. Supporting major fishing and tourist industries, the reef and the entire marine ecosystem are the lifeblood of the Keys, and hence, protecting their existence and vitality is critical to the economic and environmental future of the islands.

As with other Florida ecosystems, human activities over the past 100 years have affected the Sanctuary's water quality. Bacteria and nutrients from human wastes and chemicals such as pesticides and mercury are reaching this delicate ecosystem thereby degrading water quality and posing a public health risk. Currently, the majority of residents and commercial establishments are not connected to AWT systems, but rather septic tanks and outdated on-site package plants. These systems, if not properly operated, allow bacteria and nutrients to leech into nearshore waters. In the areas where testing is performed on nearshore waters, beaches are often posted for health advisories after moderate rainfall because fecal coliform bacteria have leached into surface waters.

Within the Sanctuary are unique and nationally significant marine environments including seagrass meadows, mangrove islands, and the only living coral barrier reef in North America. These marine environments support rich biological communities possessing extensive conservation, recreational, commercial, and aesthetic values, all of which give this area special national significance. The Sanctuary offers many opportunities for recreation, commercial fishing, and tourism-based businesses that comprise a large portion of Florida's economy. For example, the Sanctuary receives over 2.29 million annual visitors to view the Nation's largest living coral reef. Anglers from around the world also visit the Sanctuary for its challenging game fish, especially billfish, found in deeper marine waters, and bonefish, which inhabit shallow waters.

Water quality is critical to maintaining the marine ecosystem of the Sanctuary. The Sanctuary's water quality influences the coral reef and the multitude of living 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.

In light of regulatory requirements and in the interest of protecting public health and water quality, the FKWQIP was created. At the federal level, the Florida Keys National Marine Sanctuary and Protection Act of 1990 directed the U.S. Environmental Protection Agency (EPA) and the state of Florida to develop a water quality protection plan for the Sanctuary. Locally, the *Monroe County 2010 Comprehensive Plan* mandates that nutrient loadings to the marine ecosystem be reduced by the year 2010 and that wastewater systems meet more stringent Florida Statutory Treatment Standards. In recognition of the importance of improving water quality in the Sanctuary, the purpose of the FKWQIP is to assist local municipalities in Monroe County in

implementing the priority projects designed to reduce nutrient and bacteria loading, subsequently improve water quality in the Sanctuary, and meet relevant federal and state regulatory standards.

2.2 FKWQIP Goals and Objectives

The primary purpose of the FKWQIP is to improve the water quality within the Sanctuary. During the initial meeting of the PDT (November 22, 2002), a program objective and two goals for the FKWQIP were unanimously adopted. These are cited below:

Program Objective—The FKWQIP will provide an equitable, ecologically sound, and economical implementation strategy for managing wastewater and stormwater to improve water quality in the Sanctuary.

Program Goal—The FKWQIP will provide responsive, flexible, and cost-effective solutions that improve wastewater and stormwater management practices throughout the Keys and satisfy the existing and future needs of the community.

Program Goal—The FKWQIP will address affordability issues, and must satisfy all applicable environmental and regulatory criteria.

Due to the high capital cost of implementing the proposed water quality improvements, 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 beneficial aspects of the FKWQIP and the adverse effects on the natural and manmade environment if water quality improvements are not constructed, the federal government must determine the most favorable action to be implemented for this Congressional Authorization. When completed, Keys residents and visitors can expect improved nearshore water quality and improved water quality within the Sanctuary.

2.3 Program Issues

Significant issues associated with the FKWQIP identified during consultation with regulatory agencies, stakeholders, and residents of the Keys are discussed below. The primary issue is degraded water quality in the Sanctuary resulting from inadequate treatment of wastewater and stormwater in the Keys.

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 canals and nearshore marine water quality of the Keys. The studies attribute increased algal blooms, seagrass die-off, and the loss of coral cover ecosystems to inadequate on-site wastewater treatment. Scientists concur that one of the principal sources of water quality degradation in the Sanctuary is the elevated level of nutrients in the surrounding canals and nearshore waters. The EPA has concluded that the magnitude and extent of estimated nutrient loadings from wastewater sources are regionally substantial (EPA, 1993).

Cesspools. Early on-site wastewater treatment systems used in the Keys consisted of a cesspool or a seepage basin, consisting of a large excavation typically lined with brick or stone allowing raw wastewater to seep into the ground (Figure 2-1). Because the Keys do not have a significant soil layer, little if any treatment of the wastewater occurs through soil filtration. Due to limited nutrient removal, the cesspool and seepage basin discharge is essentially raw wastewater. There are an estimated 2,000 (updated March 2006) of these early cesspools still in operation throughout the Keys and they are a significant contributor to water quality degradation in the nearshore waters of the Keys. Monroe County Ordinance 03-1997 established a program to identify and eliminate cesspools, concentrating on suspected locations in older developed lots. Elimination of cesspools is a significant component of assigning priority to projects in the FKWQIP.

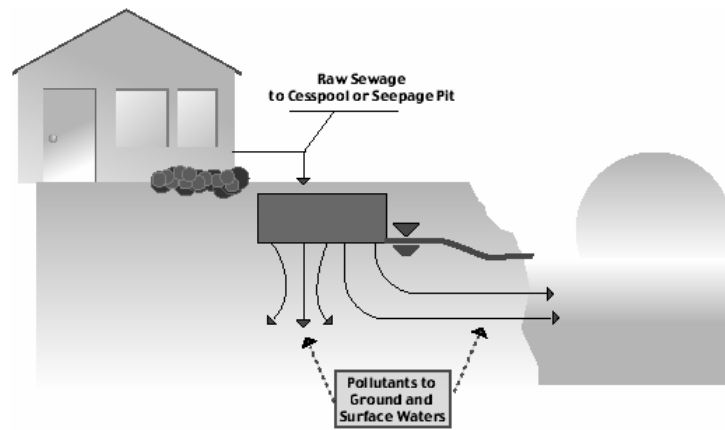


Figure 2-1 Typical Cesspool or Seepage Pit Wastewater Treatment System

Septic Tank Systems. This conventional on-site treatment system consists of a septic tank and a subsurface wastewater infiltration system, or drainfield, which relies on naturally occurring soils to provide wastewater treatment (Figure 2-2). The drainfield and underlying soils are the most critical components of septic tank systems for treatment of wastewater. However, because of the limited soil layer throughout the Keys, soil must actually be imported to construct these systems. The limited soil layer in the Keys reduces the effectiveness of these systems, especially pertaining to nutrient removal. A direct connection between septic tank waste disposal and the nearshore marine water quality was measured during a tracer study in Key Largo. Tracers added to a domestic septic tank appeared in a canal 11 hours later and in nearshore marine waters within 23 hours (Paul *et al.* 1995).

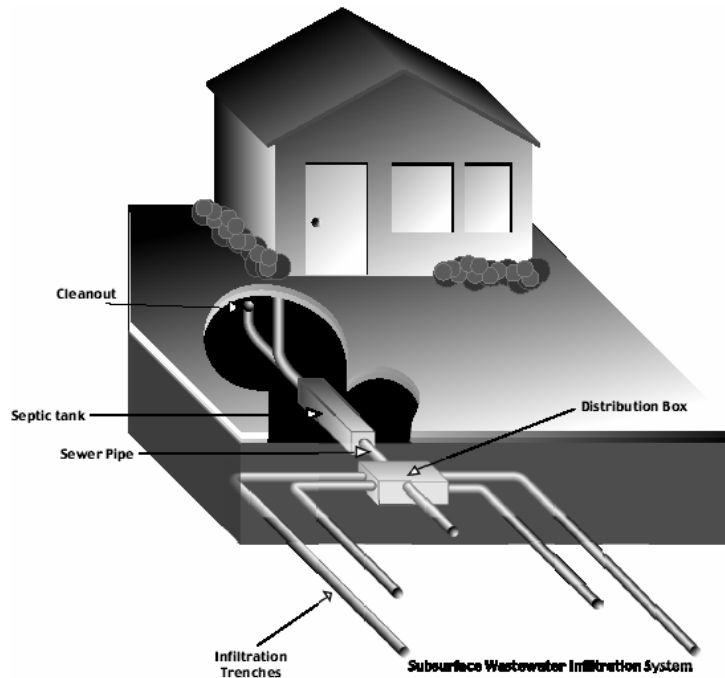


Figure 2-2 Typical Septic Tank and Wastewater Infiltration System

Issue 2: Facility Siting. Construction of wastewater collection and treatment facilities may potentially require tracts of land two to five acres in area. Vacant parcels of land are scarce in the Keys, particularly in urban areas. Potential sites for these treatment facilities may contain sensitive or critical habitat for threatened or endangered species. Additionally, construction of sewer collection systems has the potential to cross naturally or culturally sensitive lands. The farther a treatment facility is located from the area it serves, the greater the conveyance costs to construct and operate it. Increased cost creates additional pressure to locate these facilities in more populated areas of the Keys. Municipalities may invoke eminent domain to obtain needed lands thereby displacing current residences and reducing tax revenue for smaller municipalities.

Issue 3: Protected Species. The Florida Keys are a relatively small landmass in a subtropical island setting and provide habitat for many rare and protected plants and animals. The limited amount of undeveloped natural habitat in the Keys makes these areas and associated species vulnerable to development. Because there are so few remaining developable lands, any FKWQIP actions that results in the loss of natural areas is likely to impact protected species. Protected species that occur or may occur in the study area and their associated habitats, regulatory framework affecting these species, and areas important to maintaining the biodiversity in the Florida Keys must be addressed during project planning and design.

Issue 4: Effluent Disposal. Treated effluent from most wastewater treatment in the Keys is disposed of through the use of shallow injection wells. However, many of the existing injection wells are less than 90 feet deep, and many have shallow casings or are entirely uncased, which increases the probability of effluent leaks to nearshore surface waters. The Florida Department of Environmental Protection (FDEP) rules require wells to be drilled to a depth of 90 feet and cased to 60 feet.

Issue 5: Tourism. Tourism quality of life in the Keys depends upon a healthy marine ecosystem and is negatively impacted by water quality degradation. Over four million individuals per year visit the Keys to enjoy its unique natural features. Water related activities, including snorkeling, diving, fishing, and other beach related activities comprise 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 fewer individuals participating in recreational activities within waters of the Sanctuary.

Issue 6: Environmental Justice. A low and fixed-income population makes up a large portion of Monroe County and affects the ability of the County and other municipal governments to fund improvements to wastewater treatment and stormwater management facilities. About ten percent of the population was below the poverty level in 1999 and over 15 percent of the population was over the age of 65 in 2000. Many of the standard 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 an advanced on-site wastewater treatment system or connecting to a new public sewer system.

Because of the pending Florida Statutory Treatment Standard mandates, some residents may be required to pay the cost of immediate replacement of on-site wastewater treatment systems as well as future sewer connections. Residents with cesspools or septic tanks may be required to replace their existing systems with a more advanced on-site treatment system before a public sewer system can be made available to their neighborhood. However, once a public sewer system is available, the resident will be required to connect to the public system. Thus a resident may be required to pay for both a new on-site treatment system and ultimately for connection to the sewer system. Differences in the cost of implementing centralized wastewater collection and treatment vary significantly between proposed service areas in the Keys. These differences contribute to potential problems in identifying equitable and affordable means of funding wastewater and stormwater improvements.

2.4 Engineering Considerations

2.4.1 Wastewater Systems

Except for the Cities of Key West and Key Colony Beach, and the Little Venice Service Area and Ocean Reef Club Service Area where regional wastewater systems are in operation, development of wastewater facilities throughout most of Monroe County has occurred with limited forethought of regional wastewater planning. Without access to any regional wastewater utilities, each developer or homeowner has had to construct private on-site or package wastewater treatment facilities to serve their development or individual home. These conditions have resulted in the present mix of approximately 25,000 on-site systems and 260 small wastewater treatment plants (WWTPs) (*updated March 2006*).

Although the existing wastewater collection systems are not adequate for regional wastewater transmission, they could be used to provide source collection and transmission to a regional collection system. The following components of wastewater treatment had to be evaluated in the

process of developing a wastewater master plan for Monroe County and incorporated municipalities.

Collection Systems

The three wastewater collection technologies identified by wastewater master plans prepared for Monroe County and municipalities within Monroe County as best suited for use in the study area were: centrifugal grinder pump systems, progressive cavity grinder pump systems and vacuum sewers. All three technologies are capable of providing reliable wastewater service, if properly installed and maintained. At the time of the initial writing of the PMP, gravity sewers were considered to provide reliable service, but at a significantly higher cost than the alternative collection systems. However, recent and on-going studies prepared by the various entities responsible for providing sewer service in the Keys have noted that depending on area to be sewered, a gravity system may be as or more cost effective than the alternatives discussed above. Additionally, in considering existing conditions, land use and densities, as well as reliability and costs of new collection systems, some entities have deemed hybrid systems the best alternative for sewer collection.

Maintenance costs for the four wastewater collection system options are similar. Owners and operators of existing systems reported similar frequencies of maintenance calls for the two types of grinder pump stations and the vacuum valves. On the average, repairs to vacuum valves were reported to be less costly than repairs to grinder pump stations.

Effluent Disposal Methods

Requirements for effluent disposal in Monroe County were amended by the 1999 Florida Legislature prohibiting new or increased discharges into surface waters and mandating the elimination of existing discharges to surface waters by July 1, 2006. While this legislation allows effluent reuse systems, it otherwise requires the use of underground injection for effluent disposal, under the following conditions:

Shallow Injection Wells-If the design capacity of the facility is less than one million gallons per day (mgd), the injection well must be at least 90 feet deep and cased to a minimum depth of 60 feet.

Deep Injection Wells-If the design capacity of the facility is equal to or greater than one mgd, the injection well must be cased to a minimum depth of 2100 feet.

Water Reuse-The Monroe County Master Plan recommended limited use or reliance on effluent reuse. Among the drawbacks sited for effluent reuse is that land application requires full storage or backup disposal systems whenever treatment requirements are not achieved, or when the land application site cannot accept reclaimed effluent, including during extended periods of wet weather. Additionally, relatively large tracts of land are required to accommodate the effluent being disposed. Such tracts may be distant from the plant site, causing high conveyance costs. Even with these limitations however, recent planning and construction documents prepared by the various entities responsible for providing wastewater service, have been considering potential water reuse in the design of their systems.

Potentially feasible effluent management alternatives were identified and subjected to a preliminary screening. Those alternatives that contained major obstacles to implementation were eliminated from further consideration. The alternatives that passed the preliminary screening were evaluated further. Upon completion of the in-depth evaluation, the remaining effluent management alternatives were either eliminated from further consideration or incorporated into the Facilities Plan. Reuse by land application, underground injection through deep wells, underground injection through shallow wells, and surface water disposal were identified as potentially feasible methods for effluent management in the Marathon area.

Recommendation: A total of four scenarios were considered:

It should be noted that order-of-magnitude costs are reported herein. These are considered planning level costs, and their “accuracy” should be in the range of plus or minus 30 percent. Also costs may not be all inclusive, and are provided as a frame of reference for the various alternatives.

Scenario No. 1–WWTP Capacity of 0.02 mgd. FDEP does not allow reuse for systems this small. A shallow injection well system is the only remaining feasible alternative for effluent management. The order-of-magnitude construction cost estimate for this system is \$33,000 for two wells, wellfield piping, and polishing tank only.

Scenario No. 2–WWTP Capacity of 0.1 mgd. It was recommended that the primary effluent management system be a shallow injection wellfield system. The order-of-magnitude construction cost estimate for the shallow injection wellfield, including four wells, piping effluent, and polishing, is \$100,000.

Reuse should be pursued as the secondary effluent management method. 0.1 mgd is the minimum allowable size for a reuse system. The order-of-magnitude cost estimate for the reuse system is approximately \$1 million for WWTP filters, disinfection, effluent storage tank, continuous on-line turbidity and chlorine residual monitoring equipment, and high service pumping. This cost does not include transmission and distribution piping and connection to the existing irrigation systems. These offsite costs will be determined when site-specific areas for reuse are defined and can be expected to add substantially to the cost of the reuse alternative.

Scenario No. 3–WWTP Capacity of less than 1.0 mgd. As with Scenario No. 2 above, a shallow injection wellfield system is recommended for the primary effluent management system. The order-of-magnitude construction cost for the shallow injection well system, including 14 wells is \$750,000.

Reuse should be pursued as the secondary method of effluent management, depending on economic feasibility. The order-of-magnitude construction cost estimated for the filters, disinfection, effluent storage tank, continuous on-line turbidity and chlorine residual monitoring equipment, and high service pump station is approximately \$2.5 million. Again, offsite facilities, to be evaluated later in a Facilities Plan, will add substantially to the cost of the entire reuse system.

Scenario No. 4—WWTP Capacity of 2.0 mgd. A deep injection well system was recommended as the primary effluent management system. Two injection zones exist and were identified as suitable for wastewater disposal. These constitute the upper part of the Floridan Aquifer System (FAS) and are an intermediate-depth zone, extending from 650 to 1,200 feet below land surface (bls) and the deeper Boulder zone, extending from 2,100 to 2,500 feet bls.

Preliminary design indicates that a 12-inch diameter steel casing set to a depth of approximately 650 feet bls will convey effluent to the injection horizon. The well will be completed with open-hole construction from 650 to 1,200 feet bls.

Typical surface facilities will include a pump station, surge control system, yard piping, and instrumentation. A second, redundant intermediate depth injection well would provide a back-up system for periods in which the primary injection well is off-line for testing. An order-of-magnitude construction cost for two intermediate-depth injection wells and surface facilities is approximately \$1.52 million, with an annual operations and maintenance (O&M) cost of approximately \$90,000.

If the intermediate-depth deep well described above could not be permitted, another potential injection zone exists at 2,100 to 2,500 feet bls, commonly known as the Boulder Zone. This injection horizon is most likely confined by dense limestone from 1,200 to 2,100 feet bls. This option would include a 22-inch casing set to 650 feet bls, and a 12-inch-diameter casing set to 2,100 feet bls, with open-hole construction to 2,500 feet bls. The estimated order-of-magnitude construction costs for two deep wells and surface facilities is \$2.82 million, with an annual O&M cost estimated to be \$90,000.

Reuse should be pursued as the secondary effluent management method, if economically feasible. The estimated order-of-magnitude construction cost for reuse facilities at the WWTP site is approximately \$3.5 million.

Solids Waste Management

Alternatives for processing and disposing of residual wastewater solids (treatment plant sludge) that would be generated in the study area upon implementation of regional or sub regional wastewater collection and treatment systems were evaluated. The alternatives evaluated included various processes for stabilizing, dewatering, transporting, and disposing of solids produced by two WWTPs serving the primary and secondary service areas. Alternative means of handling treatment plant solids from the remaining areas of the planning area were also evaluated.

Proven solids handling processes in general use in the United States today were first screened with respect to their applicability at a new regional WWTP serving the primary service area. For the wastewater collection/treatment option utilizing subregional WWTPs, it was assumed that a single centralized solids handling facility would be constructed at one WWTP site, and solids from the other WWTPs would be transferred to that site for processing. The most feasible processes were then formulated into alternative systems, which were compared on the basis of both capital and O&M costs.

Wastewater Management Alternatives

Wastewater management alternatives were evaluated to identify the most cost-effective and environmentally favorable plan for wastewater management. The alternatives consisted of:

- Upgrade individual on-site systems with BAT and upgrade existing package plants to AWT standards.
- Serve the primary service area with sub regional WWTPs.
- Serve the primary service area with a regional WWTP.

All regional management alternatives were evaluated on the basis of providing AWT where treatment plant flows were greater than 100,000 gpd in accordance with the Monroe County Board of County Commissioners' (BCC) selection of AWT as the most environmentally sound treatment level. Alternatives were evaluated on the basis of cost and environmental and implementation factors.

When the Monroe County Master Plan was published, approximately 23,000 private on-site systems and approximately 246 small WWTPs were operating throughout the Florida Keys. The on-site systems were comprised of approximately 15,200 septic systems, 640 Advanced Treatment Units (ATUs) (Figure 2-3), and 7,200 unknown systems. As previously stated, approximately 2,000 of the unknown systems are currently suspected to be illegal cesspools. The Monroe County Master Plan estimated that the on-site systems contribute 4.88 mgd of wastewater and the WWTPs contribute 2.4 mgd of wastewater. Each of these on-site systems and treatment plants provide minimal nutrient removal with effluent from all facilities containing nutrient levels of about 20 mg/l TN and five mg/l TP. The on-site systems primarily serve single-family residences and small commercial establishments, while the small WWTPs serve condominium and apartment complexes, resorts, motels, restaurants and other larger commercial establishments where higher volumes of wastewater are generated.

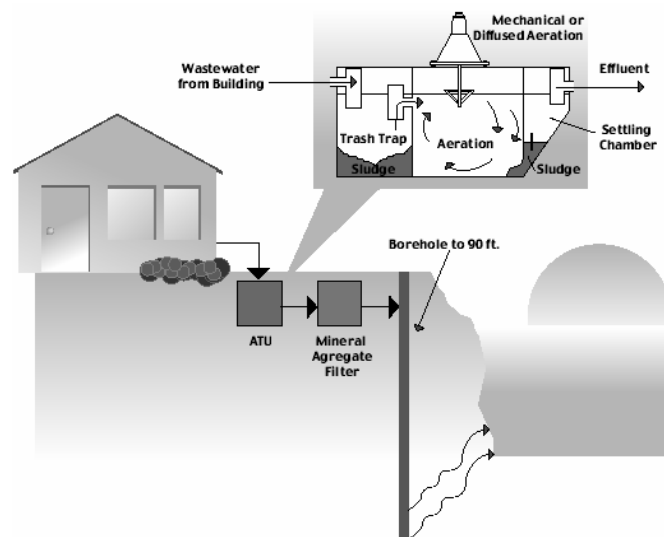


Figure 2-3 Typical Advanced Treatment Unit

Wastewater Reuse

Although there are advantages associated with wastewater reuse, the high cost associated with additional facilities and the limited availability of suitable areas to irrigate make this option more difficult to implement in the Keys than in other areas of Florida. An initial step in determining the practicality and economics of wastewater reuse in the Keys should be to conduct reuse feasibility studies throughout the different service areas. These studies should establish firm amounts of reclaimed water to which reuse customers are willing to commit and pay.

2.4.2 Stormwater Systems

According to the Monroe County Stormwater Management Master Plan (MCSMMP) and information provided by Monroe County Municipalities which have prepared Master Plans, historical reports, staff input, and public comments, there are two types of stormwater concerns in the Keys: water quality and nuisance flooding. Table 2-1 contains the results of a survey completed by citizens present at public meetings on the MCSMMP. They ranked a number of stormwater-related issues from most important to least important:

Table 2-1 Ranking of Stormwater Related Issues by Citizens

Issue	Rank
Water Quality Protection/Improvement	1
Development Controls	2
Enforcement of Existing Regulations	3
Flooding	4
Costs	5
Operation & Maintenance	6
Recreational Opportunities	7

Generally, the plan for addressing these concerns consisted of developing a list of stormwater problem areas ranking them using criteria such as: flood severity, water quality benefits from improving the problem, expected growth of the study area, overall benefit (i.e., how many citizens are affected by the problem area), and assigned historical priority. Many of the problem areas were investigated and found to be on private property.

Following the ranking, the projects were then analyzed versus a list of potential improvement alternatives and the BMP alternative for each problem area was selected. The alternatives generally considered in the Keys included those discussed in the following section.

BMP Alternatives

The MCSMMP listed 19 structural BMPs and 16 nonstructural source controls considered for the Keys.

Structural BMPs

- Shallow grassed swales
- Retention basins
- Buffer strips
- Porous pavement

- Water quality inlets and baffle boxes
- Hydrodynamic separators
- Underdrains and stormwater filter systems
- Infiltration drainfield
- Dry wells
- Modular treatment systems
- Stormwater wetlands
- Alum injection systems
- Aeration
- Level spreaders
- Oil/grease separators
- Recharge wells and bore holes with pretreatment

Based upon the climate of the Keys, the topography and soils of the islands, and stormwater management experience of engineers within the Keys, the following structural BMPs are recommended for application for all types of land development:

- Buffer strips porous pavement
- Water quality inlets
- Baffle boxes hydrodynamic separators
- Dry wells w/pretreatment
- Modular treatment stormwater wetlands
- Alum injection
- Aeration oil and grease separators
- Vegetated swales

Of this list, it was recommended that hydrodynamic separators baffle boxes, modular systems, and alum injection be pilot tested prior to full-scale recommendation since there has been no experience with these BMPs within the Keys.

Nonstructural Stormwater Controls

- Land use planning
- Public information programs
- Stormwater management ordinance requirements
- Fertilizer application controls
- Pesticide use controls
- Control of gray water (cisterns and rain barrels)
- Solid waste management
- Hazardous materials management
- Street sweeping
- Vehicle use reduction
- Directly connected impervious area (DCIA) minimization
- Low impact development
- Illicit connections (non-stormwater discharges) identification and removal
- Erosion and sediment control on construction sites

- Source control on construction sites
- Operation and maintenance

For non-structural or source controls, all of the BMPs on the list are recommended except for street sweeping. While street sweeping can be effective in some urban environments, a curb and gutter road system is generally needed and most of the Keys do not have such roads. Recommended nonstructural stormwater controls include:

- Land use planning
- Public information
- Ordinance requirements
- Cisterns/rain barrels
- Vehicle use reduction
- Impervious reduction
- Low impact development
- Erosion/sediment control
- Operation and maintenance

2.4.2.1 Special Considerations for Bridges

The MCSMMP lists the islands along U.S. Highway 1 within the Monroe County study area with the approximate lengths and bridges connecting them (lengths given to the nearest 0.1 mile). Of the 107 miles indicated, 18.9 miles, about 18 percent, of U.S. Highway 1 are bridges of various lengths.

