RESOLUTION NO. 147 - 2012

A RESOLUTION OF THE MONROE COUNTY BOARD OF COUNTY COMMISSIONERS OF MONROE COUNTY, FLORIDA ADOPTING THE CUDJOE REGIONAL WASTEWATER TREATMENT SYSTEM FACILITIES PLAN

WHEREAS, Florida's water pollution control revolving loan program is authorized under Sec. 403.1835, Florida Statutes which establishes the *Wastewater Treatment and Stormwater Management Revolving Loan Trust Fund* for projects and activities eligible for funding under Section 603 of the federal *Water Pollution Control Act* (also known as the amended *Clean Water Act); and*

WHEREAS, Section 62-503.700, Florida Administrative Code, describes the planning, design, construction and procurement requirements to obtain borrowed funding from the Florida Department of Environmental Protection's (FDEP's) *State Revolving Loan Program for Water Pollution Control (SRF)*; and

WHEREAS, Section 62-503.700 (2)(g), Florida Administrative Code, requires that the planning documentation include a description of the public participation process used to explain the project and the financial impacts to affected parties prior to the project sponsor's acceptance of the planning recommendations; and

WHEREAS, the Board of County Commissioners (BOCC) adopted the Sumerland/Cudjoe/Upper Sugarloaf Interlocal Agreement (ILA) on September 20, 2006 appropriating an initial $3 million for design; and

WHEREAS, the Interlocal Agreements are provided in the Facilities Plan; and

WHEREAS, on April 16, 2008, the BOCC adopted the First Amendment to the Summerland/Cudjoe/Upper Sugarloaf ILA expanding the scope to include design for Big Pine Key through Ramrod Key and Lower Sugarloaf and appropriated an additional $4.5 million for expanded design; and

WHEREAS, based on the BOCC's concurrence of the recommendations in the Lower Keys Wastewater Master Plan Update on November 19, 2008, the Florida Keys Aqueduct Authority held public meetings on December 8, 2008 and December 11, 2008 describing the collection system alternatives analysis which resulted in the recommendation to expand the central service area boundary to include those properties for which central service was more cost effective than onsite system upgrades; and

WHEREAS, the presentation sited the AWT Plant on North Cudjoe Key at the existing landfill site "centrally" located to treat effluent from north and south of the WWTP; and

WHEREAS, a substantial completion date during the second half of 2011 was projected based on projects being ready to bid in the fall of 2009; and

WHEREAS, a copy of the public presentation from December 8 and 11, 2008 is included in the Facilities Plan; and

WHEREAS, the BOCC approved the update to the Sanitary Wastewater Master Plan on January 19, 2008; and

WHEREAS, on August 3, 2009 the Initial Assessment Resolution (IAR) for the levy of System Development Fees (SDFs) ranging from $4,500 to $6,500 for the Cudjoe Regional Wastewater System failed during an advertised hearing due to incomplete project funding; and

WHEREAS, on August 3, 2009 the BOCC approved the Second Amendment for the (Expanded) Cudjoe Regional Wastewater System further expanding the project to include Onsite Sewage Treatment and Disposal Systems for which owners of properties not in the Master Plan but located in the Cudjoe Regional area from No Name Key through Lower Sugarloaf Key, plus Boca Chica parcels identified as RE ID # 122880-000000, 122890-000000, and 122870-000000, contract with FKAA for operation and maintenance; and

WHEREAS, on January 19, 2011 a scheduled agenda discussion occurred following the Cudjoe Regional Wastewater Funding presentation; and

WHEREAS, a copy of the public presentation from January 19, 2011 is included in the Facilities Plan; and

WHEREAS, the BOCC's consensus was to develop the funding plan using System Development Fee of $5,700 per EDU for the Cudjoe Regional Service Area; and

WHEREAS, the anticipated State of Florida FY13 General Appropriation Act in the amount of $30 million requires construction contracts for Unincorporated Monroe County by March 1, 2013; and

WHEREAS, on April 18, 2012, a summary presentation was made to BOCC depicting the service area and WWTP location, confirming the reduced estimated cost to implement of $156 million, and specifying a target date for bid opening of December 2012; and

WHEREAS, a copy of the public presentation from April 18, 2012 is included in the Facilities Plan; and

WHEREAS, the BOCC intends to fund a portion of the Cudjoe Regional Central Wastewater using future non-ad valorem revenue; and

WHEREAS, the future non-ad valorem revenue includes System Development Fees collected as special assessments and sales tax revenue; and

WHEREAS, on April 18, 2012 the BOCC approved the Second Amendment to the Interlocal Agreement establishing the System Development Fee to be paid by the property owners for the Cudjoe Regional Wastewater Project to be no more than $5,700; and

WHEREAS, the anticipated construction schedule requires the BOCC to borrow a portion of the funds to be collected as future non-ad valorem revenue; and

WHEREAS, the BOCC intends to borrow funds from the Florida Department of Environmental Protection's *State Revolving Fund Loan Program for Water Pollution Control* if financing costs prove favorable; and

WHEREAS, notice of the public meeting held by the BOCC on May 16, 2012 and the notice of intention to consider approval of this Resolution on the date hereof was published, said proof of publication(s) being attached hereto and made part of this Resolution as Attachment A; and

WHEREAS, pursuant to Section 62-503.700(2)(a)-(g), Florida Administrative Code and Sec. 403.1835(6)(b)(d)(h), (7)(a)-(h) and (11) Florida Statutes, a Facilities Plan was developed and included in the Agenda Package for this resolution consideration; and

WHEREAS, the Executive Summary is attached hereto and made part of this Resolution as Attachment B, for consideration by the Board of County Commissioners of Monroe County, Florida; and,

WHEREAS, Section 62-503-700(2) (j), Florida Administrative Code, requires that the planning documentation include an adopting resolution or other action establishing a commitment to implement the planning recommendations in order to obtain borrowed funding from the Florida Department of Environmental Protection's *State Revolving Fund Loan Program for Water Pollution Control*; and,

NOW THEREFORE, BE IT RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF MONROE COUNTY, FLORIDA that:

1. The Cudjoe Regional Wastewater Treatment Facilities Plan, included in the Agenda Package for this resolution consideration, is hereby adopted.

2. The Clerk of the Court is hereby directed to forward a certified copy of this Resolution to the Florida Department of Environmental Protection's State Revolving Fund Loan Program for Water Pollution Control.

FILED FOR RECORD
2012 MAY 29 AM 8:27

PASSED AND ADOPTED by the Board of County Commissioners of Monroe County, Florida at a regular meeting of said Board held on the 16th day of May, 2012.

Mayor David Rice	Yes
Mayor Pro Tem Kim Wigington	Yes
Commissioner George Neugent	Yes
Commissioner Heather Carruthers	Yes
Commissioner Sylvia Murphy	Yes

ATTEST
DANNY L. KOLHAGE, CLERK

By: _____
Deputy Clerk

BOARD OF COUNTY COMMISSIONER
OF MONROE COUNTY, FLORIDA

By: _____
Mayor David Rice

5/2/12

Attachment A – Notice for Facilities Plan Adoption Hearing

EXHIBIT

A

tabbies

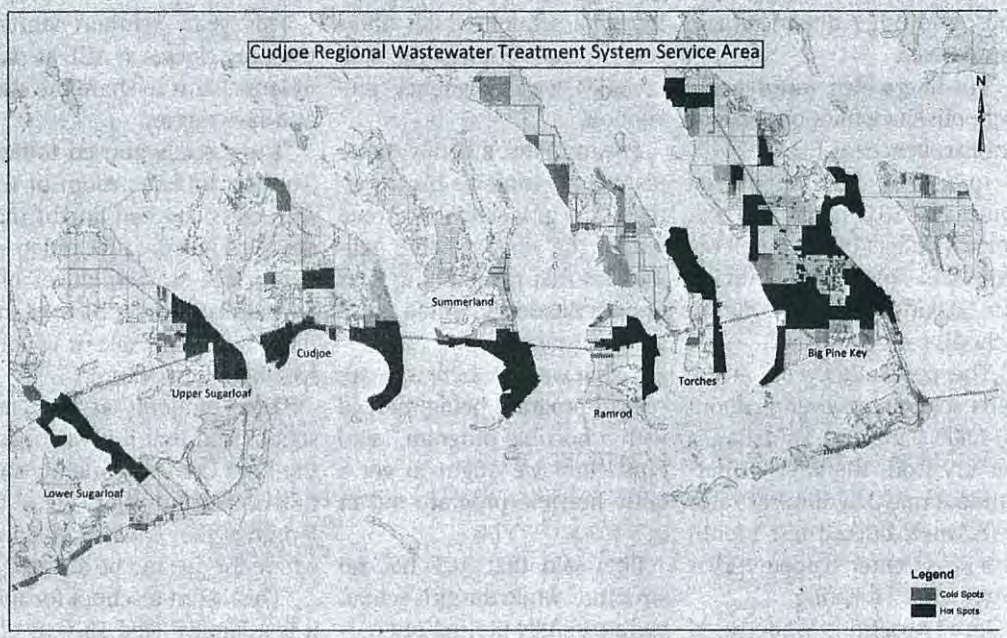
NOTICE OF INTENTION TO CONSIDER APPROVAL OF COUNTY RESOLUTION

NOTICE IS HEREBY GIVEN TO WHOM IT MAY CONCERN that on **May 16, 2012 at 3:00 p.m., or as soon thereafter as may be heard,** at the **Murray E. Nelson Government Center, 102050 Overseas Highway, Mile Marker 102, Key Largo, Monroe County, Florida,** the Board of County Commissioners of Monroe County, Florida intends to consider approval of the following County resolution:

A RESOLUTION OF THE BOARD OF COUNTY COMMISSIONERS OF MONROE COUNTY, FLORIDA ADOPTING THE CUDJOE REGIONAL WASTEWATER TREATMENT SYSTEM FACILITIES PLAN.

The purpose of this meeting is to satisfy the Florida Department of Environmental Protection's State Revolving Loan Program requirement for public participation prior to the acceptance of the planning recommendations by the project sponsor. An advanced wastewater treatment facility with a hybrid gravity and low pressure collection system is planned for construction in early 2013.

The figure below depicts the limits of the Cudjoe Regional Wastewater Treatment System Service Area to include developed parcels from Lower Sugarloaf north to Big Pine Key. The central service boundary is as delineated in the Master Plan Update approved by the Board of County Commissioners on January 28, 2009.



All affected property owners have a right to appear and provide input at the hearing and may file written objections with the County Administrator anytime prior to the public meeting. The Facilities Plan can be viewed on the Monroe County website at http://fl-monroecounty.civicplus.com/agendacenter upon publication of the May 16, 2012 BOCC agenda and no later than May 4, 2012.

ADA ASSISTANCE: If you are a person with a disability who needs special accommodations in order to participate in this proceeding, please contact the County Administrator's Office, by phoning (305) 292-4441, between the hours of 8:30 a.m. - 5:00 p.m., no later than five (5) calendar days prior to the scheduled meeting; if you are hearing or voice impaired, call "711".

Dated at Key West, Florida this 24th day of April, 2012.

DANNY L. KOLHAGE, Clerk of the Circuit Court and ex officio Clerk of the Board of County Commissioners of Monroe County, Florida

April 27, 2012 Key West Citizen

374028

ORIDA
ONROE

appeared Randy G. Erickson,
Operations of the Key West
West, in Monroe County,
ent, being a legal notice in the

o Approve Resolution
System Plan

(s) of

_____.

tizen is a newspaper published in
and that the said newspaper has
aid Monroe County, Florida every
ail matter at the post office in Key
a period of 1 year next preceding
advertisement; and affiant further
ny person, firm or corporation any
or the purpose of securing this
vspaper.

Signature of Affiant

day of April, 2012

DAWN KAWZINSKY
NOTARY PUBLIC
STATE OF FLORIDA
Comm# EE157233
Expires 1/4/2015

Notary Seal

Personally Known x Produced Identification _____
Type of Identification Produced _____

THE CITIZEN KEY WEST
The Florida Keys Only Daily Newspaper, Est. 1876
Cooke Communications, LLC
Florida Keys

PO Box 1800
Key West Fl 33041
Office....305-292-7777
Extension.....x219
Fax.....305-295-8025
legals@keysnews.com

INTERNET PUBLISHING
keywest.com
keysnews.com
floridakeys.com
key-west.com
Web Design Services

NEWSPAPERS
The Citizen
Southernmost Flyer
Solares Hill
Big Pine Free Press
Marathon Free Press
Islamorada Free Press
Key Largo Free Press

MARKETING SERVICES
Commercial Printing
Citizen Locals Card
Direct Mail

FLORIDA KEYS OFFICES
Printing / Main Facility
3420 Northside Drive
Key West, FL
33040-1800
Tel 305-292-7777
Fax 305-294-0768
citizen@keywest.com

Internet Division
33040-3328
Tel 305-292-1880
Fax 305-294-1699
sales@keywest.com

Upper Keys Office
91731 Overseas Hwy
Tavernier, FL 33070
Tel 305-853-7277
Fax 305-853-0556
freepress@floridakeys.com

STATE OF FLORIDA
COUNTY OF MONROE

Before the undersigned authority personally appeared Randy G. Erickson, who on oath says that he is Vice-President of Operations of the Key West Citizen, a daily newspaper published in Key West, in Monroe County, Florida; that the attached copy of advertisement, being a legal notice in the matter of

Notice of Intention to Approve Resolution Cudjoe Key Wastewater System Plan

was published in said newspaper in the issue(s) of

April 27, 2012.

Affiant further says that the Key West Citizen is a newspaper published in Key West, in said Monroe County, Florida and that the said newspaper has heretofore been continuously published in said Monroe County, Florida every day, and has been entered as second-class mail matter at the post office in Key West, in said Monroe County, Florida, for a period of 1 year next preceding the first publication of the attached copy of advertisement; and affiant further says that he has neither paid nor promised any person, firm or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in the said newspaper.

Signature of Affiant

Sworn and subscribed before me this 27 day of April, 2012

Notary Public:

Dawn Kawzinsky

Expires: 1/4/16

DAWN KAWZINSKY
NOTARY PUBLIC
STATE OF FLORIDA
Comm# EE157233
Expires 1/4/2016

Notary Seal

Personally Known x Produced Identification _____
Type of Identification Produced _____

THE REPORTER

P.O. Box 1197, Tavernier, Fl 33070
92655 Overseas Hwy, Tavernier Fl 33070
Phone 305- 852-3216, Fax 305- 852-0199
www.keysnet.com

PROOF OF PUBLICATION

STATE OF FLORIDA
COUNTY OF MONROE

Before the undersigned authority personally appeared **WAYNE MARKHAM** who on oath, says that he is **PUBLISHER of the THE REPORTER**, a weekly newspaper published in Tavernier, in Monroe County, Florida: that the attached copy of advertisement was published in said newspaper in the issues of: *(date(s) of publication)*

4-27-12

See reverse

Affiant further says that the said THE REPORTER is a newspaper published at Tavernier, in said Monroe County, Florida, and that the said newspaper has heretofore been continuously published in said Monroe County, Florida, each week (on Friday) and has been entered as a second class mail matter at the post office in Tavernier, in Monroe County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement. The affiant further says that he has neither paid nor promised any person, firm, or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in the said newspaper(s) and that The THE REPORTER is in full compliance with Chapter 50 of the Florida State Statutes on Legal and Official Advertisements.

Wayne Markham

Wayne Markham, Publisher

Sworn to and subscribed before me
this 27 Day of April, 2012
(SEAL)

Beverly Traeger

Notary

BEVERLY TRAEGER
MY COMMISSION # DD 969749
EXPIRES: April 18, 2014
Bonded Thru Notary Public Underwriters

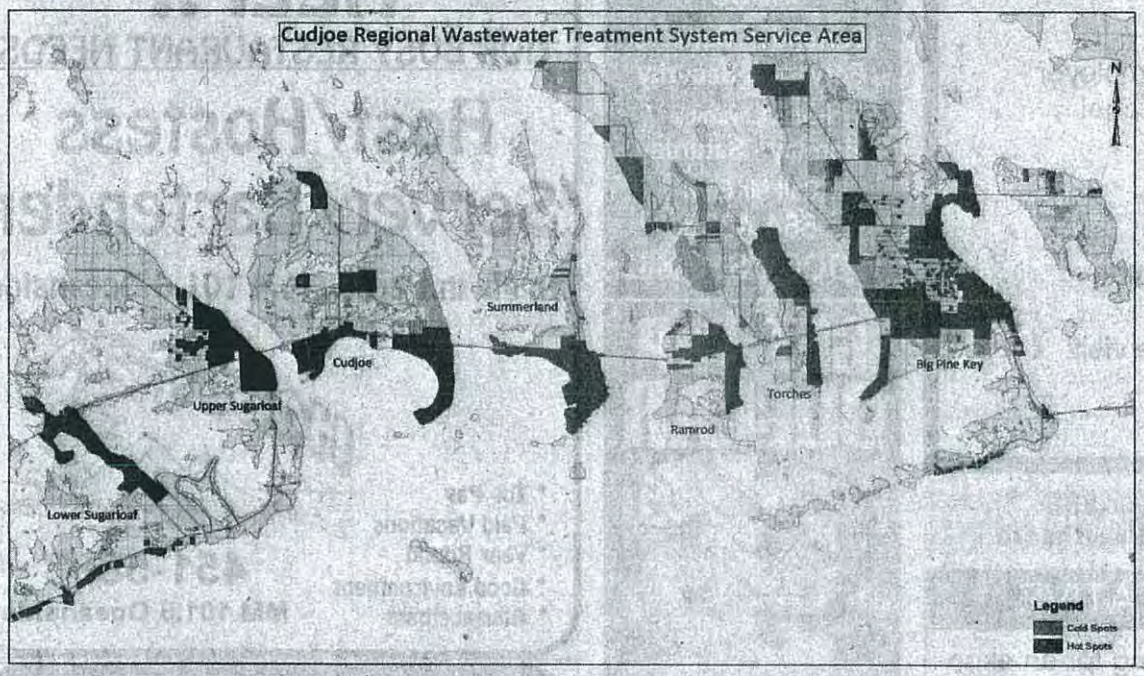
NOTICE OF INTENTION TO CONSIDER APPROVAL OF COUNTY RESOLUTION

NOTICE IS HEREBY GIVEN TO WHOM IT MAY CONCERN that on May 16, 2012 at 3:00 p.m., or as soon thereafter as may be heard, at the Murray E. Nelson Government Center, 102050 Overseas Highway, Mile Marker 102, Key Largo, Monroe County, Florida, the Board of County Commissioners of Monroe County, Florida intends to consider approval of the following County resolution:

A RESOLUTION OF THE BOARD OF COUNTY COMMISSIONERS OF MONROE COUNTY, FLORIDA ADOPTING THE CUDJOE REGIONAL WASTEWATER TREATMENT SYSTEM FACILITIES PLAN.

The purpose of this meeting is to satisfy the Florida Department of Environmental Protection's State Revolving Loan Program requirement for public participation prior to the acceptance of the planning recommendations by the project sponsor. An advanced wastewater treatment facility with a hybrid gravity and low pressure collection system is planned for construction in early 2013.

The figure below depicts the limits of the Cudjoe Regional Wastewater Treatment System Service Area to include developed parcels from Lower Sugarloaf north to Big Pine Key. The central service boundary is as delineated in the Master Plan Update approved by the Board of County Commissioners on January 28, 2009.



All affected property owners have a right to appear and provide input at the hearing and may file written objections with the County Administrator anytime prior to the public meeting. The Facilities Plan can be viewed on the Monroe County website at http://fl-monroecounty.civicplus.com/agendacenter upon publication of the May 16, 2012 BOCC agenda and no later than May 4, 2012.

ADA ASSISTANCE: If you are a person with a disability who needs special accommodations in order to participate in this proceeding, please contact the County Administrator's Office, by phoning (305) 292-4441, between the hours of 8:30 a.m. - 5:00 p.m., no later than five (5) calendar days prior to the scheduled meeting; if you are hearing or voice impaired, call "711".

Dated at Key West, Florida this 24th day of April, 2012.

DANNY L. KOLHAGE, Clerk of the Circuit Court and ex officio Clerk of the Board of County Commissioners of Monroe County, Florida

Published Reporter 4/27/12

FLORIDA KEYS

KEYNOTER

Published Twice Weekly
Marathon, Monroe County, Florida

PROOF OF PUBLICATION

STATE OF FLORIDA
COUNTY OF MONROE

Before the undersigned authority personally appeared **WAYNE MARKHAM** who on oath, says that he is **PUBLISHER of the FLORIDA KEYS KEYNOTER**, a twice weekly newspaper published in Marathon, in Monroe County, Florida: that the attached copy of advertisement was published in said newspaper in the issues of: *(date(s) of publication)*

April 28, 2012

See reverse

Affiant further says that the said FLORIDA KEYS KEYNOTER is a newspaper published at Marathon, in said Monroe County, Florida, and that the said newspaper has heretofore been continuously published in said Monroe County, Florida, twice each week (on Wednesday and Saturday) and has been entered as a second class mail matter at the post office in Marathon, in Monroe County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement. The affiant further says that he has neither paid nor promised any person, firm, or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in the said newspaper(s) and that The Florida Keys Keynoter is in full compliance with Chapter 50 of the Florida State Statutes on Legal and Official Advertisements.

Wayne Markham

Sworn to and subscribed before me
this 30 Day of April, 2012
(SEAL)

Beverly Traeger
Notary

BEVERLY TRAEGER
MY COMMISSION # DD 969749
EXPIRES: April 18, 2014
Bonded Thru Notary Public Underwriters

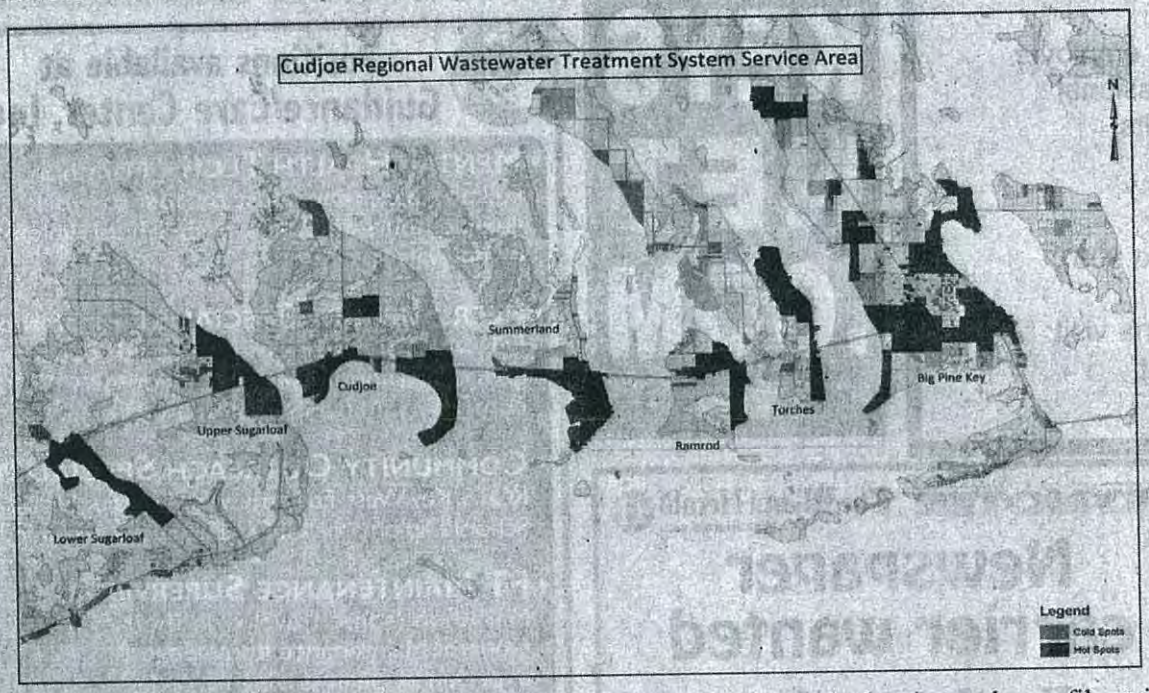
NOTICE OF INTENTION TO CONSIDER APPROVAL OF COUNTY RESOLUTION

NOTICE IS HEREBY GIVEN TO WHOM IT MAY CONCERN that on May 16, 2012 at 3:00 p.m., or as soon thereafter as may be heard, at the Murray E. Nelson Government Center, 102050 Overseas Highway, Mile Marker 102, Key Largo, Monroe County, Florida, the Board of County Commissioners of Monroe County, Florida intends to consider approval of the following County resolution:

A RESOLUTION OF THE BOARD OF COUNTY COMMISSIONERS OF MONROE COUNTY, FLORIDA ADOPTING THE CUDJOE REGIONAL WASTEWATER TREATMENT SYSTEM FACILITIES PLAN.

The purpose of this meeting is to satisfy the Florida Department of Environmental Protection's State Revolving Loan Program requirement for public participation prior to the acceptance of the planning recommendations by the project sponsor. An advanced wastewater treatment facility with a hybrid gravity and low pressure collection system is planned for construction in early 2013.

The figure below depicts the limits of the Cudjoe Regional Wastewater Treatment System Service Area to include developed parcels from Lower Sugarloaf north to Big Pine Key. The central service boundary is as delineated in the Master Plan Update approved by the Board of County Commissioners on January 28, 2009.



All affected property owners have a right to appear and provide input at the hearing and may file written objections with the County Administrator anytime prior to the public meeting. The Facilities Plan can be viewed on the Monroe County website at http://fl-monroecounty.civicplus.com/agendacenter upon publication of the May 16, 2012 BOCC agenda and no later than May 4, 2012.

