Research Review & Advisory Committee (RRAC) Meeting

December 10, 2018

Environmental Health Staff

Disease Control and Health Protection

Bureau of Environmental Health

Onsite Sewage Programs

Agenda

9:00 – 9:10	Introductions and housekeeping
9:10 – 9:20	Review of minutes from June 20, 2018 meeting
9:20 – 9:40	Old business & research program news
9:40 – 10:00	Updates on Basin Management Action Plan related activities
10:00 – 10:30	Updates on the Florida Water Management Inventory project

Agenda - Continued

10:30 – 11:00	Updates on the OSTDS funding investigation
11:00 – 11:30	Updates on the continued monitoring of nitrogen-reducing media systems
11:30 – 12:00	Public comments
12:00	Adjourn

Introductions & Housekeeping

- Committee roll call
- Identification of audience
- Will overall mute hitting *5
- Mute / unmute phone line = *6
- Do not put phone on hold
- Download meeting material:
  http://www.floridahealth.gov/environmental-health/onsite-sewage/research/rrac.html

Review of Meeting Minutes from June 20, 2018 Meeting

Old Business & Research Program News

Old Business

Action items from the RRAC meeting on June 20, 2018

1. Continue with high priority research projects.
2. Update memberships for several RRAC members.
3. Post meeting materials used for June 20 onto DOH's RRAC web page.

Final Research Projects Ranking

Project Title	Total Project Score	Project Ranking
Continuation of Florida Water Management Inventory	28	1
Continued Monitoring on Passive Nitrogen-Reducing Onsite Systems	28	2
Development of Funding Mechanisms for OSTDS Remediation and Upgrades	26	3
Correlations between water quality, OSTDS, and health effects	14	4
Estimation of failure or non-conformance rates of OSTDS	10	5

Membership Update

1. Memberships for the following professional groups need to be renewed:
   a) Home Building Industry (Florida Home Builders Association)
   b) Professional Engineer (Florida Engineering Society)
   c) Real Estate Profession (Florida Association of Realtors)

2. Notices have been sent to related RRAC members for:
   - Recommendation letter
   - Completed membership application form
   - Resume

Meeting Materials for the June 20, 2018 Meeting Posted:

http://www.floridahealth.gov/environmental-health/onsite-sewage/research/rrac.html

Program News

- Ms. Robin Eychaner took the place of Mr. Dale Holcomb in September of 2018.

- Joined the Department of Health and Rehabilitative Service in Collier County in 1994.
- Worked in environmental health programs including food, institutional care facilities, schools, mobile home parks, migrant housing, complaints, and OSTDS.
- Major tasks as environmental administrator include rule development, OSTDS early failure data, bill analysis, support of the Technical Review and Advisory Panel, and supervising two staff working on variances, variance advisory board, contractor registration, training.

Program News - Continued

1. Revision of Section 64E-6.009 (7), Florida Administrative Code:
   - Notice of Proposed Rule published on March 22, 2018.
   - Public hearing held on April 16, 2018. Written comments received.
   - Rule became effective on July 31, 2018.

Program News - Continued

2. BMAP related materials posted on the Onsite Sewage Program or DEP website:
   - Letter to home builders regarding OSTDS permitting.
   - Overview over nitrogen-reducing systems for springs protection.
   - General page of DOH-approved product lists.
   - Florida Department of Environmental Protection's Septic Upgrade Incentive Program.

Research Program News - Continued

3. Review literature about factors that may impact nitrogen removal by lignocellulosic materials

- Impact of plant species
- Impact of grain size
- Impact of type of wood
- Porosity of different plant materials
- Hydraulic efficiency of different plant materials
- Leaching of dissolved organic carbon (DOC) from different plant species
- Temperature effect
- Nitrate concentration effect

Impact of Plant Materials on Nitrogen Removal – Plant Species

Plant Materials	Grain-size (mm ± 1SD)	Nitrate Removal Rate for the Period 10-23 Months (gN/m3/day) 14^{0}C	Nitrate Removal Rate for the Period 10-23 Months (gN/m3/day) 23.5^{0}C
Pine sawdust	2 ± 1.8	2.2 ± 0.2	5.0 ± 0.2
4 mm wood chip	4 ± 2.0	2.9 ± 0.3	4.8 ± 1.0
6 mm wood chip	6 ± 3.3	3.1 ± 0.5	5.3 ± 0.2
15 mm wood chip	15 ± 5.3	3.6 ± 1.0	5.3 ± 1.4
61 mm wood chip	61 ± 19	3.3 ± 1.0	4.2 ± 0.2
Hardwood	11 ± 4.5	3.0 ± 0.5	4.9 ± 0.2
Maize cobs	45 ± 11	19.8 ± 1.8	15.0 ± 1.2
Wheat Straw	13	5.8 ± 1.4	7.8 ± 1.6
Green waste	6 ± 9.7	7.8 ± 0.2	10.5 ± 1.1

