



Introduction to Captiva Island Wastewater Alternative Study

Public Meeting
January 23, 2019

INTRODUCTION BY
CAPTIVA COMMUNITY PANEL WASTEWATER COMMITTEE
Jay Brown

CURRENT CAPTIVA WASTEWATER MANAGEMENT



- South Seas FGUA Sewer System – 50%
- Tween Waters, Sunset Captiva, Captiva Shores “Package Plants” – 10%
- On-site Systems (most are conventional septic systems) – 40%

CAPTIVA COMMUNITY PANEL WASTEWATER COMMITTEE



- Community feedback requested Panel investigate Captiva reliance on septic systems.
- Wastewater Committee created 2016.
- Committee held exploratory meetings with Lee County, Sanibel leadership, septic maintenance companies, SCCF, FGUA leadership.
- Potential septic system issues identified.

POTENTIAL SEPTIC SYSTEM ISSUES



- Water table 2-3 feet below grade.
- Proximity to coastal water.
- Four foot average elevation above sea level.
- Porous soil.
- Population density.
- Conventional septic systems unregulated.
- Many Captiva septic systems not permitted.
- Septic systems and Captiva treatment plants do not remove nitrogen from effluent.

STRATEGIC ALTERNATIVES



- **Maintain status quo.**
- **Regulate and upgrade septic systems.**
Responsibility of the Florida Department of Health
- **Establish new central sewer system.**

TKW CONSULTING ENGINEERS WASTEWATER ALTERNATIVES STUDY



- Evaluate feasibility of wastewater alternatives.
- Conceptual, not final design/conclusions.
- Approved and funded by Lee County.
- Completed September, 2018.
- Final report posted on Panel website.
- Panel summary/conclusions also posted.
- Public presentation today.
- Public comment, Q&A.

A photograph of a sunset over the ocean. The sun is low on the horizon, creating a bright orange glow that reflects on the water. The sky is filled with dark, silhouetted clouds. The overall mood is serene and natural.

Captiva Island Wastewater Alternative Study Presentation

**Public Meeting
January 23, 2019**

**PRESENTED BY
TKW CONSULTING ENGINEERS, INC.
Douglas H. Eckmann, P.E., BCEE, D.WRE, F.ASCE**

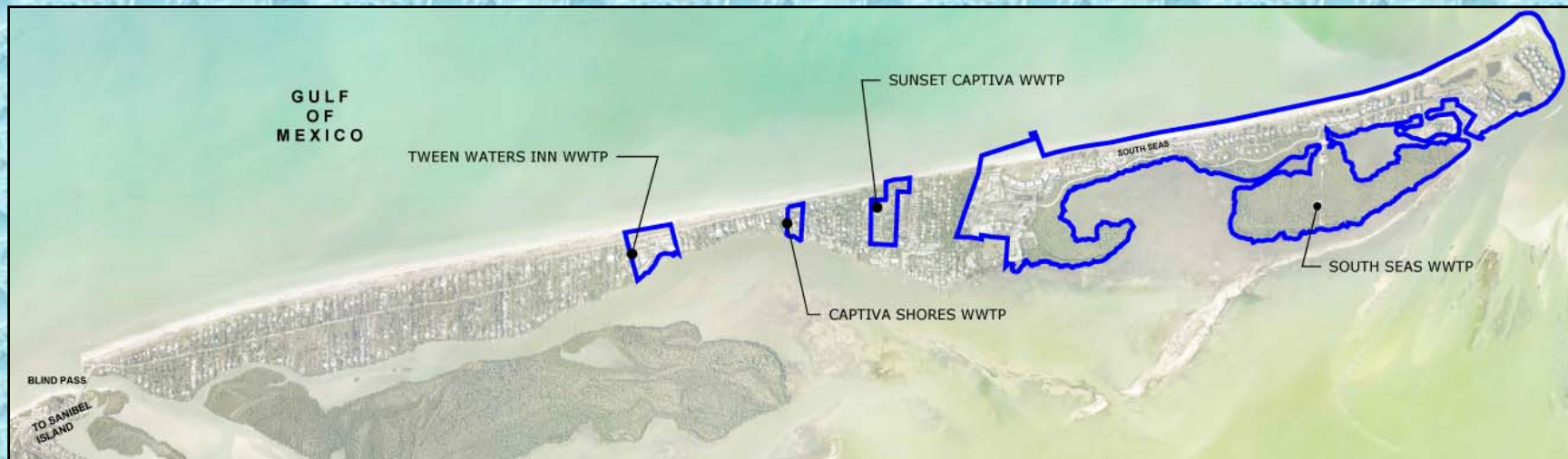
Captiva Island Wastewater Alternative Study



Objective:

Review available public information in a comprehensive informative format to identify wastewater treatment alternatives, assess benefits, and project comparative costs associated with wastewater treatment alternatives for Captiva.