ADA ASSISTANCE: If you are a person with a disability who needs special accommodations in order to participate in this proceeding, please contact the County Administrator's Office, by phoning (305) 292-4441, between the hours of 8:30 a.m. - 5:00 p.m., no later than five (5) calendar days prior to the scheduled meeting; if you are hearing or voice impaired, call "711".

Dated at Key West, Florida this 24th day of April, 2012.

DANNY L. KOLHAGE, Clerk of the Circuit
Court and ex officio Clerk of the Board of County
Commissioners of Monroe County, Florida

Published Keynoter 4/28/12

Attachment B – Facilities Plan Executive Summary

EXHIBIT

B

EXECUTIVE SUMMARY

A project specific ILA between Monroe County and the Florida Keys Aqueduct Authority for the Summerland/Cudjoe/Upper Sugarloaf Regional Wastewater System was executed on September 20, 2006. Through a series of Amendments, the project was expanded to include Lower Sugarloaf and Ramrod to Big Pine Key. The Monroe County Sanitary Wastewater Master Plan (CH2M, 2000) recommended 3 treatment plants for these areas. By evaluating treatment system alternatives, the overall project cost estimate was reduced from $194 million to $156 million. The total construction estimate of $156 million includes $18M for the reclamation facility and $132M in transmission/collection system costs. The estimated cost for onsite system upgrades in cold spots is $6M.

The Cudjoe Regional Wastewater Treatment System consists of a wastewater reclamation plant to be constructed at the Cudjoe Solid Waste Transfer Station, transmission mains and collection systems to serve the hot spot areas in the Inner Islands located from Upper Sugarloaf to Summerland and the Outer Islands which include Lower Sugarloaf Key and Ramrod to Big Pine Key. The Cudjoe Regional Wastewater Service Area and Reclamation Plant are depicted on Figure 1 below.

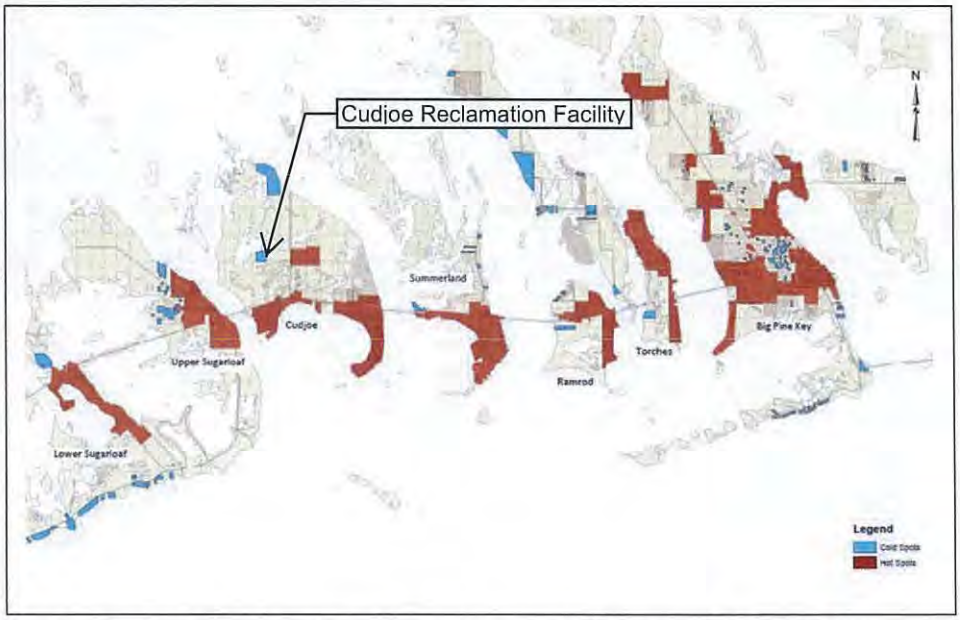


Figure 1 – Cudjoe Regional Wastewater Treatment System Service Area

The funding sources for the Cudjoe Regional Wastewater Treatment System include the FY12-13 State of Florida Appropriation subject to line item 1592A, non-ad valorem revenue including sales tax revenue and system development fees levied as special assessments and any other available source of revenue identified by Monroe County.

Construction is anticipated to begin in early 2013 and will require 3-5 years to complete.

TABLE OF CONTENTS

SECTION **PAGE**

EXECUTIVE SUMMARY i
TABLE OF CONTENTS ii
INTRODUCTION 1
PARTNERSHIP 1
PROJECT DEVELOPMENT 1
SPONSORSHIP 2
PUBLIC PARTICIPATION 2
PROJECT LOCATION 2
PROJECT DESCRIPTION 3
PROJECT COST 3
ALTERNATIVES EVALUATED 3
Wastewater Treatment Plant 3
Collection System 4
PROJECT SCHEDULE 4
FUNDING SOURCES 4

Cudjoe Regional Wastewater Treatment System

DRAFT

Facilities Plan

Compiled By:
Florida Keys Aqueduct Authority
1100 Kennedy Drive
Key West, FL 33040

Monroe County Engineering Division
102050 Overseas Highway, Suite 2-223
Key Largo, FL 33037

May 2012

KEVIN G. WILSON
LICENSE
No. 60687
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

Kevin Wilson PE# 60687
Monroe County, Director of Engineering

Tom Walker PE# 31462
5/25/12
Florida Keys Aqueduct Authority, Director of Engineering

TABLE OF CONTENTS

SECTION **PAGE**

EXECUTIVE SUMMARY i
TABLE OF CONTENTS ii
INTRODUCTION 1
PARTNERSHIP 1
PROJECT DEVELOPMENT 1
SPONSORSHIP 2
PUBLIC PARTICIPATION 2
PROJECT LOCATION 2
PROJECT DESCRIPTION 3
PROJECT COST 3
ALTERNATIVES EVALUATED 3
Wastewater Treatment Plant 3
Collection System 4
PROJECT SCHEDULE 4
FUNDING SOURCES 4

INTRODUCTION

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 land in Monroe County. The intent of the Comprehensive Plan was 1) To establish more stringent loads that can be tolerated by the County's nutrient-sensitive waters and ecosystems without experiencing short- or long- term adverse effects; 2) To prevent further degradation of groundwater, as well as confined, nearshore, and offshore waters; and 3) To ensure improvement of these water 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 (CH2M, March 2000) analysis of wastewater management alternatives concluded that it is more cost effective and environmentally sound to provide centralized wastewater collection and central Advanced Wastewater Treatment (AWT) in most areas of the Keys than to upgrade or replace all existing onsite systems and existing treatment plants.

PARTNERSHIP

The Florida Keys Aqueduct Authority (FKAA) entered into a "Master" Interlocal Agreement (ILA) on September 6, 2005 with Monroe County setting forth the commitments of the parties to work together to achieve the 2010 mandate to sewer the Florida Keys. The ILA tasks Monroe County with funding and FKAA with design, construction, operation and maintenance of unincorporated Monroe County wastewater systems other than those in the Key Largo Wastewater Treatment District and the Key West Resort Utilities service area. The ILA was amended on September 19, 2007 to include the State Revolving Fund Loan Program for Pollution Control as a funding source and to increase the County's financial commitment. The Second Amendment approved on April 18, 2012 set the System Development Fee (SDF) to no more than $5,700.

PROJECT DEVELOPMENT

A project specific ILA for the Summerland/Cudjoe/Upper Sugarloaf Regional Wastewater System was executed on September 20, 2006. The First Amendment to the ILA was adopted on April 16, 2008 and expanded the service area to include Lower Sugarloaf and Ramrod to Big Pine Key based on anticipated capital and operation/maintenance cost savings. The ILA Second Amendment was adopted on August 3, 2009 expanding the Cudjoe Regional Wastewater System to include onsite

systems for property owners who contract with FKAA. The Cudjoe Regional Wastewater Treatment System related ILAs are included in Appendix A.

SPONSORSHIP

Monroe County is the public sponsor for project funds to be borrowed using revenue collected by Monroe County. FKAA is the project sponsor for funds to be borrowed using revenue collected by FKAA.

PUBLIC PARTICIPATION

FKAA hosted two, advertised public meetings to inform affected property owners of the recommendation to expand the central wastewater system collection. The meetings were advertised and held on December 8 and 11th, 2008. The recommendation to expand the central wastewater collection system was based on FKAAs review of alternative collection system technologies. The review concluded that low pressure collection systems could be used to connect some of the less densely populated areas at a reduced overall cost.

At the time, the objective was to have the project shovel ready to utilize federal American Recovery and Reinvestment Act funds. The presentation included a schedule that included preparation of bid packages for advertisement in Summer 2009 and a substantial completion date of February 2009. The anticipated project costs presented was $194 million. The public meeting advertisement and presentation are included in Appendix B.

Monroe County held an advertised public meeting to collect the SDFs as non-ad valorem special assessments on August 3, 2009 as a first step toward funding the project. Discussion occurred to proceed with project based on collection of $4,500 to $6,500 SDFs per Equivalent Dwelling Unit (EDU). The resolution failed due to incomplete funding to complete construction. In April 2012, the BOCC approved the Second Amendment to the general project ILA with FKAA setting the SDF at no more than $5,700. Public meetings to necessary to collect the SDFs are scheduled for June 20, 2012 and July 18, 2012.

PROJECT LOCATION

The Florida Keys form an arcuate chain of small islands, composed primarily of limestone, extending from Miami to Key West, a distance of 150 miles. The Keys are bounded on the southeast by the Atlantic Ocean and the Straits of Florida, and on the northwest by the Gulf of Mexico and Florida Bay. Geologically, the Keys are divided into the Upper and Middle Keys - narrow, elongate islands parallel to the trend of the arc; and the Lower Keys - land masses with an axis perpendicular to the arc. The Upper and Middle Keys include the islands from Soldier Key in Biscayne Bay, located just north of

Key Largo, to Long Key, with the Lower Keys beginning at Big Pine Key, extending to Key West.

The overall Cudjoe Regional Wastewater Treatment System Service Area is located in the Lower Florida Keys, and extends from MM 17 to MM 33. Refer to Figure 1. The Service Area is bordered on the north by Florida Bay and on the south by the Atlantic Ocean. Additionally, most of the Service Area lies with the fragmented boundaries of the Florida Keys Wildlife Refuges Complex, which includes the National Key Deer Refuge and the Great White Heron National Wild Refuge.

PROJECT DESCRIPTION

The Cudjoe Regional Wastewater Treatment Service Area consists of two design areas. The Inner Islands located from Upper Sugarloaf to Summerland and the Outer Islands which include Lower Sugarloaf Key and Ramrod to Big Pine Key. The hot spot areas are within the boundaries of the central collection systems.

The selected treatment process is a five-stage Bardenpho system capable of meeting Advanced Wastewater Treatment Standards of 5 parts per million (ppm) Total Suspended Solids, 5 ppm Biological Oxygen Demand (BOD), 3 ppm Total Nitrogen (TN) and 3 ppm Total Phosphorus (TP). The proposed design capacity of the wastewater treatment plant is one MGD and the maximum anticipated flows will be 0.94 MGD, with a three-month average daily flow of 0.84 MGD. The wastewater treatment system has been designed to provide high level disinfection such that reclaimed water can be made available for non-potable water use. Four, 90-ft injection wells will also be constructed at the WWTP site. Gravity sewers have been selected as the method of wastewater collection in densely populated areas. Low-pressure systems will be used to provide wastewater service to less densely populated areas.

PROJECT COST

The Cudjoe Regional Wastewater Treatment Collection System is estimated to cost $156 million and includes the treatment plant at $18 million, the Inner Collection/Transmission system at $42 million, the Outer Collection/Transmission system at $90 million, and the Onsite Wastewater Nutrient Reducing Systems at $6 million.

ALTERNATIVES EVALUATED

Wastewater Treatment Plant

The Master Plan recommended separate treatment plants for Lower Sugarloaf, Upper Sugarloaf to Summerland, and Ramrod to Big Pine Key. An alternative identified was a centrally located wastewater treatment plant at the Cudjoe Solid Waste Transfer facility.

The estimated capital cost for 3 treatment plants was $187 million and one plant was $176 million. The present worth cost for the Cudjoe Regional Wastewater Treatment System with 3 treatment plants was $230 million and one plant was $204 million. The single plant alternative was selected. The Wastewater Master Plan Treatment Plant Alternatives' Review is included in Appendix C.

Collection System

A comparison of present worth cost to construct and operate low pressure, septic tank effluent pump, vacuum, and gravity collection systems for study areas on Upper Sugarloaf, Cudjoe and Summerland Keys was performed. The recommendation was a hybrid system consisting of a combination of gravity sewers in more densely developed areas and low pressure in less dense areas. A Wastewater Collection System Decision Tree was developed based on the results of the comparison. The collection system designs were finalized using the Wastewater Collection System Decision Tree. It was determined that compliance for the Cudjoe Regional Wastewater Treatment System hot and cold spots could be achieved at a lower overall cost by expanding the central service area based on the decision tree. The Central Cudjoe Waster Collection System Analysis of Alternative Wastewater Collection Systems is included in Appendix D.

PROJECT SCHEDULE

The Cudjoe Regional Wastewater Treatment System will be ready to bid in December 2012. A 3-5 year construction schedule is anticipated.

FUNDING SOURCES

The State of Florida FY12-13 Appropriation of $30 million, non-ad valorem revenue and any other revenue sources identify by Monroe County or FKAA will be used to fund the Cudjoe Regional Wastewater Treatment System described in this Facilities Plan.

ENVIRONMENTAL REVIEW

Refer to Appendix E for the Florida Keys Aqueduct Authority's Draft Environmental Assessment for the Florida Keys Water Quality Improvements Program (FKWQIP) Cudjoe Regional Wastewater System project. The Environmental Section of this Facilities Plan was submitted in April 2011. The Notice of Availability for the Federal Finding of No Significant Impact for the Draft Cudjoe Regional Facilities Plan was published in the Florida Administrative Weekly on April 29, 2011.

APPENDIX A

INTERLOCAL AGREEMENT
BETWEEN
MONROE COUNTY
AND
FLORIDA KEYS AQUEDUCT AUTHORITY
FOR THE
SUMMERLAND/CUDJOE/UPPER SUGARLOAF REGIONAL WASTEWATER SYSTEM

THIS INTERLOCAL AGREEMENT (Agreement) is entered into this 20th day of September, 2006, pursuant to Florida Statute Sec. 163.01, by and between Monroe County (County), a political subdivision of the State of Florida, and the Florida Keys Aqueduct Authority (FKAA), an independent special district.

WHEREAS, the County is authorized by Florida Statute Sec. 125.01(1) to provide, assist in providing, and fund centralized wastewater treatment systems; and

WHEREAS, Section 6, Chapter 99-395, Laws of Florida, and the County's Comprehensive Plan require that certain wastewater treatment levels be achieved by the year 2010, which levels can best be achieved by central wastewater treatment systems; and

WHEREAS, the FKAA is authorized by Chap. 76-441, Laws of Florida, as amended, and Chapter 98-519, Laws of Florida, to design, construct, and operate, wastewater treatment systems; and

WHEREAS, the FKAA and the County have entered into previous interlocal agreements establishing and confirming their ongoing partnership in providing wastewater facilities in the Florida Keys; and

WHEREAS, the County adopted Ordinance No. 38-2004, authorizing the levy of ad valorem taxes in the Summerland/Cudjoe/Upper Sugarloaf Municipal Service Taxing Unit, in order to provide an initial source of funding for the Summerland/Cudjoe/Upper Sugarloaf Regional Wastewater Project (Project); and

WHEREAS, FKAA has initiated planning, design and other services for the Project for which it may be paid with taxing unit funds; and

WHEREAS, the County by Interlocal Agreement dated September 6, 2005, and by Master Lease dated as of September 6, 2005, has committed to seek funding through federal and state grants and loans and the issuance of revenue bonds backed by the pledge of infrastructure sales tax; and will be providing additional funds to the FKAA for the administration, planning and construction of future wastewater projects in unincorporated Monroe County; and

WHEREAS, the County may have other funding mechanisms, including but not limited to infrastructure sales tax, grant and loan funding and ad valorem taxes, available to it for the provision of sewers and wastewater treatment; and

WHEREAS, County and FKAA desire to put in place procedures for the allocation, expenditure, and reimbursement of funds for the Project;

NOW, THEREFORE, in consideration of the mutual consideration and promises set forth below, the parties agree as follows:

1. COUNTY FUNDING. The County by resolution of its Board of County Commissioners, shall appropriate from any lawfully available source, those funds which have been duly approved for the estimated costs of administration, planning and construction of the Project, which shall not exceed Forty-Five million Dollars ($45,000,000). Summerland/Cudjoe/Upper Sugarloaf Municipal Service Taxing Unit ad valorem tax proceeds collected by County shall be provided to FKAA as part of the funding under this Agreement and shall be disbursed as described in paragraph 3 below. Before such disbursement, County may deduct its costs of administration and professional costs from the MSTU funds collected. As the Project progresses, and estimates are altered to reflect a combination of actual costs incurred and changes in pricing due to contracts resulting from bid processes, or other changed conditions, the FKAA shall provide such information to the County. This Agreement shall be modified as necessary to reflect such changes in the estimates in order to provide for adequate funding to be available for the timely and efficient construction of the project. The amount of the funding may be changed by written amendment to this Agreement approved by the parties.

2. PROJECT. The Project shall consist of a collection system, transmission main and method of treatment to Advanced Wastewater Treatment standards sufficient to serve the needs of the residents and businesses in the Summerland/Cudjoe/Upper Sugarloaf Wastewater Service District. Both FKAA and County shall perform their respective obligations and responsibilities under the Interlocal Agreement dated September 6, 2005. Attached are a project area map and project description (Exhibit A).

2. EXPENDITURE OF FUNDS. The FKAA shall initially be funded in the amount of Three Million Dollars ($3,000,000.00) for the administration, planning, design and construction of the Project. Thereafter, during the course of the Project, the FKAA may request reimbursement for payments made by FKAA upon submission of documentation of previous expenditures from the Three Million Dollars ($3,000,000.00) until the total amount allocated by the County is exhausted. The FKAA shall submit this documentation to the County Senior Administrator (CSA) for Sewer Projects describing the services performed and stating for which wastewater district/Project the funds were expended. The submission must be in a form satisfactory to the CSA and Clerk of the Circuit Court (Clerk). If the CSA approves the submission, she shall forward the same to the Clerk. If the CSA or the Clerk determine that the submission is unacceptable, either of them shall return it to the FKAA in writing with a written description of the deficiency(ies).

3. FISCAL CONTROLS AND QUARTERLY REPORTS. The FKAA shall establish fiscal controls and fund accounting procedures that comply with generally accepted government accounting principles, satisfactory to the Clerk, in order to assure that the funds provided to the FKAA are spent for the purposes set forth in this Agreement. All FKAA financial records pertaining to this Agreement must be made available, upon request, to the Clerk, an auditor employed by the County or the State of Florida. The records must be retained by the FKAA for five years following the receipt by the FKAA of its last payment pursuant to this Agreement. Any funds transferred by the County to the FKAA under this Agreement that are determined by the Clerk, or an auditor employed by the County or employed by the State to have been spent on a purpose not contemplated by this Agreement must be paid back to the County with interest calculated pursuant to Florida Statute Sec. 55.03(1), from the date the auditor determines the funds were expended for a purpose not authorized by this Agreement. The FKAA agrees to

provide the Clerk with quarterly status reports concerning the expenditure of these funds in sufficient detail to demonstrate compliance with the provisions of this Agreement.

4. RECORDS – ACCESS AND AUDITS. FKAA shall maintain adequate and complete records for a period of five years after termination of this Agreement. The State, the County, their officers, employees, agents and contractors shall have access to FKAA's books, records, and documents related to this Agreement upon request. The access to and inspection of such books, records, and documents by the aforementioned government representatives shall occur at any reasonable time.

5. RELATIONSHIP OF PARTIES. FKAA is, and shall be an independent contractor and not an agent or servant of the County. FKAA shall exercise control, direction, and supervision over the means and manner that its personnel, contractors and volunteers perform the work for the purpose of this Agreement. FKAA shall have no authority whatsoever to act on behalf of or as agent of the County in any promise, Agreement or representation other than specifically provided for in this Agreement. The County shall at no time be legally responsible for any negligence on the part of FKAA, its employees, agents or volunteers resulting in either bodily or personal injury or property damage to any individual, property or corporation.

6. TAXES. FKAA must pay all taxes and assessments, if any, including any sales or use tax, levied by any government agency with respect to FKAA's operations related to this Agreement.

7. INSURANCE.The parties to this Agreement stipulate that each is a state governmental agency as defined by Florida Statutes and represents to the other that it has purchased suitable Public Liability, Vehicle Liability, and Workers' Compensation insurance, or is self-insured, in amounts adequate to respond to any and all claims under federal or state actions for civil rights violations not limited by Florida Statutes Section 768.28 and Chapter 440, as well as any and all claims within the limitations of Florida Statutes Section 768.28 and Chapter 440, arising out of the activities governed by this Agreement.

To the extent allowed by law, each party shall be responsible for any acts of negligence on the part of its employees, agents, contractors, and subcontractors and shall defend, indemnify and hold the other party harmless from all claims arising out of such actions.

FKAA agrees to keep in full force and effect the required insurance coverage during the term of this Agreement. If the insurance policies originally purchased which meet the requirements of this lease are canceled, terminated or reduced in coverage, then FKAA must immediately substitute complying policies so that no gap in coverage occurs. Copies of current policy certificates shall be filed with the County whenever acquired or amended.

8. HOLD HARMLESS. To the extent allowed by law, FKAA is liable for and must fully defend, release, discharge, indemnify and hold harmless the County, the members of the County Commission, County officers and employees, County agents and contractors, and the Sheriff's Office, its officers and employees, from and against any and all claims, demands, causes of action, losses, costs and expenses of whatever type - including investigation and witness costs and expenses and attorneys' fees and costs - that arise out of or are attributable to FKAA's operations in connection with this Agreement except for those claims, demands, damages, liabilities, actions, causes of action, losses, costs and expenses that are the result of the sole negligence of the County. FKAA's purchase of the insurance required under this Agreement does not release or vitiate its obligations under this paragraph. FKAA does not waive any of its

sovereign immunity rights . ıuding but not limited to those express. in Section 768.28, Florida Statutes.

9. NON-DISCRIMINATION. FKAA and County agree that there will be no discrimination against any person, and it is expressly understood that upon a determination by a court of competent jurisdiction that discrimination has occurred, this Agreement automatically terminates without any further action on the part of any party, effective the date of the court order. FKAA and County agree to comply with all Federal and Florida statutes, and all local ordinances, as applicable, relating to nondiscrimination. These include but are not limited to: 1) Title VI of the Civil Rights Act of 1964 (PL 88-352) which prohibits discrimination on the basis of race, color or national origin; 2) Title IX of the Education Amendment of 1972, as amended (20 USC ss. 1681-1683, and 1685-1686), which prohibits discrimination on the basis of sex; 3) Section 504 of the Rehabilitation Act of 1973, as amended (20 USC s. 794), which prohibits discrimination on the basis of handicaps; 4) The Age Discrimination Act of 1975, as amended (42 USC ss. 6101- 6107) which prohibits discrimination on the basis of age; 5) The Drug Abuse Office and Treatment Act of 1972 (PL 92-255), as amended, relating to nondiscrimination on the basis of drug abuse; 6) The Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (PL 91-616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism; 7) The Public Health Service Act of 1912, ss. 523 and 527 (42 USC ss. 690dd-3 and 290ee-3), as amended, relating to confidentiality of alcohol and drug abuse patent records; 8) Title VIII of the Civil Rights Act of 1968 (42 USC s. et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing; 9) The Americans with Disabilities Act of 1990 (42 USC s. 1201 Note), as maybe amended from time to time, relating to nondiscrimination on the basis of disability; 10) Monroe County Code Ch. 13, Art. VI, prohibiting discrimination on the bases of race, color, sex, religion, disability, national origin, ancestry, sexual orientation, gender identity or expression, familial status or age; and 11) any other nondiscrimination provisions in any Federal or state statutes which may apply to the parties to, or the subject matter of, this Agreement.

10. GOVERNING LAW, VENUE, INTERPRETATION, COSTS, AND FEES. This Agreement shall be governed by and construed in accordance with the laws of the State of Florida applicable to contracts made and to be performed entirely in the State. In the event that any cause of action or administrative proceeding is instituted for the enforcement or interpretation of this Agreement, the County and FKAA agree that venue shall lie in the appropriate court or before the appropriate administrative body in Monroe County, Florida. Neither this Agreement nor any of its terms is subject to arbitration. The County and FKAA agree that, in the event of conflicting interpretations of the terms or a term of this Agreement by or between any of them the issue shall be submitted to mediation prior to the institution of any other administrative or legal proceeding. Mediation proceedings initiated and conducted pursuant to this Agreement shall be in accordance with the Florida Rules of Civil Procedure and usual and customary procedures required by the circuit court of Monroe County.

11. SEVERABILITY. If any term, covenant, condition or provision of this Agreement (or the application thereof to any circumstance or person) shall be declared invalid or unenforceable to any extent by a court of competent jurisdiction, the remaining terms, covenants, conditions and provisions of this Agreement, shall not be affected thereby; and each remaining term, covenant, condition and provision of this Agreement shall be valid and shall be enforceable to the fullest extent permitted by law unless the enforcement of the remaining terms, covenants, conditions and provisions of this Agreement would prevent the accomplishment of the original intent of this Agreement. The County and FKAA agree to reform the Agreement to replace any stricken provision with a valid provision that comes as close as possible to the intent of the stricken provision.

12. ATTORNEY'S FEES AND COSTS. The County and FKAA agree that in the event any cause of action or administrative proceeding is initiated or defended by any party relative to the enforcement or interpretation of this Agreement, the prevailing party shall be entitled to reasonable attorney's fees, court costs, investigative, and out-of-pocket expenses, as an award against the non-prevailing party, and shall include attorney's fees, courts costs, investigative, and out-of-pocket expenses in appellate proceedings.