Cameron and Schipper (2012)

Impact of Plant Materials on Nitrogen Removal – Grain Size

Wood Size Treatment	Grain-size (mm)	Nitrate Removal Rate (gN/m3/day)
Control	0.11 - 0.22	-0.14 ± 2.0
Shred	3.5 - 7.8	1.24 ± 2.1
Coarse	1.4 - 4	2.32 ± 2.0
Fine	0.35 - 0.55	3.68 ± 2.1

Schmidt and Clark (2013)

Impact of Plant Materials on Nitrogen Removal – Type of Wood

Wood Type	**Nitrate Removal Rate (gN/m3/day)**
Control	0.08 ± 1.9
Softwood	3.00 ± 2.0
Hardwood	3.61 ± 2.1

Schmidt and Clark (2013)

Porosity of Different Plant Materials

Plant Materials	Grain-size (mm ± 1SD)	Total Porosity at the Start (m3/m3)	Total Porosity at the End (m3/m3) (14^{0}C)
Pine sawdust	2 ± 1.8	0.75	0.87 ± 0.04
4 mm wood chip	4 ± 2.0	0.86	0.86 ± 0.01
6 mm wood chip	6 ± 3.3	0.8	0.85 ± 0.07
15 mm wood chip	15 ± 5.3	0.84	0.86 ± 0.02
61 mm wood chip	61 ± 19	0.83	0.87 ± 0.01
Hardwood	11 ± 4.5	0.76	0.81 ± 0.02
Maize cobs	45 ± 11	0.8	0.94 ± 0.13
Wheat Straw	13	0.95	0.97 ± 0.12
Green waste	6 ± 9.7	0.79	0.83 ± 0.02

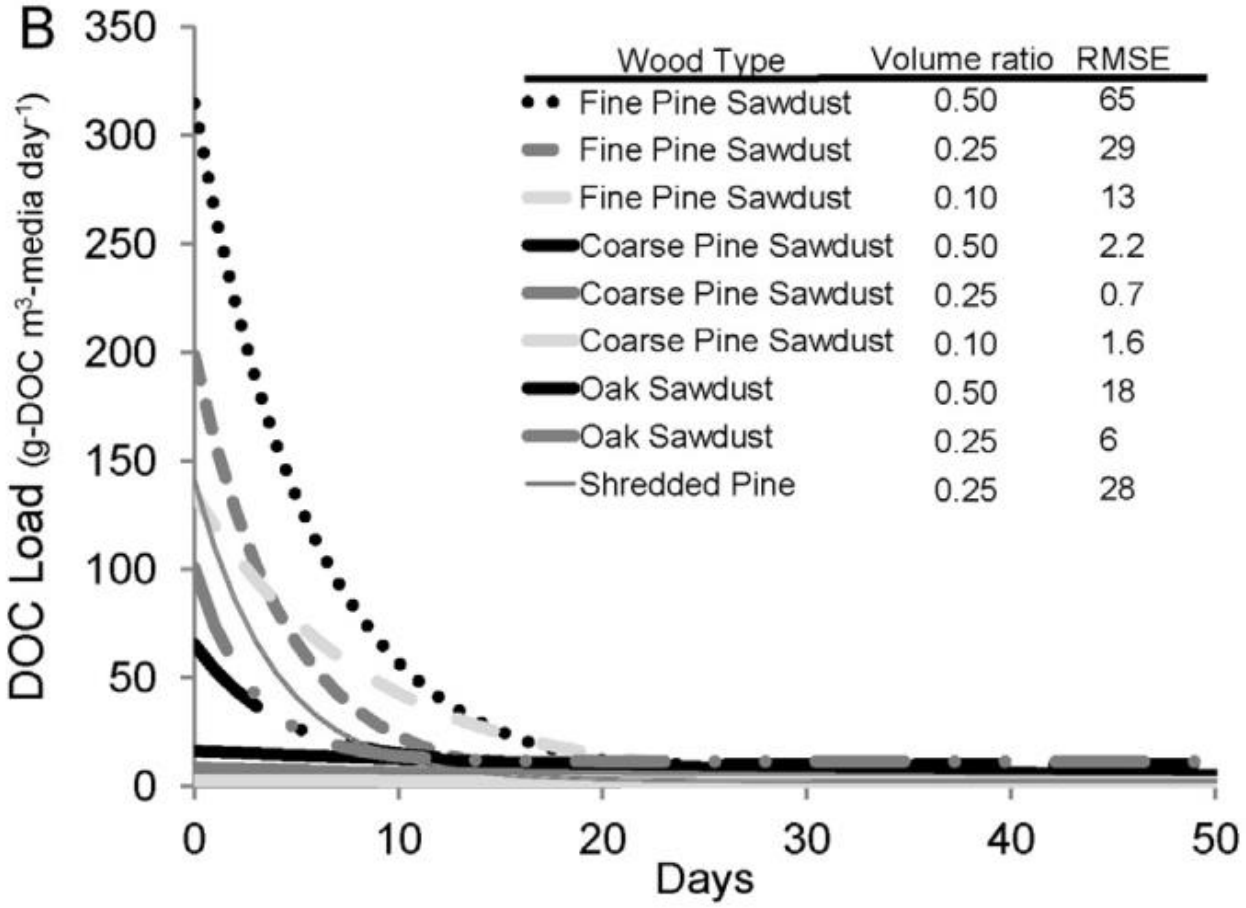
Cameron and Schipper (2012)