Related to stormwater runoff, a bridge is 100 percent impervious and rain that falls on the bridge either runs off directly to the nearshore waters under the bridge or flows down the bridge to the entrance or exit. The question of whether or not runoff directly from the bridge can be treated efficiently and at a reasonable cost was studied in the MCSMMP and it was concluded that bridge runoff control is not recommended on a large scale. However, it was suggested that bridge runoff treatment should be tried at one or more sites for a few years, with monitoring to confirm treatment efficiencies. Depending on the outcome, bridge runoff control could be implemented on selective bridges.

2.5 Public Involvement / Outreach

An extensive public involvement program for the Monroe County Sanitary Wastewater Master Plan (MCSWMP) was implemented to provide key stakeholders and interested citizens of Monroe County with the opportunity to participate 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 implemented as part of the master plan development process included:

- 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 models and evaluation processes, identified key issues to be addressed, and defined the elements of what was believed to be an acceptable sanitary wastewater master plan. Throughout the process, citizens clearly stated that cost was the most critical issue to plan implementation. Secondly, there were concerns raised by stakeholders regarding the effectiveness and reliability of the selected wastewater treatment options. Finally, County residents demanded that issues related to potential “double-pay” be addressed.

Under the National Environmental Policy Act (NEPA) of 1969, and the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations [CFR] Parts 1500 to 1508), the Corps must consider the environmental consequences of proposed federal actions (projects). Accordingly, the Corps is preparing a Programmatic Environmental Impact Statement (PEIS) to address the environmental consequences, from a programmatic perspective, of implementing wide-range water quality improvements throughout the Keys to protect water quality in the Sanctuary, including wastewater collection, treatment, and disposal options and stormwater BMPs. Under NEPA, the Corps is required to solicit input from the all interested parties, including stakeholders, residents of the Keys, and appropriate regulatory agencies, regarding proposed federal actions. The process of identifying issues that should be addressed in the PEIS is “scoping.”

Applicable regulatory agencies, affected stakeholders, and interested members of the Florida Keys community were provided opportunities to participate in the decision making process during the development 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 included:

- 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

In accordance with Corps procedures and NEPA public notification requirements, the draft PEIS was advertised in local newspapers and made available at local repositories for a 45-day comment period (April 30-June 14, 2004). Public comments submitted to the Corps during this time were reviewed and addressed, as appropriate, in the final PEIS. Again, in accordance with the Corps procedures and NEPA public notification requirements, the Final PEIS was advertised in local newspapers and made available for a 30-day comment period (September 10-October 12, 2004).

From September of 2004 until April 2006, stakeholders and the general public had a chance to participate in the scoping process and review of six Draft EAs for wastewater treatment and stormwater management improvements proposed by each municipality in the Florida Keys. A Finding of No Significant Impact (FONSI) has been issued for five of the EAs and one other (Key Largo) is in the final stages of review.

3.0 Program Components

3.0 PROGRAM COMPONENTS

3.1 Planning Process Summary

The enabling legislation for the FKWQIP directs the Corps to coordinate with local and state agencies as part of the planning process to identify and develop water quality improvement projects designed to decrease nutrient loading and improve the water quality of 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 of Monroe County have prepared wastewater treatment and stormwater management master plans during the past twelve years. Consequently, the water quality improvement projects that make up each master plan have undergone a rigorous analysis of alternatives, including facility siting and treatment technology applications.

As a result of the extensive planning efforts already implemented at the county and municipal levels, including the identification of potential alternatives and plan recommendations, additional plan formulation regarding individual water quality improvement projects for the FKWQIP was deemed unnecessary for the purposes of this PMP. A Plan Formulation Memorandum (Memorandum), which summarizes the decision-making process used and recommendations made in each master plan, has been prepared and included as Appendix C to this PMP. Since 1994, the following plans and documents have been produced and were reviewed for inclusion in this Memorandum:

3.1.1 Wastewater

Monroe County Sanitary Wastewater Master Plan

This document is dated June 2000, and was prepared by CH2MHill, Inc. et al. The stated objective of this Master Plan is to “develop a plan that would provide an equitable, ecologically sound, and economical implementation strategy for managing wastewater and improving the water quality in the Florida Keys.” The stated goal is to “provide responsive, flexible, and cost-effective solutions that improve wastewater management throughout the keys and satisfy existing and future needs of the community.” Additionally, the Master Plan’s goal is to address affordability and equity issues, and to satisfy environmental and regulatory criteria and guidelines. The planning and study area included the entire developed area of the Keys, except for the Cities of Key West and Key Colony Beach (Figure 1-1).

The recommendations presented in this master plan include:

- Replace/upgrade existing on-site systems located in lower density areas of the Keys with an OWNRS
- Installation of 12 community wastewater collection and treatment systems
- Installation of five regional wastewater collection and treatment systems
- 17 existing facilities continue to operate and upgrade their treatment processes to meet BAT or AWT, as required, by July 2010

The master plan further recommends that five of the 12 community wastewater collection and treatment systems feature interim WWTPs that, over time, be phased into the larger regional systems. Details of the recommendation from the Monroe County master plan for each of the three regions of the Keys are presented below:

Lower Keys—In the Lower Keys, four new community wastewater systems and two new regional wastewater systems are recommended for construction. The two proposed regional systems in the Lower Keys are relatively small, in terms of both volume of flow and area and thus the first phase of these WWTPs can be constructed at the actual regional WWTP site. In addition to the new systems or extension of existing systems that are discussed, the master plan recommends that seven existing facilities in the Lower Keys continue to operate and upgrade their treatment processes to meet the BAT/AWT standard by July 1, 2010.

Middle Keys—In the Middle Keys, two new community wastewater systems and one new regional systems are recommended. Other than Duck Key, Conch Key, and Long Key/Layton, all study areas of the Middle Keys will continue to operate and upgrade their treatment process to meet the BAT/AWT standard by July 1, 2010. These systems include:

- Hawk’s Cay (Hawk’s Cay portion of AWT upgrade)
- West End Long key (three facilities)
- East End Long Key (two facilities)

Upper Keys—In the Upper Keys, one new community wastewater system is recommended in Lower Matecumbe, and two new regional systems are recommended: a 1.5 mgd system to serve Islamorada Regional Wastewater Management District; and a 2.25 mgd system to serve the Tavernier/Key Largo Regional Wastewater Management District.

Since publication of the Master Project List, many of the entities or municipalities have modified their plans as noted in Section 3.3.3, Project Descriptions. Additionally, the Key Largo Wastewater Board has been formed to address wastewater projects in the Key Largo area.

Marathon Wastewater Facilities Plan

This document is dated April 1998, and was prepared by CH2MHill, Inc. et al. The purpose of this Plan is “to define the most cost-effective, environmentally sound, and implementable program for the management of existing and future wastewater pollutants that presently act, or will act, to deteriorate the Key’s water quality in the Marathon area.” The planning area encompasses the area from the Seven Mile Bridge through Conch Key (Figure 1). The three steps that comprise the implementation of the wastewater management system are stated to be “planning, design, and construction.” The scope of work for this Facilities Plan is defined in Construction Grants, 1985, a manual published by the U.S. EPA (July 1984).

City of Key West Water Quality Improvement Program

This program, dated June 2001, was developed by the City of Key West in order to facilitate the City's commitment to "divert stormwater runoff away from Outstanding Florida Waters,"

eliminate potential sewer/stormwater conflicts and to reduce infiltration and inflow in their sewer system. This program contains both wastewater and stormwater projects.

City of Key Colony Beach Sewer System Evaluation

This document, dated September 2002, was prepared by URS Corporation. The City has “continuously expended funds” over the last five years in rehabilitating their existing wastewater collection system. The purpose of this report is to assist the City’s wastewater system operation staff in identifying additional sources of Inflow and Infiltration in their wastewater system. Closed circuit TV monitoring of the sewer lines was used to identify lines in need of repair. The report presents recommendations for repair of the various sewer lines. Repair methodology includes slip lining of cracked or broken sewer lines and re-grouting of a number of service connections.

City of Marathon Reuse Component Central Wastewater Request for Proposal (RFP)

This document was prepared in May 2001, and revised in August 2001 and again in October 2001, by Calvin, Giordano & Associates, Inc. The purpose of this study is “to determine water reuse feasibility for the City of Marathon.” The scope of this study is generally based on FDEP’s *Guidelines for Preparation of Reuse Feasibility Studies for Applicants Having Responsibility for Wastewater Management*.

Design/Build/Operate Wastewater Management System (DBOWMS) for the City of Marathon, FL

This document prepared by the FKAA represents a set of specifications that accompanied a RFP for the DBOWMS for the City of Marathon, FL. The specifications establish certain minimum technical requirements and minimum level of quality for the treatment system to be constructed and operated for the City.

FEMA PEA

FEMA has received grant applications to fund the construction of several wastewater treatment systems in Monroe County. Much of the proposed project funding would be provided through FEMA 1249-DR Post Disaster–Unmet Needs funds. Matching funds will be provided through the Florida Division of Emergency Management and local government applications. While the EA finalized on December 23, 2002 was programmatic in nature, it was written to address the environmental consequences of constructing four planned wastewater treatment projects; one with the Village of Islamorada and three more projects with the FKAA. Project specific EAs are currently being prepared to address the environmental consequences of constructing the four projects.

3.1.2 Stormwater

Village of Islamorada Stormwater Management Master Plan

This document was prepared in September 2000 by Law Engineering and Environmental Services, Inc. The purpose of this plan is to “address water quality improvements to stormwater discharges into the Village’s canals and near shore waters of the Atlantic Ocean and Florida Bay.” The planning area is the entire Village, which spans from MM 90.94 on the north to 72.66 on the south and consists of four islands: Plantation Key, Windley Key, Upper Matecumbe Key and Lower Matecumbe Key (Figure 1.1).

Monroe County Stormwater Management Master Plan

This document, dated August 2001, was prepared by Camp, Dresser & McKee, Inc. The stated purposes of the Stormwater Management Master Plan are to “assess the adequacy of existing systems, prioritize stormwater management needs for each island, identify regulations and policy needs, and develop a plan to finance the construction, O&M of required facilities.” The geographic area of this project consists of the islands in the County (the Keys), which are traversed by U.S. Highway 1 (Figure 1-1).

City of Key West Stormwater Runoff Study

This document dated September 1994 was prepared by Kisinger, Campo and Associates Corp (KCA). The stated purpose of the study is to identify and map the existing flooding locations and ultimately develop a Drainage Improvement Development Plan.

City of Key West Long Range Stormwater Utility Plan

This plan, dated June 2001, was prepared by the City’s Engineering Services Division. The purpose of the plan is to document the studies previously prepared by KCA and CH2M Hill as well as information regarding flooding problems after 1994, and make recommendations as to required future projects and funding to alleviate flooding and improve water quality in and around the City of Key West.

3.1.3 Master Project List

As part of this PMP, the plans or studies listed above were reviewed and the recommended list of improvement projects from each was extracted to be incorporated in the FKWQIP master project list. The list has since been updated based on current information available from each municipality or governing entity. Information contained in this master list includes:

- The FKWQIP Project Number (simply a tracking number)
- Whether the project is a wastewater or stormwater project
- The governmental or other entity supporting the project
- The source of the data
- The project’s geographic location (i.e. Upper, Middle or Lower Keys)
- The service or study area name

3.0 Program Components

- Whether or not the project served a “Hot Spot” area
- The project name, and wastewater service area if applicable
- The “Hot Spot” area name it will serve if applicable
- The project rank by region if available
- The overall rank of the project based on each of the various master plans or studies
- The proposed action or project description
- The date the cost estimate for the project was published and the estimated cost
- An updated cost for 2004 and 2006 based on the Engineering News Records Construction Cost Index (ENRCCI) (2004 Update), a cost adjustment of 10.25 percent (2006 Update) and data provided by the municipalities
- Results of project bidding if available
- Tentative start and finish dates for each project
- Current status and projected cost estimate of the project
- Anticipated procurement method (e.g., Design-Bid-Build, Design-Build, Design-Build-Operate)
- Anticipated Corps level of involvement (e.g., Construction Administration, Design, Construction Management)
- Current Funding Available
- Funding Source
- Readiness Score based on the Readiness to Proceed Criteria discussed in section 3.2.5 of this PMP.

The Master Project List, which can be found in Appendix G, contains 260 wastewater and stormwater projects with a total estimated cost¹ of over \$705 million. A Summary of the Master Project List can be found in Table 3-1. Again as noted in Section 2.1, this Master Project List, while based on the original master plans, has been modified based on comments received from municipality staff representatives and individual PDT members.

Table 3-1 Summary of Master Project List

Government Entity	Wastewater Projects		Stormwater Projects		Total	
	Number	Estimated Cost ¹	Number	Estimated Cost ¹	Number	Estimated Cost ¹
Monroe County	36	\$225,416,583	22	\$7,810,469	58	\$233,227,052
Village of Islamorada	7	\$132,645,093	63	\$64,220,504	70	\$196,865,597
City of Key West	8	\$25,494,924	99	\$23,960,263	107	\$49,455,187
City of Key Colony Beach	1	\$551,250	-	0	1	\$551,250
Key Largo Wastewater District	16	\$138,970,000	-	0	16	\$138,970,000
City of Layton	1	\$5,735,155	-	0	1	\$5,735,155
City of Marathon	7	\$80,329,772	-	0	7	\$80,329,772
Totals	76	\$609,142,777	184	\$95,991,236	260	\$705,134,013

¹ These costs are based solely on information provided in each of the respective plans or studies and have been updated based on information provided by the various PDT members or based on the Engineering News Record Construction Cost Index and an increase of 10.25% from 2004 to 2006.

3.2 Prioritization Rationale

In implementing the FKWQIP, authorizing legislation stated, “In selecting projects under subsection (a), the Secretary shall consider whether a project will have substantial water quality benefits relative to other projects under consideration.” This is precisely what was accomplished by the various Wastewater and Stormwater Master Plans prepared for the County and Municipalities in the Keys and amended by the PDT.

3.2.1 Water Quality “Hot Spots”

In July of 1992, the EPA Oceans and Coastal Protection Divisions produced a report entitled “Water Quality Protection Program for the Florida Keys National Marine Sanctuary; Phase 1 Report.” The report provided a list of 84 water quality “Hot Spots.” These are areas, based upon workshops and discussion groups, with known or suspected water quality degradation. The list of 84 was later refined to a list of 88 “Hot Spots” according to a meeting summary dated March 19, 1996. This report list was mainly related to water quality issues associated with wastewater

influences. In July of 1999, Monroe County produced “Water Quality ‘Hot Spots’ in the Florida Keys: Evaluations for Stormwater Contributions.” This report assessed the previously identified concerns, visited the areas in the field, and defined the most probable stormwater-influenced problem areas.

3.2.2 Wastewater Project Prioritization

Monroe County Sanitary Wastewater Master Plan

Given the MCSWMP’s goal of eliminating unknown systems and cesspools other parameters such as “annual cost per pound of nitrogen or phosphorous removed” were deemed to be secondary in importance to the goal of eliminating cesspools. Consequently, the parameter of “annual cost per unknown system eliminated” was the principle criteria used for determining the extent of a community wastewater collection and treatment system, and for establishing and ranking Water Quality “Hot Spot” areas.

The MCSWMP ranks the “Hot Spots” and includes “Hot Spots” for the entire study area. The rankings are shown for the entire Keys, with a ranking of one for the “Hot Spot” areas that the MCSWMP recommended be addressed first for each region (upper, middle, lower) of the Keys, regardless of political boundaries. Generally, “Hot Spot” areas encompass two or more subdivisions and adjacent areas. As indicated above, the Monroe County Ordinance dealing with elimination of cesspools required that each area of the Keys (Upper, Middle, Lower) establish priority “Hot Spots” and initiate planning, design, and construction of these community wastewater systems.

Marathon Wastewater Facilities Plan

The Marathon Wastewater Facilities Plan used a project initial prioritization rational similar to that used in the MCSWMP.

City of Key West Water Quality Improvement Program

Prioritization rational used in developing this program was not available.

City of Key Colony Beach Sewer System Evaluation

This evaluation recommended rehabilitation projects based on the severity of the deterioration of the sewer collection or transmission segment. All repair recommendations were combined into one project in the Sewer System Evaluation. Because of ongoing investment into their sewer collection and treatment system, the City recently (March 2006) indicated that their priority project has been revised to upgrade the existing simplex lift stations to duplex lift stations. This will improve reliability of the collection system.

City of Marathon Reuse Component Central Wastewater RFP

No specific projects were identified as part of this study.

DBOWMS for the City of Marathon, FL

This project is one of those listed in both the MCSWMP and the *Marathon Wastewater Facilities Plan*. The City has recently (May 2003) indicated that they plan to implement this wastewater management system construction in seven phases.

FEMA PEA

The purpose of this document was to provide a programmatic level environmental assessment for three projects previously identified in the MCSWMP, and as such, no project prioritization was considered other than that previously performed in the Master Plan.

3.2.3 Stormwater Project Prioritization

With regard to stormwater, each master plan prioritized project areas based on criteria similar to that indicated in section 2.4.2, which listed the highest priority concern as water quality protection/improvement.

3.2.4 Intergovernmental Task Force (IGTF)

The IGTF in Monroe County is an organization with representatives from each of the Municipal Governments of the Florida Keys. The general purpose of this group is to provide a common voice to ensure that progress is made on water quality issues in the Keys.

3.2.5 Readiness to Proceed Criteria

The Readiness to Proceed Criteria dated June 22, 2001 was prepared by the FCAA, Florida Department of Community Affairs and the FDEP to “define when a recipient is eligible to receive a percentage of their share of any federal/state appropriation for wastewater and stormwater improvements authorized under the Keys Water Quality Improvement Act.

According to the criteria, to be deemed “ready to proceed,” all planning (including the selection of sites, wastewater/stormwater systems to be implemented, reclaimed water evaluation) and financing must be complete; sites must be established as available for the intended purposes, public participation must be documented; and a design-build-operate, design-build or a construction contract would have to be either executed or authorized for execution by the project sponsor’s governing body.

Further definition of these criteria presented in this document include requirements in the areas of: project site identification and availability, engineering, planning documentation, financial planning, connection and pretreatment ordinances, user charge fees, and public participation. Additionally, the document discusses the idea that acceptance of any federal grant funds shall not be contingent upon the receipt of additional federal/state funds in subsequent appropriations. Finally, the document calls for Quarterly Progress Assessment Meetings and deadlines for establishing “Readiness to Proceed.” The document can be found in Appendix D.

3.2.6 Revised Readiness to Proceed Criteria

A Revised Readiness to Proceed Criteria was drafted by a sub-committee of the PDT and distributed for comment on December 6, 2002. The revised document includes the following major changes:

- The requirement for completed “financing” was changed to “financial planning”
- The requirement for a design/build/operate, design/build or a construction contract was changed to reflect that the receipt of a bid would qualify
- A time limit for execution or authorization for execution of a contract was established at within six (6) months of availability of grant funds
- The requirement for EAs to be “completed” was changed to be “underway”
- The requirement for EA, as required, to be completed was stricken
- The requirement that a treatment process be identified was stricken
- The requirement for a “financial plan identifying the rates, fees, and charges associated with providing wastewater/stormwater management services” was changed to a “financial plan identifying the method of collecting rates...”
- The deadline for Readiness to Proceed was stricken

Based on this revised Criteria, the point system presented below was developed in order to assess each project’s readiness. The total potential points for any project would be 20.

3.2.7 Distribution Formula Approved by the IGTF

The IGTF has developed the “Distribution Formula Approved by the Intergovernmental Task Force and Presented for Approval to the Various Municipal Governments of the Florida Keys” (Distribution Formula). This document is included in Appendix F.

The Distribution Formula documents the desired and agreed upon distribution of a \$100 million Federal Appropriation. The agreed upon distribution includes the following points:

- “.... all priority project should participate in any funding that occurs until such time as their promised amounts of funding were reached, as long as all such prioritized project were considered ‘ready to proceed’ within the FY in which the appropriation was made...”
- Readiness to proceed will be based on the “Readiness to Proceed” document developed by the IGTF (Appendix D).

Five different funding scenarios were developed based on different funding levels that could be expected from the federal appropriation and various levels of “readiness to proceed” of different projects.

Table 3-2 Florida Keys Water Quality Improvement Program Readiness Assessment

Assessment Criteria	Score If Satisfied
1 Site	4
A Identification of Site	1
B Environmental and Technical Suitability	1
C Availability of Interest	1
D Legal and Zoning Designations	1
2.1 Engineering for Wastewater Management Projects	3
A Plant Identification	1
B Collection and Transmission System Identification	1
C Overlay of Plant on Survey	1
2.2 Engineering for Stormwater Management Projects	3
A Treatment and Disposal Identification	1.5
B Conveyance and Storage System Identification	1.5
3 Planning Documentation	5
A Completion of Planning	2
B Financial Plan	3
B.1 Financial Breakdown	1
B.2 Estimated Costs for Wastewater/Stormwater Management and Additional Work	1
B.3 Financial Commitments	1
4 Legal	3
A Connection Ordinance for Wastewater	1
B Pretreatment Ordinance for Wastewater	1
C User Charge or Fee Provisions	1
5 Public Participation	5
A Selection of Project Sites	2
B Establishment of Ordinances/Resolutions	1
C Adoption of Recommendations for Wastewater/Stormwater Management Option and Reuse	1
D Financial Planning	1

Once the appropriation is made or scheduled to be made, the IGTF proposes to confer with its “partners” to review the “readiness to proceed” status of each prioritized project. If the amount of funding is deemed too small to be divided according to scenarios stated above such that “substantial progress can be made,” the IGTF will meet to propose a project be funded for which it is presumed “substantial progress” can be made.

The PDT has agreed to utilize the Revised Readiness to Proceed Criteria (Appendix E) to assess a project’s readiness to proceed as part of the FKWQIP.

3.3 Initial Priority Projects

3.3.1 Selection Process

In developing the list of initial FKWQIP projects as a sub-set of the Master Project List, the following were considered:

Distribution Formula-Each local entity, as dictated in the Distribution Formula, is to receive a specified amount of the total funding. While this document does not specify the distribution for any funding greater than \$30 million, the PDT and IGTF has agreed to the following distribution of the \$100 million in funding should it be appropriated:

City of Key West	\$10,320,000
City of Marathon	\$29,560,000
Village of Islamorada	\$29,560,000
Monroe County/Key Largo	\$29,560,000
City of Layton	\$ 800,000
City of Key Colony Beach	\$ 200,000

Congressional Appropriation-As discussed above, should the appropriation from the Congress be less than the authorized \$100 million, the Distribution Formula developed by the IGTF would be used as guidance in selecting which projects would be funded.

Priority Projects-For each of the entities which makeup the IGTF, the highest priority projects from the Master Project List for that entity were selected for inclusion in the Priority Project List up to the amount of the allocated funding.

3.3.2 Priority Project List

As with the PMP, the Priority Project List is a dynamic document, as some projects will become substantially closer to “Ready to Proceed” status as the FKWQIP is implemented. Additionally, other sources of funding may become available such that high priority projects may be completed prior to distribution of funds from the FKWQIP.

The Priority Project List includes the name of the entity responsible for the project, the project name and type of project (wastewater or stormwater), whether or not the project is in a “Hot Spot” area, a readiness assessment, the projected cost of the project as well as what FKWQIP funds would be allocated to the project, the local match funds required, and the need for any additional funds. Detailed descriptions of the work involved in each of the projects can be found

on the Master Project List and the respective planning documents used to compile the Master Project List.

Priority Project Descriptions

Provided below is a brief narrative describing in a conceptual fashion the initial priority projects, updated in March of 2006 as obtained from the PDT members.

City of Key West

Projects included in the Initial Project List for the City of Key West includes 97 Stormwater Projects. Each of these projects generally consists of relatively small improvements such as installing new drainage wells and inlets or treatment structures upstream of outfalls.

City of Layton

This project is a design/build project to include a central wastewater system to serve the City of Layton. The system to serve approximately 295 equivalent dwelling units (EDUs) will include wastewater collection, transmission, treatment and effluent disposal. The collection system will include conventional gravity sewers with conventional sewage pumping stations. Based on the conceptual design provided as part of the design/build RFP, it is anticipated that the collection system will consist of approximately 8,410 linear feet of gravity sewer. The proposed transmission system will consist of 6,600 linear feet of force main and four (4) lift stations ranging in capacities from 20 to 120 gallons per minute (gpm). A 0.049 mgd WWTP will be provided which will meet BAT standards. Effluent disposal will be via shallow injections wells. Residual solids will be digested, thickened and hauled to the Florida mainland for disposal.

City of Key Colony Beach

The City of Key Colony Beach is planning to rehabilitate ten (10) existing simplex lift stations providing added reliability and minimizing potential for sewage spills. The project includes replacement of pumps and piping within the wet wells at each of the ten (10) stations. The project also includes rehabilitation of the wet well structures to include sealing of the interior walls to prevent any exfiltration of sewage.

City of Marathon

The City of Marathon has phased the development of their wastewater collection and treatment systems. The first project implemented by the City of Marathon was the Little Venice System. While the City of Marathon was originally planning to construct one central wastewater treatment facility to meet all remaining wastewater flow, a decision was made to separate the City into seven service areas and implement the type of treatment/collection that is most effective within each area.

In 2006 in a document entitled *City of Marathon Wastewater Treatment Project Implementation Summary*, the 1998 Marathon Facilities Plan collection system alternatives were re-evaluated

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using current unit prices. It was determined that vacuum systems are the most cost-effective method of wastewater collection for larger service area, but that a combination of conventional gravity systems and macerator or STEP system was more appropriate for smaller service areas. It was also determined that in areas of low density or remote location, on-site and cluster systems were the correct choice.