Existing Centralized Wastewater Service Areas



**Existing service areas for centralized wastewater collection and treatment at a permitted Wastewater Treatment Plant (WWTP)
Permitted by the Florida Department of Environmental Protection (FDEP)**

Existing Individual OSTDS (Septic) System Service Areas



**“OSTDS” as used by the Department of Health means
“Onsite Treatment and Disposal System”
Permitted by the Florida Department of Health - Lee County (FDOH)**

Evidence of Septic Systems as Primary Source of Nutrient Loading Identified in Recent Studies



Captiva Water Quality Assessment (2012) SCCF

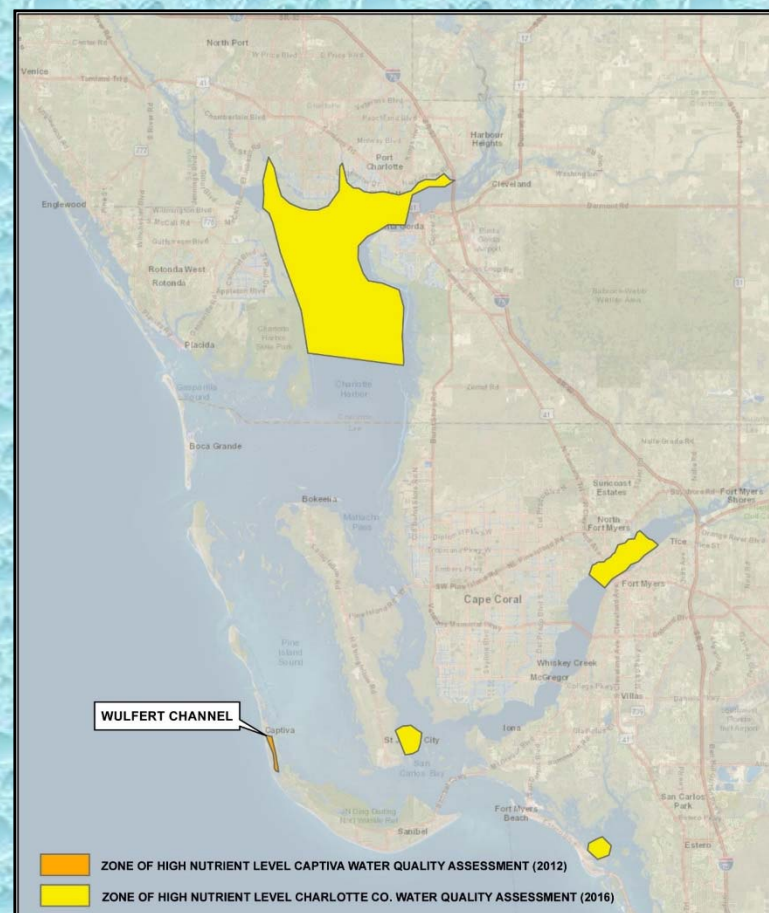
Localized Nutrient Impact Suspected Many Variables

- Nitrogen levels greater in surface water near septic systems (Wulfert Channel inlet north end Buck Key)
- Nitrogen levels greater in groundwater in populated Captiva than unpopulated natural locations
- Nitrogen levels greater in Captiva groundwater during seasonal population (also the dry season)
- Concludes nitrogen from septic systems is migrating to localized near shore water

Charlotte Co. Water Quality Assessment (2016)

Profound Water Quality Impacts tied to Septic Tank Density

- Multiple evidence of septic systems as primary source of nutrient loading in some areas of Charlotte Harbor, Caloosahatchee Estuary and Estero Bay



Overview of Wastewater and Treated Effluent Quality



Water quality indicators used in wastewater management:
(expressed as parts per million, or mg/L)

- **Total Suspended Solids (TSS)** – measure of inorganic waste
Typical untreated sewage concentration about 200 mg/L – Primarily a Public Health Issue
- **Units of Biological Oxygen Demand (BOD)** – measure of organic waste
Typical untreated sewage concentration about 200 mg/L – Primarily a Public Health Issue (can deplete oxygen in confined waters)
- **Total Nitrogen (TN)** - measure of nutrient loading
Typical untreated sewage concentration about 40 mg/L – Primarily a Water Quality Issue
- **Total Phosphorous (TP)** - measure of nutrient loading
Typical untreated sewage concentration about 10 mg/L – Primarily a Water Quality Issue

