



ASCE Palm Beach Branch
Septic-to-Sewer Conversions
September 20, 2022



PRESENTERS



Safiya Brea, P.E., LEED AP
Broward Office Leader /
Principal Engineer



**Suzanne Dombrowski, P.E., ENV SP,
M.ASCE**
Palm Beach Office Leader /
Principal Engineer



Septic-to-Sewer Conversions

OUTLINE

- Septic Tanks/Systems in Florida
- Components of a Septic System
- How a Septic System Works
- When are Septic Systems Allowed
- Regulation of Septic Tanks/Systems
- Common Issues with Septic Tanks/Systems
- Sewer System Design Options
- Regulations for Property Owner Connections
- Permitting
- Funding Sources
- Policy and Implementation
- Case Studies in Florida
- What Does the Future Hold?
- Questions

SEPTIC TANKS/SYSTEMS IN FLORIDA

Florida Trend

FLORIDA'S BUSINESS AUTHORITY

WATER POLLUTION

Florida's septic tanks and pollution

Mike Vogel | 10/25/2019

Estimated 2.6M septic systems statewide.

12% of the U.S. total.

30% of Floridians are on septic.

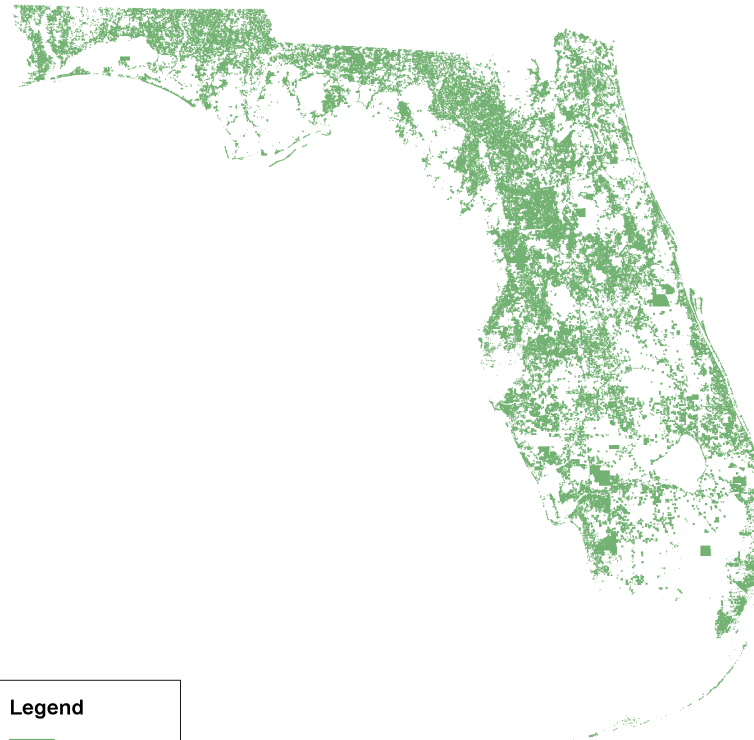
Peak was 72,578 installed in 1978.

FDOH: Septic systems are “safe and effective” ways to get rid of waste.




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SEPTIC TANKS/SYSTEMS IN FLORIDA



Legend

 Septic System

*Septic Systems Shown are "Known", "Likely" or "Suspected" per FDOH Data

Source: FDOH GIS Data

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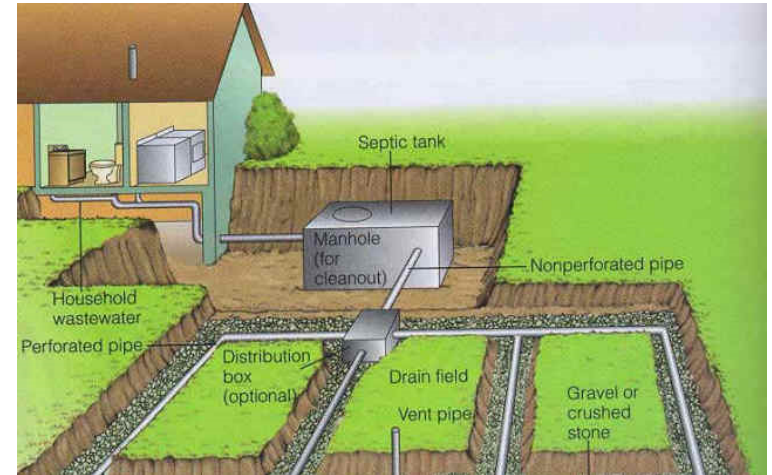


COMPONENTS OF A SEPTIC SYSTEM

Onsite Sewage Treatment and Disposal System (OSTDS)

Septic tank

Drain field



HOW A SEPTIC SYSTEM WORKS

Allows waste to separate into three layers:

Solids

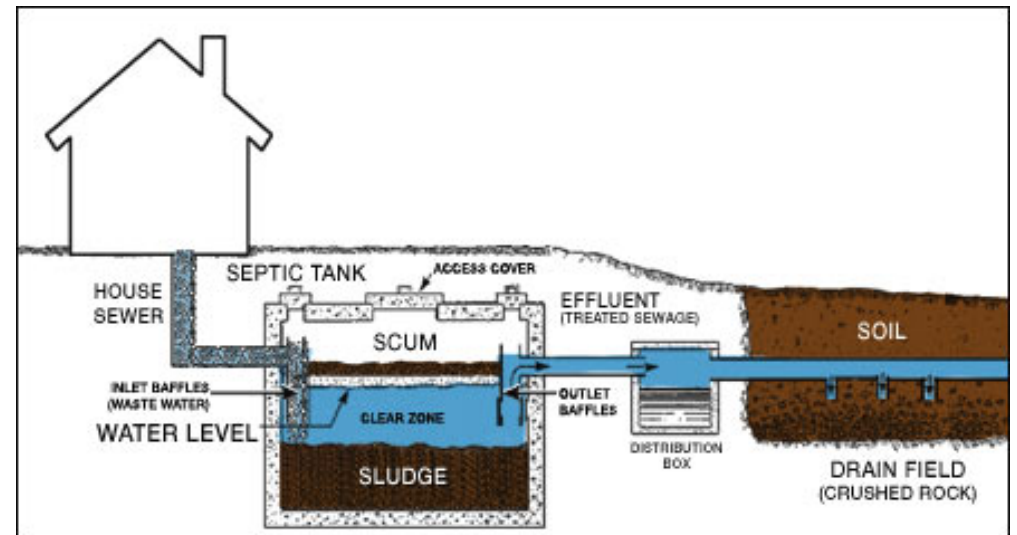
Effluent

Scum

Solids settle at the bottom, where microorganisms decompose them

Middle layer of effluent travels to drain field

Effluent is treated by rock field and percolates into the soil before reaching the groundwater



WHEN ARE SEPTIC SYSTEMS ALLOWED

Domestic sewage flow is less than 10,000 gpd*

Commercial sewage flow is less than 5,000 gpd*

No likelihood that the system will receive toxic, hazardous or industrial wastes

Centralized sewer system is not available

**Source: FDOH's Bureau of Onsite Sewage Programs*



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REGULATION OF SEPTIC TANKS/SYSTEMS

Bureau of Onsite Sewage Program in the Florida
Department of Health (DOH)

Environmental Health Section of County DOH

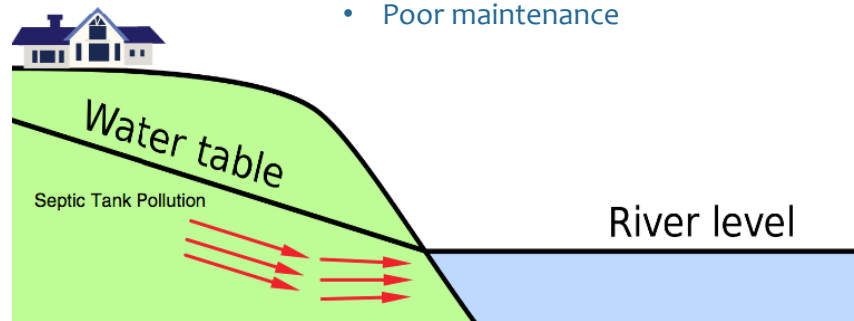


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COMMON ISSUES WITH SEPTIC TANKS/SYSTEMS

Problem with Septic Tanks

- Root intrusion
- Cracks in walls of tank
- Vehicle loads cause damage to tank or drain field
- Collapsed baffle
- Change in groundwater
- Poor maintenance



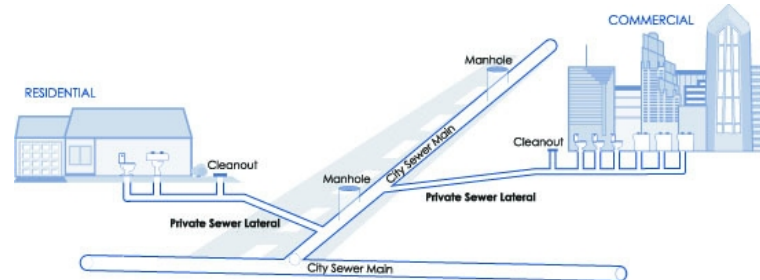
Environmental Effects

- Increased nitrogen levels in groundwater
- Contaminated drinking water wells
- Contamination of surface waters
- Health Effects in humans, animals and plants