Additionally, the construction costs and O&M costs for various combinations of WWTPs were examined. It was found that the capital costs for constructions of WWTPs to serve the City of Marathon could be reduced by using a combination of: 1) pre-engineered systems: 2) upgraded existing WWTPs: 3) use of Relocated BAT WWTPs and 4) on-site and cluster type treatment systems. This allowed the elimination of deep injection wells and long runs of force mains.

Marathon has refined their project, with the considerations discussed above, into a seven service area plan, with priorities placed on Areas 4, 6, 1, 2 and 5. Below are descriptions of the service areas and the planned improvements.

Service Area 4, Vaca Key (central), includes both ocean and bayside from 33rd Street through 60th Street as well as the Sombrero area. The year 2015 estimated wastewater flows are .399 MGD. The density in this area allows a vacuum collection system to be cost effective. A new .400 MGD nutrient removal wastewater treatment plant will be constructed in this area to provide needed treatment. The effluent disposal will be primarily re-use on the Sombrero Country Club, alternate Class V shallow injection wells will also be provided.

Service Area 6, Fat Deer Key (west), includes both ocean and bayside from Vaca Cut to Coco Plum and down Coco Plum Drive to the end. The year 2015 estimated wastewater flows are .155 MGD. This area was re-addressed in December of 2005 once it was determined that some of the flow from these areas would not be pumped to the City of Key Colony Beach WWTP. The original conclusion of grinder pump collection system for this area is still marginally the most economical, however, with the increase in flow and service area size, a vacuum collection System became much more attractive for this area. Value engineering during this review has also reduced the construction cost estimate. The inability to provide back-up power and 24 hour retention volumes for hundreds of pump stations has made the vacuum collection system the recommendation in this area. The treatment will be provided by upgrading an existing package plant both in capacity and in treatment to meet advanced wastewater treatment standards. Effluent disposal will be through Class V shallow injection wells.

Service Area 1, Knight's Key, is currently in process of re-development by a private developer. The year 2015 estimated wastewater flows are .023 MGD. The City of Marathon intends to partner with the developer to provide a new BAT plant to handle the flows from the entire island. The City would then design and construct a collection system to convey the existing property's sewage to the new BAT wastewater treatment plant located in the new development. Effluent disposal will be through Class V shallow injections wells.

Service Area 2, Boot Key, currently has one small facility surrounding the radio tower complex. The year 2015 estimated wastewater flows are .0006 MGD. The remainder of the island is not to be developed. The best way to provide service for Boot Key is a small BAT On-site unit located such

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that gravity flow will provide the only needed conveyance. Effluent disposal will be through Class V shallow injections wells, subsurface drip Irrigation, or a conventional drain field.

Service Area 5, Vaca Key (east), includes both ocean side and bayside from 60th Street through Vaca Cut and includes the Little Venice Area. The year 2015 estimated wastewater flows are .490 MGD. The density in this area allows an expansion of the existing vacuum collection system to be cost effective. The existing Little Venice advance WWTP will be expanded to .499 MGD to provide treatment. Effluent disposal will be a combination of re-use on the City of Marathon parks and events fields and through Class V shallow injection wells.

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Table 3-3 Florida Keys Water Quality Improvement Program Priority Project List

Entity	Project Priority	Project Name	Project Type SW/WW	Hot Spot Area?	Readiness (Out of 20)	Projected Cost of Top Priority Projects	Potential Allowance from Federal Funding	Local Match to Federal Funds	Total in FKWQIP	Other Local Match Required
Key West	1	97 Stormwater Projects	SW	N/A	20	\$ 20,113,640	\$ 10,320,000	\$ 5,556,923	\$ 15,876,923	\$ 4,236,717
Subtotal Key West						\$ 16,199,007	\$ 10,320,000	\$ 5,556,923	\$ 15,876,923	\$ 322,084
Layton	1	Long Key Estates, City of Layton, area adjacent to US1	WW	Y	11	\$ 5,735,155	\$ 800,000	\$ 430,769	\$ 1,230,769	\$ 3,971,186
Subtotal Layton						\$ 5,735,155	\$ 800,000	\$ 430,769	\$ 1,230,769	\$ 3,971,186
Key Colony Beach	1	City of Key Colony Beach Pump Station Rehabilitation	WW	N/A	20	\$ 551,250	\$ 200,000	\$ 107,692	\$ 307,692	\$ 192,308
Subtotal Key Colony Beach						\$ 551,250	\$ 200,000	\$ 107,692	\$ 307,692	\$ 192,308
Marathon	1	Service Area 4	WW	Y	20	\$ 22,141,063	\$ 14,391,691	\$ 7,749,392	\$ 22,141,063	\$ 0 -
	2	Service Area 6	WW	Y	20	\$ 8,601,165	\$ 5,590,757	\$ 3,010,408	\$ 8,601,165	\$ 0 -
	3	Service Area 1	WW	Y	20	\$ 1,276,302	\$ 829,596	\$ 446,706	\$ 8,601,165	\$ 0
Subtotal Marathon						\$ 59,242,605	\$ 29,560,000	\$ 20,734,912	\$ 50,294,912	\$ 8,947,693
Islamorada	1	Village of Islamorada Master Plan	WW	N/A	N/A	\$ 103,000	\$ 66,950	\$ 36,050	\$ 103,000	\$ -

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Entity	Project Priority	Project Name	Project Type SW/WW	Hot Spot Area?	Readiness (Out of 20)	Projected Cost of Top Priority Projects	Potential Allowance from Federal Funding	Local Match to Federal Funds	Total in FKWOIP	Other Local Match Required
	2	Plantation Key Colony Phase II	WW	Y	20	\$ 13,958,997	\$ 9,073,348	\$ 4,885,649	\$ 13,958,997	\$ -
	3	Plantation Key	WW	Y	10	\$ 51,307,497	\$ 20,419,702	\$ 10,995,224	\$ 31,414,926	\$ 19,892,571
Subtotal Islamorada						\$ 65,369,494	\$ 29,560,000	\$ 15,916,923	\$ 45,476,923	\$ 19,892,571
Key Largo	1	Regional Treatment Plant	WW	Y	20	\$ 16,750,000	\$ 10,887,500	\$ 5,862,500	\$ 16,750,000	\$ -
	2	North Transmission Line	WW	Y	20	\$ 5,200,000	\$ 3,380,000	\$ 1,820,000	\$ 5,200,000	\$ -
	3	Sexton Cove / Lake Surprise	WW	Y	20	\$ 9,200,000	\$ 5,980,000	\$ 3,220,000	\$ 9,200,000	\$ -
	4	Largo Gardens	WW	Y	20	\$ 5,500,000	\$ 3,575,000	\$ 1,925,000	\$ 5,500,000	\$ -
	5	Collection Basin A	WW	Y	20	\$ 12,600,000	\$ 5,737,500	\$ 3,089,423	\$ 8,826,923	\$ 3,773,077
Subtotal Key Largo						\$ 49,250,000	\$ 29,560,000	\$ 15,916,923	\$ 45,476,923	\$ 3,773,077
Totals						\$ 199,947,406	\$ 100,000,000	\$ 53,846,154	\$ 153,846,153	\$ 45,516,803

1: Project costs assumed based on the *City of Marathon Wastewater Treatment Project Implementation Summary*

Village of Islamorada

Village of Islamorada Wastewater Master Plan.

The Village has decided to develop their own Master Plan to help them better prioritize and implement their wastewater projects. Previously their plan relied on the MCSWMP as modified by a proposal for a Village-wide wastewater collection and treatment system submitted by Florida Water Services in response to an RFP issued by the Village.

Plantation Key Colony Phase II.

This project generally consists of expansion of the AWT plant built in Phase I to 0.23 mgd, and construction of a vacuum sewer system for the remainder of North Plantation Key Colony from Tavernier to the northeast, High Street to the southeast and Plantation Key Elementary to the southwest, as well as connection of Plantation Key Elementary School and Coral Shores High School.

Remainder of Plantation Key.

This project consists of providing a wastewater collection and treatment system to serve the remainder of Plantation Key. It is anticipated that the required AWT WWTP would have an average daily flow of approximately 0.35 mgd.

Key Largo Wastewater Board

Regional Treatment Plant

This project generally includes replacement of the 0.183 mgd treatment plant with a 2.25 mgd plant to serve the entire island of Key Largo. The system is projected to serve 8,988 EDUs (one unit equals a household of 2.3 persons generating about 145 gallons of effluent per day) by 2015 and will include wastewater collection, transmission, treatment, effluent disposal, and two alternatives for providing reclaimed water service. It is anticipated that the collections system will include conventional gravity sewers with conventional sewage pumping stations, or vacuum sewers with vacuum and pumping stations, or a combination of vacuum and conventional collections systems (hybrid system). The 2.25 mgd AWT plant will be located at MM 100.5 opposite Key Largo Park. The proposed wastewater treatment facility would be constructed on approximately 2.6 acres ocean side of U.S. Highway 1 and adjacent to an existing FKAA facility. The proposed site is part of a larger 23 acre parcel owned by the Key Largo Wastewater Treatment District (KLWTD). Effluent disposal will be via deep injections wells. Residual solids will be digested, thickened and transported to one of three Monroe County Solid Waste Transfer Stations and subsequently transported to the Miami-Dade Water and Sewer Department South District WWTF in Florida City

North Transmission Line

This project generally consists of construction of a transmission line from the plant at MM 100.5 to the northern edge of the service area. This installation will allow for sub-basins or collection areas north of the plant to be connected to the 2.25 mgd AWT plant as they are constructed.

Sexton Cove/ Lake Surprise Collection System

This project consists of providing a wastewater collection system to serve the Sexton Cove and Lake Surprise areas. The collection system will be connected to the North Transmission Line for transport of the wastewater collected to the 2.25 mgd AWT plant located at MM 100.5

Largo Gardens Collection System

This project consists of providing a wastewater collection system to serve the Largo Gardens area. The collection system will be connected to the North Transmission Line for transport of the wastewater collected to the 2.25 mgd AWT plant located at MM 100.5

Collection Basin A

This project consists of providing a wastewater collection system to serve the Stillwright Point, Paradise Point Cove, Riviera Village, Taylor Creek Village, Largo Sound Village, and Anglers Park areas. The collection system will be connected to the North Transmission Line for transport of the wastewater collected to the 2.25 mgd AWT plant located at MM 100.5

3.4 Method of Execution

3.4.1 Federal Appropriations

Public Law 106-554, Departments of Labor, Health, and Human Services and Education, and related Agencies Appropriations Act of 2001, Section 109, allocated \$420,000 for the Corps to begin coordination activities with the non-federal sponsor and to prepare the PMP (subject document) that defines the program scope, guidelines, schedule and resources required for program implementation. Additionally, monies are being used to prepare the appropriate level of NEPA documentation to evaluate program alternatives and address the impacts of program implementation.

Since the funding stream per year is presently an unknown factor, this PMP has assumed Congressional appropriations of various amounts for the next four years to implement the initial projects discussed in Section 3.3. Appropriation assumptions are discussed in Section 4.0.

3.4.2 Program Implementation Guidance (PIG) Document

The Corps Headquarters has prepared a PIG document to assist in the implementation of the FKWQIP that contains the following elements:

- Program Objective
- Authority
- Appropriations and Use of Funds
- Program Management
- Applicable Policy
- Procedures
- Reporting Requirements

3.4.3 Program Cooperative Agreements

The Corps is currently developing a PCA for each municipality in the Florida Keys participating in the FKWQIP. The PCAs will be executed between the federal sponsor (Corps) and the non-federal sponsor (Monroe County municipalities). Subject to the procedures established in the executed PCAs, funds appropriated for the FKWQIP will be used to execute agreements for selected design and construction assistance projects. All work will be performed within available funds.

Before entering into the PCAs, the Corps will ensure each non-federal sponsor has completed adequate planning and design activities, as appropriate. The Corps will ensure the each municipality has completed a financial plan for each project approved by the PDT for federal funding and has identified and secured the financial sources for the non-federal portion of each project. Additionally, the Corps will ensure that each project or project component implemented under the program complies with applicable growth management ordinances of Monroe County, Florida; applicable agreements between Monroe County, Florida, and the State of Florida to manage growth in Monroe County, Florida; and applicable water quality standards. Also, the Corps will ensure all projects selected for federal funding are consistent with the master wastewater and stormwater plans prepared for Monroe County, Florida.

3.4.4 Independent Technical Review (ITR) Process

An ITR is required for Corps planning projects. This is a part of the Corps Headquarters level policy and is further defined by Corps Engineer Regulations. ITR is part of the corporate quality control/quality assurance (QC/QA) process followed by Corps for all engineering projects. QC is comprised of peer reviews, normal technical review and the ITR. In general, QA oversight is for areas of responsibility (and governance) outside the authority assigned to the PDT. All planning, engineering and design products shall have an ITR. The ITR team will be established prior to work starting on individual projects and will conduct reviews as necessary to insure that the product is consistent with established criteria, guidance, regulations, procedures, and policy. The ITR process implemented for the FKWQIP will be a continuous process with reviews coordinated with the appropriate project manager to minimize lost planning and design effort.

3.4.5 Contracting and Acquisition Plan

A general contracting strategy for the FKWQIP will be outlined and included in the PCA that will be utilized for implementing subsequent phases of the FKWQIP. Contracting and acquisition strategies to be utilized during design and construction phases will be developed in subsequent updates of this PMP.

Contract specific acquisition strategies will be developed for each individual project to be advertised and awarded. Procurement statutes, regulations, and procedures applicable to the procuring Agency (i.e., municipalities within Monroe County) will dictate the acquisition process. Factors to be considered in determining the specific acquisition strategies include but are not limited to technical complexity of the work, environmental considerations/constraints, construction schedules, and magnitude of construction. Socioeconomic statutes, regulations and

procedures applicable to the socioeconomic aspects of the respective procuring Agency, will be applied to the procurement process for each individual project.

3.4.6 Design Process

A detailed scope of work will be reviewed during the design phase of each project receiving funding through the FKWQIP. The level of technical design reviews to be conducted will be determined by the Corps in concert with the municipality implementing the project and will include sufficient engineering, economic, and environmental analyses to ensure compliance with applicable federal and state laws.

In selecting projects for funding under criteria contained within Section 109, the Corps will consider whether a project will have substantial water quality benefits relative to other projects under consideration. Sufficient analysis, coordination, and documentation will be prepared to comply with applicable federal environmental laws, statutes, and Executive Orders and to provide a basis for obtaining the necessary permits and licenses for project implementation. Using information provided by each municipality, the Corps will develop and coordinate as required, an EA and Finding of No Significant Impact (FONSI) or a project-specific EIS and Record of Decision (ROD) in accordance with the NEPA of 1969 for each federally funded project or program component. This project specific NEPA documentation will include tiering off the PEIS. The non-federal sponsor is responsible for obtaining all necessary permits and licenses.

Whether the design phase of the project takes the form of a grant, design assistance, or partial cost-reimbursement for design performed by non-federal interests, the end product will be a set of plans and specifications suitable for the advertisement and award of a construction contract for the identified project. The design phase will also produce documentation of the engineering, economic, environmental, institutional analyses, and public involvement activities necessary to implement the project. Requirements include preparation of either an EA and FONSI or a project-specific EIS and ROD that tiers from the PEIS for NEPA compliance and obtaining all the necessary permits required for project implementation.

3.4.7 Real Estate Acquisition

Credit for real estate acquisition associated with the purchase of lands by the non-federal sponsor is not currently reimbursable under terms of the enabling legislation, thus is not subject to review by the Corps. If however, in the future, a determination is made that real estate purchases are reimbursable, the Corps will conduct a real estate evaluation to insure that fair market value was received for purchased property needed to construct the wastewater and stormwater treatment facilities.

If a real estate analysis is needed in the future, an inventory of all lands adjacent to the project improvements followed by a list of lands to be acquired for each specific wastewater or stormwater improvement project, will be developed. An appraisal of the costs of lands and damages, and preparation of a plan for acquisition of these lands will also be reviewed. Other tasks include an analysis of physical takings, attorney's opinion of ability to receive

compensation, and obtaining rights of entry for various field collection activities. This activity includes all written memoranda, opinions, database development reports and other documents provided by real estate personnel as required in support of feasibility phase planning efforts and eventually the purchase of the necessary land and rights-of-way.

3.4.8 Construction Activities

The non-federal sponsor (Monroe County municipalities) is responsible for development and approval of all products pertaining to the performance of work (whether performed under contract or by non-federal sponsor personnel) and will provide the Corps with an opportunity to review such products. The non-federal sponsor will also prepare and furnish to the Corps for review a proposed Operation, Maintenance, Repair, Rehabilitation and Replacement (OMRR&R) Manual. If at any time the Corps is responsible for construction, it will be responsible for development and approval of all contract products and the OMRR&R Manual and will provide the non-federal sponsor an opportunity to review such products.

3.4.9 Reimbursement

The cumulative project financial commitments will be limited to actual appropriations up to the authorized amount of \$100 million federal dollars. Assistance that involves credits or reimbursements to the non-federal sponsor is subject to the requirements established in the implementing legislation (i.e., Public Law 106-554 of 2000) and the executed PCA.

Subject to the availability of federal funding, and execution of the PCA between the non-federal sponsor and the Corps, the non-federal sponsor will be reimbursed for the non-federal share of previous design, future design, or future construction work performed by the non-federal sponsor, to the extent the credited value of the non-federal sponsor's total contributions to the project exceed its required cost share. Creditable prior design is limited to work specifically completed for projects selected by the PDT to be funded by the Corps, or separable components for which assistance is being provided. Credit for design, which occurred before the law was enacted (21 December 2001), is not allowable. Likewise, reimbursement for past construction is not authorized. The amount of the credit to be afforded for non-federal work shall be determined as specified in the executed PCA.

The Corps will process reimbursement payments based on proper invoices submitted by the non-federal sponsor. If there are unforeseen delays in making reimbursement, reasonable interest and financing charges will be credited to the non-federal sponsor by the Government. The amount of the interest and financing charges creditable shall be limited to the amount computed in accordance with the provisions of the Prompt Payment Act.

Federal costs for review of existing design performed by non-federal interests, developing the scope of work, financial analysis, NEPA compliance, and negotiating the construction agreement, will be included in the total project cost that is subject to cost sharing. All federal and non-federal costs incurred subsequent to execution of the agreement will be included in total project costs and subject to cost sharing, crediting, and reimbursement under the terms of the construction agreement.

3.4.10 NEPA 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 prepared a PEIS to evaluate the environmental consequences of implementing a wide range of projects designed to improve water quality in the Sanctuary. The PEIS describes a program to improve the wastewater and stormwater infrastructure in the Florida Keys. Because the affected environment and environmental consequences are addressed in general terms, additional NEPA documentation has been prepared for project-specific actions.

These improvements include wastewater collection, treatment, and disposal options and stormwater BMPs. The PEIS is programmatic, and as such the alternatives and environmental consequences of the overall FKWQIP implementation on the affected environment are described at a general level. Due to the conceptual nature of the FKWQIP, individual project-specific EISs or EAs that build upon the PEIS will be required and have been prepared. This process is called *tiering* and was established by the CEQ to provide “coverage of general matters in broader EIS with subsequent narrower statements or environmental analyses...” Agencies are encouraged to tier EISs to eliminate repetitive discussions of the same issues and to focus on the actual issues ripe for decisions at each level of environmental review” (40 CFR 1508.02 and 1520.20).

Starting in late FY 2004 project-specific NEPA documentation was prepared for each priority FKWQIP project scheduled to receive federal funding. To date, EAs have been prepared for projects associated with six municipalities and a FONSI issued for five of these projects (i.e., Islamorada, Key West, Key Colony Beach, Layton, and Marathon). The Key Largo EA needs to be revised and will be issued as a revised draft EA in late December 2006.

The current PDT strategy is to use a portion of the initial Congressional appropriation to prepare the required NEPA documentation for each priority project to avoid potential schedule delays.

4.0 Program Schedule

4.0 PROGRAM SCHEDULE

A program schedule has been developed assuming funding of \$100 million appropriations over the next five years to ensure that the priority projects are funded at levels necessary to meet the state mandatory 2010 treatment standards. The funding levels assumed for implementation of the program schedule are as follows:

FY 2007	\$19.7 Million
FY 2008	\$36.4 Million
FY 2009	\$21.1 Million
FY 2010	\$22.8 Million

For the projects contained in the Priority Project List, a program level schedule has been developed which considers work completed to date and includes any required planning, conceptual design, preparation of RFPs, advertisement for bid, bid review and award, and design and construction.

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REFERENCES

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APPENDICES

APPENDICES

Appendix A
Florida Keys Water Quality Improvement Act
Public Law 106-554

Under authority of Public Law 106-554, Department of Labor, Health and Human Services and Education, Related Agencies Appropriations Act of 2000, Section 109 and Conference Report H.R. 4577, 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 the water quality of the Florida Keys National Marine Sanctuary.

- (1) the non-Federal sponsor has completed adequate planning and design activities, as applicable;
 - (2) the non-Federal sponsor has completed a financial plan identifying sources of non-Federal funding for the project;
 - (3) the project complies with—
 - (A) applicable growth management ordinances of Monroe County, Florida;
 - (B) applicable agreements between Monroe County, Florida, and the State of Florida to manage growth in Monroe County, Florida; and
 - (C) applicable water quality standards; and
 - (4) the project is consistent with the master wastewater and storm water plans for Monroe County, Florida.
- (c) **CONSIDERATION.**—In selecting projects under subsection (a), the Secretary shall consider whether a project will have substantial water quality benefits relative to other projects under consideration.
- (d) **CONSULTATION.**—In carrying out this section, the Secretary shall consult with—
- (1) the Water Quality Steering Committee established under section 8(d)(2)(A) of the Florida Keys National Marine Sanctuary and Protection Act (106 Stat. 5054);
 - (2) the South Florida Ecosystem Restoration Task Force established by section 528(f) of the Water Resources Development Act of 1996 (110 Stat. 3771-3773);
 - (3) the Commission on the Everglades established by executive order of the Governor of the State of Florida; and
 - (4) other appropriate State and local government officials.
- (e) **NON-FEDERAL SHARE.**—
- (1) **IN GENERAL.**—The non-Federal share of the cost of a project carried out under this section shall be 35 percent.
 - (2) **CREDIT.**—
 - (A) **IN GENERAL.**—The Secretary may provide the non-Federal interest credit toward cash contributions required—
 - (i) before and during the construction of the project, for the costs of planning, engineering, and design, and for the construction management work that is performed by the non-Federal interest and that the Secretary determines is necessary to implement the project; and
 - (ii) during the construction of the project, for the construction that the non-Federal interest carries out on behalf of the Secretary and that the Secretary determines is necessary to carry out the project.
 - (B) **TREATMENT OF CREDIT BETWEEN PROJECTS.**—Any credit provided under this paragraph may be carried over between authorized projects.
- (f) **AUTHORIZATION OF APPROPRIATIONS.**—There is authorized to be appropriated to carry out this section \$100,000,000. Such sums shall remain available until expended.

"(54) COOK COUNTY, ILLINOIS.—\$35,000,000 for water-related infrastructure and resource protection and development, Cook County, Illinois.

"(55) MADISON AND ST. CLAIR COUNTIES, ILLINOIS.—\$10,000,000 for water and wastewater assistance, Madison and St. Clair Counties, Illinois.

"(56) IBERIA PARISH, LOUISIANA.—\$5,000,000 for water and wastewater infrastructure, Iberia Parish, Louisiana.

"(57) KENNER, LOUISIANA.—\$5,000,000 for wastewater infrastructure, Kenner, Louisiana.

"(58) BENTON HARBOR, MICHIGAN.—\$1,500,000 for water-related infrastructure, City of Benton Harbor, Michigan.

"(59) GENESEE COUNTY, MICHIGAN.—\$6,700,000 for wastewater infrastructure assistance to reduce or eliminate sewer overflows, Genesee County, Michigan.

"(60) NEGAUNEE, MICHIGAN.—\$10,000,000 for wastewater infrastructure assistance, City of Negaunee, Michigan.

"(61) GARRISON AND KATHIO TOWNSHIP, MINNESOTA.—\$11,000,000 for a wastewater infrastructure project for the city of Garrison and Kathio Township, Minnesota.

"(62) NEWTON, NEW JERSEY.—\$7,000,000 for water filtration infrastructure, Newton, New Jersey.

"(63) LIVERPOOL, NEW YORK.—\$2,000,000 for water infrastructure, including a pump station, Liverpool, New York.

"(64) STANLY COUNTY, NORTH CAROLINA.—\$8,900,000 for wastewater infrastructure, Stanly County, North Carolina.

"(65) YUKON, OKLAHOMA.—\$5,500,000 for water-related infrastructure, including wells, booster stations, storage tanks, and transmission lines, Yukon, Oklahoma.

"(66) ALLEGHENY COUNTY, PENNSYLVANIA.—\$20,000,000 for water-related environmental infrastructure, Allegheny County, Pennsylvania.

"(67) MOUNT JOY TOWNSHIP AND CONEWAGO TOWNSHIP, PENNSYLVANIA.—\$8,300,000 for water and wastewater infrastructure, Mount Joy Township and Conewago Township, Pennsylvania.

"(68) PHOENIXVILLE BOROUGH, CHESTER COUNTY, PENNSYLVANIA.—\$2,400,000 for water and sewer infrastructure, Phoenixville Borough, Chester County, Pennsylvania.

"(69) TITUSVILLE, PENNSYLVANIA.—\$7,300,000 for storm water separation and treatment plant upgrades, Titusville, Pennsylvania.

"(70) WASHINGTON, GREENE, WESTMORELAND, AND FAYETTE COUNTIES, PENNSYLVANIA.—\$8,000,000 for water and wastewater infrastructure, Washington, Greene, Westmoreland, and Fayette Counties, Pennsylvania."