Hydraulic Efficiency of Different Plant Materials

Plant Materials	Grain-size (mm ± 1SD)	Hydraulic Efficiency
Pine sawdust	2 ± 1.8	1.78 ± 0.1
4 mm wood chip	4 ± 2.0	1.84 ± 0.5
6 mm wood chip	6 ± 3.3	1.76 ± 0.3
15 mm wood chip	15 ± 5.3	1.49 ± 0.1
61 mm wood chip	61 ± 19	1.36 ± 0.1
Hardwood	11 ± 4.5	1.33 ± 0.1
Maize cobs	45 ± 11	1.64 ± 0.2
Wheat Straw	13	1.38 ± 0.1
Green waste	6 ± 9.7	1.62 ± 0.3

Cameron and Schipper (2012)

DOC Leaching from Different Plant Materials



Schmidt and Clark (2013)

Updates on Basin Management Action Plan Related Activities

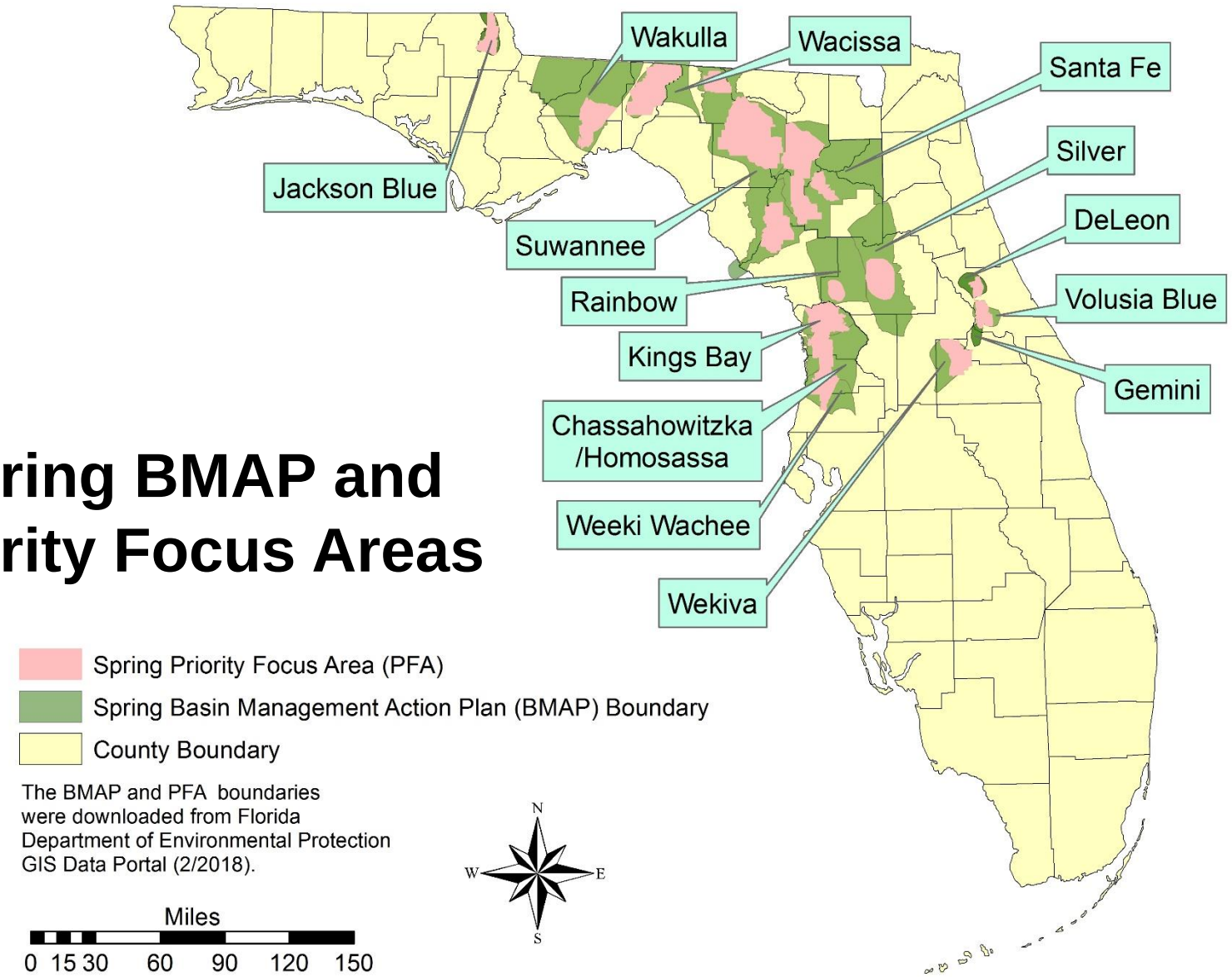
Florida Springs and Aquifer Protection Act