13. BINDING EFFECT. The terms, covenants, conditions, and provisions of this Agreement shall bind and inure to the benefit of the County and FKAA and their respective legal representatives, successors, and assigns.

15. AUTHORITY. Each party represents and warrants to the other that the execution, delivery and performance of this Agreement have been duly authorized by all necessary County and corporate action, as required by law.

16. CLAIMS FOR FEDERAL OR STATE AID. FKAA and County agree that each shall be, and is, empowered to apply for, seek, and obtain federal and state funds to further the purpose of this Agreement; provided that all applications, requests, grant proposals, and funding solicitations shall be approved by each party prior to submission.

17. ADJUDICATION OF DISPUTES OR DISAGREEMENTS. County and FKAA agree that all disputes and disagreements shall be attempted to be resolved by meet and confer sessions between representatives of each of the parties. If no resolution can be agreed upon within 30 days after the first meet and confer session, the issue or issues shall be discussed at a public meeting of the Board of County Commissioners. If the issue or issues are still not resolved to the satisfaction of the parties, then any party shall have the right to seek such relief or remedy as may be provided by this Agreement or by Florida law.

18. COOPERATION. In the event any administrative or legal proceeding is instituted against either party relating to the formation, execution, performance, or breach of this Agreement, County and FKAA agree to participate, to the extent required by the other party, in all proceedings, hearings, processes, meetings, and other activities related to the substance of this Agreement or provision of the services under this Agreement. County and FKAA specifically agree that no party to this Agreement shall be required to enter into any arbitration proceedings related to this Agreement.

19. COVENANT OF NO INTEREST. County and FKAA covenant that neither presently has any interest, and shall not acquire any interest, which would conflict in any manner or degree with its performance under this Agreement, and that only interest of each is to perform and receive benefits as recited in this Agreement.

20. CODE OF ETHICS. County agrees that officers and employees of the County recognize and will be required to comply with the standards of conduct for public officers and employees as delineated in Section 112.313, Florida Statutes, regarding, but not limited to, solicitation or acceptance of gifts; doing business with one's agency; unauthorized compensation; misuse of public position, conflicting employment or contractual relationship; and disclosure or use of certain information.

21. NO SOLICITATION/PAYMENT. The County and FKAA warrant that, in respect to itself, it has neither employed nor retained any company or person, other than a bona fide employee working solely for it, to solicit or secure this Agreement and that it has not paid or

agreed to pay any person, company, corporation, individual, or firm, other than a bona fide employee working solely for it, any fee, commission, percentage, gift, or other consideration contingent upon or resulting from the award or making of this Agreement. For the breach or violation of the provision, the FKAA agrees that the County shall have the right to terminate this Agreement without liability and, at its discretion, to offset from monies owed, or otherwise recover, the full amount of such fee, commission, percentage, gift, or consideration.

22. PUBLIC ACCESS. The County and FKAA shall allow and permit reasonable access to, and inspection of, all documents, papers, letters or other materials in its possession or under its control subject to the provisions of Chapter 119, Florida Statutes, and made or received by the County and FKAA in conjunction with this Agreement; and the County shall have the right to unilaterally cancel this Agreement upon violation of this provision by FKAA.

23. NON-WAIVER OF IMMUNITY. Notwithstanding the provisions of Sec. 786.28, Florida Statutes, the participation of the County and the FKAA in this Agreement and the acquisition of any commercial liability insurance coverage, self-insurance coverage, or local government liability insurance pool coverage shall not be deemed a waiver of immunity to the extent of liability coverage, nor shall any contract entered into by the County or the FKAA be required to contain any provision for waiver.

24. PRIVILEGES AND IMMUNITIES. All of the privileges and immunities from liability, exemptions from laws, ordinances, and rules and pensions and relief, disability, workers' compensation, and other benefits which apply to the activity of officers, agents, or employees of any public agents or employees of the County or the FKAA, when performing their respective functions under this Agreement within the territorial limits of the County shall apply to the same degree and extent to the performance of such functions and duties of such officers, agents, volunteers, or employees outside the territorial limits of the County.

25. LEGAL OBLIGATIONS AND RESPONSIBILITIES. Non-Delegation of Constitutional or Statutory Duties. This Agreement is not intended to, nor shall it be construed as, relieving any participating entity from any obligation or responsibility imposed upon the entity by law except to the extent of actual and timely performance thereof by any participating entity, in which case the performance may be offered in satisfaction of the obligation or responsibility. Further, this Agreement is not intended to, nor shall it be construed as, authorizing the delegation of the constitutional or statutory duties of the County, except to the extent permitted by the Florida constitution, state statute, and case law.

26. NON-RELIANCE BY NON-PARTIES. No person or entity shall be entitled to rely upon the terms, or any of them, of this Agreement to enforce or attempt to enforce any third-party claim or entitlement to or benefit of any service or program contemplated hereunder, and the County and the FKAA agree that neither the County nor the FKAA or any agent, officer, or employee of either shall have the authority to inform, counsel, or otherwise indicate that any particular individual or group of individuals, entity or entities, have entitlements or benefits under this Agreement separate and apart, inferior to, or superior to the community in general or for the purposes contemplated in this Agreement.

27. ATTESTATIONS. FKAA agrees to execute such documents as the County may reasonably require, to include a Public Entity Crime Statement, an Ethics Statement, and a Drug-Free Workplace Statement.

28. NO PERSONAL LIABILITY. No covenant or agreement contained herein shall be deemed to be a covenant or agreement of any member, officer, agent or employee of Monroe

County or the FKAA in his or her individual capacity, and no member, officer, agent or employee of Monroe County or the FKAA shall be liable personally on this Agreement or be subject to any personal liability or accountability by reason of the execution of this Agreement.

29. EXECUTION IN COUNTERPARTS. This Agreement may be executed in any number of counterparts, each of which shall be regarded as an original, all of which taken together shall constitute one and the same instrument and any of the parties hereto may execute this Agreement by singing any such counterpart.

30. SECTION HEADINGS. Section headings have been inserted in this Agreement as a matter of convenience of reference only, and it is agreed that such section headings are not a part of this Agreement and will not be used in the interpretation of any provision of this Agreement.

31. TERMINATION. The County may treat FKAA in default and terminate this Agreement immediately, without prior notice, upon failure of FKAA to comply with any provision related to compliance with all laws, rules and regulations. This Agreement may be terminated by County due to breaches of other provisions of this Agreement if, after written notice of the breach is delivered to FKAA, FKAA does not cure the breach within 7 days following delivery of notice of breach. The County may terminate this Agreement upon giving sixty (60) days prior written notice to FKAA. Any waiver of any breach of covenants herein contained shall not be deemed to be a continuing waiver and shall not operate to bar either party from declaring a forfeiture for any succeeding breach either of the same conditions or covenants or otherwise. Should the Agreement be terminated, County shall pay for reimbursable costs to the effective date of termination. Termination of this Agreement for this project shall have no effect on any other agreement between the County and the FKAA.

32. ASSIGNMENT. FKAA may not assign this Agreement or assign or subcontract any of its obligations under this Agreement without the approval of the County's Board of County Commissioners. All the obligations of this Agreement will extend to and bind the legal representatives, successors and assigns of FKAA and the County.

33. SUBORDINATION. This Agreement is subordinate to the laws and regulations of the United States, the State of Florida, and the County, whether in effect on commencement of this Agreement or adopted after that date.

34. INCONSISTENCY. If any item, condition or obligation of this Agreement is in conflict with other items in this Agreement, the inconsistencies shall be construed so as to give meaning to those terms which limit the County's responsibility and liability.

35. GOVERNING LAWS/VENUE. This Agreement is governed by the laws of the State of Florida and the United States. Venue for any dispute arising under this Agreement must be in Monroe County, Florida. In the event of any litigation, the prevailing party is entitled to a reasonable attorney's fee and costs.

36. ETHICS CLAUSE. FKAA warrants that it has not employed, retained or otherwise had act on its behalf any former County officer or employee subject to the prohibition of Section 2 of ordinance No. 010-1990 or any County officer or employee in violation of Section 3 of Ordinance No. 010-1990. For breach or violation of this provision, the County may, in its discretion, terminate this Agreement without liability and may also, in its discretion, deduct from the Agreement or purchase price, or otherwise recover, the full amount of any fee, commission, percentage, gift or consideration paid to the former County officer or employee.

37. CONSTRUCTION. This Agreement has been carefully reviewed by FKAA and County. Therefore, this Agreement is not to be construed against any party on the basis of authorship.

38. NOTICES. Notices in this Agreement, unless otherwise specified, must be sent by certified mail to the following:

COUNTY:
County Administrator
1100 Simonton Street
Key West, FL 33040

FKAA
Executive Director
1100 Kennedy Drive
Key West, FL 33040

39. FULL UNDERSTANDING. This Agreement is the parties' final mutual understanding. It replaces any earlier agreements or understandings, whether written or oral. This Agreement cannot be modified or replaced except by another written and signed agreement.

40. ANNUAL APPROPRIATION: Funding by County is subject to an annual appropriation by the Board of County Commissioners.

IN WITNESS WHEREOF, the parties hereto have set their hands and seals the day and year first above written.

(SEAL)
Danny L. Kolhage, Clerk

By: _____
Deputy Clerk

BOARD OF COUNTY COMMISSIONERS
OF MONROE COUNTY, FLORIDA

By: _____
Mayor/Chairperson

FLORIDA KEYS AQUEDUCT AUTHORITY

ATTEST:

By: _____
Clerk

By: _____
~~Chairman~~ Executive Director

FKAA Board Approved September 21, 2006

MONROE COUNTY ATTORNEY
APPROVED AS TO FORM:
SUZANNE A. HUTTON
COUNTY ATTORNEY
Date 9/15/06

EXHIBIT "A"

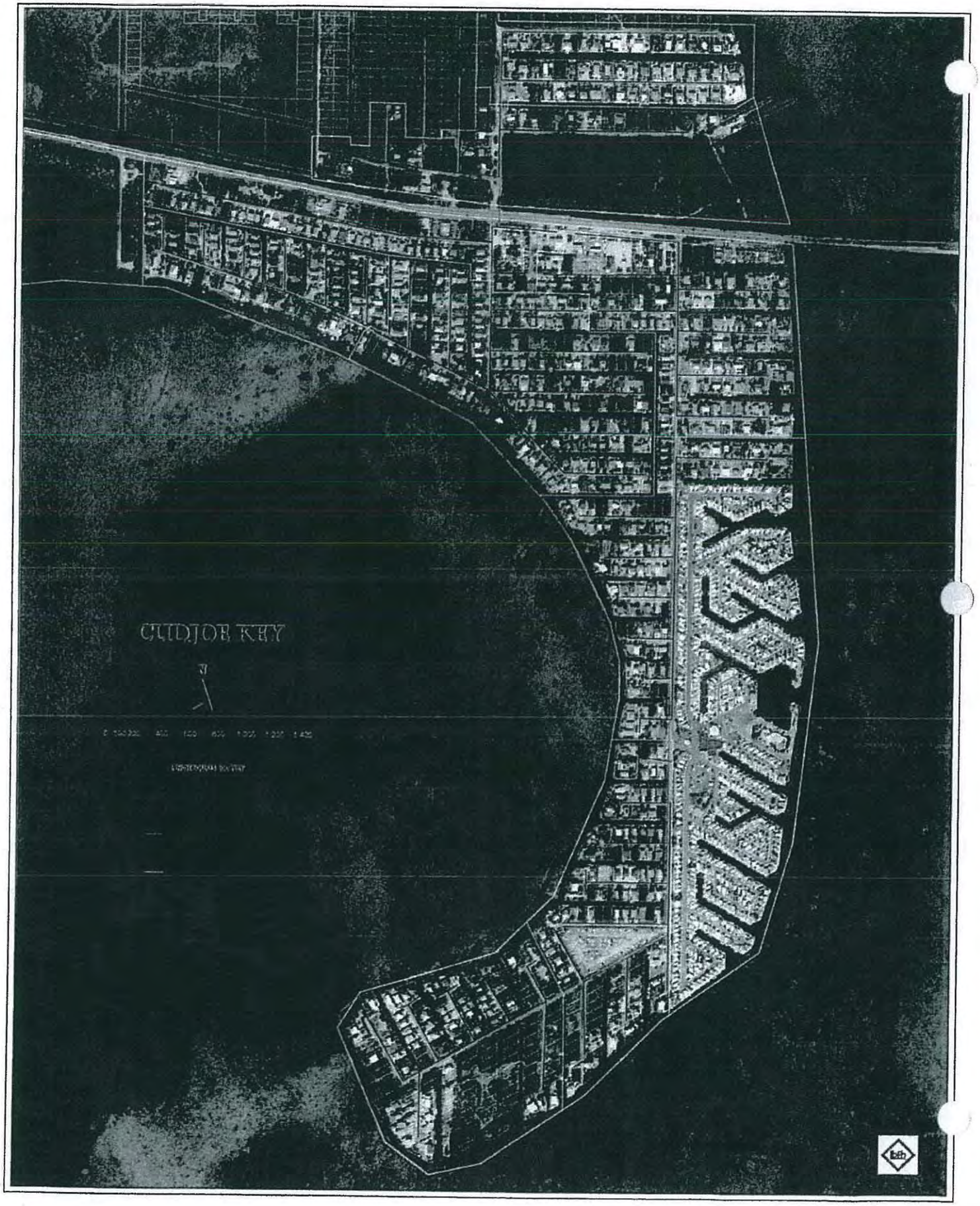
PROJECT DESCRIPTION

SUMMERLAND/CUDJOE/UPPER SUGARLOAF REGIONAL WASTEWATER SYSTEM

Gravity wastewater collection and transmission system to serve Summerland Key/Cudjoe Key/Upper Sugarloaf. New wastewater treatment plant at the Cudjoe Key Transfer Station to treat flows to meet advanced wastewater treatment standards.

See ATTACHED PROJECT AREA MAP

GUDJOE KEY
N


CUDJOE KEY
N

SUMMERLAND KEY

INTERLOCAL AGREEMENT
AMENDMENT
FOR THE
SUMMERLAND/CUDJOE/UPPER SUGARLOAF REGIONAL WASTEWATER SYSTEM
TO BE EXPANDED TO COVER DESIGN FOR
BIG PINE KEY THROUGH RAMROD KEY AND LOWER SUGARLOAF

THIS AMENDMENT TO INTERLOCAL AGREEMENT is entered into pursuant to Sec. 163.01, FS, by and between Monroe County, a political subdivision of the State of Florida, (County), and the Florida Keys Aqueduct Authority, Inc., an independent special district, (FKAA).

WHEREAS, on September 20, 2006, the parties entered into an inter-local agreement (ILA) for the purpose of funding the costs associated with the administration, planning and development of a regional wastewater project; and

WHEREAS, the timing, costs of construction and operation of the system, permitting and land acquisition issues, and funding availability contemplated for this project and future projects to be conducted by the parties pursuant to a September 6, 2005 ILA and September 2005 Master Lease have been impacted by a variety of factors during the interim; and

WHEREAS, it is estimated that the acquisition of land and permitting for a treatment plant on Big Pine Key may exacerbate delays in completing a project for that area; and

WHEREAS, combining three proposed regional systems into one is expected to produce over $11,000,000 in savings for capital costs as well as produce more cost-effective operations after the required connections are made thereto; and

WHEREAS, it is anticipated that obtaining a design to incorporate Big Pine, Ramrod and Lower Sugarloaf with the Summerland/Cudjoe/Upper Sugarloaf Regional Wastewater System will provide sufficient cost savings information with which to make the final determination to build one regional plant, which would be a subject of another amendment to this ILA; now, therefore

IN CONSIDERATION of the mutual consideration and promises set forth below, the parties agree as follows:

1. Paragraph 1, County Funding, of the ILA dated September 20, 2006, for the Summerland/Cudjoe/Upper Sugarloaf Regional Wastewater System shall be amended by adding the following sentences:

> The County shall appropriate from any lawfully available source, a sum not to exceed $4,500,000 for the design to add to the Summerland/Cudjoe/Upper Sugarloaf Regional Wastewater System necessary collection systems to accommodate from Big Pine Key to Lower Sugarloaf, to be paid to the FKAA. These funds are additional to the dollars set forth in the original inter-local agreement dated September 20, 2006. The amount of the funding may be changed by written amendment to this Agreement approved by the parties.

2. Paragraph 2, Project, Paragraph 1, County Funding, of the ILA dated September 20, 2006, for the Summerland/Cudjoe/Upper Sugarloaf Regional Wastewater System shall be amended by adding the following sentences:

The Project shall include design and cost estimates to expand the Summerland/Cudjoe/Upper Sugarloaf Regional Wastewater System to encompass Big Pine Key through Lower Sugarloaf. The Parties will amend the original ILA dated September 20, 2006, to include planning and construction of those components of the expanded design to be incorporated into the Final Project.

3. Paragraph 2, Expenditure of Funds, of the ILA dated September 20, 2006, shall be re-numbered to Paragraph 3.

4. The numbers of all remaining paragraphs of the ILA dated September 20, 2006, shall be amended to run consecutively from the paragraph above.

5. All other provisions of the ILA dated September 20, 2006, for the Summerland/Cudjoe/Upper Sugarloaf Regional Wastewater System, not inconsistent herewith shall remain in full force and effect.

6. This Agreement will take effect on the 16th day of April, 2008.

IN WITNESS WHEREOF, the parties hereto have set their hands and seals the day and year first above written.

FLORIDA KEYS AQUEDUCT AUTHORITY
KEY WEST, FLORIDA

BY: _____
James C. Reynolds, Executive Director

5/8/08
DATE

ATTEST:

BY: _____
5/8/08
DATE

APPROVED AS TO FORM

BY: _____
Kirk C. Zuelch
FKAA General Counsel
Date: _____

BOARD OF COUNTY COMMISSIONERS
OF MONROE COUNTY, FLORIDA

BY: _____
Mayor Charles "Sonny" McCoy

APR 1 6 2008
DATE

ATTEST:
DANNY L. KOLHAGE, CLERK
BY: _____

APR 1 6 2008
DATE

APPROVED AS TO FORM

BY: _____
Suzanne A. Hutton
County Attorney
Date: 4/4/08

2008 MAY 14 AM 11:07
DANNY L. KOLHAGE
CLERK
MONROE COUNTY, FLA.
FILED FOR RECORD

FKAA Board Approved April 24, 2008

INTERLOCAL AGREEMENT
AMENDMENT
FOR THE
SUMMERLAND/CUDJOE/UPPER SUGARLOAF REGIONAL WASTEWATER SYSTEM
TO BE EXPANDED TO COVER DESIGN FOR
BIG PINE KEY THROUGH RAMROD KEY AND LOWER SUGARLOAF

THIS AMENDMENT TO INTERLOCAL AGREEMENT is entered into pursuant to Sec. 163.01, FS, by and between Monroe County, a political subdivision of the State of Florida, (County), and the Florida Keys Aqueduct Authority, Inc., an independent special district, (FKAA).

WHEREAS, on September 20, 2006, the parties entered into an inter-local agreement (ILA) for the purpose of funding the costs associated with the administration, planning and development of a regional wastewater project; and

WHEREAS, the timing, costs of construction and operation of the system, permitting and land acquisition issues, and funding availability contemplated for this project and future projects to be conducted by the parties pursuant to a September 6, 2005 ILA and September 2005 Master Lease have been impacted by a variety of factors during the interim; and

WHEREAS, it is estimated that the acquisition of land and permitting for a treatment plant on Big Pine Key may exacerbate delays in completing a project for that area; and

WHEREAS, combining three proposed regional systems into one is expected to produce over $11,000,000 in savings for capital costs as well as produce more cost-effective operations after the required connections are made thereto; and

WHEREAS, it is anticipated that obtaining a design to incorporate Big Pine, Ramrod and Lower Sugarloaf with the Summerland/Cudjoe/Upper Sugarloaf Regional Wastewater System will provide sufficient cost savings information with which to make the final determination to build one regional plant, which would be a subject of another amendment to this ILA; now, therefore

IN CONSIDERATION of the mutual consideration and promises set forth below, the parties agree as follows:

1. Paragraph 1, County Funding, of the ILA dated September 20, 2006, for the Summerland/Cudjoe/Upper Sugarloaf Regional Wastewater System shall be amended by adding the following sentences:

> The County shall appropriate from any lawfully available source, a sum not to exceed $4,500,000 for the design to add to the Summerland/Cudjoe/Upper Sugarloaf Regional Wastewater System necessary collection systems to accommodate from Big Pine Key to Lower Sugarloaf, to be paid to the FKAA. These funds are additional to the dollars set forth in the original inter-local agreement dated September 20, 2006. The amount of the funding may be changed by written amendment to this Agreement approved by the parties.

2. Paragraph 2, Project, Paragraph 1, County Funding, of the ILA dated September 20, 2006, for the Summerland/Cudjoe/Upper Sugarloaf Regional Wastewater System shall be amended by adding the following sentences:

The Project shall include design and cost estimates to expand the Summerland/Cudjoe/Upper Sugarloaf Regional Wastewater System to encompass Big Pine Key through Lower Sugarloaf. The Parties will amend the original ILA dated September 20, 2006, to include planning and construction of those components of the expanded design to be incorporated into the Final Project.

3. Paragraph 2, Expenditure of Funds, of the ILA dated September 20, 2006, shall be re-numbered to Paragraph 3.

4. The numbers of all remaining paragraphs of the ILA dated September 20, 2006, shall be amended to run consecutively from the paragraph above.

5. All other provisions of the ILA dated September 20, 2006, for the Summerland/Cudjoe/Upper Sugarloaf Regional Wastewater System, not inconsistent herewith shall remain in full force and effect.

6. This Agreement will take effect on the 16th day of April, 2008.

IN WITNESS WHEREOF, the parties hereto have set their hands and seals the day and year first above written.

FLORIDA KEYS AQUEDUCT AUTHORITY
KEY WEST, FLORIDA

BY: _____
James C. Reynolds, Executive Director

5/8/08
DATE

ATTEST:

BY: _____
5/8/08
DATE

APPROVED AS TO FORM

BY: _____
Kirk C. Zuelch
FKAA General Counsel
Date: _____

BOARD OF COUNTY COMMISSIONERS
OF MONROE COUNTY, FLORIDA

BY: _____
Mayor Charles "Sonny" McCoy

APR 1 6 2008
DATE

ATTEST:
DANNY L. KOLHAGE, CLERK
BY: _____

APR 1 6 2008
DATE

APPROVED AS TO FORM

BY: _____
Suzanne A. Hutton
County Attorney
Date: 4/4/08

2008 MAY 14 AM 11:07
DANNY L. KOLHAGE
CLERK CIR. CT.
MONROE CNTY, FLA.
FILED FOR RECORD

FKAA Board Approved April 24, 2008

INTERLOCAL AGREEMENT
SECOND AMENDMENT
FOR THE
(EXPANDED) CUDJOE REGIONAL WASTEWATER SYSTEM
INCLUDING
BIG PINE KEY, RAMROD KEY, SUMMERLAND KEY, CUDJOE KEY,
THE TORCH KEYS (LITTLE, MIDDLE AND BIG), AND
UPPER AND LOWER SUGARLOAF KEYS

THIS AMENDMENT TO INTERLOCAL AGREEMENT is entered into the 3rd day of August, 2009, pursuant to Sec. 163.01, FS, by and between Monroe County, a political subdivision of the State of Florida, (County), and the Florida Keys Aqueduct Authority, Inc., an independent special district, (FKAA).

WHEREAS, on September 20, 2006, the parties entered into an interlocal agreement (ILA) for the purpose of funding the costs associated with the administration, planning and development of a regional wastewater project; and

WHEREAS, on April 16, 2008 the County approved an amendment to the ILA to expand the areas encompassed in the Cudjoe Regional wastewater System, which amendment was approved by FKAA on April 24, 2008; and

WHEREAS, it has been determined that there are a high proportion of properties in the area of the Cudjoe Regional Wastewater System which are not slated for centralized sewer but which will have to upgrade their onsite sewage treatment and disposal systems (OSTDS) at a similar per EDU cost as the centralized system; and

WHEREAS, it has been determined that it is equitable to include the OSTDS in the Cudjoe Regional area in the overall project to enable the FKAA to enter into installation and maintenance agreements and to allow the same degree of subsidization to those costly projects which are on a par with centralized system EDU costs; now, therefore

IN CONSIDERATION of the mutual consideration and promises set forth below, the parties agree as follows:

1. Paragraph 2, Project, of the Inter-local Agreement (ILA) dated September 20, 2006, for the Summerland/Cudjoe/Upper Sugarloaf Regional Wastewater System, as previously amended on April 16, 2008, shall be amended as follows:

> The Project shall be called the Cudjoe Regional Wastewater System and consist of centralized collection systems, transmission mains and method of treatment to Advanced Wastewater Treatment standards sufficient to serve the needs of the residents and businesses included for centralized systems in the Master Wastewater Plan in the Wastewater Service Districts from Big Pine Key through Lower Sugarloaf Key, and Onsite Sewage Treatment And Disposal Systems for which owners of properties not in the Master Plan but located in the Cudjoe Regional area from No Name Key through Lower Sugarloaf Key, plus Boca

Chica Key parcels identified as RE# 122880-000000, 122890-000000, and 122870-000000, contract with FKAA for installation and maintenance. The Project may be developed in phases in accordance with availability of funding. Both FKAA and County shall perform their respective obligations under the interlocal agreement dated September 6, 2005.

2. All other provisions of the ILA dated September 20, 2006, for the Summerland/Cudjoe/Upper Sugarloaf Regional Wastewater System, as previously amended, not inconsistent herewith shall remain in full force and effect.

3. This Agreement will take effect on the 3rd day of August, 2009.

IN WITNESS WHEREOF, the parties hereto have set their hands and seals the day and year first above written.