SEC. 109. FLORIDA KEYS WATER QUALITY IMPROVEMENTS. (a) IN GENERAL.—In coordination with the Florida Keys Aqueduct Authority, appropriate agencies of municipalities of Monroe County, Florida, and other appropriate public agencies of the State of Florida or Monroe County, the Secretary of the Army may provide technical and financial assistance to carry out projects for the planning, design, and construction of treatment works to improve water quality in the Florida Keys National Marine Sanctuary.

(b) CRITERIA FOR PROJECTS.—Before entering into a cooperation agreement to provide assistance with respect to a project under this section, the Secretary shall ensure that—

[U.S. Statutes-At-Large pagination is not available.]

Appendix B

Roster of PDT Members

Roster of PDT Members

Appendix B

Name	Title	Entity	Phone	Fax	Email	Address
Tom Willi	County Administrator	Monroe County	305-292-4441	305-292-4544	Willi-Tom@MonroeCounty-FL.gov	1100 Simonton Street Key West, FL 33040
David Fernandez	Utilities Director	Key West	305-293-6414	305-293-6415	dfernand@keywestcity.com	5701 W. College Rd. Key West, FL 33040
Norman Anderson	Mayor	Layton	786-299-2614		rebarman1@aol.com	
John Bartus	Councilman	Marathon	305-743-0033	305-743-3667	jebartus@bellsouth.net	P.O. Box 500938 Marathon, FL 33050
Chris Sante	Mayor	Islamorada	305-664-6400	305-664-12	ChrisSante@islamorada.fl.us	81990 Overseas Hwy., 2 nd Fl. Islamorada, FL 33036
Orlando Hernandez, P.E.	Utilities-Capital Projects Manager	Islamorada	305-852-6933	305-852-9533	Orlando.hernandez@islamorada.fl.us	81990 Overseas Hwy., 2 nd Fl. Islamorada, FL 33036
Clyde Burnett	Mayor	Key Colony Beach	305-743-3571	305-289-1767	mayor@keycolonybeach.net	P.O. Box 510299 KCB, FL 33051
Rebecca Jetton	Planning Manager	FL Dept. of Community Affairs	305-289-2402	305-289-2442	jetton@mail.state.fl.us	2796 Overseas Hwy., Suite 212 Marathon, FL 33050
Jim Reynolds	Executive Director	FL Keys Aqueduct Authority	305-296-2454	305-294-5683	jreynolds@fkaa.com	1100 Kennedy Drive Key West, FL 33040
Claude Bullock	Board Member	Key Largo Wastewater Board	305-453-5804	305-453-5807	Cbullock417@aol.com	110 Point Pleasant Drive Key Largo, FL 33037
Cecelia Weaver	Keys Service Center Manager	SFWMD	305-853-3219	305-853-3221	cweaver@sfwmd.gov	10 High Point Rd., Suite A Plantation Key, FL 33070
Shelly Trulock	Project Manager	US ACOE	904-232-3292	904-899-5001	Shelley.f.trulock@usace.army.mil	701 San Marco Blvd Jacksonville, FL 32207
Bill Kruczynski	Program Scientist	US EPA	305-743-0537	305-743-3304	kruczynski.bill@epa.gov	P.O. Box 500368 Marathon, FL 33050
Gus Rios	Environmental Administrator	FDEP, South District	305-289-2310	305-289-2314	gus.rios@dep.state.fl.us	2796 Overseas Hwy., Suite 221 Marathon, FL 33050

Appendix C

Plan Formulation Memorandum

PLAN FORMULATION MEMORANDUM

FLORIDA KEYS WATER QUALITY IMPROVEMENTS PROGRAM

**Prepared by EPJV
January 22, 2003**

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1.0 INTRODUCTION

The Florida Keys (Keys) are a chain of islands extending from the southern tip of the Florida mainland southwest to the Dry Tortugas in portions of both Dade and Monroe counties. Among the many conservation areas designated as part of the Keys are Biscayne National Park, Everglades National Park, and the xxx Wildlife Refuge, all of which are encompassed by the larger Florida Keys National Marine Sanctuary (Sanctuary) (Figure 1). The Sanctuary includes 2,800 square nautical miles of nearshore waters that are part of a complex ecosystem that also includes seagrass meadows, mangrove islands, and the only living coral barrier reef in North America. Consequently, water quality is critical to maintaining the marine ecosystem of the Sanctuary.

Importantly, as population and tourism in the Keys have increased over the years, improvements in wastewater treatment and management practices have not kept pace with this growth. Ongoing research has suggested that this trend has resulted in a significant degradation of water quality in canals and nearshore waters surrounding the Keys and that nutrients commonly found in wastewater are one of the major contributors to the decline of water quality.

For these reasons, the U.S. Army Corp of Engineers (Corps) proposes to assist local municipalities in Monroe County with the development and implementation of wastewater and stormwater improvements as part of the Florida Keys Water Quality Improvements Program (FKWQIP or Program). The Program is designed to:

- reduce nutrient loading to the Florida Keys National Marine Sanctuary,
- subsequently improve water quality in the Sanctuary, and
- meet relevant Federal and State regulatory standards.

The implementation of several wastewater and stormwater treatment master plans prepared for municipalities in Monroe County is integral to the success of the Program. The purpose of this Plan Formulation Memorandum (Memorandum) is to document the analysis and subsequent recommendations that resulted in the development of these master plans that the Corps will use as the foundation for implementing the Program. The following sections provide information relevant to the Program and the master plans that will be used in its implementation.

1.1 Florida Keys Water Quality Improvement Program

The FKWQIP provides a means of improving the water quality of the Sanctuary. A description of the Program is presented here to provide the context in which the Plan Formulation Memorandum has been developed. The Memorandum is presented in subsequent sections.

1.1.1 Program Location

This program targets the portion of the Keys connected by U.S. Highway 1, a 110-mile stretch of roadway extending from Key Largo to Key West, and the remaining developed portion of the Keys. The entire study area is within the Sanctuary (Figure 1).

1.1.2 Program Purpose

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 (Lapointe *et al.* 1990 and Kruczynski *et al.* 1999). In addition, research has suggested that increased nutrient loadings from wastewater and deterioration of canal and nearshore water quality are major contributors to the decline of water quality in the Sanctuary. Therefore, the primary purpose of the FKWQIP is to improve the water quality in the Sanctuary by the development and implementation of improved wastewater and stormwater treatment in the Keys.

At the Federal level, the Florida Keys National Marine Sanctuary and Protection Act of 1990 directed the U.S. Environmental Protection Agency (EPA) and the State of Florida to develop a water quality protection plan for the Sanctuary. Locally, the Monroe County 2010 comprehensive plan mandates that nutrient loadings be reduced in the marine ecosystem by the year 2010 and that wastewater systems meet more stringent Florida Statutory Treatment Standards. In light of regulatory requirements and in the interest of protecting public health and water quality, the FKWQIP was created.

The FKWQIP will be accomplished through the implementation of several wastewater and stormwater master plans prepared for Monroe County and other local municipalities in Monroe County. These plans are designed to provide cost-effective, environmentally sound, and feasible programs for managing pollutants that are now, or have the potential to, adversely impact the water quality of the Keys and the Sanctuary. The FKWQIP is intended to provide the technical and financial assistance for planning, engineering, and construction of wastewater and stormwater treatment improvement projects.

1.1.3 Program Authorization and Background

Under authority of Public Law 106-554, Departments of Labor, Health and Human Services and Education, and Related Agencies Appropriations Act of 2001, Section 109 and Conference Report H.R. 4577, 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 the water quality of the Sanctuary. It should be noted that programs of this nature (i.e., wastewater treatment and stormwater management construction programs) are not in accordance with Administration Program priorities of the Corps of Engineers; however, the Corps routinely undertakes similar non-traditional Corps projects.

1.1.4 Water Quality Protection Program: *Hot Spots* and *Cold Spots*

In July 1992, the U.S. Environmental Protection Agency (USEPA) Oceans and Coastal Protection Divisions produced a report entitled *Water Quality Protection Program for the Florida Keys National Marine Sanctuary; Phase I Report*. The report was based on workshops and discussions and provided a list of 84 water quality *hot spots* with known or suspected water quality degradation. According to a meeting summary dated March 19, 1996, the list of 84 was

later expanded to include 88 *hot spots* based primarily water quality issues associated with wastewater influences. In July of 1999, a Monroe County document entitled *Water Quality 'Hotspots' in the Florida Keys: Evaluations for Stormwater Contributions* was released. The report assessed previously identified stormwater concerns, documented the results of field visits, and defined the areas most likely to have stormwater-associated problems. Stormwater systems in Monroe County are regulated through Monroe County Code Section 9.5-293.

In contrast with *hot spots*, *cold spots* were defined as areas where on-site systems will continue to operate. *Cold spots* fall into two categories:

- Properties with unknown systems that must replace or upgrade their systems immediately with an on-site wastewater nutrient reducing system (OWNRS). All these systems must be replaced or upgraded by July 12, 2003.
- 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 described below.

1.1.5 Applicable Regulatory Requirements

As a result of concerns regarding water quality in the Keys, the *Monroe County Year 2010 Comprehensive Plan* (1997) mandated nutrient loading levels be reduced in the Keys marine ecosystem by the year 2010. In 1998, the Florida Governor issued Executive Order 98-309 which directed local and State agencies to coordinate with Monroe County to implement the *Year 2010 Comprehensive Plan* and eliminate cesspits, failing septic systems, and other substandard on-site sewage systems.

In 1999 the Florida Legislature set statutory effluent standards and associated compliance schedules for wastewater treatment system in Monroe County. These standards address treatment for several water quality constituents and require best available technology (BAT) standards for flows less than 100,000 gallons per day and advanced wastewater treatment (AWT) standards for design flows greater than 100,000 gallons per day. Adopted water quality standards are listed below.

Water Quality Standards		
Constituent	BAT (mg/L)	AWT (mg/L)
Biological Oxygen Demand (BOD5)	10	5
Total Suspended Solids (TSS)	10	5
Total Nitrogen (TN)	10	3
Total Phosphorus (TP)	1	1

Statutory compliance schedules for wastewater treatment systems in the county are listed below.

- All unknown (or unpermitted) on-site systems in *cold spots* and new installations shall be replaced or upgraded with an OWNRS by July 12, 2003.
- All existing on-site systems shall cease discharging or shall be upgraded to an OWNRS by July 1, 2010.
- All existing on-site wastewater treatment plants must be upgraded to either BAT or AWT effluent standards by July 1, 2010.

In 1998, additional legislation addressed wastewater concerns in the Keys by amending the enabling legislation of the Florida Keys Aqueduct Authority (FKAA), the principal potable water supplier for the Keys. Legislation was passed (F.L. 76-441) to strengthen FKAA involvement in wastewater management for Monroe County. A Memorandum of Understanding (MOU) between Monroe County and the FKAA was signed to “request that the FKAA exercise its authority to purchase, finance, construct, and otherwise acquire and to improve, extend, enlarge, and reconstruct a wastewater collection, transmission, treatment, and disposal system or systems in the Florida Keys.” A chronological summary of these and other events relevant to wastewater management in the Keys is presented in Table 1-1.

Table 1-1. Recent Chronology of Regulatory Milestones of Wastewater Management in the Florida Keys

1993	<ul style="list-style-type: none"> • Initial adoption of Monroe County Year 2010 Comprehensive Plan.
1997	<ul style="list-style-type: none"> • Monroe County Comprehensive Plan Amended to comply with Florida Statutes. • Administration Commission adopts amendments to Monroe County Year 2010 Comprehensive Plan and established Five-year Work Program (Rule 28-20.100). • MCSWMP begins. • Monroe County established original Identification and Elimination of Cesspools Ordinance, 03-1997; this ordinance was unsuccessful and was later rescinded.
1998	<ul style="list-style-type: none"> • Governor’s Executive Order 98-309 (State and Local Agency Participation in Carrying Out Monroe County Year 2010 Plan). • Florida Legislature amends the enabling legislation of the FKAA (F.L. 76-441) to reinforce the FKAA’s involvement in wastewater for Monroe County • Monroe County enters into a Memorandum of Understanding with the FKAA requesting that the FKAA exercises its authority to finance, construct, and operate wastewater systems in the Keys
1999	<ul style="list-style-type: none"> • Governor Bush and his cabinet amend the 1997 Five-Year Work Program (Rule 28-20.100) to accelerate pace of program, identify <i>hot spots</i>, and initiate cesspool identification outside of <i>hot spot</i> areas. • Monroe County passes ordinance 031-1999 (Revised Identification and Elimination of Cesspools) to comply with the Governor’s revised Five-Year Work Program. • F.L. 99-395 passed (New requirements for all sewage treatment, reuse and disposal facilities, and all on-site systems Monroe County; prohibits new or expanded discharges into surface waters, and require existing surface water discharges be eliminated before July 1, 2006).

Source: Modified from Monroe County, 2000

In addition to local regulations, Section 303(d) of the Clean Water Act (CWA) requires all states to develop a list of priority surface waters that do not meet applicable water quality standards (impaired waters) after implementation of technology-based effluent limitations. States are

require to establish Total Maximum Daily Loads (TMDLs) which designate the maximum amount of a pollutant a water body can assimilate without exceeding water quality standards.

Chapter 99-223, Laws of Florida, sets forth the process by which the 303(d) list is refined through more detailed water quality assessments. It also establishes the means for adopting TMDLs, allocating pollutant loadings among contributing sources, and implementing pollution reduction strategies. Implementation of TMDLs can include any combination of regulatory, non-regulatory, or incentive-based actions necessary to reduce the pollutant loading. Non-regulatory or incentive-based actions may include development and implementation of Best Management Practices (BMPs), pollution prevention activities, and habitat preservation or restoration. Regulatory actions may include issuance or revision of wastewater, stormwater, or environmental resource permits necessary for consistency with the TMDL. Permit conditions may be quantitative effluent limitations or, for technology-based programs, a combination of structural and non-structural BMPs necessary for achieving the desired pollutant load reduction.

Florida is comprised of fifty-two major hydrologic basins, which in turn make up five TMDL groups, each of which undergoes five phases of development, beginning with basin assessment and concluding with actual implementation. The five phases of the study for each group are as follows:

- Phase I Preliminary Basin Assessment
- Phase II Strategic Monitoring
- Phase III Data Analysis and TMDL Development
- Phase IV Management Action Plan
- Phase V Implementation

The Keys are in the fifth group of water bodies to undergo TMDL implementation and are scheduled to begin Phase I in fiscal year 2004/2005 and complete it by fiscal year 2008/2009. Currently, Phase II for water bodies in Group I was completed in April of 2002. The results of the five phases for Group 5 cannot be predicted at this early data and as such, consideration to TMDLs has not been given in this Program.

1.2 Plan Formulation Memorandum

Previously developed wastewater and stormwater master plans developed by local municipalities in Monroe County provide the individual plans necessary for implementation of the FKWQIP and also alleviate the need for the Corps to develop additional planning documents. Therefore, the Memorandum is necessary to provide the documentation of the analyses and subsequent recommendations of the plans.

1.2.1 Purpose of Plan Formulation Memorandum

The purpose of this Memorandum is to document the analyses and planning processes used in developing the various master plans and other documents prepared to date for Monroe County and municipalities within Monroe County with regard to wastewater improvements and stormwater management planning. Based on the extensive work undertaken to date in the

identification of potential alternatives and recommended plans, no additional plan formulation work will be undertaken by the Corps as part of the FKWQIP. Consequently, the purpose of this memorandum is to summarize the decision-making process used in each master plan or other relevant documents, and to document the recommendations made as part of each plan.

1.2.2 Memorandum Organization

Chapter 2 of this memorandum outlines the range of alternatives considered within the previously prepared master plans and other documents listed below and summarizes the decision making process used to select the recommended action(s) within each plan. Chapter 3 provides an overview of available cost information. Chapter 4 presents concluding statements regarding the decision making process for future plans for wastewater and stormwater treatment in Monroe County and the future use of this memorandum.

1.2.3 Master Plans and Other Documents Reviewed

Several stormwater and wastewater master plans have been prepared for Monroe County and municipalities located within Monroe County. The Corps plans to use these decision making documents as the foundation for the planning component of the FKWQIP. Since 1994, several plans and documents have been produced and were reviewed for inclusion in this Memorandum. Descriptions of each plan are provided in the following sections.

1.2.3.1 Wastewater

Draft Wastewater Facilities Plan with Phased Implementation for the Marathon Area of the Florida Keys (Marathon Wastewater Facilities Plan). This document is dated April 1998, and was prepared by CH2MHill, Inc. et al. The purpose of this Plan is “to define the most cost-effective, environmentally sound, and implementable program for the management of existing and future wastewater pollutants that presently act, or will act, to deteriorate the Key’s water quality in the Marathon area.” The planning area encompasses the area from the Seven Mile Bridge through Conch Key (see Figure 1). The three steps that comprised the implementation of the wastewater management system were stated to be “planning, design, and construction.” The scope of work for this Facilities Plan is defined in Construction Grants, 1985, a manual published by the Environmental Protection Agency (July 1984).

Design/Build/Operate Wastewater Management System (DBOWMS) for the City of Marathon, FL. This document is dated April 1998 and was prepared by the FKAA. It represents a set of specifications that accompanied a Request for Proposal (RFP) for the Design/Build/Operate Wastewater Management System for the City of Marathon, FL. The specifications establish certain minimum technical requirements and minimum level of quality for the treatment system to be constructed and operated for the City.

Monroe County Sanitary Wastewater Master Plan. This document is dated June 2000, and was prepared by CH2MHill, Inc. et al. The stated objective of this master plan was to “develop a plan that would provide an equitable, ecologically sound, and economical implementation

strategy for managing wastewater and improving the water quality in the Florida Keys.” The stated goal was to “provide responsive, flexible, and cost-effective solutions that improve wastewater management throughout the keys and satisfy existing and future needs of the community.” Additionally, The master plan’s goal is to address affordability and equity issues, and to satisfy environmental and regulatory criteria and guidelines. The planning and study area included the entire developed area of the Florida Keys, except for the Cities of Key West and Key Colony Beach (see Figure 1).

City of Marathon Reuse Component of Central Wastewater RFP. This document was prepared in May 2001, and revised in August 2001 and again in October 2001, by Calvin, Giordano & Associates, Inc. The purpose of this study was “to determine water reuse feasibility for the City of Marathon.” The scope of this study was generally based on FDEP’s *Guidelines for Preparation of Reuse Feasibility Studies for Applicants Having Responsibility for Wastewater Management*.

City of Key Colony Beach Sewer System Evaluation. This document, dated September 2002, was prepared by URS Corporation. The City has “continuously expended funds” over the last five years in rehabilitating their existing wastewater collection system. The purpose of this report is to assist the City’s wastewater system operation staff in identifying additional sources of Inflow and Infiltration in their wastewater system.

Federal Emergency Management Agency Draft Programmatic Environmental Assessment. The Federal Emergency Management Agency (FEMA) has received grant applications to fund the construction of several wastewater treatment systems in Monroe County. Much of the proposed project funding would be provided through FEMA 1249-DR post Disaster – Unmet Needs funds. Matching funds will be provided through the Florida Division of Emergency Management and local government applications. While the Environmental Assessment prepared in September of 2002 was programmatic in nature, it was written to address the environmental consequences of constructing four planned wastewater treatment projects.

1.2.3.2 Stormwater

Stormwater Runoff Study prepared for the City of Key West – This document dated September 1994 was prepared by Kisinger, Campo and Associates Corp (KCA). The stated purpose of the study is to identify and map the existing flooding locations and ultimately develop a Drainage Improvement Development Plan.

City of Key West Water Quality Improvement Program – This program, dated 1999, was developed by the City of Key West in order to facilitate the City’s commitment to “divert stormwater runoff away from Outstanding Florida Waters,” and commitment to reducing infiltration, inflow and exfiltration in their sewer system.

Islamorada, Village of Islands, Stormwater Management Master Plan. This document was prepared in September 2000 by Law Engineering and Environmental Services, Inc. The purpose of this plan is to “address water quality improvements to stormwater discharges into the

Village’s canals and near shore waters of the Atlantic Ocean and Florida Bay.” The planning area was the entire Village, which spans from Mile Marker 90.94 to the north to 72.66 to the south and consists of four islands: Plantation Key, Windley Key, Upper Matecumbe Key and Lower Matecumbe Key (see Figure 1).

City of Key West Long Range Stormwater Utility Plan – This plan, dated June 2001 was prepared by the City’s Engineering Services Division. The purpose of the plan was to document the study’s previously prepared by KCA and CH2MHill as well as information regarding flooding problems after 1994, and make recommendations as to required future projects and funding to alleviate flooding and improve water quality in and around the City of Key West.

Monroe County Stormwater Management Master Plan – This document, dated August 2001, was prepared by Camp, Dresser & McKee, Inc. The stated purposes of the Stormwater Management Master Plan are to “assess the adequacy of existing systems, prioritize stormwater management needs for each island, identify regulations and policy needs, and develop a plan to finance the construction, operation and maintenance of required facilities.” The geographic area of this project consists of the islands in the County (the Keys).

2.0 ALTERNATIVES SELECTION PROCESS

This Section documents the process used by decision makers to evaluate wastewater treatment and stormwater management options contained within the various master plans and other documents that are being used to comprehensively address wastewater treatment and stormwater management needs in the Florida Keys. This discussion also provides an explanation of the methods used to evaluate alternatives within each master plan. At the conclusion of each discussion, the recommendation(s) generated from each plan or decision making document is presented.

2.1 Monroe County Sanitary Wastewater Master Plan

The Monroe County Year 2010 Comprehensive Plan mandated that a sanitary wastewater master plan be prepared to determine acceptable levels of sanitary service and treatment for all developed and undeveloped areas of Monroe County. More specifically, the development of the plan was intended to:

- Establish more stringent nutrient limits not to exceed the maximum nutrient loads that can be tolerated by the County’s nutrient-sensitive waters and ecosystems without experiencing short-or-long-term adverse impacts.
- Prevent further degradation to groundwater, as well as confined, nearshore, and offshore waters.
- Ensure improvements of these waters to levels that have been demonstrated to support healthy, diverse, and productive populations of fish and other marine resources.

The Monroe County Sanitary Wastewater Master Plan is the result of a comprehensive 3-year study effort, which included extensive evaluations of existing systems in the Florida Keys and applicable technologies that would fulfill the objectives of the Monroe County’s 2010

Comprehensive Plan. The master plan was prepared as an initial step towards satisfying directives of this plan

The planning area of this master plan included the entire developed area of the Florida Keys, except for the Cities of Key West and Key Colony Beach (see Figure 1). While the study was ongoing, the Village of Islamorada and the City of Marathon were incorporated. Thus, the planning area included unincorporated Monroe County in the Florida Keys, as well as the Cities of Layton and Marathon and Islamorada, Village of Islands.

2.1.1 Existing Wastewater Treatment and Collection Facilities in the Keys

Except for the Cities of Key West and Key Colony Beach where regional wastewater systems are in operation, development of wastewater facilities throughout most of Monroe County has occurred with limited forethought of regional wastewater planning. Without access to any regional wastewater utilities, each developer or homeowner has had to construct private on-site or package wastewater treatment facilities to serve their development or individual home. These conditions have resulted in the present mix of approximately 23,000 on-site systems and 246 small wastewater treatment plants.

Although the existing wastewater collection systems are not adequate for regional wastewater transmission, they could be used to provide source collection and transmission to a regional collection system.

Recommendation: The Monroe County master plan recommended existing collection systems and lift stations remain under private ownership because upgrading these facilities to standards required for a regional utility would be too costly.

2.1.2 Water Quality Hot Spots

A goal of the Monroe County master plan is to coordinate the Cesspool Identification and Elimination program with the master planning efforts. This 1999 Ordinance calls for the establishment of water quality *hot spots*, defining *hot spots* as areas that are anticipated to be served by central community wastewater systems within the next 10 years or by the year 2010.

Recommendation: The Monroe County master plan recommended wastewater treatment and collection system improvements be located within *hot spots* as defined by the Monroe County Ordinance governing Cesspool Identification and Elimination (1999).

2.1.3 Estimated Flow Volume During Planning Period

The planning period used for the development of the Monroe County master plan was the 20-year interval between 1998 and 2018. Wastewater flows and customer projections were developed using water use records obtained from the Florida Keys Aqueduct Authority (FKAA) for each of the 27 master plan study areas for the baseline year (1998). Wastewater flow projections were then made based on anticipated growth for the 10-year and 20-year planning

horizons (i.e. 2008 and 2018 respectively). An assumption was made that wastewater flow is equal to water use at each residential and commercial location.

Recommendation: The Monroe County master plan estimated an increase in total wastewater flow for the first 10-year planning period of 7 percent and an estimated increase in total wastewater flow in all 27 study areas for the entire 20-year planning period of approximately 14 percent.

2.1.4 Monroe County Wastewater Management Alternatives Screening Process

The decision-making (or prioritization model) approach implemented for the Monroe County master plan incorporated technical information, as well as cost and schedule data. This information was merged with the values and concerns expressed by key decision makers, stakeholders, and interested members of the public at large to reach consensus on a recommended plan. A two-step process was implemented:

1. Screen potential land areas for possible facility siting.
2. Evaluate the wastewater management alternatives.

Decision models were developed through a joint, collaborative effort between Sanitary Wastewater Master Plan Technical Advisory Committee (SWMP TAC), Monroe County Citizens Task Force on Wastewater (Task Force), and the Monroe County Board of County Commissioners (BOCC), and also through consultation with representatives of the community-at-large. This process resulted in the identification of alternatives reflecting a true combination of stakeholder concerns with technically feasible treatment solutions.

Decision model results were placed in a ranked list of sites with associated benefits and cost estimates. The process allowed sites or alternatives to be evaluated against a common framework so they could be compared more easily, while considering both budget and schedule constraints. This process also provides insight into which factors most influenced the final decision.

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.