(Florida Statute Sections 373.801 – 373.813)

Area residents applying for **new** construction permits after expiration of the BMAP extensions (January 4, 2019) **in PFAs on lots less than one acre** have the following options:

- Connect to available sewer or,
- Install a non-nitrogen-reducing OSTDS if the applicant demonstrates that sewer connection will be available within 5 years or,
- Install a nitrogen-reducing OSTDS using various options identified by the Department.

Spring BMAP and Priority Focus Areas



"New" OSTDS per Florida Administrative Code, Chapter 64 E-6

- where none has been
- where the previous system was abandoned
- where the previous DEP-regulated treatment facility is withdrawn
- to serve a house addition rather than modifying the existing system

"New" OSTDS per Florida Administrative Code, Chapter 64 E-6

- to serve an additional structure on the property
- to replace a system when a structure expands into the location of the existing, or where the pool placement or other structure impacts the existing system
- where domestic flow increases over 20% at a non-residential establishment
- where there is any increase in commercial sewage flow

Permitting New OSTDS systems in PFAs

New permits applications completed (except the site evaluation) prior to January 4, 2019

- Will not be limited to nitrogen-reducing systems
- As previously required in 381.00655, FS, systems will have to connect to sewer should it become available

New permits applications completed after January 4, 2019 for systems on lots less than one acre in a PFA will require a nitrogen-reducing OSTDS

Existing Systems
DEP Septic Upgrade Incentive Program

- Effective September 17, 2018, DEP implemented an existing system upgrade incentive program
- The incentives are available to offset homeowner costs to upgrade existing systems to nitrogen reducing systems
- Payment will be made directly to registered septic tank contractors and state-licensed plumbers who register with DEP for the incentive program
- The incentive program is available for existing systems in Priority Focus Areas (PFA) of non-agricultural BMAPs (Citrus, Hernando, Leon, Marion, Orange, Pasco, Seminole, Volusia, Wakulla counties) only

Nitrogen-Reducing Treatment System Options

Overall Goal of Nitrogen Removal: ≥65%

Nitrogen-reducing Aerobic Treatment Units

- Certified to meet National Sanitation Foundation Standards 40 and 245
- Require operating permit (OP), maintenance entity (ME) and maintenance contract agreement (MCA)

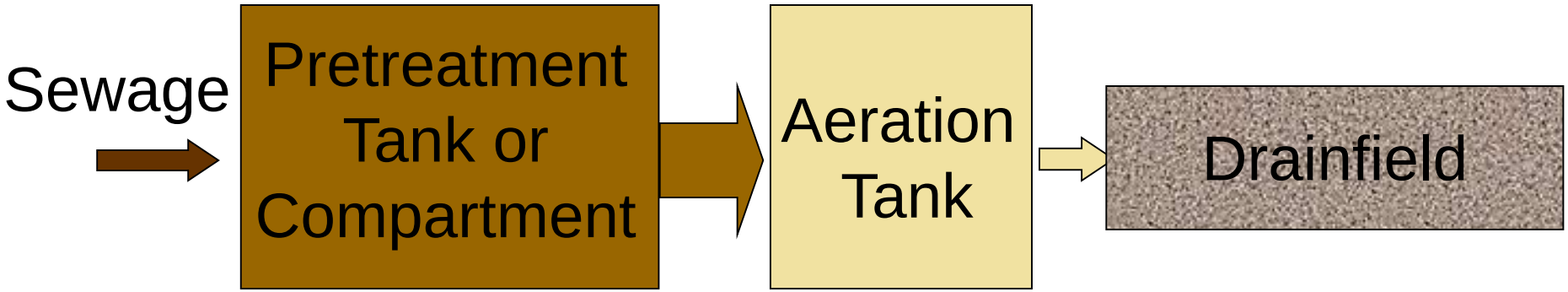
Performance-based Treatment Systems

- Must be designed by Florida Professional Engineer
- Require OP, ME and MCA
- Includes FOSNRS “in-tank” biofilters)