Economical Effects

- Tourism
- Commercial fishing
- Property values

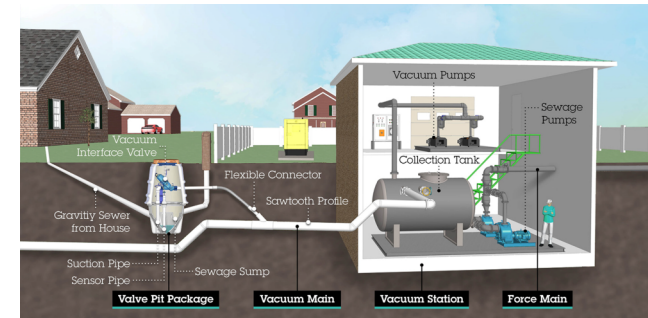
SEWER SYSTEM DESIGN OPTIONS



Gravity



Low Pressure



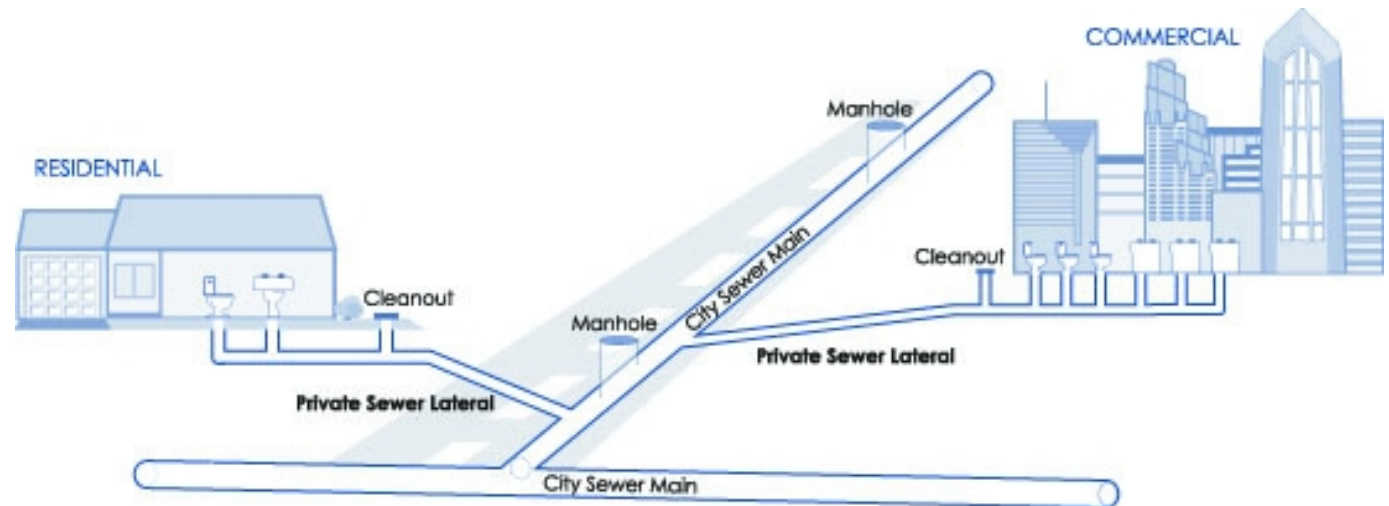
Vacuum

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SEWER SYSTEM DESIGN OPTIONS - GRAVITY

Gravity

- Lateral
- Gravity sewer line ($\geq 4''$)
- Manholes
- Discharge to lift station wetwell or WWTF



SEWER SYSTEM DESIGN OPTIONS – LOW PRESSURE

Low Pressure

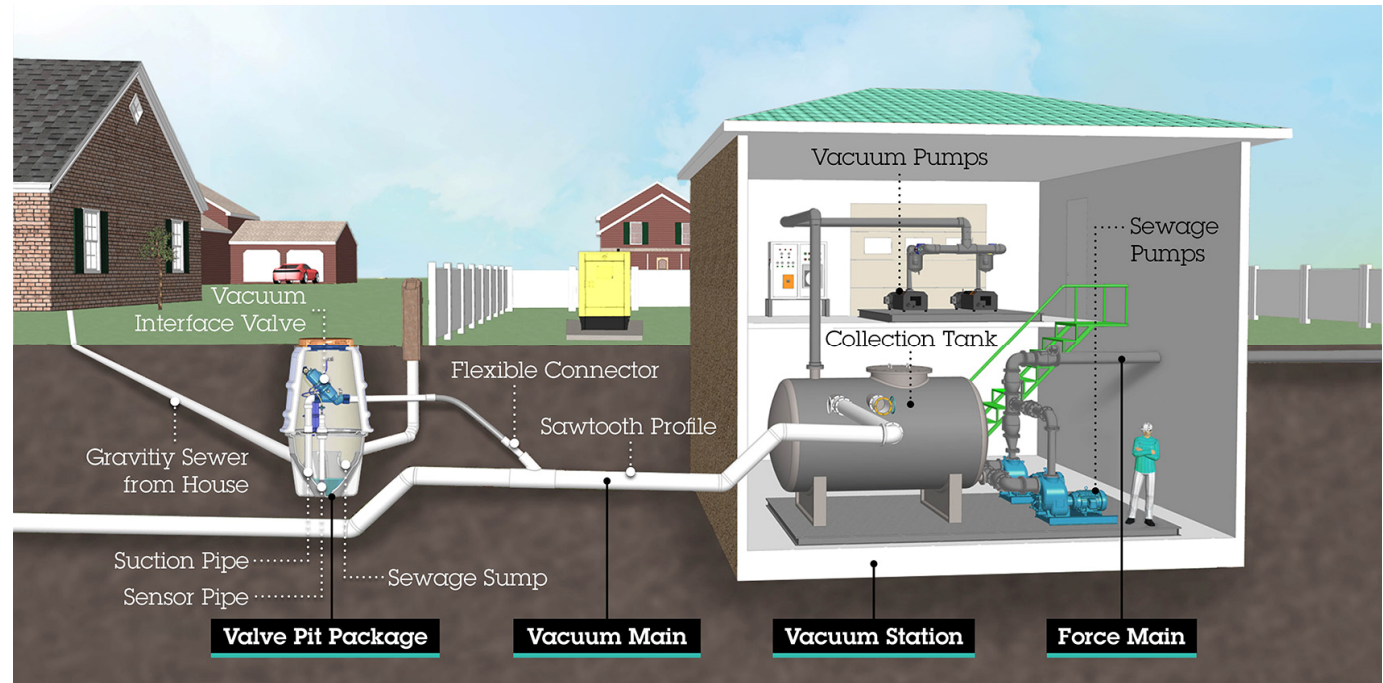
- Lateral
- Grinder pump
- Force Main(s) ($\geq 1.25''$)
- Discharge to manhole, force main, lift station wetwell, or WWTF