In evaluating wastewater management alternatives for Monroe County, decision-makers needed to consider multiple issues, including: cost, technical feasibility, performance, environmental impacts, service disruption potential, reliability, and implementation. In addition, each management alternative brings with it a host of strengths and weaknesses that had to be evaluated fairly and objectively. Finally, there were a series of policy concerns and differences

of opinion throughout the stakeholder community, and decision makers had to attempt to help resolve these as best as possible.

The evaluation model resembles a company organization chart. The first level lists the principal objective of maximizing the benefits of the wastewater management alternative. The second level lists a series of important issues identified by stakeholders. The third level lists the performance criteria that measure how well each wastewater management alternative meets the program objective.

The Wastewater Management Alternatives Screening Process involved:

- Identify Alternatives – 43 alternatives were identified.
- Preliminary Screening – Each of the 43 alternatives were scored for their ability to meet criteria in each of 7 screening areas.
- Alternative Shake-Out – Alternatives that did not meet criteria were eliminated from further evaluation.
- Next Level Screening – Alternatives that passed preliminary screening were further ranked for their ability to meet criteria within the 27 study areas.
- Feasibility Study – Ranked list of alternatives for each study area were studied for consideration in the master plan.

Recommendation: Results of the Monroe County master plan feasibility study demonstrated that it is much more cost effective and environmentally sound to provide community wastewater collection and treatment in most areas of the keys (25 of the 27 study areas) than to upgrade or replace all existing on-site systems with shared cluster on-site wastewater nutrient reduction systems and to upgrade all existing waste water treatment plants.

2.1.5 Prioritization of Proposed Projects

Given the goal of eliminating unknown systems, and correspondingly cesspools, other parameters, such as annual cost per pound of nitrogen or phosphorous removed, while important were deemed to be secondary in importance to the goal of eliminating cesspools. Consequently the parameter of annual cost per unknown system eliminated was the principal criteria used for determining the extent of a community wastewater collection and treatment system, and for establishing and ranking *hot spot* areas.

Recommendation: The *hot spots* were ranked in order of priority with a ranking of 1 for the *hot spot* areas that the Monroe County master plan recommended be addressed first as well as for each region of the Florida Keys, regardless of political boundaries. Generally, *hot spot* areas encompass two or more subdivisions and adjacent areas. As indicated above, the Monroe County Ordinance dealing with elimination of cesspools required that each area of the Keys (Upper, Middle, Lower) establish a priority *hot spot* list and initiate planning, design, and construction of these community wastewater systems for these areas.

2.1.6 Proposed On-site Systems for *Cold Spots*

Properties within *cold spot* areas where on-site systems will continue to operate fall into two categories:

- Properties with unknown systems that must replace or upgrade their systems immediately with a nutrient reduction OWNRS. All these systems must be replaced or upgraded by July 12, 2003.
- 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 of 10/10/10/1.

Recommendation: Install OWNRS as prescribed by regulatory requirements and local ordinance.

2.1.7 Wastewater Solids Management

The following discussion summarizes the solids management plan recommended by the Monroe County master plan for the 28 existing and proposed wastewater treatment facilities and the options considered. Three options were evaluated:

- **Option 1 – Minimum Regionalization.** Operate solids handling facilities at all 14 s of 100,00 gallons per day capacity or greater.
- **Option 2 – Maximum Regionalization.** Operate solids handling facilities only at the largest s in the Lower, Middle, and Upper keys with solids from all other S trucked to these facilities.
- **Option 3 – Intermediate Regionalization.** Operate solids handling facilities at the nine s of 400,000 gpd capacity or more, with solids from the remaining plants trucked to the nearest of these facilities.

Recommendation: The Monroe County master plan recommended Option 1 that the 14 s with a capacity of 100,000 gpd or greater capacity treat and dewater their own solids.

2.1.8 Wastewater Collection Alternatives

Wastewater collection alternatives were analyzed for their suitability in each of the 27 study areas. The collection system technologies that were evaluated included:

- Conventional gravity sewers,
- Simplified gravity sewers,
- Smaller diameter gravity sewers,
- Low pressure sewer grinder pump systems, septic effluent pump systems, and
- Vacuum sewers.

Of these six collection system types, three systems were determined to be best suited for the Florida keys and were evaluated in more detail: vacuum sewers, centrifugal grinder pump systems, and progressive cavity grinder pump systems. Conceptual designs for these collection systems were prepared and construction cost estimates developed. In 22 of the 27 study areas, vacuum collection was the lowest cost alternative for serving the entire study area. This was particularly the case when the number of EDUs being collected was more than 350.

Recommendation: Besides being the most cost-effective collection system alternative, vacuum sewers offer the following advantages:

- No electrical power is required at each home or vacuum value
- Wastewater collection service is maintained during short-term or long-term utility power outages. A standby generator that will automatically generate power if there is a loss of utility power will be provided at each vacuum station
- Air drawn into the vacuum system with the sewage will help to keep the sewage fresh, and thus will help to eliminate odors

2.1.9 Selection of Effluent Disposal Methods

Requirements for wastewater effluent disposal in Monroe County were amended by the 1999-Florida Legislature. This amendment prohibited new or increased discharges into surface waters and mandating the elimination of existing discharges to surface waters by July 1, 2006. This legislation allows effluent reuse systems, but otherwise requires the use of underground injection for effluent disposal, under the following conditions:

- *Shallow Injection Wells* - If the design capacity of the facility is less than 1 mgd, the injection well must be at least 90 feet deep and cased to a minimum depth of 60 feet (this is considered a shallow injection well).
- *Deep Injection Wells* - If the design capacity of the facility is equal to or greater than 1 mgd, the injection well must be cased to a minimum depth of 2,100 feet (a deep injection well).
- *Water Reuse* – The Monroe County master plan recommended limited use or reliance on effluent reuse. Among the drawbacks sited for effluent reuse are the following:
 1. Land application requires full storage or backup disposal systems whenever treatment requirements are not achieved, or when the land application site cannot take reclaimed effluent. This includes extended periods of wet weather.
 2. Relatively large tracts of land are required to accommodate the effluent being disposed. Such tracts may be distant from the plant site, causing high transmission conveyance costs.

Recommendation: Design and construct effluent disposal systems in compliance with applicable regulatory requirements.

2.1.10 Monroe County Sanitary Wastewater Master Plan Recommendations

The recommendations presented in this master plan include:

- That existing on-site systems located in lower density areas of the Florida Keys be upgraded or replaced with on-site nutrient reduction systems (OWNRS)
- Installation of 12 community wastewater collection and treatment systems
- Installation of five regional wastewater collection and treatment systems
- That 17 existing facilities continue to operate and upgrade their treatment processes to meet BAT or AWT, as required, by July 2010

The master plan further recommended that 5 of the 12 community wastewater collection and treatment systems feature interim wastewater treatment plants that, over time, be phased into the larger regional systems. Details of the recommendation from the Monroe County master plan for each of the three regions of the Florida Keys are presented below:

Lower Keys – In the Lower Keys, four new community wastewater systems and two new regional wastewater systems were recommended for construction. The two proposed regional systems in the Lower keys are relatively small, in terms of both flow and area served, thus the first phase of these s can be constructed at the actual regional site. In addition to the discussion of new systems or extension of existing systems, the master plan recommended that seven existing facilities in the Lower Keys continue to operate and upgrade their treatment processes to meet the BAT/AWT standard by July 1, 2010.

Middle Keys – in the Middle Keys, two new community wastewater systems and one new regional systems are recommended. The proposed Middle Keys service areas are shown on Figure 1. Other than Duck Key, Conch Key, and Long Key/Layton, all study areas of the Middle Keys continue to operate and upgrade their treatment process to meet the BAT/AWT standard by July 1, 2010. These systems include:

- Hawk’s Cay (Hawk’s Cay portion of AWT upgrade)
- West End Long key (three facilities)
- East end Long Key (two facilities)

Upper Keys – In the Upper Keys, one new community wastewater system is recommended in lower Matecumbe, and two new regional systems are recommended: the 1.5 million gallon per day (mgd) system to serve Islamorada Regional Wastewater Management District, and the 2.25-mgd system to serve the Tavernier/Key Largo Regional Wastewater Management District.

2.2 Marathon Wastewater Facilities Plan

2.2.1 Wastewater Treatment Plant Siting Alternatives

This preliminary screening process resulted in identification of 19 potential wastewater treatment plant () sites. These sites were applied to a selection criteria matrix to narrow the potential site list to six sites, including at least three regional sites (greater than 10 acres). The six sites with the highest scores in the site selection criteria matrix were selected for further evaluation,

including field environmental assessments. Assessed values of the sites were obtained from records of the Monroe County Property Appraiser.

Environmental assessments of the six selected sites consisted of the following activities:

- Review existing Monroe County Land Use Classification Maps.
- Review U.S. EPA Florida Keys Wetlands Advanced Identification Project Land Cover Maps.
- Review any site-specific development and proposed development plans available through Monroe County.
- Review the most recent available color infrared and tax assessor aerial imagery.
- Review threatened and endangered species data relative to each selected site.
- Site inspection by a qualified environmental scientist.

Recommendation: This master plan recommended Site No. 4 (West of 48th Street) as the first priority site for a regional . An analysis of collection system alternatives indicated that use of this site will not incur significantly higher collection/transmission system costs than use of the more centrally located Site No. 6. This site has the added advantages of being partially cleared, absent of environmentally sensitive lands, and in proximity to a reclaimed water application site (Sombrero Country Club Golf Course).

2.2.2 Collection System Alternatives

The three wastewater collection technologies identified as best suited for use in the study area were centrifugal grinder pump systems, progressive cavity grinder pump systems and vacuum sewers. All three technologies are capable of providing reliable wastewater service, if properly installed and maintained. Gravity sewers would also provide reliable service, but at a significantly higher cost than the alternative collection systems. Based on cost estimates prepared for the four collection system options, vacuum sewers were identified as the lowest cost alternative.

Of the three preferred alternative wastewater collection systems, it was reported that vacuum systems have a clear advantage with respect to system reliability. Vacuum sewers do not require a power source at individual connection points and the system can remain in service during a power outage if auxiliary power is provided at the vacuum stations. Maintenance costs for the four wastewater collection system options are similar. Owners and operators of existing systems reported similar frequencies of maintenance calls for the two types of grinder pump stations and the vacuum valves. On the average, repairs to vacuum valves were reported to be less costly than repairs to grinder pump station.

Recommendation: The entity responsible for the wastewater utility should participate in the decision process for selection of the type of collection system to be used. Final selection should be based on cost and on preference of the wastewater utility, provided the difference in cost is not large enough to adversely impact users of the system.

2.2.3 Wastewater Treatment Alternatives

The overall approach evaluated a wide range of wastewater treatment alternatives producing varying degrees of effluent quality over a wide range of capacities. The intent was to screen all reasonably promising processes that potentially could be applied in the study area, although the emphasis was on fundamental processes and not on the diversity of proprietary process variations that are available in the marketplace. Such process variations were left for further evaluation once the fundamental process train has been established.

The study area included some 70 FDEP permitted s. Consideration was given to upgrading one or more of these existing plants for use as a regional or subregional . The cost estimates developed were based primarily on information provided by a number of equipment vendors. Cost information from prior CH2M HILL projects was also utilized. Unit sizing criteria were developed in accordance with Ten States Standards. The estimates were prepared to emphasize relative cost differences between the alternatives rather than the absolute magnitude of the costs.

Recommendation: Capital and O&M costs were estimated for each alternative at treatment capacities of 0.02 mgd, 0.10 mgd, 1.0 mgd, and 2.0 mgd. Pre-engineered, field-erected treatment units were assumed for the cost estimates, however, the entity ultimately responsible for wastewater treatment may wish to consider cast-in-place construction. The initial construction cost would be somewhat higher, however, a cast-in-place plant would offer advantages in reduced maintenance and increased operational flexibility.

2.2.4 Effluent Management Alternatives

Potentially feasible effluent management alternatives were identified and subjected to a preliminary screening. Those alternatives that contained major obstacles to implementation were eliminated from further consideration. The alternatives that passed the preliminary screening were evaluated further. Upon completion of the in-depth evaluation, the remaining effluent management alternatives were either eliminated from further consideration or incorporated into the Facilities Plan. Reuse by land application, underground injection through deep wells, underground injection through shallow wells, and surface water disposal were identified as potentially feasible methods for effluent management in the Marathon area.

Recommendation: A total of four scenarios were considered:

Scenario No. 1 – Capacity of 0.02 mgd. FDEP does not allow reuse for systems this small. A shallow injection well system is the only remaining feasible alternative for effluent management. The order-of-magnitude construction cost estimate for this system is \$33,000 for two wells, wellfield piping, and polishing tank only.

Scenario No. 2 – Capacity of 0.1 mgd. It was recommended that the primary effluent management system be a shallow injection wellfield system. The order-of-magnitude construction cost estimate for the shallow injection wellfield, including four wells, piping effluent, and polishing, is \$100,000.

Reuse should be pursued as the secondary effluent management method. 0.1 mgd is the minimum allowable size for a reuse system. The order-of-magnitude cost estimate for the reuse system is approximately \$1 million for filters, disinfection, effluent storage tank, continuous on-line turbidity and chlorine residual monitoring equipment, and high service pumping. This cost does not include transmission and distribution piping and connection to the existing irrigation systems. These offsite costs will be determined when site-specific areas for reuse are defined and can be expected to add substantially to the cost of the reuse alternative.

Scenario No. 3 – Capacity of 1.0 mgd. As with Scenario No. 2 above, a shallow injection wellfield system is recommended for the primary effluent management system. The order-of-magnitude construction cost for the shallow injection well system, including 14 wells is \$750,000.

Reuse should be pursued as the secondary method of effluent management, depending on economic feasibility. The order-of-magnitude construction cost estimated for the filters, disinfection, effluent storage tank, continuous on-line turbidity and chlorine residual monitoring equipment, and high service pump station is approximately \$2.5 million. Again, offsite facilities, to be evaluated later in the Facilities Plan, will add substantially to the cost of the entire reuse system.

Scenario No. 4 – Capacity of 2.0 mgd. A deep injection well system was recommended as the primary effluent management system. Two injection zones exist that are suitable for wastewater disposal were identified. These constitute the upper part of the Floridian Aquifer System (FAS); these are an intermediate-depth zone, extending from 650 to 1,200 feet below the surface (bls) and the deeper Boulder zone, extending from 2,100 to 2,500 bls.

If the proposed injection zone is the intermediate-depth zone, preliminary design indicates that a 12-inch diameter steel casing set to a depth of approximately 650 feet bls will convey effluent to the injection horizon. The well will be completed with open-hole construction from 650 to 1,200 feet bls.

Typical surface facilities will include a pump station, surge control system, yard piping, and instrumentation. A second, redundant intermediate depth injection well would provide a back-up system for periods in which the primary injection well is off-line for testing. An order-of-magnitude construction cost for two intermediate-depth injection wells and surface facilities is approximately \$1.52 million, with an annual O&M cost of approximately \$90,000.

If the intermediate-depth deep well described above could not be permitted, another potential injection zone exists is the deeper Boulder Zone. This injection horizon is most likely confined by dense limestone from 1,200 to 2,100 feet bls. This option would include a 22-inch casing set to 650 feet bls, and a 12-inch-diameter casing set to 2,100 feet bls, with open-hole construction to 2,500 feet bls. The estimated order-of-magnitude construction costs for two deep wells and surface facilities is \$2.82 million, with an annual O&M cost estimated to be \$90,000.

The master plan recommended that reuse should be pursued as the secondary effluent management method, if economically feasible. The order-of-magnitude estimate of the construction cost for reuse facilities at the WWTP site is approximately \$3.5 million.

2.2.5 Solids Management Alternatives

Alternatives for processing and disposing of residual wastewater solids (treatment plant sludge and septage) that would be generated in the study area upon implementation of regional or subregional wastewater collection and treatment systems were evaluated. The alternatives evaluated included various processes for stabilizing, dewatering, transporting, and disposing of solids produced by two s serving the primary and secondary service areas. Alternative means of handling treatment plant solids and septage from the remaining areas of the planning area were evaluated.

Proven solids handling processes in general use in the United States today were first screened with respect to their applicability at a new regional WWTP serving the primary service area. For the wastewater collection/treatment option utilizing subregionals, it was assumed that a single centralized solids handling facility would be constructed at one site, and solids from the other s would be transferred to that site for processing. The most feasible processes were then formulated into alternative systems, which were compared on the basis of both capital and O&M costs.

Recommendation: A solids handling system consisting of aerobic digestion, dewatering, and contract hauling to remote agricultural land is the recommended alternative for a new regional WWTP. The regional WWTP or central subregional solids management facility should also be equipped to receive and co-process residual solids from the Key Colony Beach WWTP and the Hawks Cay WWTP serving the secondary service area. Continuing disposal of septage through contract haul to the Miami-Dade Water and Sewer Department (MDWASD) system is the recommended method of septage disposal.

2.2.6 Wastewater Management Alternatives

The wastewater management alternatives were evaluated to identify the most cost-effective and environmentally favorable plan for wastewater management in the Marathon Study Area. The alternatives consisted of the following.

- Upgrade individual on-site systems with Best Available Technology (BAT) and upgrade existing package plants to Advanced Wastewater Treatment (AWT) standards.
- Serve the primary service area with subregional WWTPs.
- Serve the primary service area with a regional WWTP.

All regional management alternatives were evaluated on the basis of providing AWT where treatment plant flows were greater than 100,000 gpd in accordance with the Monroe County BCC's selection of AWT as the most environmentally sound treatment level. Alternatives were evaluated on the basis of cost and environmental and implementation factors.

Recommendation: Before any reuse facilities are incorporated into the design and construction of the project, a firm, legally binding commitment to use reuse waster at a guaranteed demand should be obtained from reuse customers. Based on these commitments, the initial reuse demand can be determined, and the size and extent of the initial reuse facility can thus be determined and incorporated into the project. Depending on the size of the initial reuse capacity at the regional plant, additional capital costs could vary from approximately \$2,050,000 to \$10,500,000. Total project costs could vary from approximately \$2,600,000 to \$13,400,000; these costs would have to be included and financed in the total project cost of the regional facility. Annual O&M costs would increase between \$18,000 and \$50,000.

2.3 Islamorada, Village of Islands, Stormwater Management Master Plan

In order to evaluate potential reduction on pollutant load generated by storm events within the Village, an alternatives analysis was conducted for each of the Village's drainage basins including review of a No Action alternative. The ranking methodology evaluated the qualitative aspects of various attributes for each alternative treatment technology with regard to program priorities and future land use projections. When present, environmental impacts for each alternative were evaluated on the basis of their potential effects on natural resources including: effects on flora and fauna, water and sediment water quality standards; habitat communities and unique physical features of the environment within each basin as they relate to future land use activities.

Ten alternative scenarios to reduce pollutant load evaluated include:

- 1** Installation of sediment removal mechanisms,
- 2** Installation of drainage wells and associated sediment removal mechanisms,
- 3** Construction of swales,
- 4** Installation and maintenance of native vegetative buffers,
- 5** Construction of retention/detention facilities,
- 6** Wetland hydrologic enhancement,
- 7** Creation of wetland habitats,
- 8** Infrastructure / system maintenance,
- 9** Public education, and
- 10** No Action.

A ranking system was developed to assess the relative degree of potential adverse environmental impacted and reduction of pollutant loadings associated with each of the ten alternatives listed above. The alternatives were ranked on a scale of one to five, with five being the most desired ranking or representing negligible adverse environmental impacts, and one where significant ecosystem impacts were anticipated, or estimated costs were disproportionate to benefits.

Each alternative was ranked with regard to categories of:

- Water quality (e.g. nutrient loading; suspended solids; oil and grease and heavy metals),
- Physical parameters (e.g. maintenance; public safety and erosion and sedimentation),

- Sediment storage capacity,
- Flora and fauna (e.g. avifauna; fish; benthos; and threatened/endangered plant and animal species),
- Alternation of costal habitats,
- Land use,
- Level of Service provided (water quality and quality discharge requirements of the Village Comprehensive Plan), and
- Relative cost.

The categories were then averaged to determine the final ranking of each ten alternatives for each of the Village’s 13 proposed future land use categories. The result was a recommended strategy for reduction of pollutant loads for each land use type.

Each drainage basin may contain one or more land use types. As stated above, for each land use type a preferred methodology for pollutant reduction was developed. Each drainage basin was then ranked with regard to priority for implementation of pollution reduction measures based on the improvements ability to meet Program Priorities developed by the Village and the potential benefits of the improvements.

Recommendation: The master plan provides a prioritized list of 63 projects recommended for implementation over 30 years with an associated cost in current dollars of \$48,916,882.

2.4 Monroe County Stormwater Management Master Plan

Goals and Objectives of the Study

Based on public input and the 2010 Comp Plan, the following is a list of recommended goals and objectives for the Monroe County Stormwater Management Master Plan:

Goal 1. The stormwater master plan will identify, prioritize and recommend remedial improvements for the significant water quality related problem areas within the unincorporated areas of the County.

Goal 2. The stormwater master plan will recommend actions that will reduce the sediment and nutrient loading of near shore waters resulting from runoff.

Goal 3. The stormwater master plan will review existing regulatory requirements for the control of new development related to flooding and water quality and will recommend improvements as needed. As a related issue, the SMMP will review existing enforcement activities and recommend changes necessary to improve the compliance of existing or new regulations.

Goal 4. The stormwater master plan will recommend activities related to the stormwater management of future growth that will be expected to result in no increase in sediment or nutrient loads to near shore waters.

Goal 5. The stormwater master plan will strive to use nonstructural and source controls to achieve a reduction in existing sediment and nutrient loads. When necessary, the SMMP will recommend structural controls associated with the publicly owned infrastructure.

Alternatives Considered

As part of this plan, various alternative strategies for stormwater management with particular emphasis on those to be used in the Monroe County Stormwater Management Master Plan were considered:

On-site Approach. In the case of future urban development or retrofit of existing development, the on-site approach (also known as piecemeal approach to stormwater control) involves the delegation of responsibilities for BMP deployment to local land developers or the use by the County of BMPs serving small areas due to site constraints. Each developer is responsible for constructing a structural BMP at the development site to control nonpoint pollution loadings from the site. On-site detention ponds typically have contributing areas of 20-50 acres. The local government is responsible for reviewing each structural BMP design to ensure conformance with specified design criteria, for inspecting the constructed facility to ensure conformance with the design, and for ensuring that a maintenance plan is implemented for the facility. The treatment facility usually consumes 15 percent of developable site based on research done in the State of Florida by CDM and others.

Regional Approach. The regional approach to stormwater control involves strategically locating regional structural BMPs to control nonpoint pollution loadings from multiple development projects. For ponds serving new development, the front-end costs for constructing the structural BMP are assumed by the developer and/or the local government that administers the regional BMP plan. BMP capital costs can then be recovered from upstream developers on a "pro-rata" basis as development occurs. Individual regional BMPs are phased in as development occurs rather than constructing all regional facilities at one time. Maintenance responsibility for regional structural BMPs can be assumed by the developer (or designee with certified maintenance bonds) or by the local government. For retrofit of existing development, regional BMPs may also be used to cost-effectively treat areas near the areas that cannot be cost-effectively treated. The regional approach can address concurrence for the entire watershed.

BMP Alternatives. The study listed 19 structural BMPs and 16 nonstructural source controls considered in for the Florida Keys.

Structural BMPs

- Shallow grassed swales
- Retention basins
- Buffer strips
- Porous pavement
- Water quality inlets and baffle boxes
- Hydrodynamic separators
- Underdrains and stormwater filter systems
- Infiltration drainfield
- Dry wells
- Modular treatment systems
- Stormwater wetlands
- Alum injection systems
- Aeration
- Level spreaders
- Oil/grease separators
- Recharge wells and bore holes with pretreatment

Nonstructural Stormwater Controls

- Land use planning
- Public information programs
- Stormwater management ordinance requirements
- Fertilizer application controls
- Pesticide use controls
- Control of gray water (cisterns and rain barrels)
- Solid waste management
- Hazardous materials management
- Street sweeping
- Vehicle use reduction
- Directly connected impervious area (DCIA) minimization
- Low impact development
- Illicit connections (non-stormwater discharges) identification and removal
- Erosion and sediment control on construction sites
- Source control on construction sites
- Operation and maintenance

Bridges. The study lists the islands along US 1 within the Monroe County study area with the approximate lengths and bridges connecting them (lengths given to the nearest 0.1 mile). It can be seen that, of the 107 miles indicated, 18.9 miles (about 18 percent) of US 1 are bridges of various lengths. As part of the stormwater master plan, recommendations will be made (see below) on suggested retrofit and rehabilitation projects for US 1, excluding along most of Key

Largo, for approximately 17.5 miles. In order to address all of the potential sources of stormwater runoff, the contribution of the bridges was also considered.

Related to stormwater runoff, a bridge is 100 percent impervious and rain that falls on the bridge either runs off directly to the near shore waters under the bridge or flows down the bridge to the entrance or exit. The question, therefore, is whether or not runoff directly from the bridge can be treated efficiently and at a reasonable cost. From 1993 to 1995, the U.S. Geological Survey conducted a study of the Bayside Bridge in Clearwater, Florida (Stoker, Y.E., "*Effectiveness of a stormwater collection and detention system for reducing constituent loads from bridge runoff in Pinellas County, Florida*", USGS Open File Report 96-484). For the Bayside Bridge, stormwater runoff was collected along the bridge through inlets, and carried to a land-based detention facility near the bridge entrance. This study concluded that, after monitoring 33 storm events, runoff quality varied with total runoff volume, antecedent dry period, and season. Many parameters, including sediments and nutrients, were inversely related to runoff volume. For treatment efficiency, suspended solid loads were reduced by 30 to 45 percent, inorganic nitrogen by 60 to 90 percent and most metals by 40 to 99 percent. However, TKN, alkalinity, pH and specific conductance, among others, had negative efficiencies (i.e., the outflow values were greater than the inflow). This article points out the experience related to bridge BMPs: 1) runoff needs to be carried to the shore where it is treated, 2) regular maintenance is necessary, and 3) treatment efficiencies are highly variable, with some parameters actually increasing. While these results may not be encountered in the Florida Keys, bridge runoff control is not recommended on a large scale. However, it is suggested that bridge runoff treatment should be tried at one or more sites for a few years, with monitoring to confirm treatment efficiencies. Depending on the outcome, bridge runoff control could be implemented on selective bridges.