FLORIDA KEYS AQUEDUCT AUTHORITY
KEY WEST, FLORIDA

BY: _____
James C. Reynolds, Executive Director

5/14/10
DATE

ATTEST:

BY: Elvira Lopez

5/14/10
DATE

APPROVED AS TO FORM AND LEGAL SUFFICIENCY

BY: _____
Kirk C. Zuelch
FKAA General Counsel

ATTEST:

BY: Janet Coley

BOARD OF COUNTY COMMISSIONERS OF MONROE COUNTY, FLORIDA

BY: Sylvia J. Murphy
Mayor Sylvia J. Murphy

AUG 3 2009
DATE

ATTEST:
DANNY L. KOLHAGE, CLERK

BY: Pamela Hancock D.C.

AUG 3 2009
DATE

APPROVED AS TO FORM

BY: _____
Suzanne A. Hutton
County Attorney

Date: 7/22/09

APPENDIX B

NOTICE OF NEIGHBORHOOD WASTEWATER MEETING FLORIDA KEYS AQUEDUCT AUTHORITY

OPEN TO THE PUBLIC

MONDAY, DECEMBER 8, 2008
6:30 p.m.

VINEYARD COMMUNITY CHURCH
100 COUNTY ROAD
BIG PINE KEY, FL 33043

THURSDAY, DECEMBER 11, 2008
6:30 p.m.

SUGARLOAF SCHOOL CAFETERIA
255 CRANE BOULEVARD
SUMMERLAND KEY, FL 33042

The Florida Keys Aqueduct Authority will conduct Neighborhood Meetings for the purpose of presenting the Master Plan Update for the Cudjoe Regional System and to receive/respond to additional public comments. This meeting is open to the public. For additional information, please contact Kathryn Ovide at 295-2202 or Kovide@fkaa.com.

KWC December 7, 2008

296655

LOWER KEYS
WASTEWATER MASTER PLAN UPDATE
Neighborhood Meeting

PURPOSE

To update residents regarding project status and discuss extent of the Regional System

LOWER KEYS WASTEWATER MASTER PLAN UPDATE – TEAM MEMBERS

- Jim Reynolds – FKAA Executive Director
- Tom Walker – FKAA Director of Engineering
- Don Hubbs – FKAA Project Manager
- Ray Shimokubo – FKAA Senior Technical Manager
- Colleen Tagle – FKAA Public Information Director
- Julie Cheon – FKAA Environmental Specialist

LOWER KEYS WASTEWATER MASTER PLAN UPDATE – TEAM MEMBERS

- Roman Gastesi – Monroe County Administrator
- Dave Koppel – County Engineer
- Judy Clarke – Assistant County Engineer
- Liz Wood – County Wastewater Administrator

- Bob Eadie – Director of Health Dept, Monroe County
- Gus Rios – FDEP Environmental Administrator

Florida Keys Aqueduct Authority

LOWER KEYS
WASTEWATER MASTER PLAN UPDATE

-FKAA AREA-

December 2008

Workshop

Workshop Outline

Lower Keys Master Plan Update

- Collection System alternative analysis
  - Gravity sewers
  - Vacuum sewers
  - Low pressure system
  - STEP (septic tank effluent pumping) system
- Evaluation of on-site systems
- Evaluation of expanding central sewer system into existing cold spot areas

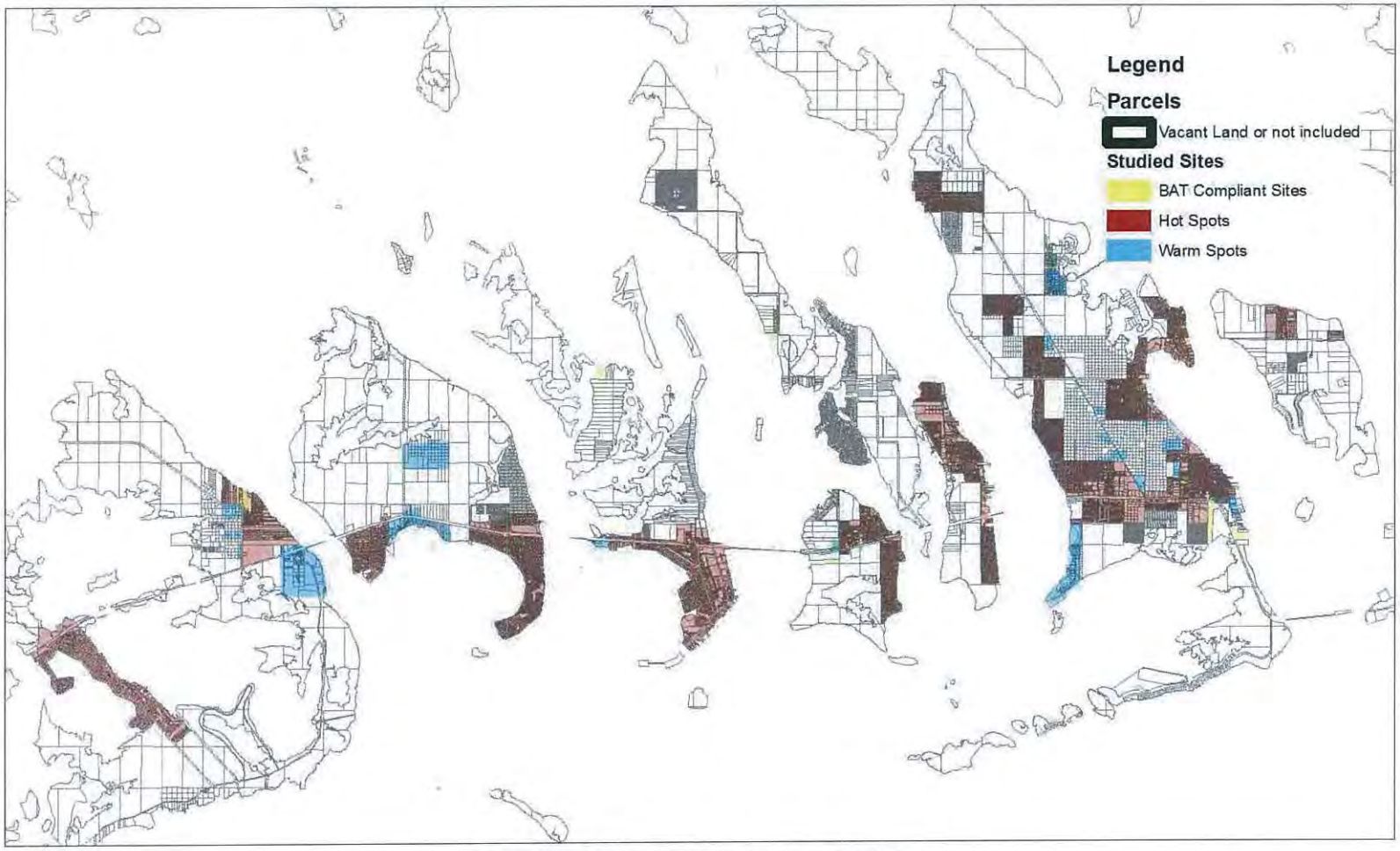
Cudjoe Regional System

On-site System Partnership with County and DOH

Objectives

- Provide Cost-effective and Reliable Option to Complete Wastewater Program
- Provide Central Service to the Maximum Number of Residents and Businesses within Feasible Economics
- Provide residents assistance with DOH approved on-site systems

Master Plan Service Area



Lower Keys Regional Sewer System Study Area

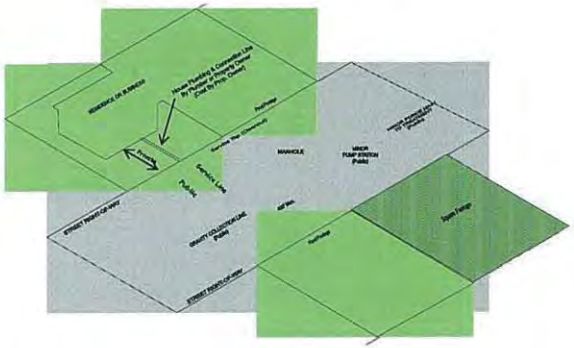
Collection System Alternative Analysis

Alternative Systems Under Consideration

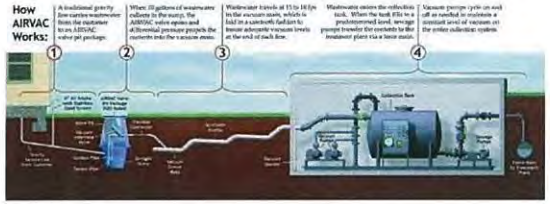
- Gravity sewers
- Vacuum sewers
- Low pressure system
- STEP (septic tank effluent pumping) system

What is a:

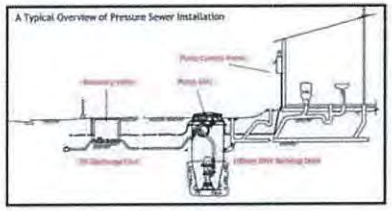
Gravity Sewer System?



Vacuum Sewer System?



Low-Pressure Sewer System?

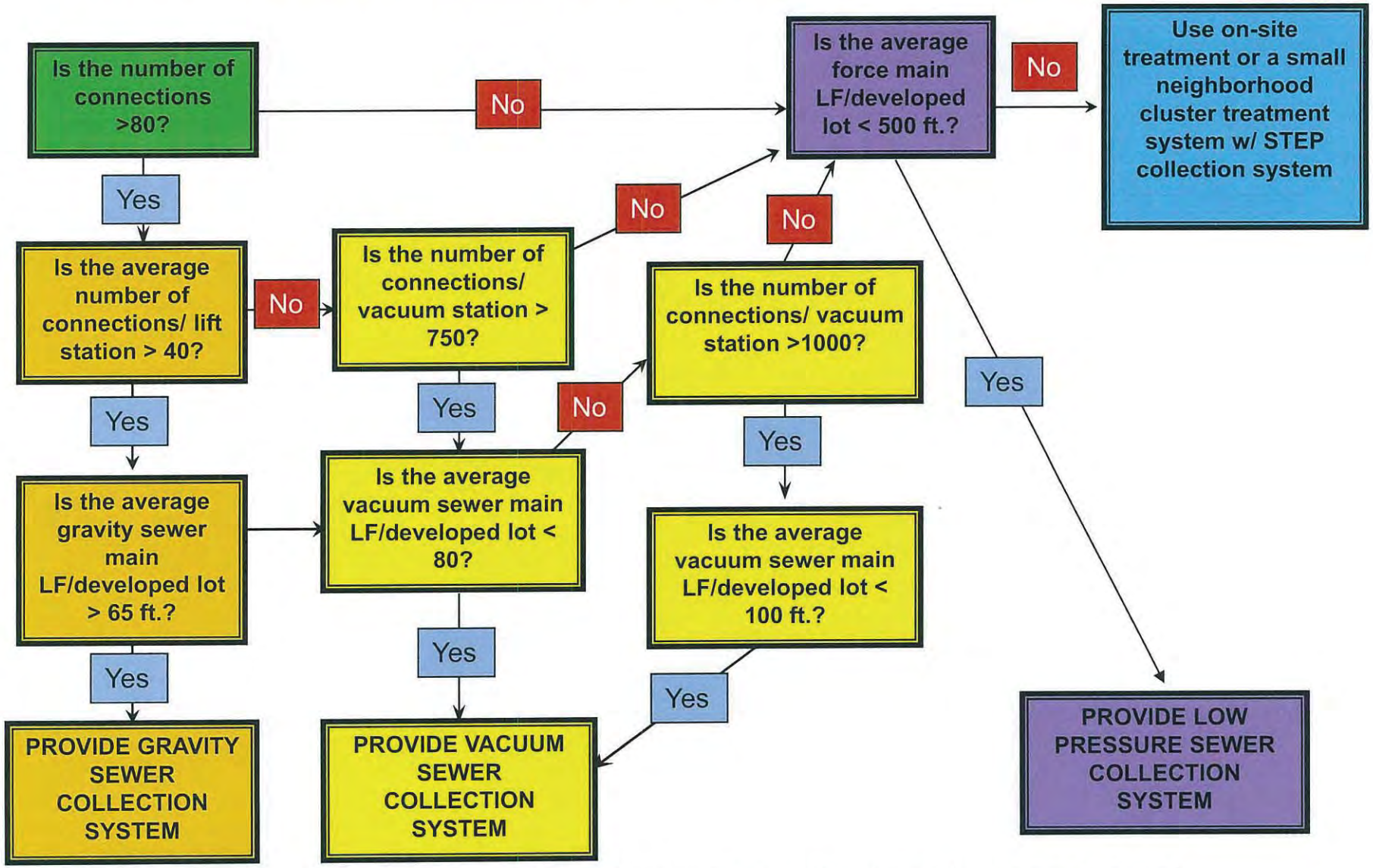


Septic Tank Effluent Pump (STEP) System?

Comparison of Collection Systems Within Lower Keys

System	Reliability	Life Cycle Costs	Construction Issues	O&M Issues	Private Property Issues
Gravity	High	Average	Average	Low	Low
Low Pressure	Average	Average	Low	Average	Average
Vacuum	Average	Average	Average	Average	Average
STEP	Average	High	Average	High	High

Wastewater Collection System Decision Tree



Note: The maximum average linear feet of force main per developed lot was calculated based on a life cycle cost of $36,000 for an on-site OWNRS treatment system.

Recommended Option - Hybrid Alternatives

- Conventional Gravity Systems in Higher Density Areas
- Low Pressure Systems in Lower Density Areas
- OWNRS for Homes in Outer Reaches - Not Cost effective for Central Sewer Systems

DEVELOPMENT OF ON-SITE WASTEWATER NUTRIENT REMOVAL SYSTEMS (OWNRS) BEST AVAILABLE TECHNOLOGY (BAT)

FKAA was tasked to develop approximate costs to retrofit a typical household to become 2010 Compliant.

NEW BAT AEROBIC INSTALLATION

10,10,10,1 Standards

PHOSPHORUS REMOVAL PROCESS TANK INSTALLATION

Being filled with LECA (light expanded clay aggregate) media

Ready for phosphorus treatment

On-Site Cost SUMMARY

Average Estimated Costs for "typical" OWNRS

- Capital cost of about $22,000
- Annual operating costs expected at about $2,200
- 20 year life cycle cost ranged widely but expected to average about $36,000 per household.

These values are expected to vary widely depending on complexity of installation.

Increasing Central System Boundary

Creating "warm" areas out of "cold" areas.

- To reduce number of on-site systems
- To connect more homes to central sewer system for higher level treatment

Method of Analysis

Compare costs

- Sewer connection cost to on-site system cost

Consider other benefits

- More nutrient reduction
- Larger customer base
- Frees up space in yards

Increasing Central System Boundary

- Reach out into cold spots to determine potential added connections
  - Approximately 500 LF for single connection
  - Template for adding additional units laid upon aerial maps with existing homes
  - Potential for hooking additional 200-300 cold spot units

Focused Master Planning Service Area

Current "Hot Spot" Area

- About 10,000 equivalent dwelling units

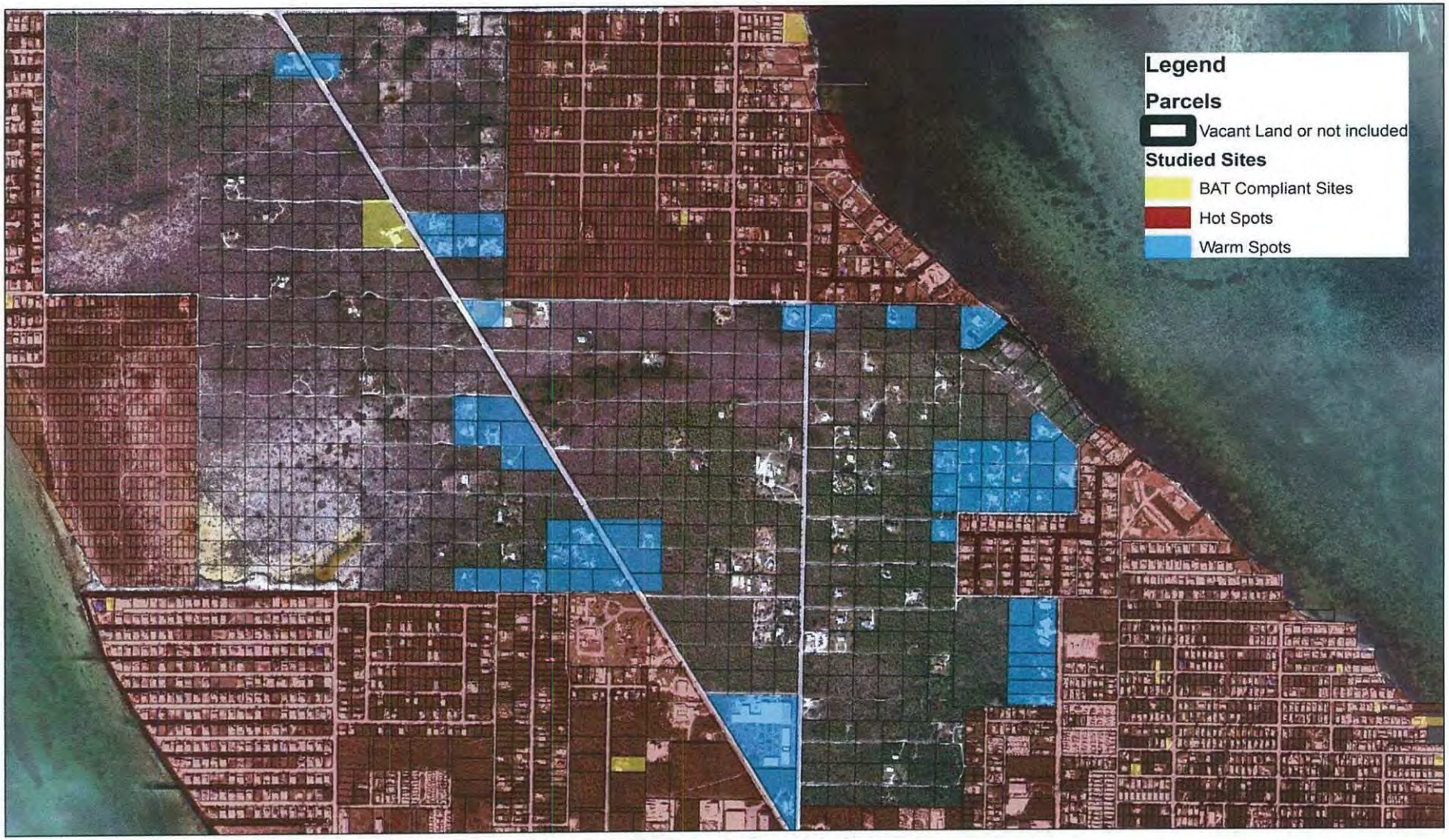
Current "Cold Spot" Areas

- 540 buildings

Lower Keys Regional Sewer System Study Area

Cold and Warm Spot Areas

Cold and Warm Spot Areas



Middle Big Pine Key

Cold and Warm Spot Areas-UPPER SUGARLOAF

Upper Sugarloaf

Cudjoe Regional Wastewater System

AWT Plant on North Cudjoe Key

- Existing Landfill Site
- Collect /Pump Flows from North and South Islands
- Reclaimed Water Provisions

SCHEDULE AND COSTS

ESTIMATED COST TO COMPLETE

1) Lower Sugarloaf Key--	$ 18 million
2) Cudjoe Regional Service Area (Central Keys)--	$ 44 million
3) Big Pine Regional Service Area (North Lower Keys)--	$ 80 million
4) Treatment Facility and Master Stations	$ 32 million
5) On-site system conversion	$ 20 million
GRAND TOTAL	**$ 194 million**

CUDJOE REGIONAL FACILITY IMPLEMENTATION SCHEDULE

- Transmission System Design and Construction
- Collection System Design and Construction
- Treatment Plant Design
- Treatment Plant Construction

Substantial completion expected during the second half of 2011 (Dependent on Funding)

BOCC / DOH / FKAA Partnership

To address remaining on-site systems

- County and DOH to regulate and enforce administrative codes
- County to handle assessment program
- FKAA to design/construct/operate/own

Allow for opt in or out provisions

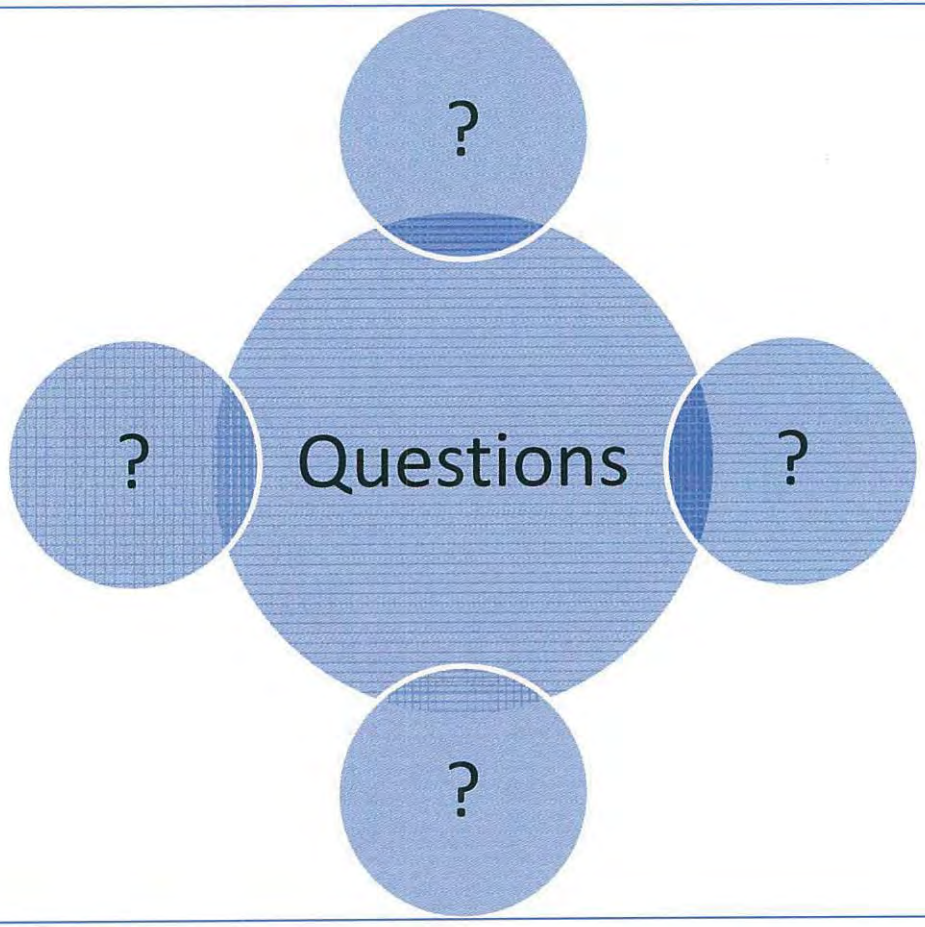
State funding for equity and service

Equity for assessments– consistent monthly O&M costs

PROGRAM ACTION

- BOCC Consensus with Master Plan Update
  - Modify Service Area Boundaries
  - Confirm Collection System Hybrid Options
- Determine Project Funding
- Begin Final Designs for Lower Keys Service Area
  - Ready for Bidding in Summer/Fall 2009
- Implement On-Site System Program
  - Interagency Agreement
  - Develop List of Interested Residents

Lower Keys
Wastewater Master Plan Update



Property Owner Responsibilities

- **Municipal Service Taxing Unit (MSTU)**
  - Provides design and development funding
- **System Development Charge**
  - for your share of the project's capital costs
    - Based on Equivalent Dwelling Units (EDUs)
    - Payable either in full or over 20 years through a non ad valorem assessment on your annual tax bill
- **Cost of installing lateral and decommissioning the septic tank**
- **Monthly user charge for operation of the system**

Lateral Installation Costs

- **Permits**
  - Septic/Cesspit Abandonment (DOH) $50
  - Lateral Installation Permit (County) $66

- **Plumber Installation**
  - Varies depending on the length of the run and obstacles encountered
  - Past experience indicates costs between $1,500 & $5,000

- **Owner/Builder Option**
  - Property owners that live in the residential dwelling may be allowed to complete their own lateral installation
  - Consult with Monroe County Building Department

Cold Spot On-Site System Options

Proposed FKAA On-Site Program

- Determine whether to opt in or opt out

- If you opt in
  - -Enter into an easement agreement with FKAA
  - -Pay assessment and monthly bill

- If you opt out
  - -Hire engineer to design & contractor to install on-site system
  - -Obtain all necessary permits
  - -Contract with operator to perform required annual inspections
  - -Service & maintain system to meet DOH requirements
  - -All costs borne by property owner

APPENDIX C

Florida Keys Aqueduct Authority

Post Office Box 1239
1100 Kennedy Drive
Key West, Florida 33041-1239
Telephone (305) 296-2454
www.fkaa.com

J. Robert Dean
Chairman
Key West

Mary L. Rice
Vice-Chairman
Marathon

Elena Z. Herrera
Secretary/Treasurer
Rockland Key

Rose M. Dell
Big Pine Key

David C. Ritz
Key Largo

James C. Reynolds
Executive Director

March 5, 2008

David S. Koppel, PE, County Engineer
1100 Simonton Street, Suite 2 -216
Key West, FL 33040

RE: Wastewater Master Plan Alternatives' Review

Dear Mr. Koppel:

FKAA received your letter dated February 6, 2008 requesting an evaluation of the possibility of connecting all wastewater areas from Lower Sugarloaf Key through Big Pine Key to a central WWTP located on Cudjoe Key.

Your letter also referenced wastewater service for the south end of Long Key, including Outdoor Resorts (ODR), and potential cost savings associated with maintaining the ODR treatment facility in operation.