SEWER SYSTEM DESIGN OPTIONS - VACUUM

Vacuum

- Lateral
- Collection Chamber (Interface Valve)
- Vacuum Pipeline ($\geq 3''$)
- Vacuum Station w/ Collection Tank
- Discharge to WWTF via conventional system



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DESIGN OPTIONS – COMPARISON – GRAVITY

Advantage	Disadvantage
Simple operation	Construction requires greater excavation depth (impacts construction cost)
No valve vaults/pump pits at each service	Greater disruption to community and for a longer duration (during construction)
Most common system in U.S.	Lift stations are required at system low points
Design criteria well established and outlined in State/local regulations	Multiple lift stations – more emergency generators and manpower (during power outages)
Electrical power confined to lift stations (if required)	Manholes source of I/I
Gravity systems typically perform well	Minimum velocity must be maintained to prevent settling of solids
Grit and solids can be handled	Expansion of gravity systems can be limited
	Additional service connections more difficult/costly with deeper gravity mains

DESIGN OPTIONS – COMPARISON – LOW PRESSURE

Advantage	Disadvantage
Smaller pipe sizes required	Grinder pumps required at each service
Shallow depth installation	Broken lines can result in loss of pressure
Less disruption to community (during construction)	Pigging of line may be required to remove grit and solids (on long runs, etc.)
Low initial cost compared to gravity	Each grinder station requires electrical power
Reduced risk of I/I	
Not dependent on elevations/population density	
Allows for expansion of the system	
More common than vacuum sewer systems	

DESIGN OPTIONS – COMPARISON – VACUUM

Advantage	Disadvantage
Shallow depth installation	Valve vault required at each service
Reduces the number of lift stations required to serve the area	Broken lines can result in loss of vacuum (and I/I)
Reduced risk of I/I	Vacuum systems not as widely utilized as other systems (increases O&M training requirement)
Vacuum pits are air operated and not powered by electricity	Vacuum systems consist of moving parts throughout system
Not dependent on elevations/population density	Potential odor and noise complaints at vacuum stations
Allows for expansion of the system	Vacuum stations are typically more expensive to construct than traditional submersible lift stations

DESIGN OPTIONS – COMPARISON – OVERALL

	Common System	Shallow/Low Impact Construction	Small Pipe Size	No Mechanical Components @ Service Connection	No Power Source @ Service Connection	Well-Defined Regulations	No Grit/Solids Issues	Less I/I Concerns	Independent of Elevation	No Min. WW Flow Required	Expandable System	Lower Cost
Gravity	✓			✓	✓	✓	✓					
Low Pressure	✓	✓	✓					✓	✓	✓	✓	✓
Vacuum		✓			✓		✓	✓	✓	✓	✓	

REGULATIONS FOR PROPERTY OWNER CONNECTIONS

381.00655, Florida Statutes

- Owner of properly functioning OSTDS must connect to public system within 365 days of notification that the system is operational
- Owner of improperly functioning OSTDS must connect to public system within 90 days of notification that the system is operational
- Owner of public sewer system may waive requirement for mandatory connection if such connection is not required in the public interest due to public health considerations.

381.00655(1)(a), Florida Statutes

- Grants property owner the option of paying the amortized value of connection fees in equal monthly payments for 2 years
- If property owner has demonstrated financial hardship, connection fees can be paid over 5 years

PERMITTING - FDOH

Florida Department of Health

- 64E-6.011(1), F.A.C.

Whenever the use of an onsite sewage treatment and disposal system is discontinued following connection to a sanitary sewer or discontinuing the use of a septic tank and replacement with another septic tank, the system shall be abandoned within 90 days and any further use of the system for any purpose shall be prohibited. However, if the Department of Environmental Protection or its designee approves the use of the retention tank where the tank is to become an integral part of a sanitary sewer system or stormwater management system, the septic tank need not be abandoned.

- 64E-6.011(2)(a), F.A.C.

Property owner or agent shall apply for a permit from the department to abandon the existing onsite sewage system and submit the required fee...

- 64E-6.011(3), F.A.C.

The permitting provisions of paragraph 64E-6.011(2)(a), F.A.C., are not required if a local utility or local plumbing authority performs a system abandonment program which requires the completion of those steps listed in paragraphs 64E-6.011(2)(b), (c), (d), and (e), F.A.C. If the system abandonment is performed by a local utility or local plumbing authority, the local utility or local plumbing authority performing the abandonment program shall maintain a log of all inspections performed and shall forward the log to the County Health Department on a monthly basis.

PERMITTING - FDEP

Florida Department of Environmental Protection

- Florida Statutes Chapter 403 Part I

“Unless exempted by rule or statute, any facility or activity which discharges wastes into waters of the state or which will reasonably be expected to be a source of water pollution must obtain a permit from the department.”

- 62-604.300(8)(a) Notification/Application for Constructing A Domestic Wastewater Collection/Transmission System
- 62-604.300(8)(b) Request for Approval to Place a Domestic Wastewater Collection/Transmission System into Operation
- National Pollution Discharge Elimination System (NPDES) Permit



Septic-to-Sewer Conversions

FUNDING SOURCES

Show Me The Money!