In-ground Nitrogen-Reducing Biofilter (INRB) stacked under a conventional drainfield

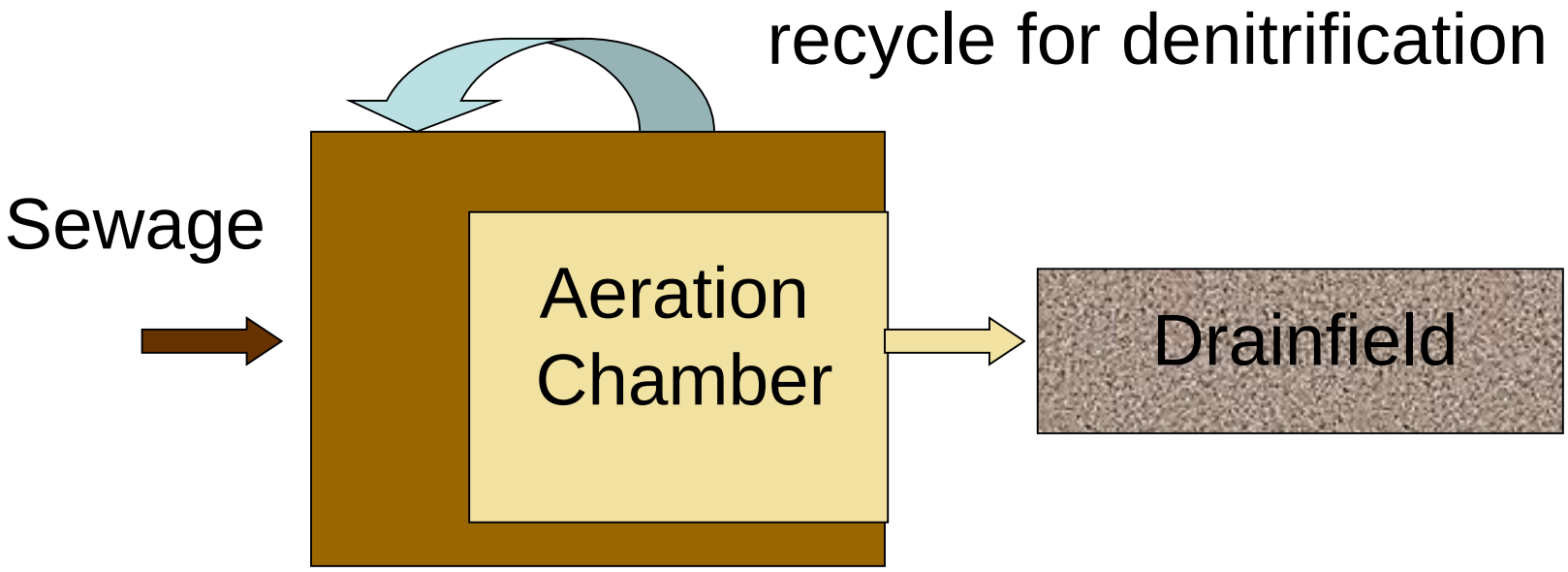
- No engineer design should be needed unless lot conditions require
- No OP, ME or MCA needed

Aerobic Treatment Unit (ATU)



- About 8,000 NSF 40 units installed in Florida
- Approximately 600 of these are nitrogen-reducing ATUs certified to meet NSF 245 Standard

Nitrogen-Reducing Aerobic Treatment Unit



List of NSF245-certified ATUs

Manufacturer	Equipment Series	NSF Tested Model	Florida Approved NSF – 245 Certified Models	Average Total Nitrogen Removal Efficiency (%)
Aquaklear, Inc.	AquaKlear	AK6S245	AK6s245C, AK10S245C	50.8%
Bio-Microbics, Inc.	BioBarrier	MBR 0.5	MBR 0.5-N; MBR 1.0-N; MBR 1.5-N	79%
Bio-Microbics, Inc.	MicroFAST	0.5	MicroFast 0.5, 0.625, 0.75, 0.9, 1.5	55%
Fuji Clean USA	CEN	5	CEN 5, 7, 10	74%

More NSF -245 certified ATUs can be found at:
http://www.floridahealth.gov/environmental-health/onsite-sewage/products/_documents/245cert-atu-18.pdf.pdf

Performance-based Treatment System (PBTS)

Specialized onsite sewage treatment and disposal system

In many cases, includes an ATU

Designed to achieve specific and measurable established *performance standards* for:

- Carbonaceous biochemical oxygen demand ($CBOD_5$), total suspended solids,
- TN (total nitrogen), TP (total phosphorus), and
- Fecal coliforms

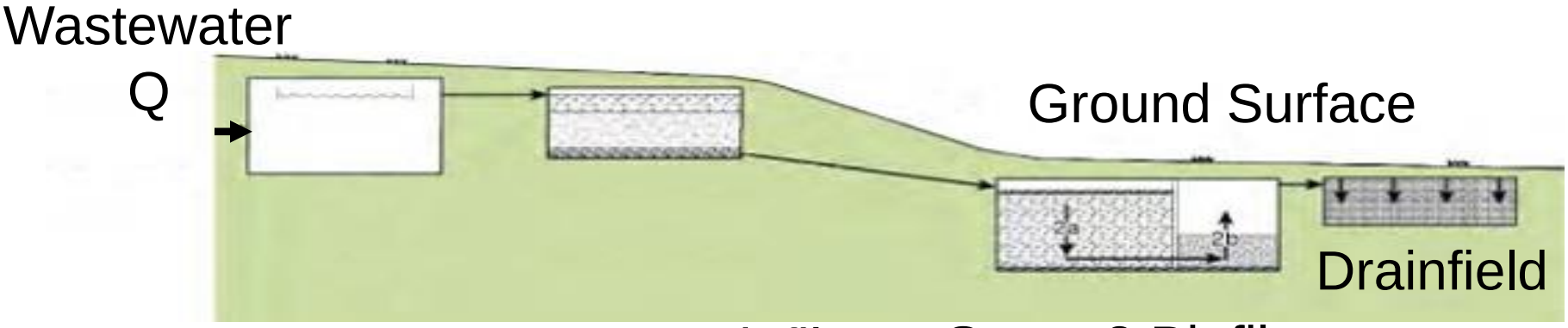
Data for Components of PBTS

Equipment Series	Equipment	TN Removal (%)	Vendor	Innovative Status
Aerocell	Aerocell ATS SCAT-8-AC-C500	77%	Quanics	Yes
Aqua Safe	Aqua Safe 500	52%	Ecological Tanks Inc.	Yes
EcoPure	EcoPure 300	44%	Eco-Pure Wastewater System	n/a
CE	Fuji Clean CE 5	67%	Fuji Clean USA, LLC	Yes

- At least 50% nitrogen-reduction before drainfield
- Some of these are permitted for innovative system testing.
- More nitrogen-reducing PBTS components can be found at http://www.floridahealth.gov/environmental-health/onsite-sewage/products/_documents/npbts-components.pdf

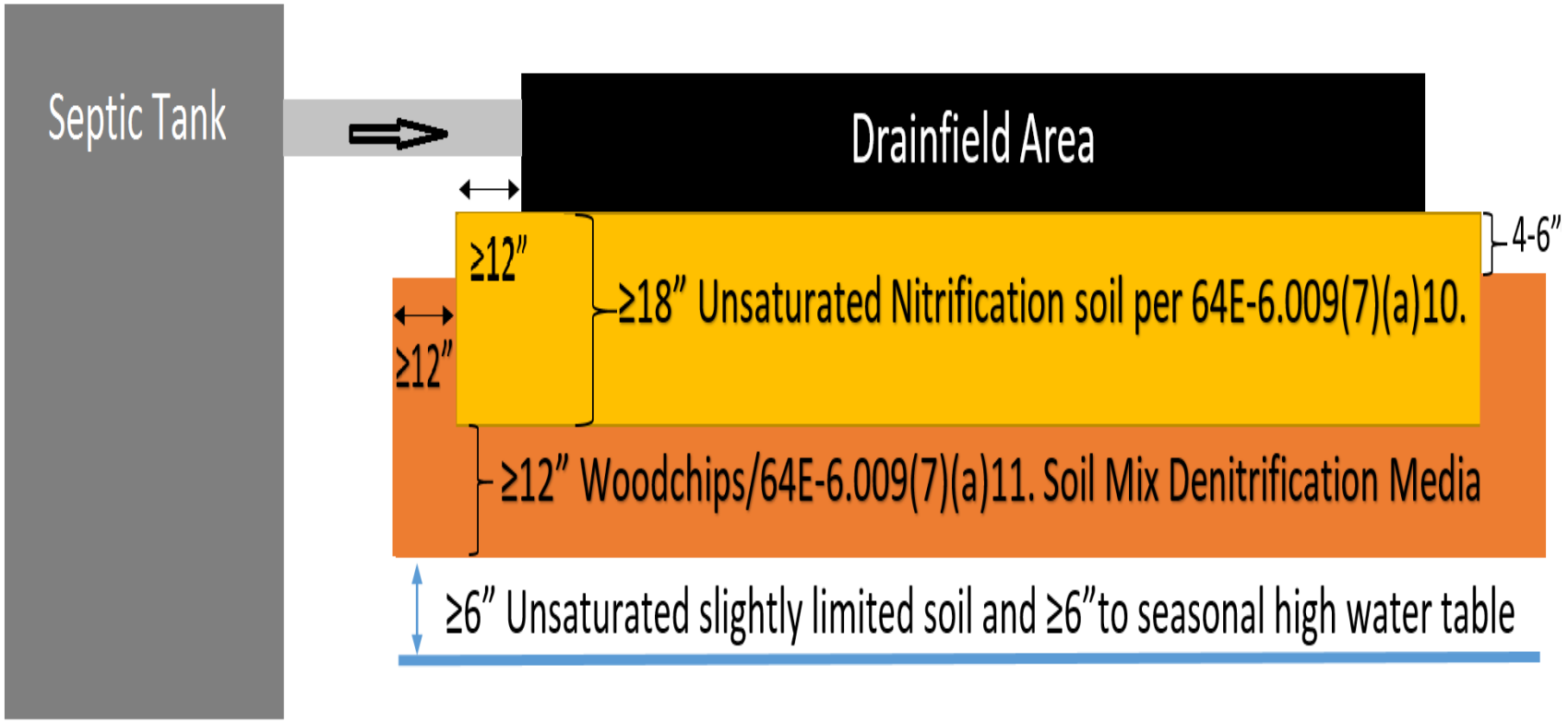
Two-Stage Nitrogen Reduction Process Example