Upon receiving your request for this evaluation, FKAA developed order-of-magnitude cost estimates for these alternatives.

Lower Sugarloaf to Big Pine

Attachment A is a Technical Memorandum (by CH2M Hill) providing a cost comparison of the expanded service area alternative versus the Master Plan provision of three separate systems. As determined in this cost analysis, the expanded Lower Keys option is estimated to provide service at lower capital and operating costs. However, when the entire collection and treatment system is considered, the net differences in estimated costs are 6% capital and 13 % Present Worth (20-yr, 6% I), as herein summarized:

Cost Item	Master Plan Option -3 Systems	Alternative Plan –Single System
Total Capital Cost	$187 million	$176 million 11
Present Worth (20-Yr)	$230 million	$204 million 26

In addition to the estimated cost savings, the combined system has the added benefits of:

- Having existing County property adjacent to the Cudjoe landfill for the treatment plant; assuming a minimum of 2 acres is still available for the expanded plant. Obtaining and permitting two additional treatment plant sites would be time-consuming and possibly contentious.
- Operating one AWT system for this service area instead of three. The added complexities of operating AWT systems and the limited pool of operational staff available in the Keys makes the one plant option a more reliable choice.

Long Key

Regarding the approach to serve the lower reaches of Long Key, FKAA has reviewed recent studies provided by Outdoor Resorts (ODR) for possible upgrade of its existing treatment plant to meet BAT standards. Questions were submitted by FKAA to ODR regarding their plans, yet no responses have been provided for our review of feasibility.

In addition, FKAA has conducted a brief analysis of treating flows from lower Long Key at the Layton WWTP; inclusive of ODR. Based on this analysis, capital costs in the range of $4 to 5 million are estimated to build a collection system, force main and treatment expansion to handle this additional service area. This option is technically feasible and environmentally sound.

We remain open to further input from Monroe County and stakeholders. We look forward to further discussing these issues with you, and should you need any further information please do not hesitate to call.

Sincerely,

Thomas G. Walker, PE, BCEE
Director of Engineering

cc: Monroe County Commissioners
Debbie Fredericks, Acting County Administrator
Andrew Trivette, Division Director/Growth Management
Judy Clarke, Assistant County Engineer
Liz Wood, Senior Administrator.-Sewer Projects
Jim Reynolds, Kirk Zuelch, Donald Hubbs, Ray Shimokubo, FKAA

Attachment

APPENDIX D

Letter Report

- Final -

Florida Keys Aqueduct Authority

Central Cudjoe Regional Wastewater Collection System

Analysis of Alternative Wastewater
Collection Systems (Task 3.2)

February 2009

MATHEWS CONSULTING INC.
Civil and Environmental Engineers
www.mathewsconsultinginc.com

Table of Contents

SECTION

1.0 Introduction

2.0 Alternative Wastewater Collection Systems

3.0 Study Area – Upper Sugarloaf Key

4.0 Study Area – Cudjoe Key

5.0 Study Area – Summerland Key

6.0 Wastewater Collection System Decision Analysis

7.0 Conclusions

8.0 Works Cited

LIST OF FIGURES

1-1 Service Area

2-1 Gravity Collection System
2-2 STEP Collection System
2-3 Typical STEP Installation
2-4 Low Pressure Collection System
2-5 Vacuum Collection System

3-1 Upper Sugarloaf Key Preliminary LPS Collection System Layout
3-2 Upper Sugarloaf Key Preliminary STEP Collection System Layout
3-3 Upper Sugarloaf Key Preliminary Vacuum Collection System Layout
3-4 Upper Sugarloaf Key Preliminary Gravity Collection System Layout

4-1 Cudjoe Key Preliminary LPS Collection System Layout
4-2 Cudjoe Key Preliminary STEP Collection System Layout
4-3 Cudjoe Key Preliminary Vacuum Collection System Layout
4-4 Cudjoe Key Preliminary Gravity Collection System Layout

5-1 Summerland Key Preliminary LPS Collection System Layout
5-2 Summerland Key Preliminary STEP Collection System Layout
5-3 Summerland Key Preliminary Vacuum Collection System Layout
5-4 Summerland Key Preliminary Gravity Collection System Layout

6-1 Wastewater Collection System Decision Tree

7-1 Project Schedule

APPENDIX

A "Development of On-Site Wastewater Nutrient Removal Systems (OWNRS) Lifecycle Costs Using Best Available Technology (BAT)", FKAA – January 2009

B "FDEP Form 62-604.300(8)(a) Wastewater Collection/Transmission System Permit"

C DEP Rule Chapter 62-604, F.A.C. "Collection Systems and Transmission Facilities"

D Monroe County/FDEP/FKAA Meeting Minutes for Sugar Pine Wastewater Project (July 7, 2008)

Section 1

Introduction

1.0 Introduction

Recognizing that the economic health of Monroe County and its municipalities relies largely on the environmental health of a unique marine ecosystem, the County's Year 2010 Comprehensive Plan mandated that nutrient loading levels be reduced in the marine ecosystem of the Florida Keys. In June of 2000, the "*Sanitary Wastewater Master Plan*" (Master Plan) was finalized with a firm objective of eliminating approximately 23,000 private on-site septic systems by July 2010. Through interlocal agreement, Monroe County has requested that the Florida Keys Aqueduct Authority (FKAA) design, build, and operate County-owned infrastructure on behalf of the citizens in the Master Plans prescribed service areas.

The Master Plan identified Cudjoe Key/Summerland Key as a target service area for this effort. With the assistance of one of its wastewater consultants (CH2M HILL), FKAA completed a Preliminary Design Report (PDR), entitled "Cudjoe Wastewater Collection and Transmission System Project" in August 2008.

In early 2008, County staff requested that the FKAA consider a change in the Master Plan to expand the service area to include the entire area between Sugarloaf Key and Big Pine Key. This change represented a dramatic enlargement of the original Cudjoe Key/Summerland Key service area. A PDR update completed on February 28, 2008 indicated a potential cost savings should the newly expanded service area prove serviceable, and in May 2008, an interlocal agreement amendment allowed for the procurement of professional engineering services necessary to implement the goals of the Master Plan.

On behalf of Monroe County, the Florida Keys Aqueduct Authority will design, permit and construct wastewater projects for the Cudjoe Regional Wastewater Service Area, which encompasses the Lower Sugarloaf Key Community Service Area, the Central Cudjoe Key Regional Service Area (Upper Sugarloaf Key, Cudjoe Key and Summerland Key) and the Big Pine Regional Service Area (Ramrod Key, Little Torch Key and Big Pine Key). The proposed plan is to provide a wastewater collection/transmission system and a wastewater treatment plant (WWTP) to serve these areas. The goal will be a permitted conveyance and treatment system that will combine various wastewater collection system technologies in order to connect as many private on-site septic systems as possible for the lowest overall lifecycle cost.

1.0 Introduction

Mathews Consulting, Inc. has been retained by FKAA to provide engineering services for the collection system for the **Central Cudjoe Key Regional Service Area** (Upper Sugarloaf Key, Cudjoe Key & Summerland Key). Located in the lower portion of the Florida Keys, these three islands consist of approximately 2,000 acres of developed and undeveloped land and span approximately 6.5 miles along U.S. Highway 1.

The objective of this Letter Report is to review general alternative wastewater collection system technologies, select the best value technology or combination of technologies tailored to serving the global "Hot Spot" areas that are located in Upper Sugarloaf Key, Cudjoe Key & Summerland Key, and develop a "Wastewater Collection System Decision Tree" that can be used as a guideline in other sewer service areas in the Florida Keys. "Hot Spots" are defined as those areas that will receive a wastewater collection and treatment system. The wastewater collection systems evaluated included:

- Conventional Gravity Sewer Systems
- Septic Tank Effluent Gravity (STEG) Systems
- Septic Tank Effluent Pump (STEP) Systems
- Low Pressure/Grinder Pump Systems
- Vacuum Sewer Systems

The final work product will be a permitted conveyance system that will combine various wastewater collection system technologies in order to connect as many on-site septic systems to the Regional System as possible for the lowest overall lifecycle costs. The combined strategic utilization of proper planning and technology, extending to the greatest number of sewer connections for the best value, is an approach developed by FKAA through its many years of experience in the utility business. For areas that will not be cost effective to be served by the Regional System (e.g. outer areas that are located far from the reach of the collection system) an On-Site Wastewater Nutrient Removal System (OWNRS) to meet the 2010 Best Available Technology (BAT) Standard (10 mg/l BOD, 10 mg/l TSS, 10 mg/l total N and 1 mg/l P) is recommended.

The FKAA staff prepared the document titled "Development of On-Site Wastewater Nutrient Removal Systems (OWNRS) Lifecycle Costs Using Best Available Technology (BAT)", January 2009, which is included in Appendix A of this Letter Report.

Conceptual design layouts for each of these collection alternatives were prepared for Upper Sugarloaf Key, Cudjoe Key and Summerland Key. Refer to Figure 1-1 for location map of the study areas. Cost estimates prepared include capital, operations, replacement and maintenance for a 20-year lifecycle period. The advantages and disadvantages of each system are also presented in this Letter Report. A wastewater collection system decision tree was also developed in order to establish the type of wastewater collection system that would be most viable for a particular neighborhood in the Florida Keys Service Area.

To facilitate review, the report has been divided into eight main sections. The content of each section is briefly summarized below.

Section 1.0 — ***Introduction:*** Presents a brief description of project history, project area and the wastewater collection systems evaluated.

Section 2.0 — ***Alternative Wastewater Collection Systems:*** Presents detailed discussion of the wastewater collection systems (conventional gravity sewer systems, septic tank effluent pump [STEP] systems, low pressure/grinder pump systems and vacuum sewer systems. Advantages and disadvantages of each of these systems are provided along with FDEP permitting requirements.

Section 3.0 — ***Study Area – Upper Sugarloaf Key:*** Provides a preliminary design layout for each of the four wastewater collection systems. A preliminary initial construction cost opinion and a summary of present worth cost (including construction, operation and maintenance cost) for each type of sewer collection system is provided.

Section 4.0 — ***Study Area – Cudjoe Key:*** Provides a preliminary design layout for each of the four wastewater collection systems. A preliminary initial construction cost opinion and a summary of present worth cost (including construction, operation and maintenance cost) for each type of sewer collection system is provided.

Section 5.0 — ***Study Area – Summerland Key:*** Provides a preliminary design layout for each of the four wastewater collection systems. A preliminary initial construction cost opinion and a summary of present worth cost (including construction, operation and maintenance cost) for each type of sewer collection system is provided.

Section 6 — ***Wastewater Collection System Decision Analysis:*** Presents a Wastewater Collection System Decision Tree that can be used to determine the type of wastewater collection system best suited for neighborhoods or collection system areas in the Florida Keys based on such factors as number of connections, lot size, initial construction cost and present worth (i.e. Lifecycle) costs.

Section 7 — ***Conclusions:*** Recapitulates the recommended improvements and presents a schedule for proceeding with detailed design, permitting and bidding. A list of action items are also presented.

Section 8 — ***Works Cited:*** Provides list of information reviewed during the preparation of this Letter Report.

MATHEWS CONSULTING INC.
Civil and Environmental Engineers

SCALE: 1"=3000' 3000' 1500' 0 3000'

Florida Keys Aqueduct Authority

CUDJOE REGIONAL WASTEWATER SYSTEM

SERVICE AREA

PROJ NO: 1474
DATE: FEB. 2009
FIGURE 1-1

Section 2

Alternative Wastewater Collection Systems

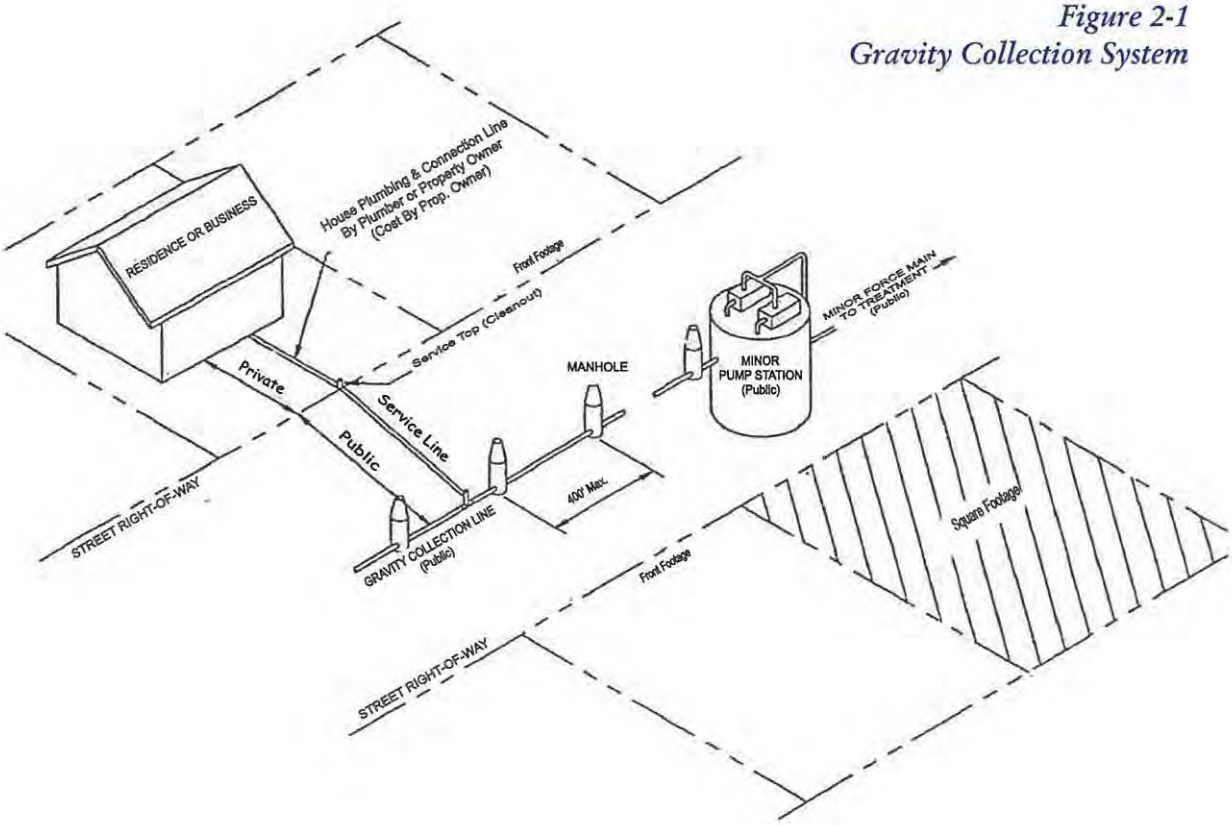
2.0 Alternative Wastewater Collection Systems

This Section evaluates alternative wastewater collection and transmission technologies that could be utilized in each of the Study Areas (Upper Sugarloaf Key, Cudjoe Key and Summerland Key). Conventional gravity sewer system and four (4) alternative wastewater conveyance systems (septic tank effluent gravity [STEG] systems, septic tank effluent pump [STEP] systems, low pressure/grinder pump systems, and vacuum collection systems) were reviewed and their characteristics are described in this Section. Advantages and disadvantages of these systems are listed in Table 2-1. Also, FDEP permitting requirements are discussed at the end of this section.

Gravity Sewer Systems

Conventional gravity flow sewer systems are the most widely used method of wastewater collection in residential and other developed areas. In a conventional gravity sewer system, wastewater is transported by gravity from each service connection (e.g. clean-out @ property) to a main gravity sewer. The main gravity sewer is sloped to provide a flow velocity adequate to convey solids and minimize settling, generally two (2) feet per second (fps). Manholes are placed on the sewer lines at intervals of 300 to 400 feet and at all intersections and changes of slopes.

Figure 2-1
Gravity Collection System



Sanitary Sewer Manhole

Sanitary Sewer Manhole

Fiberglass Lift Station

Manholes allow access for inspection, cleaning and repair of the gravity collection piping. Because of the continuous slope, the depth of gravity sewers increases with distance downstream until the depth becomes too great for economical construction. Typically, for the Florida Keys this depth is 8 feet due to the challenging subsurface conditions (e.g. limestone bedrock & high water table). Once the maximum depth is reached, a lift station is required to pump the wastewater to a shallower gravity-sewer system manhole, or through a force main to another lift station (e.g. piggy-back system), and then to a Master Lift Station, which will ultimately pump through a force main system to the Regional WWTP.

A cost-effective design of a gravity sewer system requires optimizing the maximum gravity sewer depth with the number of lift stations utilized in the system. Maximizing the depth of gravity sewer construction minimizes the number of lift stations required, while maintaining minimum depth requires more lift stations. Deep sewer construction and lift stations are both associated with high costs, and the optimum balance between sewer depth and number of lift stations used is highly dependent on site-specific conditions. Factors adversely affecting deep sewer construction and use of gravity sewers in general include difficult excavation conditions (e.g. rock), high water tables, existing high-density development, and presence of extensive underground utilities in the area to be serviced.

Septic Tank Effluent Gravity Systems

Septic Tank Effluent Gravity (STEG) systems utilize septic tanks at the wastewater source to remove solids and floating materials, such as oil and grease. In addition to removing solids from the waste stream, septic tanks anaerobically decompose the waste into liquid and solid byproducts (e.g. producing a partially treated wastewater effluent). Effluent from the septic tanks is then discharged to small diameter gravity sewer system. Since solids are removed in the septic tanks, STEG lines do not need to be designed to transport solids. This reduces the velocity and gradient required, which reduces the depth of excavation. It also eliminates the need for manholes at all junctions, grade changes, and alignment changes, resulting in potential cost savings. Because the septic tanks provide for some attenuation of peak flow, STEG diameters can be reduced in comparison to a conventional gravity sewer line serving the same flow. The STEG lines can be constructed with some inflective gradient (i.e., dip and rise in gravity line), provided adequate head and velocity is available at peak daily flow to suspend solids and clean the line.

One disadvantage of STEG collection systems is that each connected unit must have a septic tank. In order to avoid maintenance problems in the STEG lines, the septic tanks must be properly maintained, including pumping of septage at regular intervals. Costs of pumping, hauling, treating and disposing of septage must be included in the overall system operation and maintenance costs. Though STEG systems require less slope than conventional gravity sewer systems (typically 25 to 50 percent of gravity sewer slopes), they require greater burial depth than the minimum cover requirements for pressure sewers.

STEG systems are designed to discharge into a gravity sewer collection system that is typically received and pumped by a lift station in order to convey the effluent wastewater to the wastewater treatment plant. STEG systems are advantageous in areas with a terrain that is sloped toward the wastewater treatment plant or large regional lift station (e.g. mountain-type areas). In areas that are flat, the gravity collections systems are sloped to each associated lift station. **Since STEG effluent sewer require a gravity sewer system to receive its effluent, these systems are not economically feasible where the terrain is flat, such as the Florida Keys.** This is based on the cost of each effluent septic tank added to the cost of a gravity sewer collection system. Therefore, STEG systems were not analyzed as a viable collection system for these study areas.

Septic Tank Effluent Pump Systems

Similar to the STEG systems, Septic Tank Effluent Pump (STEP) systems also utilize septic tanks at the wastewater source for separation and decomposition of settleable and floating solids. STEP systems utilize small septic tank effluent pump stations and pressure sewers to convey partially decomposed wastewater. Pumps used in these systems are typically fractional horsepower submersible pumps with operating heads below 200 feet. The pumps are generally not designed for solids transport because the impellers, which operate under higher head conditions, have close tolerances and are not made to pass solids. Since they are not required to be sloped and because of the high head conditions, STEP pressure sewers can be installed with minimum cover (typically 30 to 36 inches) and can be easily routed over or under existing utilities to avoid conflicts since the pressure sewers are small diameter piping.

Figure 2-2
STEP Collection System

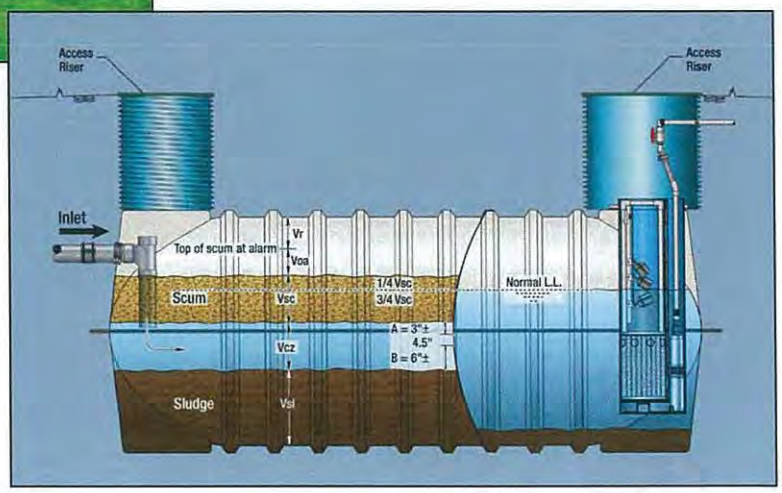


Figure 2-3
Typical STEP Installation

Like STEG systems, STEP systems have the disadvantage of utilizing numerous septic tanks which must be regularly maintained to minimize problems in the pressure sewer collection system. Pumping, hauling, treatment, and disposal of septage must be included in the operation and maintenance costs for STEP systems. Another disadvantage of STEP systems is the large number of pumps in the system that must be maintained. Selection of standardized pumps for the system should be based on initial costs plus operation and maintenance costs over a 20-year period.

STEP System Installation

STEP System Installation

STEP System Installation

Control Panel on Side of House

The characteristics of wastewater collected with a STEP system are nearly identical to that of an STEG system. The wastewater quality is weak with respect to suspended, settleable, and floating solids, but is readily biodegradable. It is also anaerobic and may emit hydrogen sulfide upon contact with air, potentially causing odor and corrosion problems. Wastewater collected with STEP systems can be treated by conventional methods, such as extended aeration (activated sludge process).

Low Pressure Systems

Low pressure/grinder pump systems utilize a small grinder pump station at each wastewater source (residential and/or commercial property) and small-diameter, low pressure force mains for transmission either to lift stations or directly to a WWTP. The grinder pump station accepts the entire wastewater stream from the residence or business and is not generally used in conjunction with a septic tank. Stations serving single residential units typically utilize fiberglass or high density

polyethylene (HDPE) wet-wells 24 to 30 inches in diameter. The grinder pumps typically range from 1 to 3 horsepower, depending on the type of pump selected and the number of units served by the pump station. All solids in the waste stream are ground to a slurry and pumped through small diameter pressure sewers similar in size to those utilized by STEP systems. Since these systems do not rely on gravity, the sewers can be constructed with minimum cover (30 to 36 inches). Since there are no septic tanks utilized in low pressure/grinder pump systems, installation costs and septage handling costs associated with the septic tanks are avoided.

Figure 2-4
Low Pressure Collection System

Two common types of grinder pumps are in widespread use, submersible centrifugal grinder pumps and submersible progressive-cavity grinder pumps. Most manufacturers utilize submersible centrifugal grinder pumps. The submersible centrifugal grinder pumps for single residence applications are typically 1.0 to 2.0 horsepower and have shutoff heads between 90 and 105 feet. Flow rates of individual pumps in the system vary from near 60 gpm at low pressure to near zero gpm as pressure approaches the shutoff head. If pressures in the grinder pump system force mains approach the shutoff head of the pumps, pumps in those areas will discharge minimal volumes until other pumps in the system shut off and pressure in the force main decreases. These high-head conditions should only be reached under extreme conditions, most likely following a power outage, and should not present any operational problems if the force main system is properly sized.

House Service Piping

Low Pressure Pump Station Installation

Control Panel on Side of House

Low Pressure Pump Station Cover

The other pump type used in grinder pump systems is the submersible progressive cavity pump. This pump is a semi-positive displacement pump, which means that it will produce small changes in flow for relatively large changes in head. Typical operating characteristics for this pump are 15 gpm at zero head and 9 gpm at 180 feet of head. The low pump discharge compared to centrifugal pumps and the ability to operate at higher heads maintains steadier flow conditions in the force mains and reduces the probability of pumps not being able to pump against the head conditions. The ability to operate at higher heads also minimizes the number of lift or repump stations necessary for a large grinder pump collection system.

Disadvantages of grinder pump systems are primarily associated with maintenance of the numerous grinder pump stations in the system. As with STEP systems, pump selection should be based on initial costs plus 20 year operation and maintenance costs. The use of high-quality grinder pumps is generally cost-effective because of the potentially high maintenance costs associated with the cutting/grinding mechanism.

Wastewater delivered to treatment plants by grinder pump systems differs from that delivered by STEP or STEG systems because solids removal does not occur

in the grinder pump system. In addition, the wastewater at the source will not have the anaerobic characteristics of STEP and STEG system wastewater. Grinder pump system wastewater is similar to wastewater delivered by conventional gravity sewer systems, except that the solids are ground by the pumps. Advanced wastewater treatment (AWT) processes are capable of treating wastewater delivered by grinder pump stations.

Vacuum Sewer Systems

Vacuum sewer collection systems have been used for commercial applications since 1959 and for residential applications since the early 1970's. A vacuum sewer system consists of one or more vacuum stations, collection system piping, and vacuum sewer services. Vacuum stations provide vacuum pumping to draw wastewater to the station and discharge pumping to pump wastewater to a WWTP through a pressure force main. Vacuum valves regulate the entry of wastewater and air into the collection system piping. Each of these three components is described in the following paragraphs.

A typical residential vacuum sewer service consists of a gravity line from one or more structures to a 30-gallon holding tank equipped with a vacuum valve. Opening of the valve is initiated by a pressure sensor in the holding tank. When liquid in the tank reaches a preset level, the sensor activates, opening the valve to discharge waste and air into the vacuum collection system. The time that the vacuum valve is open is normally adjusted to twice the time required to discharge wastewater from the holding tank. This allows air to enter the system behind the wastewater. This air is necessary to drive wastewater in the line to the vacuum station. As a benefit, this air provides some aeration of wastewater as it passes through the vacuum collection system. Vacuum valve pits are typically located on or near property lines so that they can serve two or more adjacent homes.