Septic-to-Sewer Conversions

FUNDING ASSISTANCE

USDA Rural Development

American Rescue Plan Act of 2021 (ARPA)

FDEP Division of Water Restoration Assistance (DWRA)

- Clean Water State Revolving Fund (CWSRF)
- Nonpoint Source Funding
 - Federal Clean Water Act Section 319(h) Grants (319 Grants)
 - State Water-Quality Assistance Grants (SWAG)

Other Potential FDEP Fund Sources

- Water Protection Grants (via Protecting Florida Together webpage)
- Wastewater Grant Program
- Water Management Districts



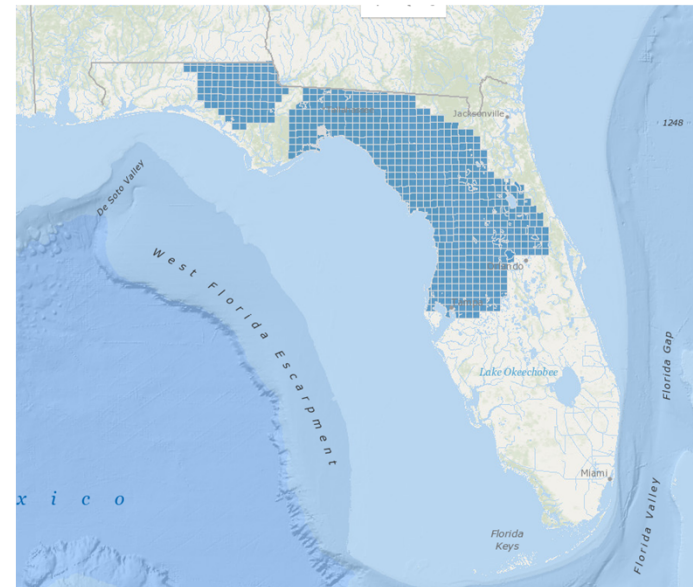
POLICY AND IMPLEMENTATION

SENATE BILL 552: Florida Springs and Aquifer Protection Act

- Require the development of OSTDS remediation plans when OSTDSs contribute significantly to pollution of a Priority Focus Area;

What Does this Mean?

- FDEP charged with developing remediation plans in Springs Protection Areas where septic systems account for more than 20% of the nutrient loading



POLICY AND IMPLEMENTATION

Communication Plan with Stakeholders

- Quality of life disruptions
- Financial burden



CASE STUDIES IN FLORIDA

Case Studies: Septic to Sewer Conversion in Florida

- Planning level: Seacoast Utility Authority Low Pressure Sewer Plan
- Gravity sewer: BCWWS UAZ
- Low pressure sewer: FKA
- Gravity/low pressure sewer: Kennedy Space Center's KARS Park, Merritt Island, FL
- Gravity sewer: Gardens Subdivision, Rockledge, FL
- Low pressure sewer: Centralized Wastewater System - Phase II, Taylor County, FL

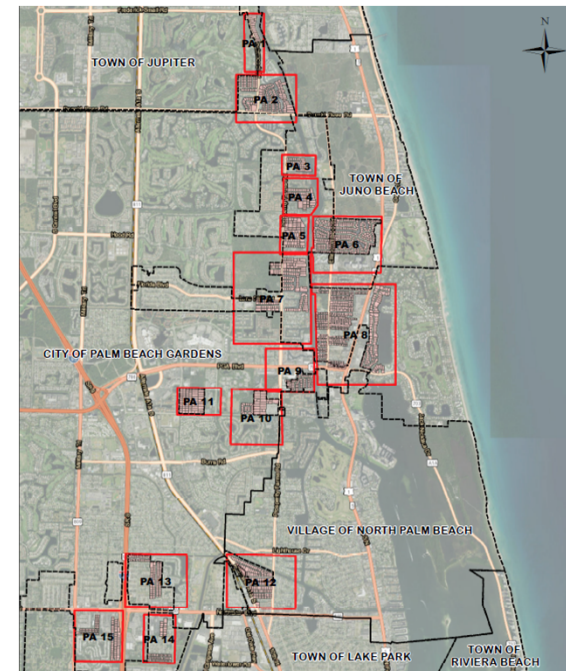


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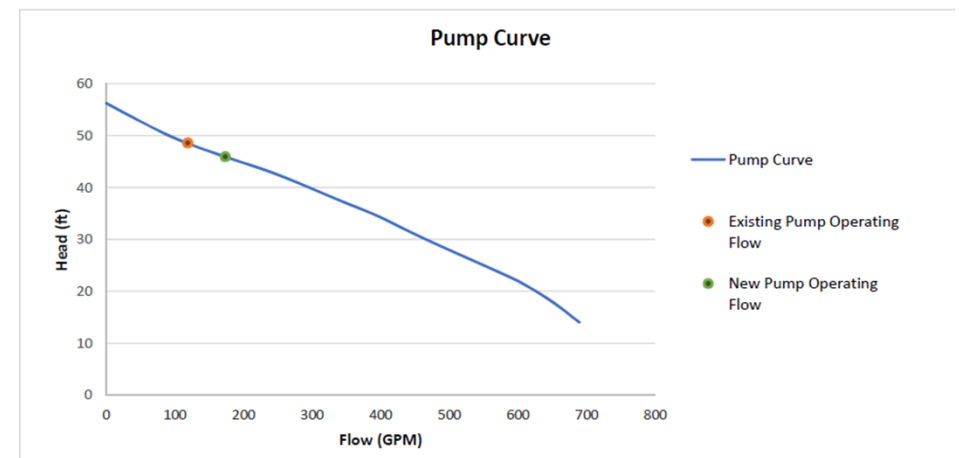
CASE STUDY #1: SUA LOW PRESSURE FORCE MAIN PLAN