Existing On-Island Wastewater Treatment Plants



	South Seas WWTP	Tween Waters Inn WWTP	Sunset Captiva WWTP	Captiva Shores Condominium WWTP	Comparison AWWTP (Donax WRF)
Year in Service	1975	1979	1980	1980	1995
Treatment Level	Secondary with Filtration (90% removal)	Secondary with Filtration (90% removal)	Secondary with Filtration (90% removal)	Secondary with Filtration (90% removal)	AWT Tertiary (98% removal)
Permitted Capacity	180,000 gpd	40,000 gpd	25,000 gpd	10,000 gpd	2,400,000 gpd (3,000,000 planned)
TSS Limit	5 mg/L	10 mg/L	10 mg/L	10 mg/L	5 mg/L (planned)
BOD Limit	20 mg/L	20 mg/L	20 mg/L	20 mg/L	5 mg/L (planned)
TN Limit	No Limit	No Limit	No Limit	No Limit	3 mg/L (planned)
TP Limit	No Limit	No Limit	No Limit	No Limit	1 mg/L (planned)
Effluent Disposal	Irrigation Reuse and Shallow Injection Well	Land Application and Irrigation Reuse	Land Application	Land Application	Deep Injection Well or Reuse

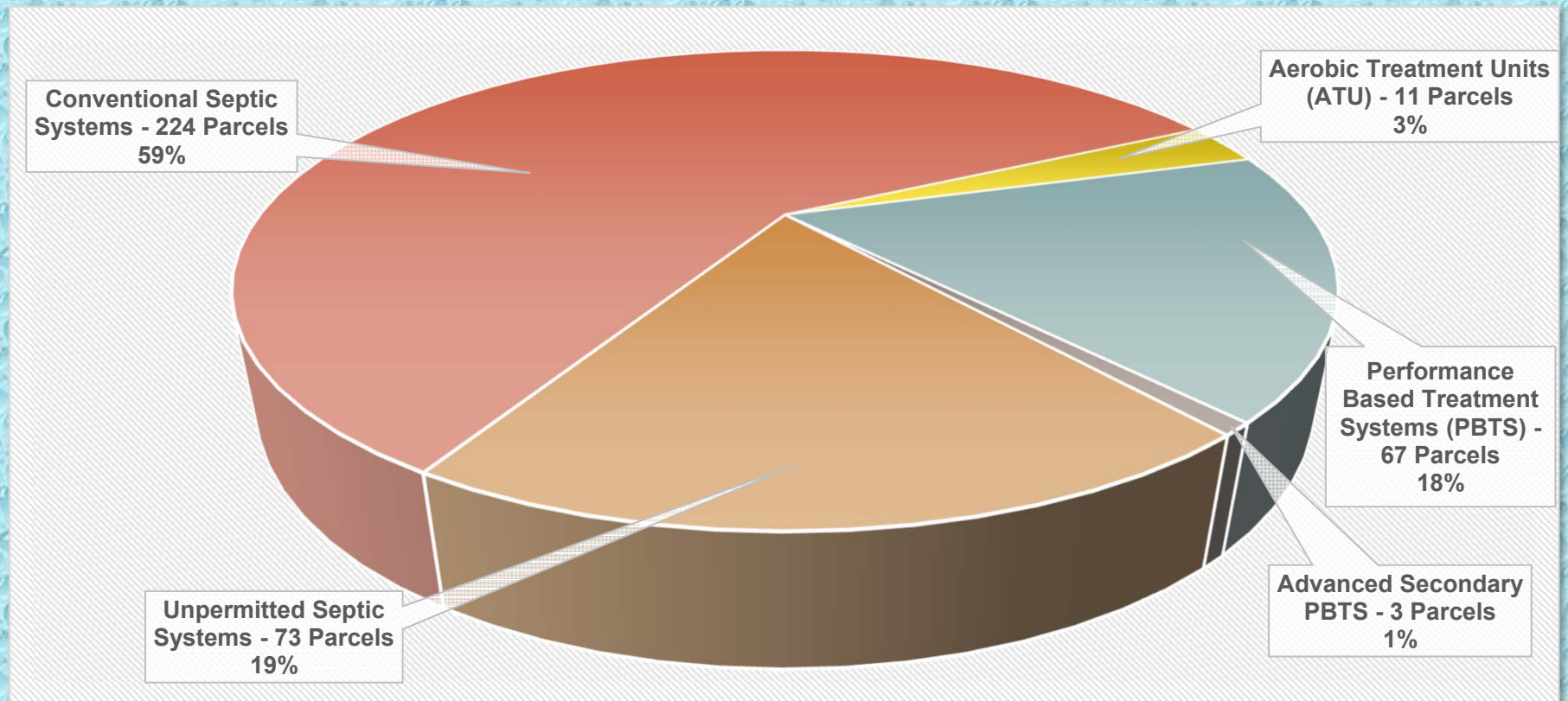
Inventory of Captiva Island Septic Systems