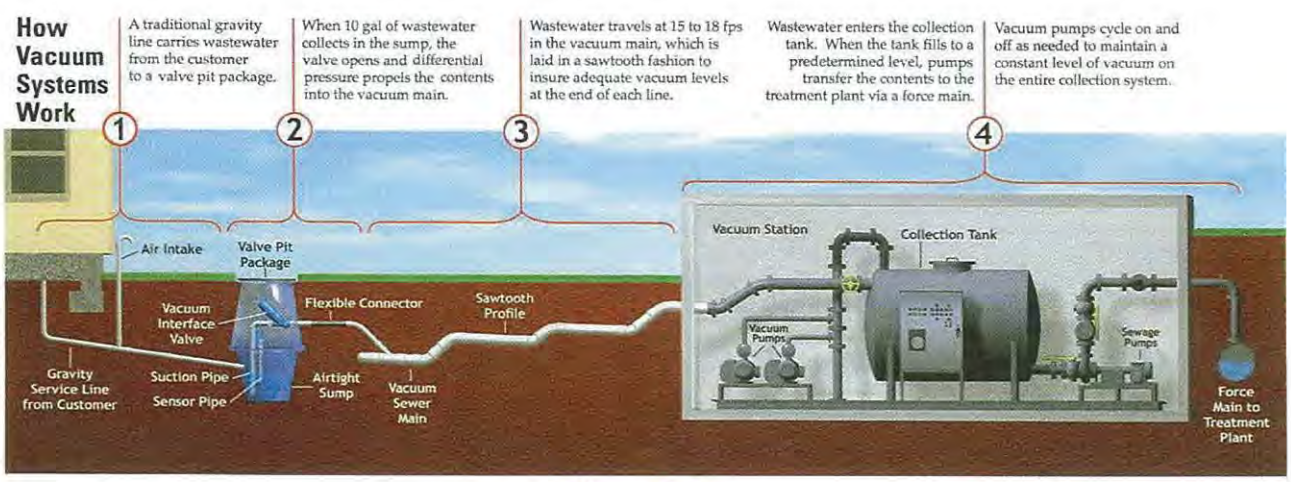


Figure 2-5
Vacuum Collection System Diagram

Vacuum collection piping typically consists of 4-inch to 10-inch solvent weld or push-on, rubber-gasketed PVC pipe laid on a minimum 0.2 percent slope in a sawtooth profile. In order to minimize excavation depth in flat topography or to provide wastewater transport up an incline, lifts are used in the lines. The lifts consist of two 45° bends with the lift pipe section in between, resulting in a sawtooth profile configuration. This section acts as an airlift and provides some additional aeration as wastewater is forced through the lift by rising air. Valving for vacuum collection lines is similar to that for pressure sewers, with plug or resilient wedge gate valves on branches and at intervals on the mains to allow isolation for repairs or troubleshooting.

Trencher in Operation

Collection Piping Installation

Vacuum Pit Installation

Vacuum Station

Vacuum stations in the Keys are usually constructed of concrete block buildings on elevated concrete foundations with plan dimensions of approximately 25 feet by 30 feet. Part of the structure is constructed below grade to accommodate entry of the vacuum sewer. Two (2) alternating liquid ring or sliding vane vacuum pumps withdraw air from a vacuum reservoir tank, which is connected in turn to a fiberglass or steel collection tank. The reservoir tank serves two purposes. First, it provides a vacuum reservoir to limit the number of vacuum pump starts much like the pressure storage tank of a compressed air system. Second, it keeps the vacuum pumps from contacting the air/sewage mix being collected into the collection tank. This separation prevents droplets from damaging the vacuum pumps. Vacuum switches on this reservoir tank control operation of the vacuum pumps.

The collection tank receives the air and sewage transported by the collection piping and serves the same purpose as a wet well in a conventional lift station. Two (2) alternating, non-clog wastewater pumps remove wastewater from the collection tank, and discharge it to the force main. These pumps are controlled by level probes in the wastewater collection tank. Equipment for the vacuum stations is typically skid-mounted for ease of installation. Non-submersible components of the vacuum station (e.g., pump motors and control panels) are located above the 100-year flood elevation.

The advantages and disadvantages of vacuum collection systems over pressure collection systems (STEP or grinder systems) are summarized in Table 2-1. A major advantage is that pump stations at the wastewater source are eliminated, which greatly reduces the number of pumps in the collection system that must be maintained. The vacuum valves at the service connection do not require any power, which not only eliminates the cost of electrical service and use, but facilitates using one vacuum valve pit to serve two or more residences and allows for continuity of service during power outages. If multiple connections were used with STEP or grinder system, one of the residences served would have to pay for the power used and seek reimbursement from the other residences. Another advantage of vacuum sewers is aeration of the wastewater that is provided throughout the collection system, minimizing anaerobic conditions and associated odor and corrosion problems. Vacuum collection system piping has similar advantages over conventional gravity systems as do STEP and grinder systems, i.e., smaller diameters and shallower cover requirements.

Disadvantages of vacuum sewer systems include the need for relatively large vacuum stations and the potential difficulties in locating these stations in an area that is already developed. Vacuum collection system piping is somewhat more costly than small-diameter pressure systems because of the need to maintain 0.2 percent slopes (which requires grade control and somewhat greater depth), the need to install numerous lift sections, and the slightly larger pipe diameters required to serve comparable flows.

Hybrid or Mixed Systems

Combinations of the conventional and alternative wastewater collection systems described in this section are possible and in some cases can help lower the costs of the collection system. The primary concern in combining systems is that the wastewater characteristics of an upstream system must be compatible with the downstream system into which it is discharged. For example, a low pressure/grinder pump system can be discharged to a conventional gravity system. Also, a vacuum collection system can be discharged to a conventional gravity system. A low pressure/grinder pump system that is only serving 8-10 houses could discharge into a vacuum collection system. A STEP system discharging to a conventional gravity system may require additional precautions for corrosion and odor control.

Advantages/Disadvantages of Each Collection System

A comparison of advantages and disadvantages of the four collection system alternatives is presented in Table 2-1.

Table 2-1
Comparison of Advantages and Disadvantages of Collection System Alternatives

Wastewater Collection Method		Advantages		Disadvantages
Conventional Gravity Sewers	1	Well established technology, lowest O&M cost of all technologies.	1	Higher initial construction costs in areas of difficult excavation (rock), high water tables and flat topography.
	2	Collectors contained within the public right-of-way.	2	Disruption of community during construction (entire ROW utilized).
	3	Minimal facilities required at point of service (gravity service connection).	3	Increased potential for infiltration and inflow. Salinity can be high in coastal areas.
	4	Entire waste stream conveyed from property.	4	Manholes required at all junctions, grade changes and alignment changes. Numerous small lift stations required.
	5	No power required from individual residence.	5	Placement of regional "Master" lift stations within communities may require changes in zoning and the acquisition of valuable property.
	6	Excess capacity is typically built in allowing easy expansion. The additional storage also allows a few days of continued operation during mechanical or electrical failures.	6	Collection areas may be restricted by canals and drainage structures.
	7	The life of a conventional gravity system is typically 40 years before repairs, such as slip lining or replacement is required.	7	Performance affected by low flows.

Table 2-1
Comparison of Advantages and Disadvantages of Collection System Alternatives

Wastewater Collection Method		Advantages		Disadvantages
Septic Tank Effluent Pump (STEP) systems	1	Collector mains may be laid at constant depth to conform to topography.	1	Interceptor tank located on private property with easement required. A significant amount of owners property is required. This will require excavation on private property. This area will not be available for pool, driveway, boat parking, etc. Installation logistics may be difficult on small lots.
	2	Performance not affected by low flows.	2	Power required at each connection supplied by homeowner.
	3	Reduction in BOD and TSS in WWTP influent.	3	Individual service lost with power outage.
	4	Manholes & lift stations eliminated.	4	Historically, maintenance requirements for STEP systems have been higher than most alternatives. Also, numerous units to handle.
	5	Infiltration/inflow are minimized.	5	Settleable solids retained on private property that require periodic removal.
	6	Smaller pipe diameters than gravity systems are utilized. Pressure sewers can be constructed with minimum cover (30"-36").	6	Septic, settled wastewater collected that requires odor control at receiving manholes and lift stations.
	7	Collector mains are usually installed in R/W off of road pavement.	7	May require additional WWTP chemical feed, significant private property construction disruption potential.
	8	Roadway restoration costs are significantly reduced when compared with conventional gravity sewer installations.	8	With older homes, there may be a need to upgrade electrical service at the residence to allow for addition of the pump unit.
	9	Reduces peak flow pumping.		
Low Pressure/Grinder Pump Systems (including progressive cavity and centrifugal grinder pump systems)	1	Collector mains may be laid at constant depth to conform to topography.	1	Some installations may need to be on private property with the easement required due to long lateral runs.
	2	Performance not affected by low flows.	2	Power required at each connection supplied by homeowner.
	3	Manholes eliminated.	3	Long detention and travel times may require odor control at air release valves.
	4	Infiltration eliminated.	4	Individual service lost with power outage.
	5	Most lift stations eliminated.	5	Somewhat greater operation and maintenance costs than conventional gravity systems with numerous units to handle.
	6	Smaller pipe diameters than gravity systems are utilized. Pressure sewers can be constructed with minimum cover (30"-36").	6	With older homes, there may be a need to upgrade electrical service at the residence to allow for addition of the pump unit.
	7	Roadway restoration costs are significantly reduced when compared with conventional gravity sewer and vacuum installations.	7	Pump station required at each service connection.

Table 2-1
Comparison of Advantages and Disadvantages of Collection System Alternatives

Wastewater Collection Method		Advantages		Disadvantages
	8	Collector mains usually installed in R/W off road pavement.	8	To reduce costs, multiple connections may be used where one pump unit serves two or more homes; however, one residence would have to pay for the power used and be reimbursed.
	9	Grinder pump station can be installed in R/W and further savings could be achieved with single duplex station/ multiple connection.		
Vacuum Systems	1	Entire waste stream conveyed from property.	1	Collector mains must be installed to grade in a sawtooth pattern; high installation sensitivity.
	2	Wastewater maintained in aerobic state.	2	Standby power required at central vacuum station to prevent service loss during power outages - no system storage.
	3	Performance not affected by low flows.	3	Limited number of manufacturers of equipment – proprietary cost premium.
	4	Smaller pipe diameters than gravity systems are generally utilized.	4	Pipe Diameters are greater than those for low pressure systems.
	5	Manholes eliminated.	5	O&M costs are higher than other alternative collection systems.
	6	Collector mains and valves installed in R/W off road pavement, minimal private property disruption.	6	Relatively large (25'x30') building required for vacuum/pump station.
	7	No power required at connection.	7	Potential difficulty and cost associated with the purchase of land for the vacuum station.
	8	One vacuum valve can serve two or more lots.	8	There is no alarm for loss at vacuum or high level in pits. The first notification is often due to a back-up in customers home.
			9	Performance of vacuum sewer system depends on quality of construction. Pre-qualification of contractors is recommended.

FDEP Permitting Requirements

Each project area (Upper Sugarloaf Key, Cudjoe Key & Summerland Key) will require an FDEP Wastewater Collection/Transmission System Permit. FDEP requires a separate application and fee for each non-contiguous project (i.e. projects that are not interconnected or are not located on adjacent streets or in the same neighborhood). The required DEP Form 62-604.300 (8)(a) is included in Appendix B of this Letter Report. The DEP Rule Chapter 62-604, F.A.C., for Collection Systems and Transmission Facilities is included in Appendix C.

It is important to note that FKAA & Monroe County met with FDEP (Fort Myers/Marathon staff) on July 7, 2008 to discuss the Cudjoe Regional Wastewater System. The minutes of that meeting are included at Attachment D.

Section 3

Study Area - Upper Sugarloaf Key

3.0 Study Area – Upper Sugarloaf Key

Upper Sugarloaf Key is located at Mile Marker 18.6, between Lower Sugarloaf Key and Cudjoe Key. Upper Sugarloaf Key has 12 commercial lots including a public school, church, restaurant, and two campgrounds. Currently 247 residential lots are occupied with very low to medium density. At build-out 365 lots are expected to be occupied. Since Upper Sugarloaf Key has developed only 68% of the build-out lots, opportunities exist to utilize alternative collection systems to defer a significant portion of construction cost.

The sewer collection systems evaluated for this area are listed below in the order they appear.

- Low Pressure Sewer/Grinder Collection System (LPS) (refer to Figure 3-1)
- STEP Effluent Collection System (refer to Figure 3-2)
- Vacuum Sewer Collection System (refer to Figure 3-3)
- Gravity Sewer Collection System (refer to Figure 3-4)

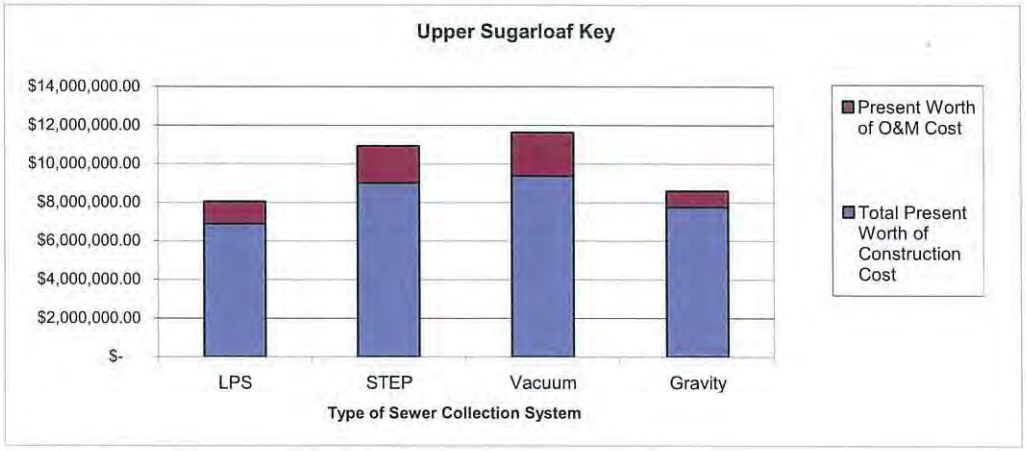
For each system, a preliminary design was developed on an aerial map. A preliminary construction cost opinion was developed utilizing recent bid information from the Keys and gathering information from system suppliers. A present worth cost analysis was performed for each potential sewer collection system using O&M data from EPA, published technical reports, engineering reports, system operator interviews and manufacturer vendors' data.

Table 3-1 provides a summary of present worth cost (including construction, operation, and maintenance cost) for each type of sewer collection system. A twenty year present worth cost analysis (e.g. Lifecycle costs) was calculated based on an interest rate of 6% and an inflation rate of 3%.

Table 3-1
Upper Sugarloaf Key
Present Worth Summary for Each Type of Sewer Collection System

Type of Sewer Collection System	LPS	STEP	Vacuum	Gravity
Initial Construction Cost	$ 5,772,081.42	$ 7,412,984.92	$ 8,632,913.90	$ 7,750,489.71
Future Construction Cost	$ 1,498,600.00	$ 2,098,040.00	$ 974,090.00	0
Present Worth of Future Construction	$ 1,132,408.12	$ 1,585,371.37	$ 736,065.28	0
Total Present Worth of Construction Cost	$ 6,904,489.54	$ 8,998,356.29	$ 9,368,979.18	$ 7,750,489.71
Present Worth of O&M Cost	$ 1,140,390.38	$ 1,926,265.61	$ 2,255,271.13	$ 833,738.18
Total Present Worth	**$ 8,044,879.92**	**$ 10,924,621.90**	**$ 11,624,250.31**	**$ 8,584,227.88**
PW of Construction Cost/EDU @ Build-Out	$ 13,808.98	$ 17,996.71	$ 18,737.96	$ 15,500.98
Total Present Worth/EDU @ Build-Out	$ 16,089.76	$ 21,849.24	$ 23,248.50	$ 17,168.46

EDUs @ Build-Out = 500



An explanation for each row heading in Table 3-1 is provided below:

Initial Construction Cost: The construction cost required to provide the existing developed lots with sewer service.

Future Construction Cost: The portion of the construction cost required to serve future residents that can be deferred. Conventional gravity sewer systems cannot be easily expanded to pick up additional users. The infrastructure necessary to serve future residents is included in the Initial Construction Cost for gravity sewer systems. That is why this column for gravity is $0.

Present Worth of Future Cost: Future construction was assumed to occur 5, 10, and 15 years after initial construction. The future construction expense was discounted to present worth dollars.

Total Present Worth of Construction Cost: The sum of Initial Construction Cost and Present Worth of Future Construction Cost.

Present Worth of O&M Cost: The cost of all forecasted operation and maintenance cost over a 20 year period discounted to present worth dollars.

Total Present Worth: The sum of Total Present Worth of Construction Cost and Present Worth of O&M Cost.

PW of Construction Cost/EDU @ Build-Out: The Total Present Worth of Construction Cost divided by the number of EDUs (Equivalent Dwelling Units) at build-out.

Total Present Worth/EDU @ Build-Out: The Total Present Worth divided by the number of EDUs (Equivalent Dwelling Units) at build-out.

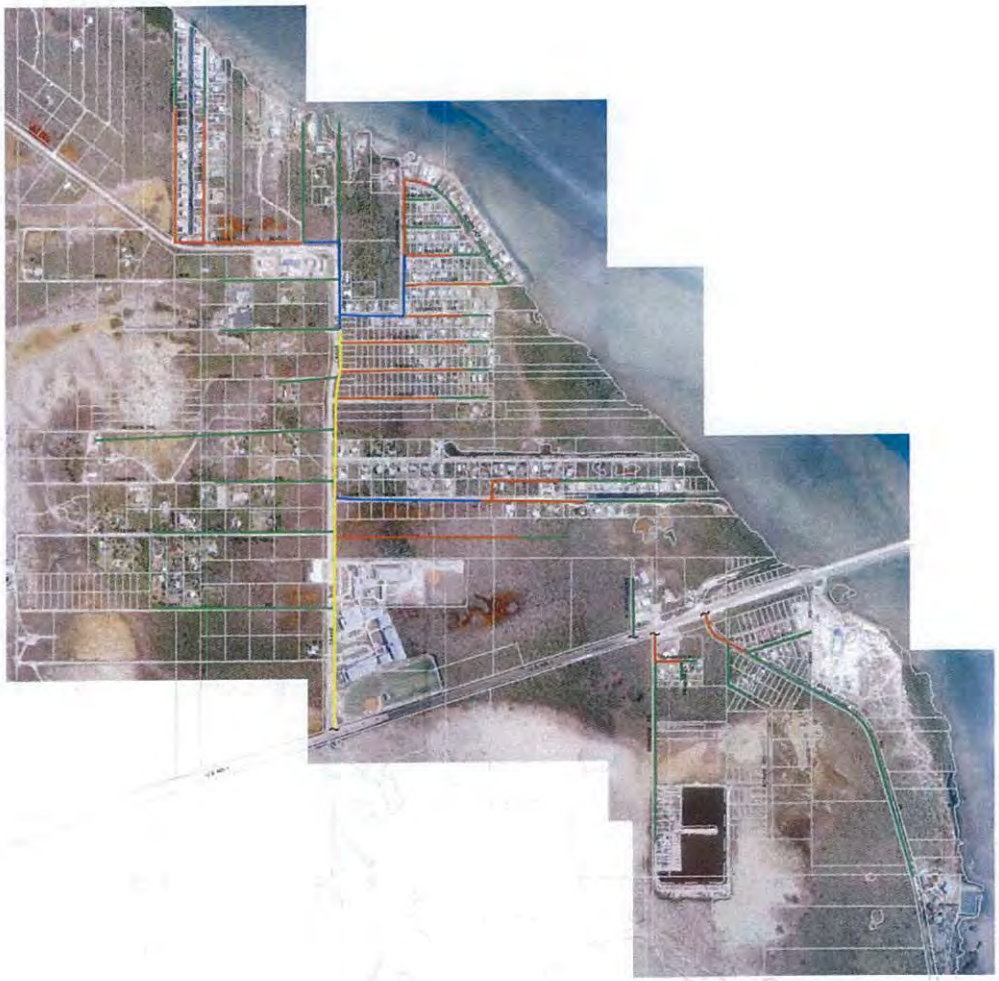
As shown on Table 3-1, the lowest initial construction cost and lowest present worth cost to provide sewer service to Upper Sugarloaf Key is the Low Pressure Sewer System. However, high density areas could be served by a conventional gravity sewer system. As the system is further designed, the Wastewater Collection System Decision Tree (see Section 6.0) should be used to determine the most optimum hybrid system for a low pressure system/gravity collection system for this service area.

Another important factor that will be considered in selecting a wastewater collection system will be a "Policy Decision" by FKAA regarding the type of system(s) that they plan to operate and maintain in their Service Areas.

Upper Sugarloaf Key

LOW PRESSURE/GRINDER PUMP SYSTEM

FIGURE 3–1



NORTH

LEGEND

- 2" LPS SEWER MAIN
- 3" LPS SEWER MAIN
- 4" LPS SEWER MAIN
- 6" LPS SEWER MAIN

MATHEWS CONSULTING INC.
Civil and Environmental Engineers

SCALE: 1"=1000'
1000' 500' 0 1000'

Florida Keys Aqueduct Authority

CUDJOE REGIONAL WASTEWATER SYSTEM

UPPER SUGARLOAF KEY
PRELIMINARY LPS COLLECTION SYSTEM LAYOUT

PROJ NO: 1474
DATE: FEB. 2009
DWG: LPS–1

Table 3-2

LPS #1
Upper Sugarloaf Key
Low Pressure Sewer

Number of EDUs Current	382
Number of EDUs Build-Out	500

COLLECTION SYSTEM - INSTALLED COST

CURRENT CONSTRUCTION COSTS

ITEM	QUANTITY	UNITS	UNIT PRICE	TOTAL PRICE
2" Force Main (1)	21582	LF	$ 42.00	$ 906,444.00
3" Force Main (1)	12313	LF	$ 48.00	$ 591,024.00
4" Force Main (1)	3274	LF	$ 54.00	$ 176,796.00
6" Force Main (1)	3324	LF	$ 68.00	$ 226,032.00
2" Valves	18	EA	$ 500.00	$ 9,000.00
3" Valves	15	EA	$ 750.00	$ 11,250.00
4" Valves	4	EA	$ 1,100.00	$ 4,400.00
6" Valves	3	EA	$ 2,000.00	$ 6,000.00
Simplex Low Pressure Station (2)	247	EA	$ 10,000.00	$ 2,470,000.00
Duplex Low Pressure Station (2)	12	EA	$ 12,000.00	$ 144,000.00
			Subtotal	**$ 4,544,946.00**
			Other Project Cost (3) 27%	$ 1,227,135.42
			Current Estimated Total =	**$ 5,772,081.42**
			Current Estimated Cost/EDU =	*$ 15,110.16*

BUILD-OUT CONSTRUCTION COSTS

ITEM	QUANTITY	UNITS	UNIT PRICE	TOTAL PRICE
2" Force Main (1)	21582	LF	$ 42.00	$ 906,444.00
3" Force Main (1)	12313	LF	$ 48.00	$ 591,024.00
4" Force Main (1)	3274	LF	$ 54.00	$ 176,796.00
6" Force Main (1)	3324	LF	$ 68.00	$ 226,032.00
2" Valves	18	EA	$ 500.00	$ 9,000.00
3" Valves	15	EA	$ 750.00	$ 11,250.00
4" Valves	4	EA	$ 1,100.00	$ 4,400.00
6" Valves	3	EA	$ 2,000.00	$ 6,000.00
Simplex Low Pressure Station (2)	365	EA	$ 10,000.00	$ 3,650,000.00
Duplex Low Pressure Station (2)	12	EA	$ 12,000.00	$ 144,000.00
			Subtotal	**$ 5,724,946.00**
			Other Project Cost (3) 27%	$ 1,545,735.42
			Build-Out Estimated Total =	**$ 7,270,681.42**
			Build-Out Estimated Cost/EDU =	*$ 14,541.36*

Notes:

(1) Cost of force mains includes trench repair and road restoration.

(2) Cost of LPS Station includes tank, equipment, installation, electrical connection and 1-1/4" lateral with restoration.

(3) Other project costs include construction contingencies and engineering fees.