- Seacoast Utility Authority (SUA) provides wastewater services to approximately 44,000 residential properties and 1,700 businesses
- 15 areas were identified as lacking sewer service (on septic tank)
 - Project areas range in size from 19 to 604 parcels
 - Total affected number of parcels was 2,216



CASE STUDY #1: SUA LOW PRESSURE FORCE MAIN PLAN

- Identify design criteria
 - Pipe size, material
- Analyze downstream impacts to existing sanitary system
 - Gravity sewer
 - Force mains
 - Lift station capacity
- **Conceptual designs and cost estimates**
 - Include lift station , gravity sewer and force main upgrades where required



Results

Will Pump Handle Additional Flow?

Yes

Will the Pump Efficiency Increase or Decrease?

Increase

Pump Efficiency Reduction Due to New Flow

10%

CASE STUDY #1: SUA LOW PRESSURE FORCE MAIN PLAN

- Results

- Total project cost = \$23,432,828
- Number of parcels = 2,216
- Average cost per parcel = \$10,573

6. **Initial Low-Pressure Sewer Assessment - \$10,600.00 per parcel.** Governed by Authority Policies, practices and procedures and the provisions of the sewer service agreement referenced above, and subject to the availability of Authority funding, the Authority shall design, permit, construct, own, operate, maintain, renew and replace such Low Pressure Sewer System improvements as may be required to allow connection of the customer-owned on-site pumping facilities to the Authority's Low Pressure Sewer System at the customer's property line.

SEACOAST UTILITY AUTHORITY

4200 HOOD ROAD
PALM BEACH GARDENS, FL 33410-1810

Business Phone: (561) 627-2900

Customer Service Phone: (561) 627-2920

After Hours Emergency Phones: (561) 627-2900

Facsimile Number: (561) 624-2839

Web Site Address: www.sua.com

UNIFORM EXTENSION POLICY

Adopted December 14, 1988

Revised September 23, 2020

CASE STUDY #2: BCWWS BROADVIEW PARK NIP

- Last of Neighborhood Infrastructure Improvement Projects to be carried out by Broward County in the unincorporated areas
- 96,000 LF of roadways
- 715 Acres



Septic-to-Sewer Conversions

CASE STUDY #2: BCWWS BROADVIEW PARK NIP

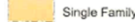





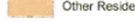

Land Use

- 1,461 Single Family Homes
- 775 Multi-Family Homes or Mobile Homes
- School
- Special Needs Center
- County Park
- Several Commercial Businesses
- 6,800 residents
- **1,500 septic tanks**



Legend

Land Use Type

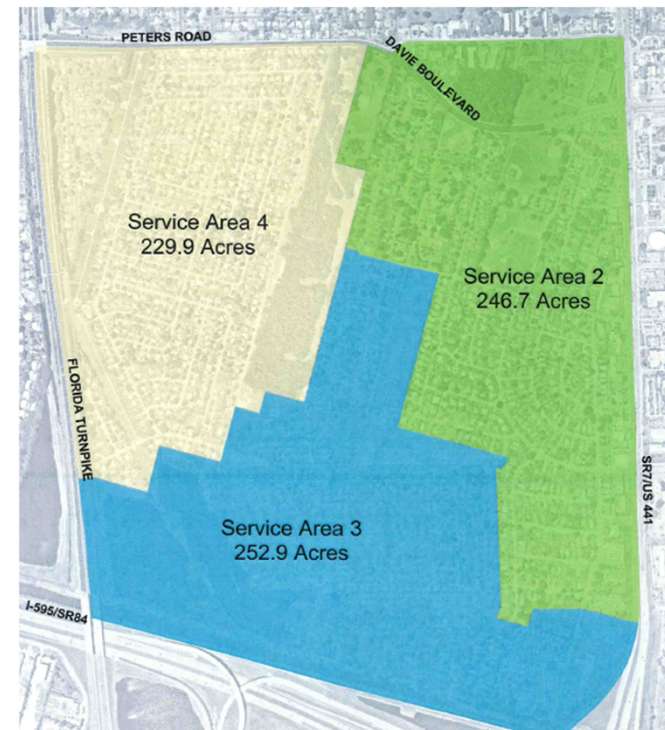
 Single Family	 Commercial
 Mobile Home	 Industrial
 Multi-Family	 Institutional / Government
 Other Residential	 Other

Septic-to-Sewer Conversions

CASE STUDY #2: BCWWS BROADVIEW PARK NIP

Phases

- Basis of Design Report
- Bid Package 1: Water
- Bid Package 2: Septic-to-Sewer (east side)
- Bid Package 3: Septic-to-Sewer (west side)
- Bid Package 4: 20" water transmission main