In-tank Nitrogen Reduction Biofilter - PBTS



Note: In flat landscapes may need a single pump.

In-ground Nitrogen-Reducing Biofilter (INRB)



A nitrate-reducing layer below drainfield; material reacts with nitrate

Water Table Separation

INRBs

- Require to have at least 24 inches of water table separation (subtracting the lignocellulosic layer)

New ATU/PBTS

- Require to meet 24 inches of water table separation
- At least 50% nitrogen-reduction required before discharge to drainfield

Repairs or Modifications ATU/PBTS

- If nitrogen-reduction is ≥ 50% and < 65%: drainfield required to meet 24 inches water table separation
- If nitrogen-reduction is ≥ 65%: follow 64E-6 FAC for water table separation for systems repairs

Updates on the Florida Water Management Inventory (FLWMI) Project

Status

Cycle 1: Completed September 30, 2016

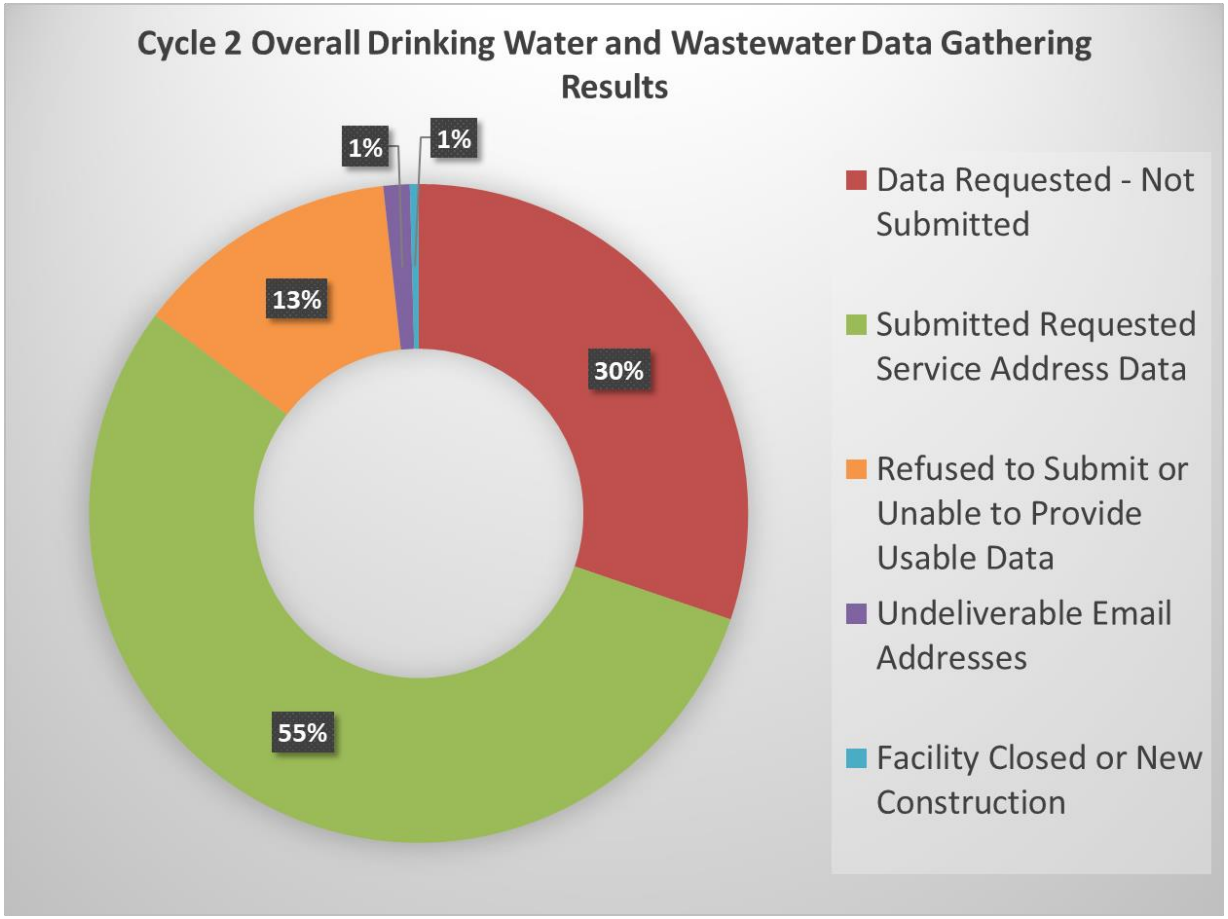
Goal – Develop statewide drinking water and wastewater inventory