Table 3-3

Present Worth Cost Analysis (20 year)
Upper Sugarloaf Key
Low Pressure Sewer

Current EDU =	382
Build Out EDU =	500

Assumptions:

Inflation =		3%	
Interest rate =		6%	
Add 11 pumps in year 5, 12 pumps in year 10, and 12 pumps in year 15			
Labor/hr =	$	100.00	Including overhead
$/KWH =	$	0.10	
Electric =	$	30.00	/pump/yr
Prevnt. Maint. =	$	30.00	/pump/yr
Public Education =	$	2.00	/pump/yr
Emergency call out =	$	390.00	/pump/12yr
Pump replacement =	$	2,000.00	/pump/12yr

Initial Construction Cost = $ 5,772,081.42

Calculation of present worth of future construction

$1,498,600.00 of construction can be deferred as lots are developed in the future as follows:

In year 5, 10, & 15 a third of construction will be completed. Cost will be escalated at 3% inflation, then converted to present worth at I = 6%

		$1,498,600.00/3=	$	499,533.33	
(F/P) at 3% for 5 years =	1.1593	$499,533.33x1.1593=	$	579,108.99	Construction Cost at year 5
(F/P) at 3% for 10 years =	1.3439	$499,533.33x1.3439=	$	671,322.85	Construction Cost at year 10
(F/P) at 3% for 15 years =	1.5580	$499,533.33x1.5580=	$	778,272.93	Construction Cost at year 15

Converting the future construction cost to Present Worth with I = 6% gives:

(P/F) at 6% for 5 years =	0.7473	$579,108.99x0.7473=	$	432,768.15
(P/F) at 6% for 10 years =	0.5584	$671,322.85x0.5584=	$	374,866.68
(P/F) at 6% for 15 years =	0.4173	$778,272.93x0.4173=	$	324,773.30

Present Worth of future construction = $ 1,132,408.12

Annualize cost of pump replacement and emergency call outs in 12 years and again in 24 years

Calculate future price of pump replacement and emergency call out at 3% inflation in 12 yrs

(F/P) at 3% for 12 years =	1.4258	($2,000+$390)x1.4258=	$	3,407.66	per pump

Converting the 12 year future pump replacement/emergency call out cost to Present Worth with I = 6% gives:

(P/F) at 6% for 12 years =	0.4970	$3,407.66x0.4970=	**$**	**1,693.61**	per pump

Calculate future price of pump replacement and emergency call out at 3% inflation in 24 yrs

(F/P) at 3% for 24 years =	2.0328	($2,000+$390)x2.0328=	$	4,858.39	per pump

Converting the future pump replacement/emergency call out cost to an annualized cost over 12 years with I = 6% gives:

(A/F) at 6% for 12 years =	0.0593	$4,858.39x0.0593=	$	288.10	per pump/yr

By taking the annualized cost for 8 years, a future cost for year 12 can be calculated with I = 6% gives:

(P'/A) at 6% for 8 years =	8.3838	$288.10x8.3838=	$	2,415.39	in year 12

Converting the annualized cost of future pump replacement/emergency call out cost from year 13 to year 20 to Present Worth with I = 6% gives:

(P/F) at 6% for 12 years =	0.4970	$2,415.39x0.4970=	**$**	**1,200.45**

PW of future pump replacement and emergency call out per pump = **$ 2,894.06** (12yr and 24yr combined)

Converting the present worth of two pump replacements to annualized dollars

(A/P) at 6% for 20 years =	0.0872	$2,894.06x0.0872=	**$**	**252.36**	per pump/yr

Table 3-3 (Con't)

Present Worth Cost Analysis (20 year)
Upper Sugarloaf Key
Low Pressure Sewer

Total annualized cost per pump per year:

Pump replacement =	$	252.36	/pump/yr
Electric =	$	30.00	/pump/yr
Prevnt. Maint. =	$	30.00	/pump/yr
Public Education =	$	2.00	/pump/yr
Total =	**$**	**314.36**	/pump/yr

Convert annualized costs to Present Worth

Assume pumps will be phased in as follows:

Period I: 271 pumps through year 5
Period II: 311 pumps from year 6 through year 10
Period III: 350 pumps from year 11 through year 15
Period IV: 389 pumps from year 16 through year 20

Calculation of present worth of annualized cost for Period I:

Period I: Annualized cost =		$314.36x271=	$ 85,192.09	/yr	
(P/A) at 6% for 5 years =	4.2124	$85,192.09x4.2124=	$	**358,863.18**	**Present Worth for Period I**

Calculation of present worth of annualized cost for Period II:

Period II: Annualized cost =		$314.36x311=	$ 97,766.57	/yr	
(P'/A) at 6% for 5 years =	4.2124	$97,766.57x4.2142=	$	411,831.91	in year 5 dollars
(P/F) at 6% for 5 years =	0.7473	$411,831.91x0.7473=	$	**307,761.99**	**Present Worth for Period II**

Calculation of present worth of annualized cost for Period III:

Period III: Annualized cost =		$314.36x350=	$110,026.69	/yr	
(P'/A) at 6% for 5 years =	4.2124	$110,026.69x4.2142=	$	463,476.43	in year 10 dollars
(P/F) at 6% for 10 years =	0.5584	$463,476.43x0.5584=	$	**258,805.24**	**Present Worth for Period III**

Calculation of present worth of annualized cost for Period IV:

Period IV: Annualized cost =		$314.36x389=	$122,286.81	/yr	
(P'/A) at 6% for 5 years =	4.2124	$122,286.81x4.2142=	$	515,120.95	in year 15 dollars
(P/F) at 6% for 15 years =	0.4173	$515,120.95x0.4173=	$	**214,959.97**	**Present Worth for Period IV**

Present Worth of all annualized cost for all periods = $ 1,140,390.38

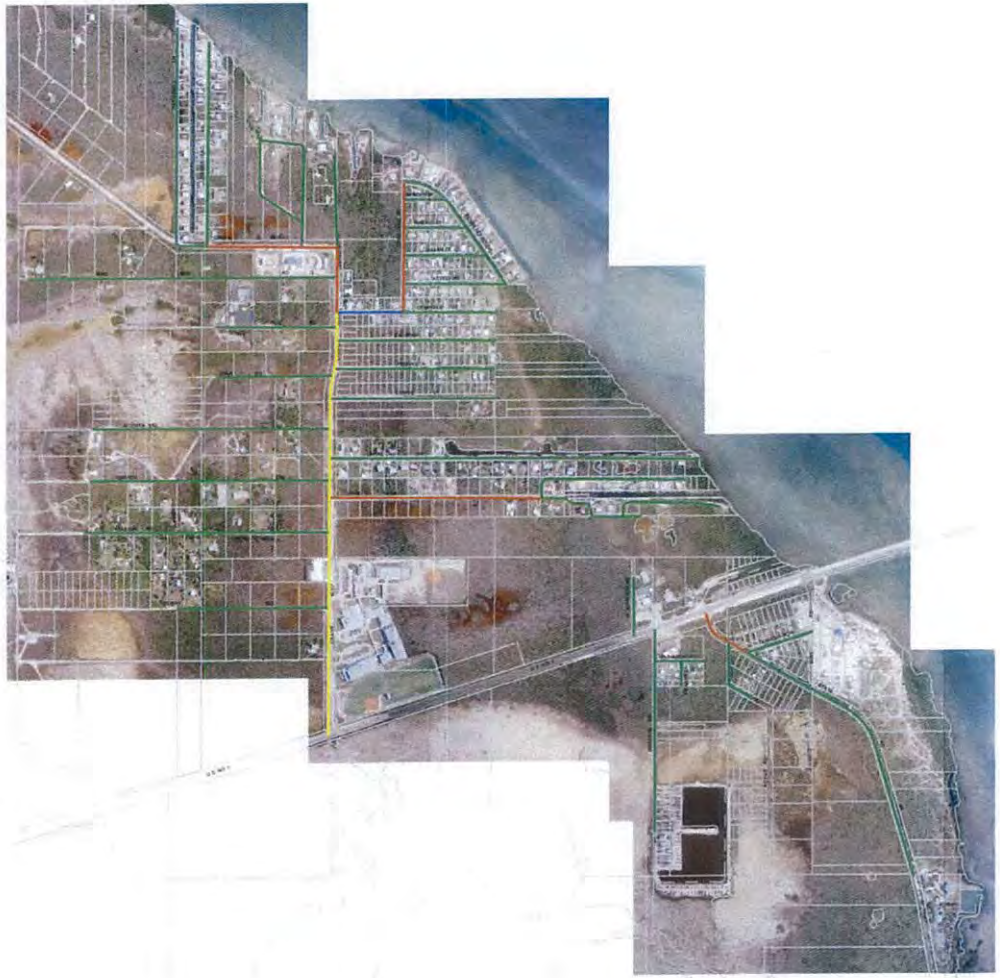
Total Present Worth = $ 8,044,879.92

Present Worth / Current EDUs = $ 21,059.90
Present Worth / Build-Out EDUs = $ 16,089.76

Upper Sugarloaf Key

SEPTIC TANK EFFLUENT PUMP (STEP) SYSTEM

FIGURE 3–2



NORTH

LEGEND

- 2" STEP SEWER MAIN
- 3" STEP SEWER MAIN
- 4" STEP SEWER MAIN
- 6" STEP SEWER MAIN

MATHEWS CONSULTING INC.
Civil and Environmental Engineers

SCALE: 1"=1000'
1000' 500' 0 1000'

Florida Keys Aqueduct Authority

CUDJOE REGIONAL WASTEWATER SYSTEM

UPPER SUGARLOAF KEY
PRELIMINARY STEP COLLECTION SYSTEM LAYOUT

PROJ NO: 1474
DATE: FEB. 2009
DWG: STEP–1

Table 3-4

STEP #1
Upper Sugarloaf Key
STEP

Number of EDUs Current	382
Number of EDUs Build-Out	500

COLLECTION SYSTEM - INSTALLED COST

CURRENT CONSTRUCTION COSTS

ITEM	QUANTITY	UNITS	UNIT PRICE	TOTAL PRICE
2" Force Main (1)	39060	LF	$ 42.00	$ 1,640,520.00
3" Force Main (1)	4996	LF	$ 48.00	$ 239,808.00
4" Force Main (1)	548	LF	$ 54.00	$ 29,592.00
6" Force Main (1)	3507	LF	$ 68.00	$ 238,476.00
2" Valves	48	EA	$ 500.00	$ 24,000.00
3" Valves	10	EA	$ 750.00	$ 7,500.00
4" Valves	1	EA	$ 1,100.00	$ 1,100.00
6" Valves	6	EA	$ 2,000.00	$ 12,000.00
Simplex STEP Station (2)	247	EA	$ 14,000.00	$ 3,458,000.00
Duplex STEP Station (2)	12	EA	$ 15,500.00	$ 186,000.00
			Subtotal	**$ 5,836,996.00**
			Other Project Cost (3) 27%	$ 1,575,988.92
			Current Estimated Total =	**$ 7,412,984.92**
			Current Estimated Cost/EDU =	*$ 19,405.72*

BUILD-OUT CONSTRUCTION COSTS

ITEM	QUANTITY	UNITS	UNIT PRICE	TOTAL PRICE
2" Force Main (1)	39060	LF	$ 42.00	$ 1,640,520.00
3" Force Main (1)	4996	LF	$ 48.00	$ 239,808.00
4" Force Main (1)	548	LF	$ 54.00	$ 29,592.00
6" Force Main (1)	3507	LF	$ 68.00	$ 238,476.00
2" Valves	48	EA	$ 500.00	$ 24,000.00
3" Valves	10	EA	$ 750.00	$ 7,500.00
4" Valves	1	EA	$ 1,100.00	$ 1,100.00
6" Valves	6	EA	$ 2,000.00	$ 12,000.00
Simplex STEP Station (2)	365	EA	$ 14,000.00	$ 5,110,000.00
Duplex STEP Station (2)	12	EA	$ 15,500.00	$ 186,000.00
			Subtotal	**$ 7,488,996.00**
			Other Project Cost (3) 27%	$ 2,022,028.92
			Build-Out Estimated Total =	**$ 9,511,024.92**
			Build-Out Estimated Cost/EDU =	*$ 19,022.05*

Notes:

(1) Cost of force mains includes trench repair and road restoration.

(2) Cost of STEP Station includes tank, equipment, installation, electrical connection and 1-1/4" lateral with restoration.

(3) Other project costs include construction contingencies and engineering fees.

Table 3-5

Present Worth Cost Analysis (20 year)
Upper Sugarloaf Key
STEP Collection System

Current EDU =	382
Build Out EDU =	500

Assumptions:

Inflation =		3%	
Interest rate =		6%	
Add 11 pumps in year 5, 12 pumps in year 10, and 12 pumps in year 15			
Labor/hr =	$	100.00	Including overhead
$/KWH =	$	0.10	
Electric =	$	20.00	/pump/yr
Prevnt. Maint. =	$	271.30	/pump/yr
Public Education =	$	2.00	/pump/yr
Emergency call out =	$	390.00	/pump/5yr
Tank pump out =	$	400.00	/pump/5yr
Pump replacement =	$	870.00	/pump/20yr

Preventive maintenance labor cost is derived from data from Charlotte County. Nine people work full time to maintain 6,900 STEP units.

Initial Construction Cost = $ 7,412,984.92

Calculation of present worth of future construction

$2,098,040.00 of construction can be deferred as lots are developed in the future as follows:

In year 5, 10, & 15 a third of construction will be completed. Cost will be escalated at 3% inflation, then converted to present worth at I = 6%

		$2,098,040.00/3=	$	699,346.67	
(F/P) at 3% for 5 years =	1.1593	$699,346.67x1.1593=	$	810,752.59	Construction Cost at year 5
(F/P) at 3% for 10 years =	1.3439	$699,346.67x1.3439=	$	939,851.99	Construction Cost at year 10
(F/P) at 3% for 15 years =	1.5580	$699,346.67x1.5580=	$	1,089,582.11	Construction Cost at year 15

Converting the future construction cost to Present Worth with I = 6% gives:

(P/F) at 6% for 5 years =	0.7473	$810,752.59x0.7473=	$	605,875.41
(P/F) at 6% for 10 years =	0.5584	$939,851.99x0.5584=	$	524,813.35
(P/F) at 6% for 15 years =	0.4173	$1,089,582.11x0.4173=	$	454,682.61

Present Worth of future construction = $ 1,585,371.37

Annualize cost of pump replacement

Calculate future price of pump replacement at 3% inflation in 20 yrs

(F/P) at 3% for 20 years =	1.8061	$870.00x1.8061=	$	1,571.31	per pump

Converting the pump replacement cost to an annualized cost over 20 years with I = 6% gives:

(A/F) at 6% for 20 years =	0.0272	$1,571.31x0.0272=	**$**	**42.74**	per pump/yr

Annualize cost of emergency call outs and tank pump outs in 5, 10, 15, & 20 years

Calculate future price of emergency call out and tank pump out at 3% inflation in 5 yrs

(F/P) at 3% for 5 years =	1.1593	$790x1.1593=	$	915.85	per pump

Converting the 5 year future emergency call out and tank pump out cost to Present Worth with I = 6% gives:

(P/F) at 6% for 5 years =	0.7473	$915.85x0.7473=	**$**	**684.41**	per pump

Calculate future price of emergency call out and tank pump out at 3% inflation in 10 yrs

(F/P) at 3% for 10 years =	1.3439	$790x1.3439=	$	1,061.68	per pump

Converting the 10 year future emergency call out and tank pump out cost to Present Worth with I = 6% gives:

(P/F) at 6% for 10 years =	0.5584	$1,061.68x0.5584=	**$**	**592.84**	per pump

Calculate future price of emergency call out and tank pump out at 3% inflation in 15 yrs

(F/P) at 3% for 15 years =	1.5580	$790x1.5580=	**$**	1,230.82	per pump

Table 3-5 (Con't)

Present Worth Cost Analysis (20 year)
Upper Sugarloaf Key
STEP Collection System

Converting the 15 year future emergency call out and tank pump out cost to Present Worth with I = 6% gives:

(P/F) at 6% for 15 years =	0.4173	$1,230.82x0.4173=	$	**513.62**	per pump

Calculate future price of emergency call out and tank pump out at 3% inflation in 20 yrs

(F/P) at 3% for 20 years =	1.8061	$790x1.8061=	$	1,426.82	per pump

Converting the 20 year future emergency call out and tank pump out cost to Present Worth with I = 6% gives:

(P/F) at 6% for 20 years =	0.3118	$1,426.82x0.3118=	$	**444.88**	per pump

PW of future emergency call out per pump = **$ 2,235.76** (5, 10, 15, & 20yr combined)

Converting the present worth of emergency call out and tank pump out cost to annualized dollars

(A/P) at 6% for 20 years =	0.0872	$2,235.76x0.0872=	$	**194.96**	per pump/yr

Total annualized cost per pump per year:

Pump Replacement =	$	42.74	/pump/yr
Emerg. Call Out & Pump Out =	$	194.96	/pump/yr
Electric =	$	20.00	/pump/yr
Prevnt. Maint. =	$	271.30	/pump/yr
Public Education =	$	2.00	/pump/yr
Total =	**$**	**531.00**	/pump/yr

Convert annualized costs to Present Worth

Assume pumps will be phased in as follows:

Period I: 271 pumps through year 5
Period II: 311 pumps from year 6 through year 10
Period III: 350 pumps from year 11 through year 15
Period IV: 389 pumps from year 16 through year 20

Calculation of present worth of annualized cost for Period I:

Period I: Annualized cost = $531.00x271= $143,900.37 /yr

(P/A) at 6% for 5 years =	4.2124	$143,900.37x4.2124=	$	**606,165.94**	**Present Worth for Period I**

Calculation of present worth of annualized cost for Period II:

Period II: Annualized cost = $531.00x311= $165,140.28 /yr

(P'/A) at 6% for 5 years =	4.2124	$165,140.28x4.2142=	$	695,636.92	in year 5 dollars
(P/F) at 6% for 5 years =	0.7473	$695,636.92x0.7473=	$	**519,849.47**	**Present Worth for Period II**

Calculation of present worth of annualized cost for Period III:

Period III: Annualized cost = $531.00x350= $185,849.19 /yr

(P'/A) at 6% for 5 years =	4.2124	$185,849.19x4.2142=	$	782,871.13	in year 10 dollars
(P/F) at 6% for 10 years =	0.5584	$782,871.13x0.5584=	$	**437,155.24**	**Present Worth for Period III**

Calculation of present worth of annualized cost for Period IV:

Period IV: Annualized cost = $531.00x389= $206,558.10 /yr

(P'/A) at 6% for 5 years =	4.2124	$206,558.10x4.2142=	$	870,105.35	in year 15 dollars
(P/F) at 6% for 15 years =	0.4173	$870,105.35x0.4173=	$	**363,094.96**	**Present Worth for Period IV**

Present Worth of all annualized cost for all periods = $ 1,926,265.61

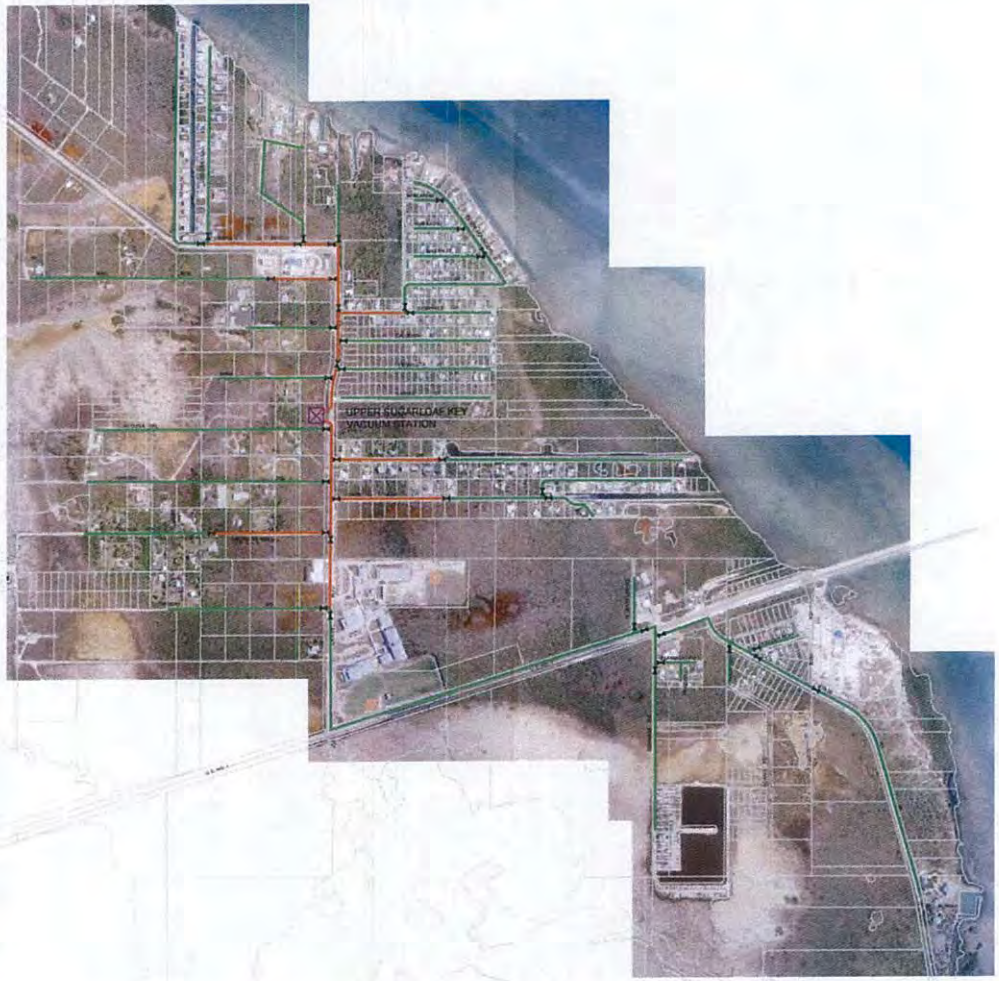
Total Present Worth = $ 10,924,621.90

Present Worth / Current EDUs = $ 28,598.49
Present Worth / Build-Out EDUs = $ 21,849.24

Upper Sugarloaf Key

VACUUM SEWER SYSTEM

FIGURE 3-3



NORTH

LEGEND

- 4" VACUUM SEWER MAIN
- 6" VACUUM SEWER MAIN
- 8" VACUUM SEWER MAIN
- DIVISION VALVE
- VACUUM STATION

MATHEWS CONSULTING INC.
Civil and Environmental Engineers

SCALE: 1"=1000'
1000' 500' 0 1000'

Florida Keys Aqueduct Authority

CUDJOE REGIONAL WASTEWATER SYSTEM

UPPER SUGARLOAF KEY
PRELIMINARY VACUUM COLLECTION SYSTEM LAYOUT

PROJ NO: 1474
DATE: FEB. 2009
DWG: VS-1

Table 3-6

VS #1
Upper Sugarloaf Key
Vacuum Sewer

Number of EDUs Current	382
Number of EDUs Build-Out	500

COLLECTION SYSTEM - INSTALLED COST

CURRENT CONSTRUCTION COSTS

ITEM	QUANTITY	UNITS	UNIT PRICE	TOTAL PRICE
4" Vacuum Main (1)	36070	LF	$ 66.00	$ 2,380,620.00
6" Vacuum Main (1)	8100	LF	$ 73.70	$ 596,970.00
4" Division Valves	33	EA	$ 1,210.00	$ 39,930.00
6" Division Valves	9	EA	$ 1,650.00	$ 14,850.00
6" Force Main (1)	3400	LF	$ 68.00	$ 231,200.00
6" Valves	3	EA	$ 2,000.00	$ 6,000.00
Vacuum Valve Pits (2)	156	EA	$ 13,000.00	$ 2,028,000.00
Vacuum Station (3)	1	EA	$ 1,500,000.00	$ 1,500,000.00
			Subtotal	**$ 6,797,570.00**
			Other Project Cost (4) 27%	$ 1,835,343.90
			Current Estimated Total =	**$ 8,632,913.90**
			Current Estimated Cost/EDU =	*$ 22,599.25*

BUILD-OUT CONSTRUCTION COSTS

ITEM	QUANTITY	UNITS	UNIT PRICE	TOTAL PRICE
4" Vacuum Main (1)	36070	LF	$ 66.00	$ 2,380,620.00
6" Vacuum Main (1)	8100	LF	$ 73.70	$ 596,970.00
4" Division Valves	33	EA	$ 1,210.00	$ 39,930.00
6" Division Valves	9	EA	$ 1,650.00	$ 14,850.00
6" Force Main (1)	3400	LF	$ 68.00	$ 231,200.00
6" Valves	3	EA	$ 2,000.00	$ 6,000.00
Vacuum Valve Pits (2)	215	EA	$ 13,000.00	$ 2,795,000.00
Vacuum Station (3)	1	EA	$ 1,500,000.00	$ 1,500,000.00
			Subtotal	**$ 7,564,570.00**
			Other Project Cost (4) 27%	$ 2,042,433.90
			Build-Out Estimated Total =	**$ 9,607,003.90**
			Build-Out Estimated Cost/EDU =	*$ 19,214.01*

Notes:

(1) Cost of force mains and vacuum mains includes trench repair and road restoration.

(2) Valve pit cost includes:

$ 3,500	for purchase of valve & pits
$ 5,000	for installation of valve & pits
$ 3,000	for laterals
$ 1,500	for cross-overs from pit to vacuum main
$ 13,000	Total

(3) Vacuum stations include:

Vacuum station equipment
Odor control
Construction of concrete building with underground construction and bathroom
Emergency back-up generator
Telemetry
Cost of Land
(Cost of legal/real estate fees, public notice and public hearings have not been included.)

(4) Other project costs include construction contingencies and engineering fees.

Table 3-7

Present Worth Cost Analysis (20 year)
Upper Sugarloaf Key
Vacuum Sewer Collection System

Current EDU =	382	
Build Out EDU =	500	

Assumptions:

Inflation =	3%		
Interest rate =	6%		
Add 1 vacuum pit in year 5, 1 vacuum pit in year 10, and 0 vacuum pits in year 15			
Add 2 EDUs in year 5, 2 EDUs year 10, and 2 EDUs in year 15			
Labor/hr =	$ 100.00	Including overhead	
$/KWH =	$ 0.10		
Power =	$ 2.92	/EDU/month	
Station Maint. =	$ 49,750.00	per year	497.5 hr/yr @ $100/hr
Prevnt. Maint. =	$ 452.00	/valve/yr	
Public Education =	$ 1.50	/EDU/yr	
Vac. Valve Rebuild=	$ 35.25	/valve/10yrs	

Preventive maintenance labor cost is based on FKAA's experience at Little Venice. One full time person is required to maintian a vacuum station with 350 Valve Pits.

Initial Construction Cost = $ 8,632,913.90

NOTE: The cost for land to accommodate the vacuum lift station is not included in this present worth cost analysis.