Recommendations: The stormwater master plan provides a number of benefits related to the goals and objectives of the plan. First, the master plan provides retrofit and rehabilitation projects for all of the identified public problem areas within the Keys. These projects will address both flooding and water quality improvements. Second, the implementation of the master plan will also improve maintenance activities for existing and future stormwater management facilities. Third, the master plan recommends a number of programs that will minimize the runoff pollutant loading to the near shore waters from future developments and eventually will reduce the loads from existing sources.

The following actions were recommended.

- *Monroe County should adopt a 95 percent treatment requirement and strictly enforce its application on new development and significant redevelopment.* The 95 percent treatment requirement means that new developments must remove 95 percent of the annual average load of pollutants from developed property. For the purposes of this plan, the 95 percent standard means 95 percent capture of the mean annual rainfall volume. Through modeling of stormwater pollutant loading for future growth, it has been shown that this requirement will achieve Goal 4 (no increase in future loads). The consequences of this requirement are two-fold. First, the County should review each new development to confirm that the 95 percent requirement is met and through construction inspection, confirm that the stormwater systems are being built according to the approved design.

Second, the County should work with existing residential and commercial developments that plan to redevelop. Once reasonable stormwater retrofits are defined that meet the 95 percent rule, the County should allow redevelopment, as the redeveloped property will provide water quality benefits.

- *Monroe County should implement an operation and maintenance (O&M) program for public stormwater management systems and inspection of private systems.* The O&M program adopted by the County should include routine maintenance for critical stormwater systems as well as routine inspection of others. Furthermore, private stormwater systems should receive proper maintenance with annual certification by owners.
- *Monroe County or South Florida Water Management District (SFWMD) should develop a stormwater well inventory.* Runoff from both public and private properties is discharged into drainage wells. Unfortunately, very little is known about the location, tributary area and land use draining to each well. While drainage wells provide significant stormwater flood relief, the benefits and impacts on water quality are not well documented because of the lack of information.
- *Monroe County and SFWMD should enforce existing regulations through inspection and asbuilt drawings.* The review of existing federal, state, regional and local stormwater regulations confirmed that there are sufficient regulatory controls defined today. However, field inspections confirmed that many of the permitted systems were not built according to the permit and/or are not being maintained. County and water management district inspectors should also be trained in sediment and erosion control.
- *Monroe County should pay special attention to marinas with respect to stormwater runoff.* Many of the stormwater quality problem areas identified in the Florida Keys were related to private marinas. Field inspections identified major problems that were related to runoff from material storage areas, unpaved areas, and lack of stormwater controls prior to discharge. The County should encourage the state to continue the Clean Marina Program, and marina retrofits should be reviewed on a case-by-case basis to meet the 95 percent rule.
- *Monroe County should encourage redevelopment and retrofit with reductions in impervious area.* Many of the existing stormwater problems occur because development has increased the imperviousness of the area. Increased imperviousness changes the volume, timing, peak flow, and pollutant content of stormwater runoff. The County should offer incentives for the reduction of impervious areas using vegetated and landscaped swales, rain gardens, bio-filters, and pervious pavement.
- *Monroe County should encourage the use of vegetated buffers and conservation measures.* As noted previously, the major problems encountered in the Florida Keys are due to the lack of stormwater controls prior to discharge. Simple, yet powerful, controls consist of vegetated buffers such as swales, rain gardens, bio-filters and bio-retention. Also, by conserving water through the use of runoff for residential irrigation reduces the

volume of runoff and limits the pollutant loading discharged. Conservation measures such as cisterns, rain barrels and xeriscape are particularly effective.

- *Monroe County should require all vegetated systems such as swales, medians, etc., to be planted with native vegetation to minimize maintenance.* Planting of vegetated systems with native plants will maintain the beauty of the Florida Keys' natural environment as well as minimize special maintenance. Public and private construction and development should be encouraged to use salt-tolerant plants near shoreline spray areas and other native plants away from the coast line.
- *With the support of federal, state, and regional governments, Monroe County should implement the recommended retrofit and rehabilitation projects to address existing problem areas.* Twenty-two retrofit and rehabilitation projects have been identified to address problem areas within Monroe County. The projects include improvements to be implemented by the Florida Department of Environmental Regulation (Heritage Bike Trail), Florida Department of Transportation (along US 1), Monroe County and Marathon. Three additional projects on private property have been considered as well: K-Mart in Marathon, Key Largo Trailer Village, and the Safe Harbor area on Stock Island. These represent example projects to illustrate the possible retrofit or rehabilitation of private property.
- *Where possible, FDOT should include stormwater controls as part of all Florida Keys projects, including bridge entrances and exits.* A review of existing designs and a field survey of FDOT systems showed that many areas have limited stormwater quality controls. Many of the bridge entrances and exits, especially in the Upper Keys discharge uncontrolled stormwater that contain significant sediment loads. Since the FDOT stormwater system is the major (and in some study areas, the only) stormwater controls available, stormwater quality improvements will also result in improvements to near shore waters.

2.5 Stormwater Runoff Study Prepared for the City of Key West

2.5.1 Goals of the Study

The stated purpose of the study is to identify and map the existing flooding locations and ultimately develop a Drainage Improvement Development Plan by prioritizing the documented flooding areas and analyzing alternative solutions for each area.

2.5.2 Alternatives Considered

The study considered six alternatives to address flooding.

1. Roadside ditches
2. Urban storm drain systems
3. French drains
4. Storage chambers

- 5. Retention/detention ponds
- 6. Gravity wells

Recommendations: Recommendations made for the program includes the following:

- Implement a City wide maintenance program that would provide scheduled cleaning of the existing and/or proposed storm drain systems.
- Implement a street sweeping program to keep the streets clean of yard debris and trash which would eventually block inlets and pipes.
- Install flap gates or similar devices on outfalls that discharge into the Atlantic Ocean or the Gulf of Mexico. This would help prevent tidal waters from entering the storm drain systems and flooding the roadways.
- The existing storm drain systems should be inventoried and mapped. This would include documenting the type, size, location, elevation, and condition of all inlets, manholes, pipes and outfalls. To accomplish this task, all structures that are filled with dirt and debris would need to be cleaned. This could be completed on each flooding location as they are chosen for improvements.
- Model the existing storm drain system associated with each flooding location and determine which improvements are necessary to alleviate the flooding problems and provide as much stormwater treatment as possible.

2.6 City of Key West Water Quality Improvement Program

Goals of the Program

The stated goal of this program was to facilitate the City’s commitment to “divert stormwater runoff away from Outstanding Florida Waters,” and commitment to reducing infiltration, inflow and exfiltration in their sewer system.

Recommendations: Recommendations made for the program includes the following:

- Installation of five Pump-Assist Injection Well Systems built to BMP standards to prevent flooding, divert stormwater flow from outfalls and Outstanding Florida Waters and avoid near-shore water contamination.
- Elimination and/or Retrofit of 63 outfalls to reduce or eliminate discharge of pollutants to near-shore waters.
- Installation of 239 injection wells to prevent flooding and divert stormwater flow from outfalls and sheet flow to Outstanding Florida Waters.
- Retrofit existing injection wells to provide additional treatment for oils and hydrocarbons.

2.7 City of Key West Long Range Stormwater Utility Plan

Purpose of the Plan

The purpose of the plan was to document the study’s previously prepared by KCA and CH2MHill as well as information regarding flooding problems after 1994, and make

recommendations as to required future projects and funding to alleviate flooding and improve water quality in and around the City of Key West.

Alternatives Considered

Alternatives considered in the Plan included:

- To control storm surge
 - Increasing the height of seawalls, beach berms and roadways around the perimeter of the Island
 - Place tide-valves on every outfall.
- To control flooding due to intense rain events
 - Install French Drain systems in higher elevation areas
 - Install Outfalls and wells in lower elevation areas
- To control standing water
 - Install French drain
 - Regrade areas to drain onto existing drainage inlets or retention areas
 - Install infrastructure to tie into existing drainage systems

Recommendations: The plan presents the list of recommended improvements for various drainage areas within the City as well as a recommended maintenance program. The recommended projects include:

- Limited road reconstruction
- Numerous drainage wells
- Outfall treatment structures
- Additional infrastructure (inlets and piping) to convey stormwater to existing systems or outfalls.

2.8 City of Key West Wastewater Enterprise Fund Capital Improvements Program

Based on information provided by the City, there are eight projects included in this program which extends until the year 2013. The projects consist of the following:

- Deep injection well
- Miscellaneous sewer system repairs
- Installation of manhole liners
- Installation of manhole rain guards
- S. Duval Street sewer rehabilitation
- Wastewater reuse WWTP improvements
- Wastewater reuse distribution system
- Truman Annex Sewer

2.9 City of Key Colony Beach Sewer System Evaluation

This document, dated September 2002, was prepared by URS Corporation. The City has “continuously expended funds” over the last five years in rehabilitating their existing wastewater collection system. The purpose of this report was to assist the City’s wastewater system operation staff in identifying additional sources of inflow and infiltration in their wastewater system.

Recommendation: Based on the investigation, the recommended rehabilitation work included sliplining, point repairs and grouting.

2.10 City of Marathon Reuse Component for Central Wastewater Request For Proposal (RFP)

Three alternatives for public access reuse systems were evaluated for a design year of twenty years from the current date:

- A maximum reuse system where 100 percent of the average annual daily flow of domestic wastewater is reused in the design year,
- A medium reuse system where 33 percent of the average annual daily flow of domestic wastewater is reused in the design year, and
- A minimum reuse system where 31 percent of the average annual daily flow of domestic wastewater is reused in the design year.

For the maximum distribution of reuse water, nearly 1.6 million gallons per day (mgd) of treated effluent will have to be stored and pumped to all potential current and future reuse water users. The reuse water will be continuously monitored for total suspended solids (TSS) and chlorine residual to determine if it passes the water quality requirements. Unsuccessfully treated water will be stored and diverted to the head of the plant to be retreated. Regulatory criteria requires that reject storage and wet weather storage provide volumes equal to one day flow and three days flow, respectively, at the average daily design flow. A water balance was performed using the FDEP’s LANDAP98 computer model to confirm the quantity of wet weather storage needed.

For the medium reuse system and minimum reuse system, approximately 0.52 mgd and 0.49 mgd of effluent, respectively would be stored and pumped to a portion of reuse water users.

Recommendation: Inclusion of a reuse component was deemed to be technically feasible and the required equipment and facilities were identified. The land for the reuse facilities would be located at the future WWTF site at Crawl Key.

It does not appear that the project will harm the biological environment nor have a major adverse impact on the physical or socioeconomic environment as long as the construction work follows the design and specification requirements.

Present value analyses showed that the Minimum and Medium Reuse Systems are possible choices. The maximum reuse system, due to its high capital costs, was deemed economically infeasible.

The Marathon area and the Florida Keys, in general, currently practice water conservation, mainly due to the high cost of potable water. Therefore, relatively few sites, including residences have irrigation systems. The report identified potential reuse sites which contained green areas that could be irrigated. Prior to implementing a reuse program, a survey must be taken to determine which sites would participate and then there must be a firm legally binding commitment to use reuse water at a guaranteed demand from reuse customers.

2.11 DBOWMS for the City of Marathon, FL

The DBOWMS is a RFP, which is generally in compliance with the Monroe County Sanitary Wastewater Master Plan and Marathon Wastewater Facilities Plan. As such, it does not appear that alternatives were considered, and that recommendations from the master plans were used to develop this RFP.

Recommendation: The recommendations of this document are essentially the requirements of the Request for Proposal, which are detailed below.

- Collect wastewater via a vacuum sewer system and transmit wastewater to a treatment facility with a design capacity of 1.52 mgd Annual Average Daily Flow (AADF), expandable to 2.0 mgd AADF.
- Provide for a treatment facility that must produce effluent that meets AWT standards.
- Additional treatment processes required as part of the RFP include:
 - Influent flow metering and screening,
 - High-level disinfection,
 - Effluent disposal,
 - Sludge digestions, dewatering and storage, and
 - Odor control.
- Provide effluent disposal through deep injection wells and a reclaimed water system.

2.12 FEMA Draft Programmatic Environmental Assessment

In the EA, FEMA is considering the provision of funding assistance related to several proposed alternatives, which are designed to improve wastewater treatment, and ultimately water quality in the Florida Keys. Alternatives presented in the EA parallel alternatives studied and approved for consideration by Monroe County in its master plan. This plan served as the base document in the description of wastewater treatment options. The EA addressed three alternatives:

Alternative 1 – No Action Alternative: Under this alternative FEMA would not provide funds to the project applicants for wastewater improvements. Communities currently utilizing on-site systems, such as cesspools and septic systems, to manage wastes would have to construct either community or regional WWTFs or on-site wastewater nutrient reduction systems, to effectively manage waste nutrient to levels that meet the Florida Statutory Treatment Standards of 2010.

Alternative 2 – Centralized Wastewater Treatment Plant Alternative: project applicants with FEMA grant funds would construct a new community or regional WWTF or perform facility upgrades to existing systems at selected locations in the Florida Keys. New construction of community and regional WWTFs would be targeted in densely populated areas, where the installation of central sewers would eliminate a high number of declining and inadequate on-site wastewater treatment methods such as septic tanks and cesspools.

Alternative 3 – On Site Treatment Upgrades: project applicants would use FEMA funds to convert OWTs, such as cesspools and septic tanks with drainfields, to OWNRS to improve wastewater management in the Florida Keys. A biological nitrogen removal system coupled with physical/chemical phosphorous removal system, disinfection (through chlorination or other means), and disposal through either subsurface drip irrigation systems or shallow injection wells are proposed under this alternative. Under this alternative, a “cluster system” would be designed such that multiple homes would use one OWNRS system.

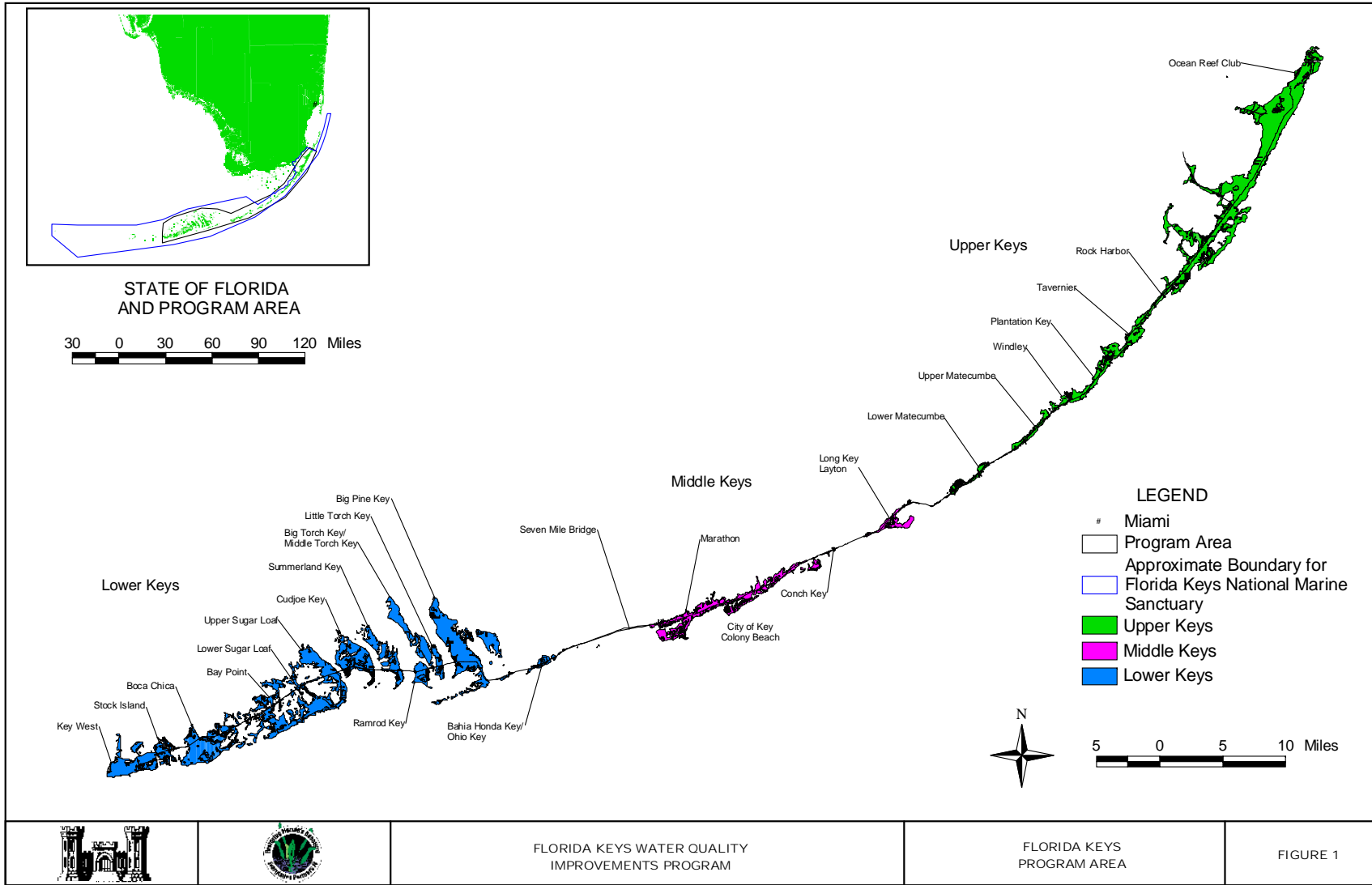
Recommendation: The FEMA EA supports implementation of the Monroe County master plan and proposes that projects with the Florida Keys Aqueduct Authority and the Village of Islamorada be implemented to reduce wastewater nutrient loading at selected County *hot spots*. FEMA monies through the Unmet Needs program would be used to establish their wastewater treatment objectives.

3.0 COST ESTIMATES

The estimated cost to implement all projects listed in the master plan is \$529,624,949. The costs for each project were compiled from each respective plan and the accuracy of these cost estimates has not been scrutinized during the preparation of this document. It is assumed that these are “order-of-magnitude” estimates as defined by the American Association of Cost Engineers. These estimates are subject to change based on market conditions. As the FWQIP moves forward, recent bid prices should be considered for refining estimated future costs.

4.0 CONCLUSIONS

The recommendations that have been documented herein will serve as the basis for development of the Program Management Plan (PMP) and proposed action in the Programmatic Environmental Impact Statement. The recommendations from the various planning documents discussed above served as the basis for development of the overall program project list which the municipalities will be asked to update for inclusion in the PMP.



Appendix D

Readiness to Proceed Document

Prepared by the Intergovernmental Task Force

Readiness to Proceed Criteria
Developed by the Monroe County Intergovernmental Task Force
Draft 6/22/01

To qualify for grant award, the following conditions must be met: All planning (including the selection of sites, wastewater/stormwater systems to be implemented, reclaimed water evaluation, and financing must be complete; sites must be established as available for the intended purposes, public participation must be documented; and a (design/build/operate), (design/build) or a construction contract would have to be either executed or authorized for execution by the project sponsor's governing body.

1. SITES All Project sites shall be:

- a) Identified. Legal descriptions of the properties, including boundary surveys, shall be complete for all required project sites. When all work will be in existing easements or rights of way or on property otherwise owned by the project sponsor, only the identification of the sites (s) will be necessary.
- b) Determined environmentally and technically suitable. Environmental Assessments complete. If determined necessary Environmental Impact Statements completed. Initial geo-technical evaluations of sites, as necessary to assure feasibility of construction shall be completed. When all work will be in existing easements or rights of way or on property otherwise owned by the project sponsor and properly zoned, the foregoing determination will be unnecessary.
- c) Available. Sufficient interest must be held, by the local government, in the sites to enable uninterrupted construction. Sufficient interest means ownership, easement, right-of-way, formal agreement enabling construction, contract for purchase, formal option for purchase/lease with willing seller, or initiation of condemnation process.
- d) Sites shall have the appropriate legal zoning designations(s).

2.1 ENGINEERING FOR WASTEWATER MANAGEMENT PROJECTS.

- a) Identification of treatment plant capacity, treatment level, and treatment processes.
- b) Identification of Collection and transmission system technology and preliminary layout.
- c) Physical overlay of treatment plant process units and disposal facilities on plant site location survey.

2.2 ENGINEERING FOR STORMWATER MANAGEMENT PROJECTS.

- a) Identification of treatment and disposal facilities or methods.
- b) Identification of conveyance and storage capacities.

3. PLANNING DOCUMENTATION.

- a) All wastewater/stormwater planning must be complete and the recommendations, including those for reuse of reclaimed water, contained in the planning documents must be adopted by the local government. The recommendations are to be reflected in the procurement or contract documents.
- b) The financial plan identifying the rates, fees, and charges associated with providing wastewater/stormwater management services. under the different grant funding levels identified by the Intergovernmental Funding Task Force. Information on customer base, location and level of services shall be reflected in the procurement of contract documents for wastewater management services. The plan shall address all capital costs (including financing) operation and maintenance costs.
 - b.1) The financial plan shall identify the amount(s) and source(s) of the non-federal share (State Revolving Loan Program, commercial lending, bonds, dedicated local revenues, etc.) of the project costs. associated with the different grant funding levels identified by the Intergovernmental Funding Task Force.
 - b.2) The financial plan shall identify the nature and amount of all estimated costs, both for the project sponsor's wastewater/stormwater management system and for additional work, if any, associated with the system for which individual property owners will be directly responsible.
 - b.3) A commitment from a financing entity to make available the non-federal share of the project costs must be documented.

4. LEGAL

- a.) Connection ordinance for wastewater management systems. The connection ordinance shall describe all existing wastewater conditions subject to mandatory connection.
- b.) Pretreatment ordinance for wastewater systems. The pre-treatment ordinances shall describe the conditions under which wastes may be discharged to the system.
- c.) User charge or fee provisions for wastewater/stormwater management systems. Draft ordinance/resolution provisions shall describe the structure of rates, fees, and charges. It shall describe the conditions and process under which the schedule of rates, fees, and charges will be changed.

5. PUBLIC PARTICIPATION. Public participation shall be complete for the following activities:

- a) Selection of project sites to be acquired for the project.
- b) Establishment of ordinances/resolutions.
- c) Adoption of recommendations for wastewater/stormwater management options and reuse.
- d) Financial planning.

6. FUNDING LEVEL. The acceptance of any federal grant funds shall not be contingent upon the receipt of additional federal/state funds in subsequent appropriations.

7. DEADLINES FOR READINESS-TO-PROCEED

- a) Quarterly Progress Assessment Meeting shall be held by the intergovernmental Task Force.
- b) The deadline for establishing Readiness-To-Proceed for fiscal year 2002 Grant Funds shall be June 30, 2002.

Appendix E

Revised Readiness to Proceed Document

Prepared by the PDT

Revised Readiness to Proceed Criteria for the Florida Keys Water Quality Improvement Program Wastewater and Stormwater Projects
2/23/03

This document was developed by the Program Delivery Team for the Florida Keys Water Quality Improvement Program.

To qualify for grant award, the following conditions must be met: All planning (including the selection of sites, wastewater/stormwater systems to be implemented, reclaimed water evaluation, and financial planning must be complete; sites must be established as available for the intended purposes, public participation must be documented; and a (design/build/operate), (design/build) or a construction contract bid or proposal would have to be received and either executed or authorized for execution by the project sponsor's governing body within six (6) months of availability of grant funds.

1. SITES All Project sites shall be:

- e) Identified. Legal descriptions of the properties, including boundary surveys, shall be complete for all required project sites. When all work will be in existing easements or rights of way or on property otherwise owned by the project sponsor, only the identification of the sites (s) will be necessary.
- f) Determined environmentally and technically suitable. Environmental Assessments underway. Initial geo-technical evaluations of sites, as necessary to assure feasibility of construction shall be completed. When all work will be in existing easements or rights of way or on property otherwise owned by the project sponsor and properly zoned, the foregoing determination will be unnecessary.
- g) Available. Sufficient interest must be held, by the local government, in the sites to enable uninterrupted construction. Sufficient interest means ownership, easement, right-of-way, formal agreement enabling construction, contract for purchase, formal option for purchase/lease with willing seller, or initiation of condemnation process.
- h) Sites shall have the appropriate legal zoning designations(s).

2.3 ENGINEERING FOR WASTEWATER MANAGEMENT PROJECTS.

- d) Identification of treatment plant capacity, and treatment level.
- e) Identification of Collection and transmission system technology and preliminary layout.
- f) Physical overlay of treatment plant process units and disposal facilities on plant site location survey.

2.4 ENGINEERING FOR STORMWATER MANAGEMENT PROJECTS.

- c) Identification of treatment and disposal facilities or methods.
- d) Identification of conveyance and storage capacities.

8. PLANNING DOCUMENTATION.

- c) All wastewater/stormwater planning must be complete and the recommendations, including those for reuse of reclaimed water, contained in the planning documents must be adopted by the local government. The recommendations are to be reflected in the procurement or contract documents.
- d) The financial plan identifying the method of collecting rates, fees, and charges associated with providing wastewater/stormwater management services. Information on customer base, location and level of services shall be reflected in the procurement or contract documents for wastewater management services. The plan shall address all capital costs (including financing) operation and maintenance costs.
 - b.1) The financial plan shall identify the amount(s) and source(s) of the non-federal share (State Revolving Loan Program, commercial lending, bonds, dedicated local revenues, etc.) of the project costs.
 - b.2) The financial plan shall identify the nature and amount of all estimated costs, both for the project sponsor's wastewater/stormwater management system and for additional work, if any, associated with the system for which individual property owners will be directly responsible.
 - b.3) A commitment from a financing entity to make available the non-federal share of the project costs must be documented.