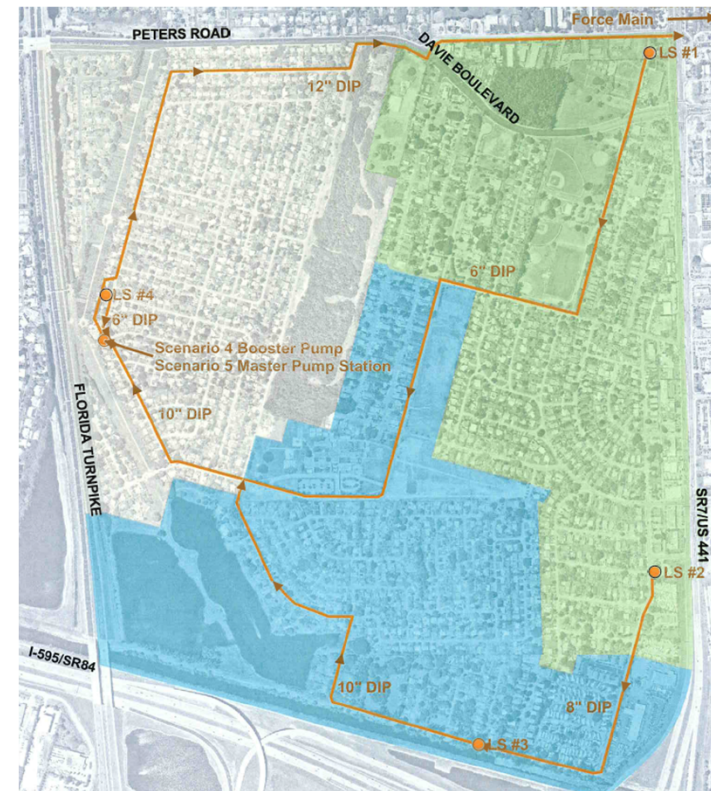


Septic-to-Sewer Conversions

CASE STUDY #2: BCWWS BROADVIEW PARK NIP

Basis of Design Report

- Population projections
- Water and sewer demand forecasting
- Drainage master system
- Sidewalk improvement analysis
- Landscape beautification



Septic-to-Sewer Conversions

CASE STUDY #2: BCWWS BROADVIEW PARK NIP

Bid Package 2 & 3: Septic-to-Sewer

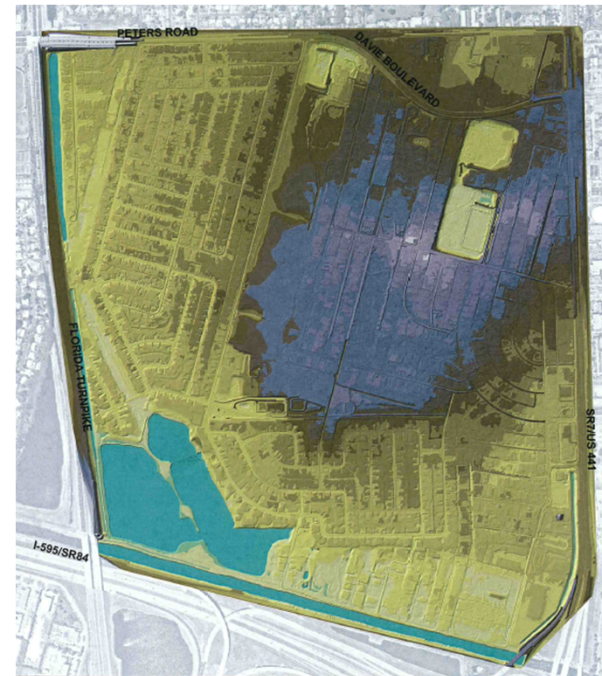
- 16 miles of gravity sewer
- 4 miles of force main
- 3 lift stations
 - 2 duplex
 - 1 mater triplex



CASE STUDY #2: BCWWS BROADVIEW PARK NIP

Challenges

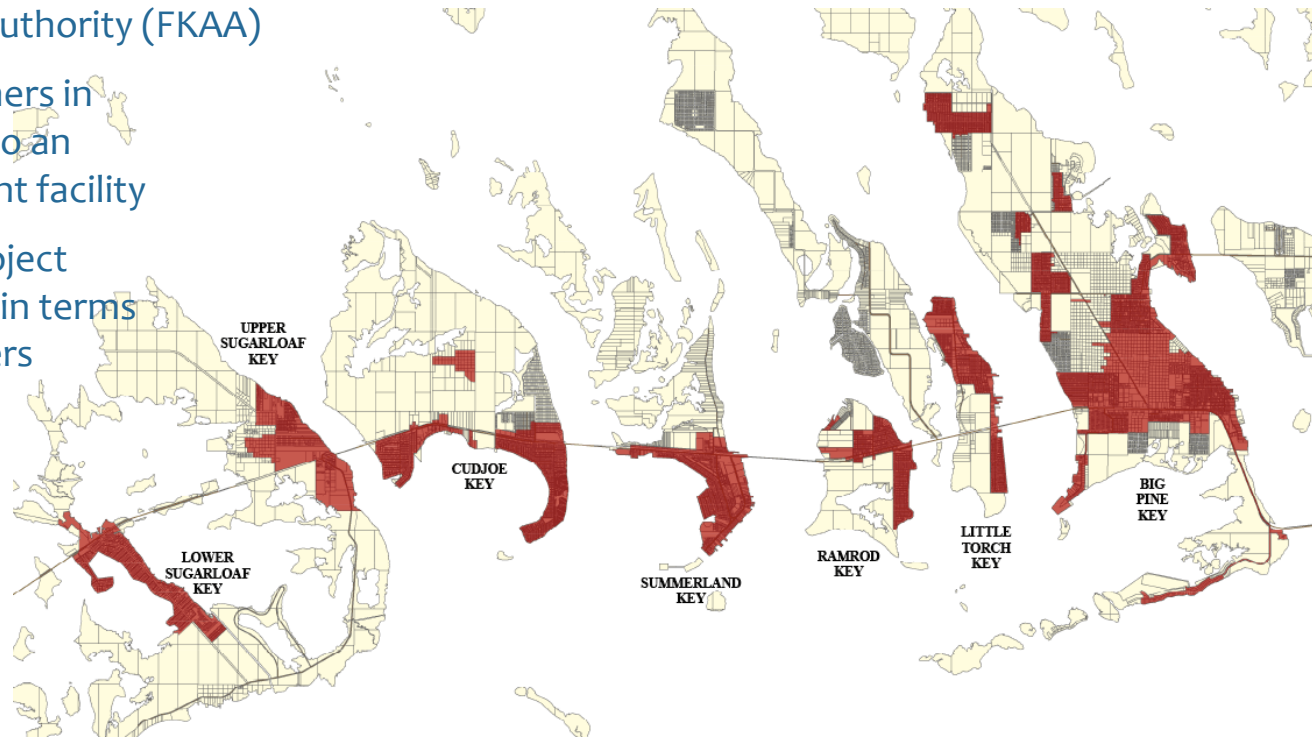
- Elevation differential (17 feet)
- Older properties with underground utilities not up to code
- Dewatering and contamination
- Deep excavations
- Phasing
- Community Involvement
- Multiple regulatory agencies