Onsite Treatment and Disposal Systems

378 OSTDS units currently on Captiva (2018)

78% conventional septic or not permitted

22% advanced OSTDS



Onsite Wastewater Alternative Overview Current Technology



FDOH Regulated Effluent Maximum Limit in mg/L (ppm)	Conventional Septic System (75% Removal TSS/BOD)	Aerobic Treatment Unit (85% Removal TSS/BOD)	Secondary Performance Based Treatment System (90% Removal TSS/BOD)	Advanced Secondary Performance Treatment System (95% removal of TSS/BOD, 50% N, 0% P) Better than existing WWTPs	Advanced Wastewater Treatment (AWT) PBTS Florida Keys Model* Not as good as AWT level WWTP
TSS	50 mg/L assumed	30 mg/L	20 mg/L	10 mg/L	10 mg/L
BOD	50 mg/L assumed	30 mg/L	20 mg/L	10 mg/L	10 mg/L
TN	No removal	No limit	No limit	20 mg/L	10 mg/L
TP	No removal	No limit	No limit	10 mg/L	1 mg/L

**AWT PBTS not enforceable under current Florida Dept of Health Regulations*

Overview of Wastewater Alternatives



Maintain

Onsite Wastewater Treatment and Disposal Systems in areas not served by existing collection systems

Construct

A Centralized Wastewater Collection and Treatment System

- Option 1 - Expand South Seas WWTP
- Option 2 - Partner with Sanibel (treatment at Donax WRF)

(A new on-island WWTP is not feasible.)

Onsite Wastewater Management Alternative Status Quo Current Technology



Advantages

- No action required

Disadvantages

- Does not address nutrient loading to nearshore waters.
- Non-permitted septic systems are not addressed, unless improvements to property trigger replacement and permitting by DOH.
- Requires on-property drainfield.
- Owner responsible for maintenance.
- Susceptible to power outages, storm surge, and sea level rise.
- Less effective when used seasonally.
- May have higher long term maintenance and replacement cost if DOH requires replacement with an Advanced OSTDS, once permitting requirement is triggered.
- Different levels of nutrient removal depending on type of system installed.
- Pending HB 85 (effective October 2019) could increase inspection requirements.

Cost

- Cost of installing a new Aerobic Treatment Unit (ATU) or Performance Based Treatment System (PBTS) on a residential property about \$36,000.
- Annual maintenance contract about \$800 per year.

Centralized Collection and Treatment Alternative

Option 1 – Expand South Seas WWTP



System Requirements:

- Construct a collection system for service areas outside South Seas.
- Requires an easement from South Seas for a wastewater forcemain.
- Could eliminate the existing Sunset Captiva, Captiva Shores, and Tween Waters Inn WWTPs.
- Could utilize private collection systems associated with existing WWTPs.
- Expand the South Seas WWTP to increase capacity by 200,000 gpd to 400,000 gpd.
- FDEP may require advanced wastewater treatment (AWT) or Membrane bio-reactor (MBR) technology and Deep Injection Well (DIW) because of increased volume treated.

Centralized Collection and Treatment Alternative

Option 1 – Expand South Seas WWTP



Advantages

- Eliminate all onsite wastewater systems on Captiva.
- Could eliminate the three package WWTPs.
- Transfers responsibility to a Managed Utility

Disadvantages

- Site subject to impact of sea level rise.
- Site wetland mitigation likely required.
- If FDEP requires AWT or MBR, add about \$4.5 million to projected cost.