9. LEGAL

- a.) Connection ordinance for wastewater management systems. The connection ordinance shall describe all existing wastewater conditions subject to mandatory connection.
- b.) Pretreatment ordinance for wastewater systems. The pre-treatment ordinances shall describe the conditions under which wastes may be discharged to the system.
- c.) User charge or fee provisions for wastewater/stormwater management systems. Draft ordinance/resolution provisions shall describe the structure of rates, fees, and charges. It shall describe the conditions and process under which the schedule of rates, fees, and charges will be changed.

10. PUBLIC PARTICIPATION. Public participation shall be complete for the following activities:
 - e) Selection of project sites to be acquired for the project.
 - f) Establishment of ordinances/resolutions.
 - g) Adoption of recommendations for wastewater/stormwater management options and reuse.
 - h) Financial planning.

11. FUNDING LEVEL. The acceptance of any federal grant funds shall not be contingent upon the receipt of additional federal/state funds in subsequent appropriations.

Appendix F

Funding Allocation Scheme

Prepared by the Intergovernmental Task Force

Distribution Formula Approved by the Intergovernmental Task Force and presented for approval to the various Municipal Governments of the Florida Keys:

On the issue of the prioritization of projects for the \$100 million federal appropriation, the Intergovernmental Task Force determined that the immediate priority should be Key West stormwater and the three large municipal central wastewater treatment systems. It was acknowledged that Key West had stepped aside from a population-based claim on funds with the understanding that they would be a funding priority.

The IGTF recommended that all the priority projects should participate in any funding that occurs until such time as their promised amounts of funding were reached, as long as all such prioritized projects were deemed "ready to proceed" within the fiscal year in which an appropriation was made (see "readiness to proceed" document). If, however, any of those wastewater facility projects were not ready, Key West would see additional funds (and/or a higher percentage of funds) of its total to be received. Both Layton and Key Colony Beach would be a later year priority.

The following scenarios were allowed and supported by the group:

Should the \$30 million appropriation be made, it would be divided as follows:

\$8.5 million	Unincorporated Monroe	28.33%
\$8.5 million	Islamorada	28.33%
\$8.5 million	Marathon	28.33% ¹
\$4.5 million	Key West	15%
Totals: \$30 million		100%

The percentages above would hold for all projects ready for funding within the fiscal year for which the appropriation was made. If any of the wastewater projects proposed for funding should be found to be "not ready," then the division would be as follows:

\$9.85 million	Wastewater Project One	32.83% ²
\$9.85 million	Wastewater Project Two	32.83%
\$10.3 million	Key West	34.33%
Totals: \$30 million		100%

If two of the above mentioned wastewater projects were determined to be "not ready," the division would be as follows:

\$19.7 million	Wastewater Project One	65.67%
\$10.3 million	Key West	34.33%
Totals: \$30 million		100%

¹ Note that these figures will not always add up to 100% because of the decimal places proceeding beyond where demonstrated within the text of these minutes. Where decimals extend beyond that reflected here, 100% is a rough equivalent of the figures noted in the minutes, but an actual equivalent of the full figure, were its full decimal equivalent represented.

² See Footnote 1 above.

Should the appropriation be less than \$30 million, the division of funds would follow the percentages outlined above, not the numeric figures, for each of the scenarios detailed. For example, if the appropriation were to be \$15 million, and all parties were deemed to be "ready" within the appropriation fiscal year, the division would be as follows:

\$4.25 million	Unincorporated Monroe	28.33 ³ %
\$4.25 million	Islamorada	28.33%
\$4.25 million	Marathon	28.33%
\$2.25 million	Key West	15%
Totals: \$15 million		100%

If any one of the wastewater projects should not be ready to proceed, the division would be as follows:

\$4.925 million	Wastewater Project One	32.83 ⁴ %
\$4.925 million	Wastewater Project Two	32.83%
\$5.15 million	Key West	34.33%
Totals: \$15 million		100%

Once an appropriation is made or scheduled to be made, the Intergovernmental Task force will sit down with its state partners to review quarterly the readiness status of each and every prioritized project. If an amount of funding that is presumed too small to be divided, the IGTF will immediately schedule a meeting to propose funding for a project or project(s) for which substantial progress can be made. SHOULD the IGTF determine that the funding formula proposed above is not workable under that condition.

Note that this entire funding scenario is based on the conviction of the Intergovernmental Task Force that we are stronger standing together, and supporting one another in everyone's moving forward. This funding formula is based upon a commitment by every municipal government to make progress on water quality issues, and to stand together until all such projects are funded.

Note also that, because state funding may well be forthcoming BEFORE the federal funds are in place, those funds will need to be made available along the lines of the distribution formula expressed above (for the federal funds) so that those priority projects may establish their "readiness to proceed" as quickly as possible).

END

Appendix G

Master Project List

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EPJV Number	WW/SW	Gov't Entity	Region	Service / Study Area	Hot Spot (Y/N)	Project Name	Project Rank by Region	Overall Rank	Proposed Action	Tentative Start	Tentative Finish	2006 Escalated Project Cost Estimate or Actual Price	Readiness
1	WW	Monroe County	Lower Keys	Stock Island	Yes	Stock Island	1	3	Extend wastewater service to unsewered area of KW Resort Utility franchise area.	1/1/03	01/01/04	\$ 4,281,630	15
2	WW	Monroe County	Lower Keys	Big Coppitt	Yes	Boca Chica	2	5	Provide wastewater collection service to Hot Spot area. Construct 0.2 mgd WWTP expandable to 0.40 mgd. Other options include negotiate with NAS Key West for provide wastewater collection service to Hot Spot area. Provide 0.05 mgd WWTP capable of upgrading to 0.075 mgd for this service area. Connect package plant to	3/1/04	03/01/05	\$ 16,115,155	15
3	WW	Monroe County	Lower Keys	Bay Point	Yes	Bay Point	3	6	Provide wastewater collection service to Hot Spot area. Provide initial 0.30 mgd WWTP, expandable to 0.50 mgd for this regional service area.	6/3/03	06/04/04	\$ 5,556,950	15
4	WW	Monroe County	Lower Keys	Big Pine Regional	Yes	Big Pine	4	8	Provide wastewater collection service to Hot Spot area.	3/1/04	03/01/05	\$ 15,281,613	15
5	WW	Monroe County	Lower Keys	Big Pine Regional	Yes	Big Pine	5	11	Provide wastewater collection service to Hot Spot area. Expand regional WWTP to 0.60 mgd.	3/1/05	03/01/06	\$ 18,393,505	15
6	WW	Monroe County	Lower Keys	SCU	Yes	Summerland	7	23	Provide wastewater collection service to Hot Spot area. Provide initial 0.22 mgd WWTP expandable to 0.66 mgd for this regional service area.	3/1/06	03/01/07	\$ 17,865,595	15
7	WW	Monroe County	Lower Keys	Big Pine Regional	Yes	Big Pine	8	25	Provide wastewater collection service to Hot Spot area. Expand regional WWTP to 0.90 mgd.	3/1/06	03/01/07	\$ 6,946,188	15
8	WW	Monroe County	Lower Keys	Big Pine Regional	Yes	Big Pine	9	26	Provide wastewater collection service to Hot Spot area.	3/1/06	03/01/07	\$ 11,530,671	15
9	WW	Monroe County	Lower Keys	SCU	Yes	Cudjoe	10	28	Provide wastewater collection service to Hot Spot area. Expand regional WWTP to 0.44 mgd.	3/1/07	03/01/08	\$ 14,475,855	15
10	WW	Monroe County	Lower Keys	SCU	Yes	Upper Sugarloaf	11	31	Provide wastewater collection service to Hot Spot area.	3/1/07	03/01/08	\$ 4,341,367	15
11	WW	Monroe County	Lower Keys	SCU	Yes	Cudjoe	12	36	Provide wastewater collection service to Hot Spot area.	3/1/07	03/01/08	\$ 11,009,707	15
12	WW	Monroe County	Lower Keys	Big Pine Regional	Yes	Ramrod	13	39	Provide wastewater collection service to Hot Spot area.	3/1/08	03/01/09	\$ 9,293,999	15
13	WW	Monroe County	Lower Keys	Boca Chica	Yes	Boca Chica	14	41	Provide wastewater collection service to Hot Spot area. Expand WWTP to 0.40 mgd	3/1/08	03/01/09	\$ 6,348,815	15
14	WW	Monroe County	Lower Keys	Big Pine Regional	Yes	Big Pine	15	42	Provide wastewater collection service to Hot Spot area.	3/1/08	03/01/09	\$ 7,154,573	15
15	WW	Monroe County	Lower Keys	Boca Chica	Yes	Boca Chica	16	43	Provide wastewater collection service to Hot Spot area.	3/1/08	03/01/09	\$ 5,695,874	15
16	WW	Monroe County	Lower Keys	Lower Sugar Loaf	Yes	Lower Sugar Loaf	17	44	Provide wastewater collection service to Hot Spot area. Provide 0.12 mgd WWTP for this service area.	3/1/08	03/01/09	\$ 12,987,982	15
17	WW	Marathon	Middle Keys	Marathon Primary	N/A	Vaca key (central)	1	N/A	0.4 MGD AWT Plant and Vacuum Collection System	8/1/05	10/01/09	\$ 22,141,063	20
18	WW	Marathon	Middle Keys	Marathon Secondary	N/A	Fat Deer Key (west)	2	N/A	0.155 MGD AWT Plant Upgrade and Vacuum Collection System	8/1/05	11/01/07	\$ 8,601,165	20
19	WW	Marathon	Middle Keys	Marathon Primary	N/A	Knight's Key	3	N/A	0.023 MGD BAT Plant and Collection System	12/1/06	09/01/07	\$ 1,276,302	20
20	WW	Marathon	Middle Keys	Marathon Primary	N/A	Boot Key	4	N/A	0.0006 MGD BAT Plant and Gravity Collection System	6/1/06	02/01/07	\$ 33,295	20
21	WW	Marathon	Middle Keys	Marathon Secondary	N/A	Vaca Key (east)	5	N/A	Expand Little Venice AWT plant to 0.5 MGD and Vacuum Collection System	6/1/06	12/31/10	\$ 27,190,780	20
22	WW	Marathon	Middle Keys	N/A	N/A	Vaca Key (west)	6	N/A	0.250 MGD AWT Plant and Vacuum Collection System	5/1/07	09/01/09	\$ 13,706,373	20
23	WW	Marathon	Middle Keys	Marathon Secondary	N/A	Grassy Key	7	N/A	0.063 MGD BAT Plant as well as ON-site and Cluster Systems and Collection System	5/1/07	05/01/10	\$ 7,380,354	20
24	WW	City of Layton	Middle Keys	Long Key / Layton	Yes	Long Key Layton	7	45	Provide wastewater collection service to Hot Spot area. Provide 0.05 mgd WWTP for this service area.	1/1/05	07/15/06	\$ 5,735,155	20
25	WW	KLWTD	Upper Keys	Tavernier/Key Largo Regional	Yes	Sexton Cove / Lake Surprise	5	1	Community wastewater collection systems.	11/1/05	06/01/07	\$ 9,200,000	20
26	WW	KLWTD	Upper Keys	Tavernier/Key Largo Regional	Yes	Key Largo Trailer Village	1	2	Community wastewater collection system with interim 0.183 mgd treatment plant.	9/1/04	04/01/06	\$ 9,125,000	20
27	WW	KLWTD	Upper Keys	Tavernier/Key Largo Regional	Yes	Largo Gardens	6	2	Community wastewater collection system.	11/1/05	06/01/07	\$ 5,500,000	20
28	WW	KLWTD	Upper Keys	Tavernier/Key Largo Regional	Yes	Collection Basin D	10	2	Community wastewater collection systems serving Hibiscus Park and Newport Village.	1/1/07	02/01/08	\$ 4,175,000	20
29	WW	KLWTD	Upper Keys	Tavernier/Key Largo Regional	Yes								20

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30	WW	KLWTD	Upper Keys	Tavernier/Key Largo Regional	Yes	Collection Basin A	7	3, 7	Community wastewater collection systems serving Stillwright Point, Paradise Point Cove, Riviera Village, Taylor Creek Village, Largo Sound Village, and Anglers Park.	1/1/08	02/01/09	\$ 12,600,000	20
31	WW	KLWTD	Upper Keys	Tavernier/Key Largo Regional	Yes	Collection Basin I	15	5, 14	Community wastewater collection systems serving Hammer Point, Tavernier Park, Tavernier Harbor, Tavernier Subdivision, Camp Pleasant, Sheril Park, Tavernier	6/1/10	06/01/11	\$ 8,770,000	20
32	WW	Village of Islamorada	Upper Keys	Islamorada	Yes	Plantation Key Colony Phase I Regional Treatment Plant	6	14	Provide wastewater collection service to Hot Spot area. Provide initial 0.75 mgd WWTP expandable to 1.50 mgd for the regional service area.	3/1/04	08/01/05	\$ 12,487,838	15
33	WW	KLWTD	Upper Keys	Tavernier/Key Largo Regional	Yes	North Transmission Line	3	N/A	Replace 0.183 mgd waste treatment plant with 2.30 mgd plant to serve the entire island of Key Largo.	11/1/05	02/01/08	\$ 16,750,000	20
34	WW	KLWTD	Upper Keys	Tavernier/Key Largo Regional	Yes	North Transmission Line	4	N/A	Northern half force main and adjacent Hwy 1.	11/1/05	06/01/07	\$ 5,200,000	20
35	WW	KLWTD	Upper Keys	Tavernier/Key Largo Regional	Yes	Collection Basin E	11	8	Community wastewater collection systems serving Port Largo, Buttonwood Shores, Key Largo Beach, Thompsons Subdivision, and Key Largo Ocean	12/1/08	06/01/10	\$ 11,150,000	20
36	WW	Village of Islamorada	Upper Keys	Lower Matecumbe	Y	Lower Matecumbe	9	18	Provide wastewater collection service to Hot Spot area. Provide 0.18 mgd WWTP for this service area.	3/1/05	03/01/06	\$ 18,743,393	15
37	WW	KLWTD	Upper Keys	Tavernier/Key Largo Regional	Yes	Collection Basin F	12	11	Community wastewater collection systems serving Point Pleasant, Lazy Lagoon, Sunset Cove, Harbor Shores and Pirates Cove	12/1/10	12/01/11	\$ 6,830,000	20
38	WW	KLWTD	Upper Keys	Tavernier/Key Largo Regional	Yes	Collection Basin G	13	11	Community wastewater collection systems serving Marion Park, Rock Harbor Estates, Mandalay and The Harborage.	6/1/11	06/02/12	\$ 6,000,000	20
39	WW	KLWTD	Upper Keys	Tavernier/Key Largo Regional	Yes	Collection Basin H	14	4, 12	Community wastewater collection systems serving Wynken Blynken & Nod, Silver Shores, Lime Grove, Sunrise Point, Sunset Point, Seaside, Richard Park.	6/1/11	08/01/12	\$ 13,780,000	20
40	WW	Village of Islamorada	Upper Keys	Islamorada	Yes	Upper Matecumbe	13	22	Provide wastewater collection service to Hot Spot area. Connect all package plants in this Hot Spot area to regional system.	3/1/05	03/01/06	\$ 27,025,358	15
41	WW	KLWTD	Upper Keys	Tavernier/Key Largo Regional	Yes	Collection Basin J	16	14	Community wastewater collection systems serving Harris Ocean Park, Ocean Park Village, Palma Sola, Burtons Yacht Harbor and Blue Water.	1/1/10	02/01/11	\$ 10,405,000	20
42	WW	KLWTD	Upper Keys	Tavernier/Key Largo Regional	Yes	Key Largo Park	2	15	Community wastewater collection system (uses 0.183 mgd plant).	4/1/05	05/01/06	\$ 3,900,000	20
43	WW	KLWTD	Upper Keys	Tavernier/Key Largo Regional	Yes	Collection Basin B	8	3, 16	Community wastewater collection systems serving Cross Key Waterway, Bermuda Shores, Twin Lakes, Bahia Mar, Largo Sound Park, Anglers Park Shores, and	6/1/09	07/01/10	\$ 9,250,000	20
44	WW	KLWTD	Upper Keys	Tavernier/Key Largo Regional	Yes	South Transmission Line	9	N/A	Southern half force main and adjacent Hwy 1.	5/1/07	08/01/08	\$ 6,335,000	20
45	WW	Village of Islamorada	Upper Keys	Islamorada	Yes	Windley Key	18	32	Provide wastewater collection service to Hot Spot area. Connect all package plants in this Hot Spot area to regional system.	3/1/07	03/01/08	\$ 9,008,453	15
46	WW	Village of Islamorada	Upper Keys	Islamorada	Yes	Plantation Key Colony Phase II	19	33	Provide wastewater collection service to Hot Spot area.	6/1/05	03/01/08	\$ 13,958,997	15
47	WW	Village of Islamorada	Upper Keys	Islamorada	Yes	Plantation Key	21	38	Provide wastewater collection service to Hot Spot area.	3/1/08	03/01/09	\$ 51,307,497	15
48	WW	Monroe County	Lower Keys	Stock Island	No	Stock Island			Upgrade WWTP	3/1/03	03/01/04	\$ 1,055,821	15
49	WW	Monroe County	Lower Keys	Stock Island	No	Stock Island			Upgrade WWTP	3/1/03	03/01/04	\$ 694,619	15
50	WW	Monroe County	Lower Keys	Stock Island	No	Stock Island			Upgrade WWTP	3/1/08	03/01/09	\$ 347,309	15
51	WW	Monroe County	Lower Keys	Boca Chica	No	NAS Key West			Upgrade WWTP	3/1/08	03/01/09	\$ 930,789	15
52	WW	Monroe County	Lower Keys	Bahia Honda	No	Bahia Honda State Park			Upgrade WWTP	3/1/08	03/01/09	\$ 136,145	15
53	WW	Monroe County	Lower Keys	Bahia Honda	No	Bahia Honda State Park			Upgrade WWTP	3/1/08	03/01/09	\$ 141,702	15
54	WW	Monroe County	Lower Keys	Bahia Honda	No	Sunshine Key Campground			Upgrade WWTP	3/1/08	03/01/09	\$ 259,787	15
55	WW	Monroe County	Middle Keys	Marathon Secondary	No	Marathon II	7	N/A	Provide Collection and Transmission System in noted basins. Connect to new WWTP	1/1/05	10/02/10	\$ 13,230,000	15
56	WW	Monroe County	Middle Keys	West End Long Key	No	Ocean Bay Condominium			Upgrade WWTP	3/1/08	03/01/09	\$ 129,199	15
57	WW	Monroe County	Middle Keys	West End Long Key	No	Long Key State Park			Upgrade WWTP	3/1/08	03/01/09	\$ 129,199	15
58	WW	Monroe County	Middle Keys	West End Long Key	No	Outdoor Resorts			Upgrade WWTP	3/1/08	03/01/09	\$ 266,734	15

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59	WW	Monroe County	Middle Keys	East End Long Key	No	Oceanside Isles Apartments			Upgrade WWTP	3/1/08	03/01/09	\$ 130,588	15
60	WW	Monroe County	Middle Keys	East End Long Key	No	Fiesta Key Campground			Upgrade WWTP	3/1/08	03/01/09	\$ 266,734	15
61	WW	Monroe County	Upper Keys	Ocean Reef Club	No	North Key Largo Utility Company			Upgrade WWTP	3/1/09	03/01/10	\$ 7,863,084	15
62	WW	Monroe County	Upper Keys	Jewish Creek	No	Gilbert's			Upgrade WWTP	3/1/09	03/01/10	\$ 138,924	15
63	WW	Monroe County	Upper Keys	Jewish Creek	No	Anchorage			Upgrade WWTP	3/1/09	03/01/10	\$ 138,924	15
64	WW	Monroe County	Upper Keys	County Line	No	Barefoot Cay Plant and Extension			Upgrade WWTP	3/1/09	03/01/10	\$ 644,606	15
65	WW	Monroe County	All	All	No	Upgrade of Unknown Systems			Upgrade of Unknown Systems	3/1/09	03/01/10	\$ 4,890,116	15
66	WW	Monroe County	All	All	No	Onsite System Upgrade in 2010			Onsite System Upgrade in 2010	3/1/09	03/01/10	\$ 17,712,778	15
67	SW	Monroe County	Middle Keys	Monroe County	No	Marathon Government Center	1	N/A	Install Water Quality Treatment unit, repair well	6/24/05	06/24/05	\$ 37,585	20
68	SW	Monroe County	Upper Keys	Monroe County	No	Card Sound Road	3	N/A	Sod shoulders, create berms. Install Water Quality Treatment units.	6/24/05	06/25/05	\$ 116,253	20
69	SW	Monroe County	Upper Keys	Monroe County	No	Burton Drive at US1	4	N/A	Regrade swales	6/25/05	06/25/05	\$ 14,645	20
70	SW	Monroe County	Upper Keys	Monroe County	Yes	Jo-Jean Way in Tavernier	5	N/A	Construct baffle box at end of 36" outfall	6/25/05	06/25/05	\$ 38,751	20
71	SW	Monroe County	Lower Keys	Monroe County	No	El Prado Circle on Coppitt Key	6	N/A	Install Water Quality Treatment units	6/26/05	06/26/05	\$ 116,253	20
72	SW	Monroe County	Lower Keys	Monroe County	Yes	Veterans Park on Little Duck Key	2	N/A	Install Water Quality Treatment unit	6/24/05	06/24/05	\$ 4,536	20
73	SW	Monroe County	Middle Keys	City of Marathon	No	24th Street - Boot Key Harbor	1	N/A	Construct berms and regrade swales	6/24/05	06/24/05	\$ 4,536	20
74	SW	Monroe County	Middle Keys	City of Marathon	Y	27th Street	2	N/A	Install Water Quality Treatment unit	6/24/05	06/24/05	\$ 29,031	20
75	SW	Monroe County	Middle Keys	City of Marathon	No	Sombrero Isles	3	N/A	Install Water Quality Treatment units and regrade swales	6/24/05	06/25/05	\$ 191,681	20
76	SW	Monroe County	Middle Keys	City of Marathon	No	52nd Street - Boot Key Harbor	4	N/A	Install Water Quality Treatment unit	6/25/05	06/26/05	\$ 29,031	20
77	SW	Monroe County	Upper Keys	FDOT	No	Indian Key Bayside Parking	1	N/A	Create berm	6/24/05	06/24/05	\$ 2,722	20
78	SW	Monroe County	Upper Keys	FDOT	No	Ocean/Bay Side Parking MM 77.5	2	N/A	Regrade swales	6/24/05	06/24/05	\$ 3,370	20
79	SW	Monroe County	Middle Keys	FDOT	No	Bayside Parking MM66	3	N/A	Regrade swales	6/24/05	06/24/05	\$ 21,903	20
80	SW	Monroe County	Middle Keys	FDOT	No	Sombrero Beach Road	4	N/A	Regrade swales	6/24/05	06/25/05	\$ 695,186	20
81	SW	Monroe County	Lower Keys	FDOT	No	Rockland to Shark	5	N/A	Widen shoulder, regrade swales, resurface with porous asphalt	6/25/05	06/25/05	\$ 704,387	20
82	SW	Monroe County	Lower Keys	FDOT	No	Big Coppitt Boat Ramp	6	N/A	Regrade swales. Road and driveway repair	6/25/05	06/25/05	\$ 55,729	20
83	SW	Monroe County	Lower Keys	FDOT	No	Boca Chica to Rockland	7	N/A	Regrade swales and add porous pavement	6/25/05	06/26/05	\$ 1,462,819	20
84	SW	Monroe County	Lower Keys	FDOT	No	North Harris Channel to Park Channel	8	N/A	Widen paved shoulder with porous pavement and regrade swales	6/25/05	06/26/05	\$ 541,737	20
85	SW	Monroe County	Lower Keys	FDOT	No	Bow Channel to Kemp (Cudjoe Key)	9	N/A	Widen paved shoulder with porous pavement and regrade swales	6/26/05	06/26/05	\$ 1,354,471	20
86	SW	Monroe County	Lower Keys	FDEP	No	Saddlebunch Bike Trail-Big Coppitt	1	N/A	Regrade swales	6/24/05	06/24/05	\$ 878,832	20
87	SW	Monroe County	Lower Keys	FDEP	No	Bahia Honda Bike Trail	2	N/A	Regrade swales		06/25/05	\$ 1,181,971	20