Calculation of present worth of future construction

$974,090.00 of construction can be deferred as lots are developed in the future as follows:

In year 5, 10, & 15 a third of construction will be completed. Cost will be escalated at 3% inflation, then converted to present worth at I = 6%

		$974,090.00/3=	$ 324,696.67	
(F/P) at 3% for 5 years =	1.1593	$324,696.67x1.1593=	$ 376,420.85	Construction Cost at year 5
(F/P) at 3% for 10 years =	1.3439	$324,696.67x1.3439=	$ 436,359.85	Construction Cost at year 10
(F/P) at 3% for 15 years =	1.5580	$324,696.67x1.5580=	$ 505,877.41	Construction Cost at year 15

Converting the future construction cost to Present Worth with I = 6% gives:

(P/F) at 6% for 5 years =	0.7473	$376,420.85x0.7473=	$ 281,299.30
(P/F) at 6% for 10 years =	0.5584	$436,359.85x0.5584=	$ 243,663.34
(P/F) at 6% for 15 years =	0.4173	$505,877.41x0.4173=	$ 211,102.64

Present Worth of future construction = $ 736,065.28

Annualize cost of all Vacuum Valve/Controller Maintenance per Vacuum Valve

Calculate future price of vacuum valve rebuild at 3% inflation in 10 yrs

(F/P) at 3% for 10 years =	1.3439	$35.25x1.3439=	$ 47.37	per vacuum valve at year 10

Calculate future price of vacuum valve rebuild at 3% inflation in 20 yrs

(F/P) at 3% for 20 years =	1.8061	$35.25x1.8061=	$ 63.67	per vacuum valve at year 20

Converting all the future maintenance cost to Present Worth with I = 6% gives:

(P/F) at 6% for 10 years =	0.5584	$47.37x0.5584=	$ 26.45	per vacuum valve
(P/F) at 6% for 20 years =	0.3118	$63.67x0.3118=	$ 19.85	per vacuum valve

Present Worth of future maintenance cost per vacuum valve = $ 46.30

Calculating the annualized cost per valve over 20 years at I = 6% gives:

(A/P) at 6% for 20 years =	0.0872	$46.30x0.0872=	$ **4.04**	per vacuum valve per year

Adding the annualize cost of preventive maintenance gives a total annualized cost per valve of:

$452.00+$4.04= $ **456.04** per vacuum valve per year

Convert annualized Vacuum Valve Maintenance cost to Present Worth

Assume vacuum valves will be phased in as follows:

Period I: 156 vacuum valves through year 5
Period II: 176 vacuum valves from year 6 through year 10
Period III: 196 vacuum valves from year 11 through year 15
Period IV: 215 vacuum valves from year 16 through year 20

Table 3-7 (Con't)

Present Worth Cost Analysis (20 year)
Upper Sugarloaf Key
Vacuum Sewer Collection System

Calculation of present worth of annualized valve maintenance cost for Period I:

Period I: Annualized cost =	$456.04x156=	$ 71,141.88	/yr		
(P/A) at 6% for 5 years =	4.2124	$71,141.88x4.2124=	$	**299,678.04**	**Present Worth for Period I**

Calculation of present worth of annualized valve maintenance cost for Period II:

Period II: Annualized cost =	$456.04x176=	$ 80,262.63	/yr		
(P'/A) at 6% for 5 years =	4.2124	$80,262.63x4.2142=	$	338,098.30	in year 5 dollars
(P/F) at 6% for 5 years =	0.7473	$338,098.30x0.7473=	$	**252,660.86**	**Present Worth for Period II**

Calculation of present worth of annualized valve maintenance cost for Period III:

Period III: Annualized cost =	$456.04x196=	$ 89,383.38	/yr		
(P'/A) at 6% for 5 years =	4.2124	$89,383.38x4.2142=	$	376,518.56	in year 10 dollars
(P/F) at 6% for 10 years =	0.5584	$376,518.56x0.5584=	$	**210,247.97**	**Present Worth for Period III**

Calculation of present worth of annualized valve maintenance cost for Period IV:

Period IV: Annualized cost =	$456.04x215=	$ 98,048.10	/yr		
(P'/A) at 6% for 5 years =	4.2124	$98,048.10x4.2142=	$	413,017.81	in year 15 dollars
(P/F) at 6% for 15 years =	0.4173	$413,017.81x0.4173=	$	**172,352.33**	**Present Worth for Period IV**

Present Worth of all annualized valve maintenance cost for all periods = $ 934,939.20

Convert annualized Power Cost and Public Education cost to Present Worth

Assume EDUs will be phased in as follows:

Period I: 382 EDUs through year 5
Period II: 422 EDUs from year 6 through year 10
Period III: 461 EDUs from year 11 through year 15
Period IV: 500 EDUs from year 16 through year 20

Annualize cost per EDU= ($2.92/EDU/month)x(12 months/year)+$1.50/EDU/yr= **$ 36.54**

Calculation of present worth of annualized cost per EDU for Period I:

Period I: Annualized cost =	$36.54x382=	$ 13,958.28	/yr		
(P/A) at 6% for 5 years =	4.2124	$13,958.28x4.2124=	$	**58,797.86**	**Present Worth for Period I**

Calculation of present worth of annualized cost per EDU for Period II:

Period II: Annualized cost =	$36.54x422=	$ 15,419.88	/yr		
(P'/A) at 6% for 5 years =	4.2124	$15,419.88x4.2142=	$	64,954.70	in year 5 dollars
(P/F) at 6% for 5 years =	0.7473	$64,954.70x0.7473=	$	**48,540.65**	**Present Worth for Period II**

Calculation of present worth of annualized cost per EDU for Period III:

Period III: Annualized cost =	$36.54x461=	$ 16,844.94	/yr		
(P'/A) at 6% for 5 years =	4.2124	$16,844.94x4.2142=	$	70,957.63	in year 10 dollars
(P/F) at 6% for 10 years =	0.5584	$70,957.63x0.5584=	$	**39,622.74**	**Present Worth for Period III**

Calculation of present worth of annualized cost per EDU for Period IV:

Period IV: Annualized cost =	$36.54x500=	$ 18,270.00	/yr		
(P'/A) at 6% for 5 years =	4.2124	$18,270.00x4.2142=	$	76,960.55	in year 15 dollars
(P/F) at 6% for 15 years =	0.4173	$76,960.55x0.4173=	$	**32,115.64**	**Present Worth for Period IV**

Present Worth of all annualized power & education costs for all periods = $ 179,076.88

Convert annualized Vacuum Station Maintenance Cost to Present Worth

Annualized portion of vacuum station maintenance cost to be charged to service area is:

		$49,750.00*2=	$	99,500.00	per year
(P/A) at 6% for 20 years =	11.4699	$99,500.00*11.4699=	$	**1,141,255.05**	**Present Worth of Vacuum Station Maint.**

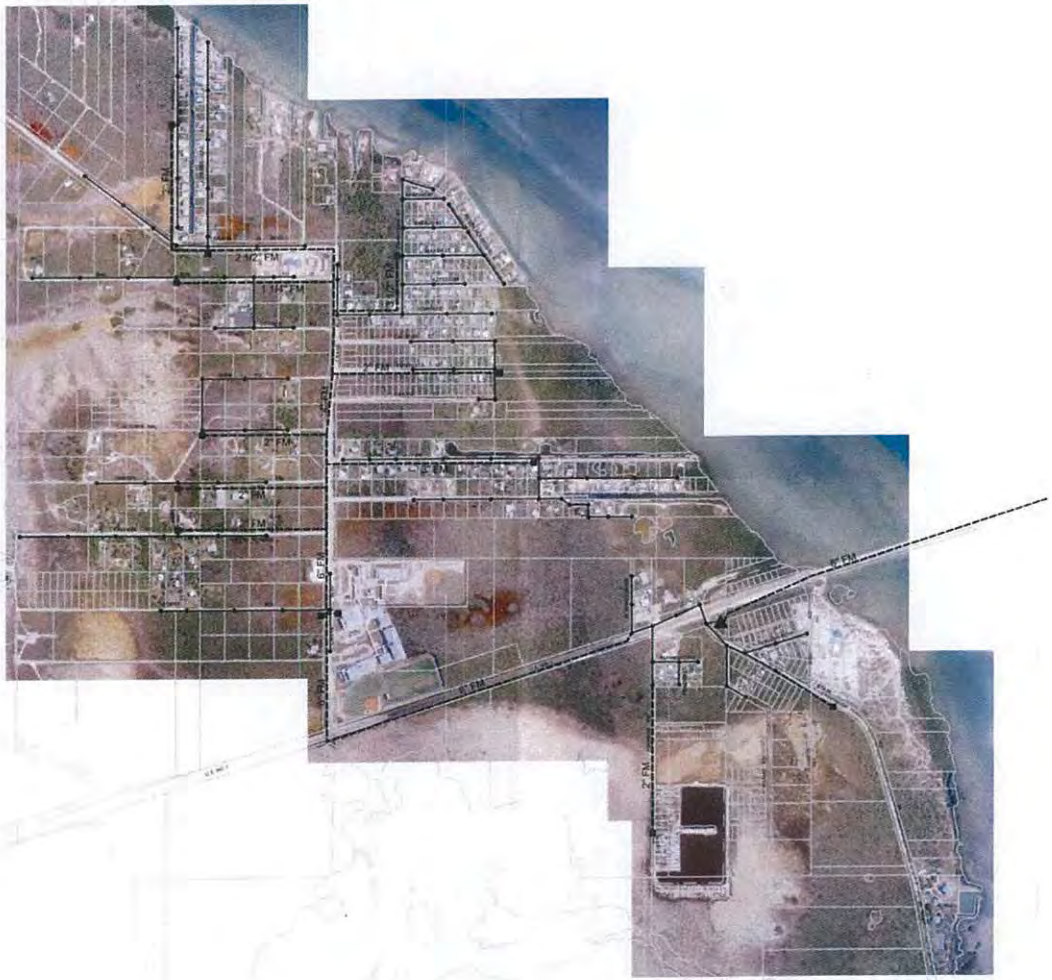
Total Present Worth = $ 11,624,250.31

Present Worth / Current EDUs = $ 30,429.97
Present Worth / Build-Out EDUs = $ 23,248.50

Upper Sugarloaf Key

GRAVITY SEWER SYSTEM

FIGURE 3-4



NORTH

LEGEND

- LIFT STATION AND FORCE MAIN
- MANHOLE AND GRAVITY MAIN
- ▲ MASTER LIFT STATION

MATHEWS CONSULTING INC.
Civil and Environmental Engineers

SCALE: 1"=1000'
1000' 500' 0 1000'

Florida Keys Aqueduct Authority

CUDJOE REGIONAL WASTEWATER SYSTEM

UPPER SUGARLOAF KEY
PRELIMINARY GRAVITY COLLECTION SYSTEM LAYOUT

PROJ NO: 1474
DATE: FEB. 2009
DWG: GS-1

Table 3-8

Gravity #1 w/Mathews Consulting Updated Costs
Upper Sugarloaf Key
Gravity Sewer

Number of EDUs Current	382
Number of EDUs Build-Out	500

COLLECTION SYSTEM - INSTALLED COST

BUILD-OUT CONSTRUCTION COSTS

ITEM	QUANTITY	UNITS	UNIT PRICE	TOTAL PRICE
Manholes	86	LF	$ 6,000.00	$ 516,000.00
8" Gravity Sewers	22427	LF	$ 118.00	$ 2,646,386.00
6" Service Laterals	5375	LF	$ 78.00	$ 419,250.00
Force Mains	13374	LF	$ 54.00	$ 722,196.00
Concrete Lift Station	5	EA	$ 131,000.00	$ 655,000.00
Primary Lift Station S11	1	EA	$ 350,000.00	$ 350,000.00
			Subtotal	$ 5,308,832.00
			Pavement Restoration (30% of Gravity Sewer Cost)	$ 793,915.80
			Construction Cost	**$ 6,102,747.80**
			Other Project Costs (1) 27%	*$ 1,647,741.91*
			Estimated Total =	**$ 7,750,489.71**
			Estimated Cost/EDU Current =	$ 20,289.24
			Estimated Cost/EDU Build-Out =	$ 15,500.98

(1) Other project costs include construction contingencies and engineering fees.

Table 3-9

Present Worth Cost Analysis (20 year)
Upper Sugarloaf Key
Gravity Sewer System

Current EDU =	275
Build Out EDU =	403

Assumptions:

Inflation =		3%	
Interest rate =		6%	
Labor/hr =	$	100.00	Including overhead
$/KWH =	$	0.10	
Power =	$	2.72	/EDU/month
Prevnt. Maint. =	$	7,500.00	/station/yr — 75 hr/station @ $100/hr
Pump replacement =	$	20,000.00	/station/10 yr

Initial Construction Cost = $ 7,750,489.71

Present worth of pump replacement in 10 years and again in 20 years

Calculate future price of pump replacement at 3% inflation in 10 yrs
(F/P) at 3% for 10 years = 1.3439 $20,000x1.3439= $ 26,878.00 per station

Converting the 10 year future pump replacement cost to Present Worth with I = 6% gives:
(P/F) at 6% for 10 years = 0.5584 $26,878.00x0.5584= **$ 15,008.68** per station

Calculate future price of pump replacement at 3% inflation in 20 yrs
(F/P) at 3% for 20 years = 1.8061 $20,000x1.8061= $ 36,122.00 per station

Converting the 20 year future pump replacement cost to Present Worth with I = 6% gives:
(P/F) at 6% for 20 years = 0.3118 $36,122.00x0.3118= **$ 11,262.84** per station

The Study Area will be charged for maintenance at 6 stations
Total Present worth of pump replacements **($15,008.68+$11,262.84)*6 = $ 157,629.09**

Present worth of preventative maintenance for 6 lift stations:

Convert the annualized cost per station to present worth gives:
(P/A) at 6% for 20 years = 11.4699 $7,500*6*11.4699= **$ 516,145.50**

Total annualized cost per EDU per year:
Power = $ 2.72 /EDU/month

Convert annualized costs per EDU to Present Worth
Assume EDUs will be phased in as follows:
Period I: 275 EDUs through year 5
Period II: 318 EDUs from year 6 through year 10
Period III: 361 EDUs from year 11 through year 15
Period IV: 403 EDUs from year 16 through year 20

Annualize cost per EDU= ($2.72/EDU/month)x(12 months/year)= **$ 32.64**

Calculation of present worth of annualized cost per EDU for Period I:
Period I: Annualized cost = $32.64x275= $ 8,976.00 /yr
(P/A) at 6% for 5 years = 4.2124 $8,976.00x4.2124= **$ 37,810.50 Present Worth for Period I**

Calculation of present worth of annualized cost per EDU for Period II:
Period II: Annualized cost = $32.64x318= $ 10,379.52 /yr
(P/A) at 6% for 5 years = 4.2124 $10,379.52x4.2142= $ 43,722.69 in year 5 dollars
(P/F) at 6% for 5 years = 0.7473 $43,722.69x0.7473= **$ 32,673.97 Present Worth for Period II**

Table 3-9 (Con't)

Present Worth Cost Analysis (20 year)
Upper Sugarloaf Key
Gravity Sewer System

Calculation of present worth of annualized cost per EDU for Period III:

Period III: Annualized cost =		$32.64x361= $ 11,783.04 /yr			
(P'/A) at 6% for 5 years =	4.2124	$11,783.04x4.2142=	$	49,634.88	in year 10 dollars
(P/F) at 6% for 10 years =	0.5584	$49,634.88x0.5584=	**$**	**27,716.12**	**Present Worth for Period III**

Calculation of present worth of annualized cost per EDU for Period IV:

Period IV: Annualized cost =		$32.64x403= $ 13,153.92 /yr			
(P'/A) at 6% for 5 years =	4.2124	$13,153.92x4.2142=	$	55,409.57	in year 15 dollars
(P/F) at 6% for 15 years =	0.4173	$55,409.57x0.4173=	**$**	**23,122.41**	**Present Worth for Period IV**

Present Worth of all annualized cost per EDU for all periods = $ 121,323.00

Total Present Worth = $ 8,545,587.29

Present Worth / Current EDUs = $ 31,074.86
Present Worth / Build-Out EDUs = $ 21,204.93

Section 4

Study Area - Cudjoe Key

4.0 Study Area – Cudjoe Key

Cudjoe Key is located between Mile Markers 20 and 23. Cudjoe Key lies between Upper Sugarloaf Key and Summerland Key. Cudjoe Key has 42 developed commercial lots with room for 108 at build-out within the sewer service area. Currently 998 residential lots are occupied with very low to high density. At build-out 1,348 lots are expected to be occupied. Since Cudjoe Key has developed only 73% of the build-out lots, opportunities exist to utilize alternative collections systems to defer a significant portion of construction cost.

Most of the high density residential areas of Cudjoe Key are cut with narrow canals. This restricts the size of a conventional gravity sewer collection system, and increases the construction cost due to dewatering challenges.

The sewer collection systems evaluated for this area are listed below in the order they appear.

- Low Pressure Sewer/Grinder Collection System (LPS) (refer to Figure 4-1)
- STEP Effluent Collection System (refer to Figure 4-2)
- Vacuum Sewer Collection System (refer to Figure 4-3)
- Gravity Sewer Collection System (refer to Figure 4-4)

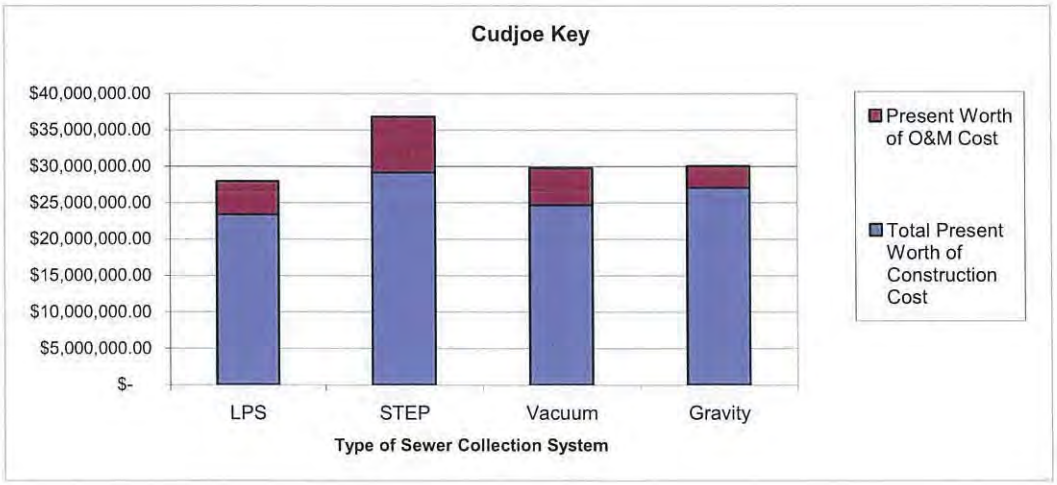
For each system, a preliminary design was developed on an aerial map. A construction cost opinion was developed utilizing recent bid information from the Keys and gathering information from system suppliers. A present worth cost analysis was performed for each potential sewer collection system using O&M data from EPA, published technical reports, engineering reports, system operator interviews and vendors' data.

Table 4-1 provides a summary of present worth cost (including construction, operation, and maintenance cost) for each type of sewer collection system. A twenty year present worth cost analysis (e.g. Lifecycle costs) was calculated based on an interest rate of 6% and an inflation rate of 3%.

Table 4-1
CUDJOE KEY
Present Worth Summary for Each Type of Sewer Collection System

Type of Sewer Collection System	LPS	STEP	Vacuum	Gravity
Initial Construction Cost	$ 19,144,853.76	$ 23,339,696.78	$ 22,470,333.52	$ 27,086,007.55
Future Construction Cost	$ 5,577,840.00	$ 7,700,010.00	$ 2,938,780.00	0
Present Worth of Future Construction	$ 4,214,861.42	$ 5,818,466.48	$ 2,220,671.52	0
Total Present Worth of Construction Cost	$ 23,359,715.18	$ 29,158,163.26	$ 24,691,005.04	$ 27,086,007.55
Present Worth of O&M Cost	$ 4,542,174.95	$ 7,672,316.06	$ 5,055,412.09	$ 2,961,410.45
Total Present Worth	**$ 27,901,890.13**	**$ 36,830,479.33**	**$ 29,746,417.13**	**$ 30,047,418.00**
PW of Construction Cost/EDU @ Build-Out	$ 10,642.24	$ 13,283.90	$ 11,248.75	$ 12,339.87
Total Present Worth/EDU @ Build-Out	$ 12,711.57	$ 16,779.26	$ 13,551.90	$ 13,689.03

EDUs @ Build-Out = 2195



An explanation for each row heading in Table 4-1 is provided below:

Initial Construction Cost: The construction cost required to provide the existing developed lots with sewer service.

Future Construction Cost: The portion of the construction cost required to serve future residents that can be deferred. Conventional gravity sewer systems cannot be easily expanded to pick up additional users. The infrastructure necessary to serve future residents is included in the Initial Construction Cost for gravity sewer systems. That is why this column for gravity is $0.

Present Worth of Future Cost: Future construction was assumed to occur 5, 10, and 15 years after initial construction. The future construction expense was discounted to present worth dollars.

Total Present Worth of Construction Cost: The sum of Initial Construction Cost and Present Worth of Future Construction Cost.

Present Worth of O&M Cost: The cost of all forecasted operation and maintenance cost over a 20 year period discounted to present worth dollars.

Total Present Worth: The sum of Total Present Worth of Construction Cost and Present Worth of O&M Cost.

PW of Construction Cost/EDU @ Build-Out: The Total Present Worth of Construction Cost divided by the number of EDUs (Equivalent Dwelling Units) at build-out.

Total Present Worth/EDU @ Build-Out: The Total Present Worth divided by the number of EDUs (Equivalent Dwelling Units) at build-out.

As shown on Table 4-1, the lowest initial construction cost and lowest present worth cost to provide sewer service to Cudjoe Key is the Low Pressure Sewer System. However, high density areas could be served by a conventional gravity sewer system. As the system is further designed, the Wastewater Collection System Decision Tree (see Section 6.0) should be used to determine the most optimum hybrid system for a low pressure system/gravity collection system for this service area.

Another important factor that will be considered in selecting a wastewater collection system will be a "Policy Decision" by FKAA regarding the type of system(s) that they plan to operate and maintain in their Service Areas.

Cudjoe Key

LOW PRESSURE/GRINDER PUMP SYSTEM

FIGURE 4-1

MATHEWS CONSULTING INC.
Civil and Environmental Engineers

SCALE: 1"=1000' (1000' 500' 0 1000')

Florida Keys Aqueduct Authority

CUDJOE REGIONAL WASTEWATER SYSTEM

CUDJOE KEY
PRELIMINARY LPS COLLECTION SYSTEM LAYOUT

PROJ NO: 1474
DATE: FEB. 2009
DWG: LPS-2

Table 4-2

LPS #2
Cudjoe Key
Low Pressure Sewer

Number of EDUs Current	1736
Number of EDUs Build-Out	2195

COLLECTION SYSTEM - INSTALLED COST

CURRENT CONSTRUCTION COSTS

ITEM	QUANTITY	UNITS	UNIT PRICE	TOTAL PRICE
2" Force Main (1)	79526	LF	$ 42.00	$ 3,340,092.00
3" Force Main (1)	778	LF	$ 48.00	$ 37,344.00
4" Force Main (1)	15023	LF	$ 54.00	$ 811,242.00
6" Force Main (1)	1510	LF	$ 68.00	$ 102,680.00
8" Force Main (1)	3597	LF	$ 90.00	$ 323,730.00
2" Valves	87	EA	$ 500.00	$ 43,500.00
3" Valves	0	EA	$ 750.00	$ -
4" Valves	20	EA	$ 1,100.00	$ 22,000.00
6" Valves	1	EA	$ 2,000.00	$ 2,000.00
8" Valves	3	EA	$ 2,700.00	$ 8,100.00
Simplex Low Pressure Station (2)	988	EA	$ 10,000.00	$ 9,880,000.00
Duplex Low Pressure Station (2)	42	EA	$ 12,000.00	$ 504,000.00
			Subtotal	**$ 15,074,688.00**
			Other Project Cost (3) 27%	$ 4,070,165.76
			Current Estimated Total =	**$ 19,144,853.76**
			Current Estimated Cost/EDU =	*$ 11,028.14*

BUILD-OUT CONSTRUCTION COSTS

ITEM	QUANTITY	UNITS	UNIT PRICE	TOTAL PRICE
2" Force Main (1)	79526	LF	$ 42.00	$ 3,340,092.00
3" Force Main (1)	778	LF	$ 48.00	$ 37,344.00
4" Force Main (1)	15023	LF	$ 54.00	$ 811,242.00
6" Force Main (1)	1510	LF	$ 68.00	$ 102,680.00
8" Force Main (1)	3597	LF	$ 90.00	$ 323,730.00
2" Valves	87	EA	$ 500.00	$ 43,500.00
3" Valves	0	EA	$ 750.00	$ -
4" Valves	20	EA	$ 1,100.00	$ 22,000.00
6" Valves	1	EA	$ 2,000.00	$ 2,000.00
8" Valves	3	EA	$ 2,700.00	$ 8,100.00
Simplex Low Pressure Station (2)	1348	EA	$ 10,000.00	$ 13,480,000.00
Duplex Low Pressure Station (2)	108	EA	$ 12,000.00	$ 1,296,000.00
			Subtotal	**$ 19,466,688.00**
			Other Project Cost (3) 27%	$ 5,256,005.76
			Build-Out Estimated Total =	**$ 24,722,693.76**
			Build-Out Estimated Cost/EDU =	*$ 11,263.19*

Notes:

(1) Cost of force mains includes trench repair and road restoration.

(2) Cost of LPS Station includes tank, equipment, installation, electrical connection and 1-1/4" lateral with restoration.

(3) Other project costs include construction contingencies and engineering fees.