Projected Cost

	Construction Cost with Collection System	Cost per ERC (1) Including \$7,000 of Owner costs	Annual Sewer Billing Based on FGUA Unified Rate
Collection system, 200,000 gpd WWTP expansion, and deep injection well (DIW)	\$21,500,000	\$33,500	\$1,060
AWT or MBR upgrade	\$26,000,000	\$39,000	\$1,060

(1) Cost per ERC assumes Package Plant service areas included in program (811 ERC)

Centralized Collection and Treatment Alternative

Option 2 – Partner with Sanibel



Wastewater System in Partnership with Sanibel Utilities

A centralized system based on collecting wastewater on Captiva Island and treating wastewater on Sanibel Island at the Donax WRF - currently planned to be expanded 600,000 gpd to 3,000,000 gpd and upgraded to AWT level treatment. (Captiva needs 200,000 gpd about 7% of Donax WRF capacity)

Combined System Requirements:

- Construct a collection system for non-sewered service areas.
- Could eliminate the existing Sunset Captiva, Captiva Shores, and Tween Waters Inn WWTPs.
- Could utilize private collection systems associated with the existing WWTPs.
- Construct Master Pumping Station and Forcemain to Sanibel's MPS No. 1.
- Wastewater treatment centralized at Sanibel's Donax WRF. Currently being upgraded to advanced AWT level treatment with nutrient removal.
- Expands Sanibel's wastewater service area to include Captiva Island outside South Seas.
- Interlocal Agreement between Lee County and City of Sanibel.

The South Seas (FGUA) remains a separate independent wastewater system.

Centralized Collection and Treatment Alternative

Option 2 – Partner with Sanibel



Cost per ERC to Partner with Sanibel

- Sanibel Connection Fee \$5,000 – to buy share of existing or planned treatment capacity.
- Collection System Assessment ($\$15,700,000 / 811 = \$19,360$) – to construct the collection and transmission system.
- Owner's side sewer \$5,000 – to modify plumbing to connect to gravity sewer in public right of way.
- Septic tank abandonment \$2,000 – to remove or abandon in place an existing septic system.
- **Total \$31,360 (1)**

(1) Cost per ERC assumes existing Package Treatment Plant service areas included in program (811 ERC)

Centralized Collection and Treatment Alternative

Option 2 – Partner with Sanibel



Advantages

- Technically feasible
- Eliminate all OSTDS on Captiva
- Could include three package WWTPs
- Transfers responsibility to a Managed Utility
- Provides AWWTP level nutrient removal – Sanibel is upgrading Donax to AWWTP
- Utility financing and **deferred payment options** for Assessment, Impact Fees, and Owner's onsite costs (side sewer and septic abandonment).

Projected Cost

Construction Cost for Collection and Transmission plus Sanibel Impact Fees	Cost per ERC (1) includes Owner Costs of \$7,000 est.	Annual Sewer Billing (2)	Projected Total Annual Cost (3)
\$19,755,000	\$31,360	\$778	\$3,000 +/- (use \$3,500 for discussion)

(1) Cost per ERC assumes Package Plant service areas included in program (811 ERC)

(2) Current Sanibel rate for a single residence

(3) Annual cost assuming assessments and owners costs are repaid over 20 years at 3.5% interest for a single residence (ERC)

Wastewater Treatment Alternatives Summary

Long term costs not that different between Alternatives



	Including connection fee, assessment, and Owner's site expense		
Maintain Status Quo with Onsite Treatment	Owner Cost per ERC (new advanced system)	Maintenance Cost	Equivalent Annual Cost (20 years at 3.5% assumed)
	\$36,000 +/-	\$800	\$3,330 +/-
Expand the South Seas WWTP	Cost per ERC (without AWT with Owner's costs)	Sewer Charges (current)	Equivalent Annual Cost (20 years at 3.5% assumed)
	\$33,500	\$1,060	\$3,400 +/-
Partner with Sanibel on Donax WRF	Cost per ERC (with Owner's costs)	Sewer Charges (current)	Annual Cost with SRF Financing
	\$31,360	\$778	\$3,000 +/- (use \$3,500 for discussion)

PANEL CONCLUSIONS



- Septic systems may not be sustainable long term due to environmental and climate change impacts.
- Upgrade to high performance septic systems likely not cost effective versus central sewer.
- Sanibel partnership likely best central sewer alternative.
- Estimated cost about \$3,500 annually per property owner over 20 years with utility financing.
- Not enough facts yet for complete cost-benefit analysis.

FURTHER STUDY NEEDED



- Are septic systems impacting health/water quality today?
- If so, how significant is the impact?
- How big is the impact versus other water quality determinants?
- When and how will climate change induced sea level rise impact septic systems?
- Are property values at risk? In 20 years?

PANEL NEXT STEPS



- Complete environmental/SLR consulting project.
- Determine feasibility/effectiveness of regulation.
- Determine possible outside funding sources.
- Confirm Sanibel capacity/partnership.
- Define inter local agreement.
- Panel recommendation/report – late Spring.
- Straw poll, public feedback.
- Central sewer requires municipal taxing authority and approval by majority of property owners.



Questions . . .



Discussion