Septic-to-Sewer Conversions

CASE STUDY #3: CUDJOE REGIONAL WW COLLECTION SYSTEM

- Client: Florida Keys Aqueduct Authority (FKAA)
- FDEP mandated that all customers in Monroe County be connected to an advanced wastewater treatment facility
- At the time, was the largest project undertaken by Monroe County in terms of cost and number of customers
- Project components
 - 40 miles force main
 - 20 miles gravity sewer
 - 4 lift stations
 - 62 grinder stations
 - Over 5,000 parcels



Septic-to-Sewer Conversions

CASE STUDY #3: CUDJOE REGIONAL WW COLLECTION SYSTEM

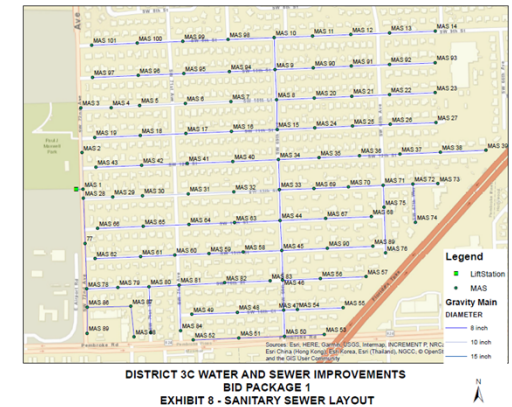
- Hybrid system
- Gravity sewer for denser areas
- Low pressure sewer for more sparse areas
- Design-build procurement method to accelerate project schedule



Septic-to-Sewer Conversions

CASE STUDY #4: DISTRICT 3C

- Client: Broward County Water and Wastewater
- Abandonment of existing septic systems with combination gravity/force main/lift stations to an existing Master Pump Station and WWTP.
- 2 Phase project with 1,700 septic-to-sewer conversions.
- Owner funded.
- Currently under design with construction expected to commence next year.



Septic-to-Sewer Conversions

CASE STUDY #5: GARDENS SUBDIVISION

- Client: City of Rockledge
- Abandonment of existing septic systems with gravity, lift station, force main to City's existing WWTP.
- 140+ septic-to-sewer conversions.
- State Revolving Fund (SRF)
- Eliminate discharge to the Indian River Lagoon (adjacent downstream to the east of the project).



Septic-to-Sewer Conversions



CASE STUDY #6: CENTRALIZED WASTEWATER SYS. – PH II

- Client: Taylor Coastal Water & Sewer District
- Abandonment of existing septic systems with low pressure collection system connect to existing force mains/lift stations under Phase I.
- 100+ septic-to-sewer conversions.
- USDA Rural Development grant funded.
- Eliminate discharge to Gulf of Mexico (immediately adjacent to the project) on a regular basis, as well as during storm surges.
- Also upgraded package WWTP installed under Phase I.



Septic-to-Sewer Conversions

WHAT DOES THE FUTURE HOLD?

Financial Cost

- At \$5-\$15K per septic system, the cost to convert **2.6M homes is \$39B!**
~35% of Florida's annual budget.
- 10K+ new septic systems each year

Implementation of Innovative Systems

- Convert septic to central sewer
- Advanced treatment to convert effluent for recharge of aquifer/reclaim water for irrigation.

Updates to Restrictive Local Municipality Standards



Septic-to-Sewer Conversions

QUESTIONS



Safiya Brea, P.E., LEED AP
Broward Office Leader /
Principal Engineer
Email: sbrea@chenmoore.com
Office: +1 (954) 730-0707 x 1007

Questions?



Suzanne Dombrowski, P.E., ENV SP, M.ASCE
WPB Office Leader / Principal Engineer
Email: sdombrowski@chenmoore.com
Office: +1 (561) 746-6900 x 1035



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