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88	SW	Monroe County	Lower Keys	FDEP	No	Saddlebunch Bike Trail-Saddlebunch	3	N/A	Regrade swales	6/25/05	06/26/05	\$ 325,042	20
89	WW	City of Key Colony Beach	Middle Keys	Entire City	N/A	Pump Station Rehabilitation	1	N/A	Rehabilitation of 10 of the existing 13 pump stations	6/1/05	09/01/05	\$ 551,250	18
90	SW	Village of Islamorada	Upper Keys	LMK 6	Yes	LMK 6	2	N/A	Drainage Wells, Swales	3/1/01	03/01/02	\$ 1,075,688	20
91	SW	Village of Islamorada	Upper Keys	Bridge Segments	No	Bridge Segments	3	N/A	Drainage Wells, Retention/Detention Facilities, Sediment Removal	3/1/02	03/01/03	\$ 744,573	20
92	SW	Village of Islamorada	Upper Keys	LMK 7	Yes	LMK 7	4	N/A	Swales	3/1/03	03/01/04	\$ 945,946	20
93	SW	Village of Islamorada	Upper Keys	LMK 5	Yes	LMK 5	5	N/A	Swales	3/1/04	03/01/05	\$ 802,734	20
94	SW	Village of Islamorada	Upper Keys	LMK 8	Yes	LMK 8	6	N/A	Drainage Wells, Swales	3/1/04	03/01/05	\$ 451,325	20
95	SW	Village of Islamorada	Upper Keys	LMK 3	Yes	LMK 3	7	N/A	Drainage Wells, Swales	3/1/04	03/01/05	\$ 551,410	20
96	SW	Village of Islamorada	Upper Keys	LMK 10	Yes	LMK 10	8	N/A	Swales	3/1/05	03/01/06	\$ 136,291	20
97	SW	Village of Islamorada	Upper Keys	LMK 11	Yes	LMK 11	9	N/A	Swales	3/1/05	03/01/06	\$ 529,274	20
98	SW	Village of Islamorada	Upper Keys	PNK 23	Yes	PNK 23	10	N/A	Drainage Wells, Swales	3/1/05	03/01/06	\$ 1,113,122	20
99	SW	Village of Islamorada	Upper Keys	PNK 21	Yes	PNK 21	11	N/A	Drainage Wells, Swales	3/1/05	03/01/06	\$ 882,734	20
100	SW	Village of Islamorada	Upper Keys	PNK 18	Yes	PNK 18	12	N/A	Swales	3/1/06	03/01/07	\$ 651,924	20
101	SW	Village of Islamorada	Upper Keys	PNK 19	Yes	PNK 19	13	N/A	Swales	3/1/06	03/01/07	\$ 533,887	20
102	SW	Village of Islamorada	Upper Keys	PNK 20	Yes	PNK 20	14	N/A	Drainage Wells, Swales	3/1/07	03/01/08	\$ 175,973	20
103	SW	Village of Islamorada	Upper Keys	PNK 27	Yes	PNK 27	15	N/A	Drainage Wells, Swales	3/1/07	03/01/08	\$ 1,117,604	20
104	SW	Village of Islamorada	Upper Keys	PNK 26	Yes	PNK 26	16	N/A	Swales	3/1/07	03/01/08	\$ 473,358	20
105	SW	Village of Islamorada	Upper Keys	PNK 24	Yes	PNK 24	17	N/A	Swales	3/1/08	03/01/09	\$ 36,782	20
106	SW	Village of Islamorada	Upper Keys	PNK 25	Yes	PNK 25	18	N/A	Swales	3/1/08	03/01/09	\$ 335,990	20
107	SW	Village of Islamorada	Upper Keys	PNK 1	Yes	PNK 1	19	N/A	Drainage Wells, Swales	3/1/08	03/01/09	\$ 2,545,469	20
108	SW	Village of Islamorada	Upper Keys	WYK 6	Yes	WYK 6	20	N/A	Drainage Wells, Swales	3/1/09	03/01/10	\$ 488,028	20
109	SW	Village of Islamorada	Upper Keys	WYK 5	Yes	WYK 5	21	N/A	Drainage Wells, Swales	3/1/09	03/01/10	\$ 913,821	20
110	SW	Village of Islamorada	Upper Keys	UMK 5	No	UMK 5	22	N/A	Drainage Wells, Swales	3/1/10	03/01/11	\$ 3,020,902	20
111	SW	Village of Islamorada	Upper Keys	PNK 5	No	PNK 5	23	N/A	Drainage Wells	3/1/11	03/01/12	\$ 382,827	20
112	SW	Village of Islamorada	Upper Keys	WYK 2	No	WYK 2	24	N/A	Drainage Wells, Swales	3/1/11	03/01/12	\$ 1,292,899	20
113	SW	Village of Islamorada	Upper Keys	PNK 16	No	PNK 16	25	N/A	Swales	3/1/12	03/01/13	\$ 558,196	20
114	SW	Village of Islamorada	Upper Keys	PNK 15	No	PNK 15	26	N/A	Swales	3/1/12	03/01/13	\$ 259,486	20
115	SW	Village of Islamorada	Upper Keys	UMK 7	No	UMK 7	27	N/A	Drainage Wells, Swales	3/1/12	03/01/13	\$ 2,368,623	20
116	SW	Village of Islamorada	Upper Keys	PNK 10	No	PNK 10	28	N/A	Drainage Wells	3/1/13	03/01/14	\$ 485,599	20
117	SW	Village of Islamorada	Upper Keys	UMK 1	No	UMK 1	29	N/A	Drainage Wells, Swales	3/1/13	03/01/14	\$ 3,188,368	20

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118	SW	Village of Islamorada	Upper Keys	UMK 11	No	UMK 11	30	N/A	Drainage Wells, Swales	3/1/14	03/01/15	\$ 812,618	20
119	SW	Village of Islamorada	Upper Keys	PNK 17	No	PNK 17	31	N/A	Drainage Wells, Swales	3/1/14	03/01/15	\$ 914,200	20
120	SW	Village of Islamorada	Upper Keys	PNK 22	No	PNK 22	32	N/A	Drainage Wells, Swales	3/1/14	03/01/15	\$ 866,642	20
121	SW	Village of Islamorada	Upper Keys	PNK 12	No	PNK 12	33	N/A	Drainage Wells, Swales	3/1/15	03/01/16	\$ 2,070,354	20
122	SW	Village of Islamorada	Upper Keys	LMK 17	No	LMK 17	34	N/A	Drainage Wells, Swales	3/1/15	03/01/16	\$ 904,541	20
123	SW	Village of Islamorada	Upper Keys	LMK 13	No	LMK 13	35	N/A	Swales	3/1/16	03/01/17	\$ 2,295,116	20
124	SW	Village of Islamorada	Upper Keys	PNK 4	No	PNK 4	36	N/A	Drainage Wells, Swales	3/1/17	03/01/18	\$ 1,313,663	20
125	SW	Village of Islamorada	Upper Keys	PNK 7	No	PNK 7	37	N/A	Drainage Wells, Swales	3/1/17	03/01/18	\$ 667,873	20
126	SW	Village of Islamorada	Upper Keys	LMK 15	No	LMK 15	38	N/A	Swales	3/1/17	03/01/18	\$ 438,068	20
127	SW	Village of Islamorada	Upper Keys	WYK 4	No	WYK 4	39	N/A	Drainage Wells, Swales	3/1/18	03/01/19	\$ 873,045	20
128	SW	Village of Islamorada	Upper Keys	UMK 4	No	UMK 4	40	N/A	Drainage Wells, Swales	3/1/18	03/01/19	\$ 1,087,664	20
129	SW	Village of Islamorada	Upper Keys	PNK 13	No	PNK 13	41	N/A	Drainage Wells, Swales	3/1/19	03/01/20	\$ 1,285,687	20
130	SW	Village of Islamorada	Upper Keys	UMK 10	No	UMK 10	42	N/A	Drainage Wells, Swales	3/1/20	03/01/21	\$ 2,053,835	20
131	SW	Village of Islamorada	Upper Keys	PNK 6	No	PNK 6	43	N/A	Drainage Wells	3/1/20	03/01/21	\$ 153,866	20
132	SW	Village of Islamorada	Upper Keys	UMK 3	No	UMK 3	44	N/A	Drainage Wells	3/1/21	03/01/22	\$ 1,938,279	20
133	SW	Village of Islamorada	Upper Keys	UMK 6	No	UMK 6	45	N/A	Drainage Wells, Swales	3/1/22	03/01/23	\$ 2,232,691	20
134	SW	Village of Islamorada	Upper Keys	UMK 2	No	UMK 2	46	N/A	Drainage Wells, Swales	3/1/22	03/01/23	\$ 1,470,017	20
135	SW	Village of Islamorada	Upper Keys	PNK 3	No	PNK 3	47	N/A	Drainage Wells, Swales	3/1/23	03/01/24	\$ 2,783,098	20
136	SW	Village of Islamorada	Upper Keys	PNK 8	No	PNK 8	48	N/A	Swales	2/29/24	03/01/25	\$ 508,547	20
137	SW	Village of Islamorada	Upper Keys	PNK 9	No	PNK 9	49	N/A	Drainage Wells, Swales	2/28/25	03/01/25	\$ 1,237,962	20
138	SW	Village of Islamorada	Upper Keys	PNK 14	No	PNK 14	50	N/A	Swales	2/28/26	03/01/25	\$ 396,920	20
139	SW	Village of Islamorada	Upper Keys	PNK 11	No	PNK 11	51	N/A	Swales	3/1/25	03/01/26	\$ 3,124,730	20
140	SW	Village of Islamorada	Upper Keys	LMK 18	No	LMK 18	52	N/A	Drainage Wells, Swales	3/1/26	03/01/27	\$ 754,031	20
141	SW	Village of Islamorada	Upper Keys	PNK 2	No	PNK 2	53	N/A	Drainage Wells, Swales	3/1/26	03/01/27	\$ 395,946	20
142	SW	Village of Islamorada	Upper Keys	LMK 14	No	LMK 14	54	N/A	Swales	3/1/26	03/01/27	\$ 870,145	20
143	SW	Village of Islamorada	Upper Keys	LMK 12	No	LMK 12	55	N/A	Swales	3/1/26	03/01/27	\$ 1,289,919	20
144	SW	Village of Islamorada	Upper Keys	LMK 16	No	LMK 16	56	N/A	Swales	3/1/27	03/01/28	\$ 147,533	20
145	SW	Village of Islamorada	Upper Keys	WYK 1	No	WYK 1	57	N/A	Drainage Wells, Swales	3/1/27	03/01/28	\$ 843,150	20
146	SW	Village of Islamorada	Upper Keys	WYK 3	No	WYK 3	58	N/A	Drainage Wells, Swales	3/1/27	03/01/28	\$ 1,165,984	20

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147	SW	Village of Islamorada	Upper Keys	UMK 9	No	UMK 9	59	N/A	Drainage Wells, Swales	3/1/28	03/01/29	\$ 129,167	20
148	SW	Village of Islamorada	Upper Keys	UMK 8	No	UMK 8	60	N/A	Drainage Wells, Swales	3/1/28	03/01/29	\$ 1,452,890	20
149	SW	Village of Islamorada	Upper Keys	LMK 9	No	LMK 9	61	N/A	Swales	3/1/29	03/01/30	\$ 734,524	20
150	SW	Village of Islamorada	Upper Keys	LMK 2	No	LMK 2	62	N/A	Swales	3/1/29	03/01/30	\$ 252,894	20
151	SW	Village of Islamorada	Upper Keys	LMK 1	No	LMK 1	63	N/A	Swales	3/1/29	03/01/30	\$ 224,235	20
152	SW	City of Key West	Lower Keys	FEMA	N/A	Clinton Square (Front & Whitehead, Green & Whitehead)	1	N/A	2 wells & inlets & pipe down Green	6/30/05	06/29/07	\$ 345,343	20
153	SW	Village of Islamorada	Upper Keys	LMK 4	Yes	LMK 4	1	N/A	Drainage Wells	3/1/01	03/01/02	\$ 467,834	20
154	SW	City of Key West	Lower Keys	City	N/A	Caroline & Elizabeth	2	N/A	well & inlets	6/30/05	06/29/07	\$ 166,505	20
155	SW	City of Key West	Lower Keys	City	N/A	Fleming & Frances Street	3	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
156	SW	City of Key West	Lower Keys	City	N/A	White Street (@ Fleming, @ Southard or Angela)	4	N/A	2 wells & inlets	6/30/05	06/29/07	\$ 296,008	20
157	SW	City of Key West	Lower Keys	City	N/A	White Street & Pine Street	5	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
158	SW	City of Key West	Lower Keys	City	N/A	Eisenhower & Petronia	6	N/A	well & inlet	6/30/05	06/29/07	\$ 148,004	20
159	SW	City of Key West	Lower Keys	City	N/A	Pearl & Angela	7	N/A	well & inlet	6/30/05	06/29/07	\$ 148,004	20
160	SW	City of Key West	Lower Keys	City	N/A	1 Block W of George on South	8	N/A	well, inlets & mini sys	6/30/05	06/29/07	\$ 271,341	20
161	SW	City of Key West	Lower Keys	City	N/A	Von Phister & Ashby	9	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
162	SW	City of Key West	Lower Keys	City	N/A	100' West of Patterson & 2nd Street	10	N/A	raise road & geotextile dip	6/30/05	06/29/07	\$ 24,667	20
163	SW	City of Key West	Lower Keys	City	N/A	Between 14th & Kennedy & Northside Dr.	11	N/A	raise road dip-major	6/30/05	06/29/07	\$ 308,342	20
164	SW	City of Key West	Lower Keys	City	N/A	20th Terrace & Cindy Avenue	12	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
165	SW	City of Key West	Lower Keys	City	N/A	Between 3rd & 4th on Seidenberg, 2nd & Staples, 3rd & Staples	13	N/A	2 wells, inlets & mini sys	6/30/05	06/29/07	\$ 473,613	20
166	SW	City of Key West	Lower Keys	City	N/A	11th Street (11th & Patterson)	14	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
167	SW	City of Key West	Lower Keys	City	N/A	Windsor & Passover (or Windsor & Williams)	15	N/A	well & inlet oversized grates	6/30/05	06/29/07	\$ 148,004	20
168	SW	City of Key West	Lower Keys	City	N/A	Seminole & Alberta	16	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
169	SW	City of Key West	Lower Keys	City	N/A	South & Whitehead	17	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
170	SW	City of Key West	Lower Keys	City	N/A	United & Whitehead	18	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
171	SW	City of Key West	Lower Keys	City	N/A	South & Simonton	19	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
172	SW	City of Key West	Lower Keys	City	N/A	Whalton & Von Phister (disconnect from White)	20	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
173	SW	City of Key West	Lower Keys	City	N/A	Johnson & Whalton	21	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
174	SW	City of Key West	Lower Keys	City	N/A	United & Simonton	22	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
175	SW	City of Key West	Lower Keys	City	N/A	Williams & Catherine	23	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20

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176	SW	City of Key West	Lower Keys	City	N/A	Catherine & Georgia (or Florida)	24	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
177	SW	City of Key West	Lower Keys	City	N/A	Green & Ann St.	25	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
178	SW	City of Key West	Lower Keys	City	N/A	Louisa & Simonton	26	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
179	SW	City of Key West	Lower Keys	City	N/A	8th & Staples	27	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
180	SW	City of Key West	Lower Keys	City	N/A	7th & Staples	28	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
181	SW	City of Key West	Lower Keys	City	N/A	Laird & Thompson	29	N/A	3 inlets	6/30/05	06/29/07	\$ 37,001	20
182	SW	City of Key West	Lower Keys	City	N/A	Angela & Passover	30	N/A	3 inlets to existing well	6/30/05	06/29/07	\$ 37,001	20
183	SW	City of Key West	Lower Keys	City	N/A	Catherine & Varella	31	N/A	3 inlets to existing well	6/30/05	06/29/07	\$ 37,001	20
184	SW	City of Key West	Lower Keys	City	N/A	George & Patricia	32	N/A	3 inlets to existing well & mini sys	6/30/05	06/29/07	\$ 55,502	20
185	SW	City of Key West	Lower Keys	City	N/A	South (between Leon & Thompson)	33	N/A	wells & inlets	6/30/05	06/29/07	\$ 148,004	20
186	SW	City of Key West	Lower Keys	City	N/A	17th St & 16th Terrace (eliminate outfall)	34	N/A	wells & inlets	6/30/05	06/29/07	\$ 148,004	20
187	SW	City of Key West	Lower Keys	City	N/A	Venetian Dr (near Trinidad-eliminate outfall)	35	N/A	wells & inlets	6/30/05	06/29/07	\$ 148,004	20
188	SW	City of Key West	Lower Keys	City	N/A	Jamaica (N end-eliminate outfall)	36	N/A	wells & inlets	6/30/05	06/29/07	\$ 148,004	20
189	SW	City of Key West	Lower Keys	City	N/A	Bahama Dr (N end-eliminate outfall)	37	N/A	wells & inlets	6/30/05	06/29/07	\$ 148,004	20
190	SW	City of Key West	Lower Keys	City	N/A	Amelia & Whitehead	38	N/A	wells & inlets	6/30/05	06/29/07	\$ 148,004	20
191	SW	City of Key West	Lower Keys	City	N/A	Caroline & Whitehead	39	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
192	SW	City of Key West	Lower Keys	City	N/A	Virginia & White	40	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
193	SW	City of Key West	Lower Keys	City	N/A	Riviera & 17th St (eliminate outfall)	41	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
194	SW	City of Key West	Lower Keys	City	N/A	Eisenhower & Newton (eliminate outfall)	42	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
195	SW	City of Key West	Lower Keys	City	N/A	Varella St. & Virginia, Catherine St. & Grinnell	43	N/A	wells, inlets & mini sys	6/30/05	06/29/07	\$ 296,008	20
196	SW	City of Key West	Lower Keys	City	N/A	Catherine & White	44	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
197	SW	City of Key West	Lower Keys	City	N/A	Patterson St. (east of 5th)	45	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
198	SW	City of Key West	Lower Keys	City	N/A	Riviera & 11th Street	46	N/A	Outfall treatment structure	6/30/05	06/29/07	\$ 148,004	20
199	SW	City of Key West	Lower Keys	City	N/A	Riviera & Riviera St.	47	N/A	Outfall treatment structure	6/30/05	06/29/07	\$ 148,004	20
200	SW	City of Key West	Lower Keys	City	N/A	Sunrise Drive & 18 St.	48	N/A	Outfall treatment structure	6/30/05	06/29/07	\$ 148,004	20
201	SW	City of Key West	Lower Keys	City	N/A	Radisson Outfall- need easement-Northside system	49	N/A	Outfall treatment structure	6/30/05	06/29/07	\$ 246,673	20
202	SW	City of Key West	Lower Keys	City	N/A	Searstown- Twin 48's	50	N/A	Outfall treatment structure	6/30/05	06/29/07	\$ 493,347	20
203	SW	City of Key West	Lower Keys	City	N/A	Overseas Market- need easement	51	N/A	Outfall treatment structure	6/30/05	06/29/07	\$ 370,010	20
204	SW	City of Key West	Lower Keys	City	N/A	Silver Eagle Market- need easement	52	N/A	Outfall treatment structure	6/30/05	06/29/07	\$ 246,673	20

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205	SW	City of Key West	Lower Keys	City	N/A	4th Street	53	N/A	Outfall treatment structure	6/30/05	06/29/07	\$ 148,004	20
206	SW	City of Key West	Lower Keys	City	N/A	1st Street	54	N/A	Outfall treatment structure	6/30/05	06/29/07	\$ 148,004	20
207	SW	City of Key West	Lower Keys	City	N/A	George Street	55	N/A	Outfall treatment structure	6/30/05	06/29/07	\$ 148,004	20
208	SW	City of Key West	Lower Keys	City	N/A	Leon & Jose Marti	56	N/A	Outfall treatment structure	6/30/05	06/29/07	\$ 296,008	20
209	SW	City of Key West	Lower Keys	City	N/A	Margaret N	57	N/A	Outfall treatment structure	6/30/05	06/29/07	\$ 296,008	20
210	SW	City of Key West	Lower Keys	City	N/A	Williams & Caroline (eliminate outfall)	58	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
211	SW	City of Key West	Lower Keys	City	N/A	Eliza White or Georgia	59	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
212	SW	City of Key West	Lower Keys	City	N/A	Eliza & Florida	60	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
213	SW	City of Key West	Lower Keys	City	N/A	20th & Duck	61	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
214	SW	City of Key West	Lower Keys	City	N/A	Duck W of 15th	62	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
215	SW	City of Key West	Lower Keys	City	N/A	Duck & 18th	63	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
216	SW	City of Key West	Lower Keys	City	N/A	Eagle E of 14th	64	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
217	SW	City of Key West	Lower Keys	City	N/A	Eagle & 20th	65	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
218	SW	City of Key West	Lower Keys	City	N/A	Kennedy & Riviera (eliminate outfall)	66	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
219	SW	City of Key West	Lower Keys	City	N/A	Fleming & Williams	67	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
220	SW	City of Key West	Lower Keys	City	N/A	7th Street (Patterson to Staples)	68	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
221	SW	City of Key West	Lower Keys	City	N/A	Lining for Pump Assist	69	N/A	Appurtenance Lining	6/30/05	06/29/07	\$ 740,020	20
222	SW	City of Key West	Lower Keys	City	N/A	Pump Assist Ashby Outfall	70	N/A	Pump Station	6/30/05	06/29/07	\$ 1,641,623	20
223	SW	City of Key West	Lower Keys	City	N/A	Pump Assist White Outfall	71	N/A	Pump Station	6/30/05	06/29/07	\$ 704,012	20
224	SW	City of Key West	Lower Keys	City	N/A	Pump Assist Duval S Outfall	72	N/A	Pump Station	6/30/05	06/29/07	\$ 686,128	20
225	SW	City of Key West	Lower Keys	City	N/A	Pump Assist Duval N Outfall	73	N/A	Pump Station	6/30/05	06/29/07	\$ 2,205,000	20
226	SW	City of Key West	Lower Keys	City	N/A	Pump Assist Reynolds Outfall	74	N/A	pump assist well	6/30/05	06/29/07	\$ 911,218	20
227	SW	City of Key West	Lower Keys	Alternate	N/A	6th Street (Patterson to Staples)	75	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
228	SW	City of Key West	Lower Keys	Alternate	N/A	8th Street (South of Patterson)	76	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
229	SW	City of Key West	Lower Keys	Alternate	N/A	11th Street (11th & Flagler Ave.)	77	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
230	SW	City of Key West	Lower Keys	Alternate	N/A	Fogarty Ave. (6th St. to 7th St.)	78	N/A	Additional wells	6/30/05	06/29/07	\$ 49,335	20
231	SW	City of Key West	Lower Keys	Alternate	N/A	Harriet St. (14th to 15th)	79	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
232	SW	City of Key West	Lower Keys	Alternate	N/A	2nd Street (South of Patterson)	80	N/A	Mini System	6/30/05	06/29/07	\$ 86,336	20
233	SW	City of Key West	Lower Keys	Alternate	N/A	Duval & United Street	81	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20

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234	SW	City of Key West	Lower Keys	Alternate	N/A	20th & Paula	82	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
235	SW	City of Key West	Lower Keys	Alternate	N/A	Eaton Street & Margaret Street	83	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
236	SW	City of Key West	Lower Keys	Alternate	N/A	Harris Avenue (East of 1st)	84	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
237	SW	City of Key West	Lower Keys	Alternate	N/A	Seidenburg (East of 1st Street)	85	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
238	SW	City of Key West	Lower Keys	Alternate	N/A	Fogarty (East of 5th and between 6th & 7th)	86	N/A	well & inlets	6/30/05	06/29/07	\$ 296,008	20
239	SW	City of Key West	Lower Keys	Alternate	N/A	Leon & South	87	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
240	SW	City of Key West	Lower Keys	FEMA	N/A	Reynolds St	88	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
241	SW	City of Key West	Lower Keys	FEMA	N/A	Kamien Subdivision	89	N/A	12 wells & inlets	6/30/05	06/29/07	\$ 1,539,242	20
242	SW	City of Key West	Lower Keys	FEMA	N/A	Florida St & Laird St	90	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
243	SW	City of Key West	Lower Keys	FEMA	N/A	Reynolds St & South St	91	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
244	SW	City of Key West	Lower Keys	FEMA	N/A	Reynolds & Von Phister	92	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
245	SW	City of Key West	Lower Keys	FEMA	N/A	Reynolds & Johnson	93	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
246	SW	City of Key West	Lower Keys	FEMA	N/A	Reynolds & Casa Marina	94	N/A	3 inlets and piping	6/30/05	06/29/07	\$ 148,005	20
247	SW	City of Key West	Lower Keys	FEMA	N/A	Josephine St & Blanch St	95	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
248	SW	City of Key West	Lower Keys	FEMA	N/A	Searstown Donald Ave.	96	N/A	3 inlets and piping	6/30/05	06/29/07	\$ 444,012	20
249	SW	City of Key West	Lower Keys	FEMA	N/A	Fort St Drainage (Catherine St. & Thomas St.)	97	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
250	SW	City of Key West	Lower Keys	FEMA	N/A	White St & Casa Marina Ct.	98	N/A	well & inlets	6/30/05	06/29/07	\$ 148,003	20
251	SW	City of Key West	Lower Keys	FEMA	N/A	United St & Thompson	99	N/A	well & inlets	6/30/05	06/29/07	\$ 148,004	20
252	WW	City of Key West	Lower Keys	City	N/A	Manhole Rain Guard	1	N/A	N/A	10/2/03	10/02/03	\$ 215,839	11
253	WW	City of Key West	Lower Keys	City	N/A	S. Duval St. Sewer Rehab. Project	2	N/A	N/A	10/2/03	12/02/03	\$ 98,669	11
254	WW	City of Key West	Lower Keys	City	N/A	Truman Annex Sewer (BRAC)	3	N/A	N/A	10/2/03	12/02/03	\$ 1,006,427	20
255	WW	City of Key West	Lower Keys	City	N/A	Manhole Liners	4	N/A	N/A	10/2/03	12/02/04	\$ 246,673	10
256	WW	City of Key West	Lower Keys	City	N/A	Misc Sewer System Repairs	5	N/A	N/A	10/2/03	10/02/13	\$ 2,713,407	10
257	WW	City of Key West	Lower Keys	City	N/A	Deep Injection Well	6	N/A	N/A	10/2/07	10/02/07	\$ 5,550,150	10
258	WW	City of Key West	Lower Keys	City	N/A	Wastewater Reuse WWTP	7	N/A	N/A	10/2/09	10/02/09	\$ 7,400,201	20
259	WW	City of Key West	Lower Keys	City	N/A	Wastewater Reuse Distrib	8	N/A	N/A	10/2/10	10/02/10	\$ 8,263,557	10
260	WW	Village of Islamorada	Upper Keys	Islamorada	N/A	Village of Islamorada Master Plan	N/A	N/A	Provide an updated plan for the Village to meet their goals and legislative mandates	9/1/04	01/01/05	\$ 113,558	N/A