Cycle 2: Completed September 30, 2018

Goal – Update the parcel data to the most recent Department of Revenue data and to fill in Cycle 1 data gaps

Cycle 2 Financial Summary

FUNDING SOURCE	AMOUNT	PERCENT OF TOTAL
Contractual - EPA Nonpoint Source Funds	$187,544.75	50%
Match – DOH Onsite Sewage Research Trust Fund	$98,002.03	26%
Match – DOH Environmental Health Fee Trust Fund	$35,943.97	10%
Other – CDC Environmental Public Health Tracking Grant	$56,154.29	15%
TOTAL	$377,645.04	

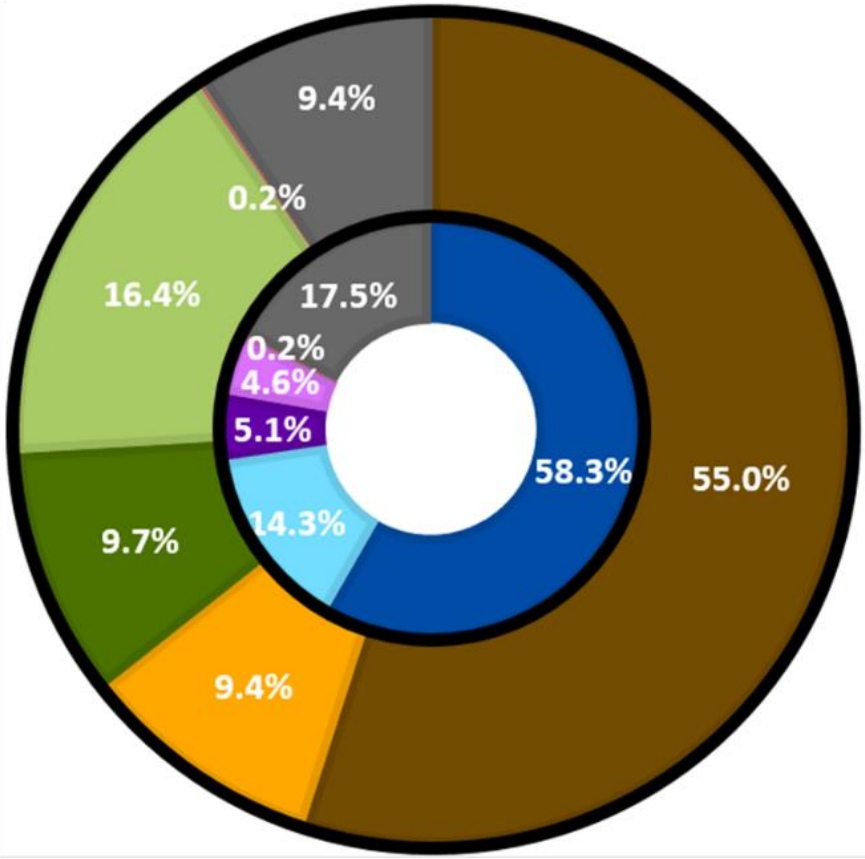


Summary of facilities that submitted data during Cycle 2

FACILITY TYPE	# OF FACILITIES SUBMITTING DATA	FACILITY SIZE
WASTEWATER UTILITY	156	1,244 million gallons per day
PUBLIC WATER SYSTEM	356	8,144,392 population served

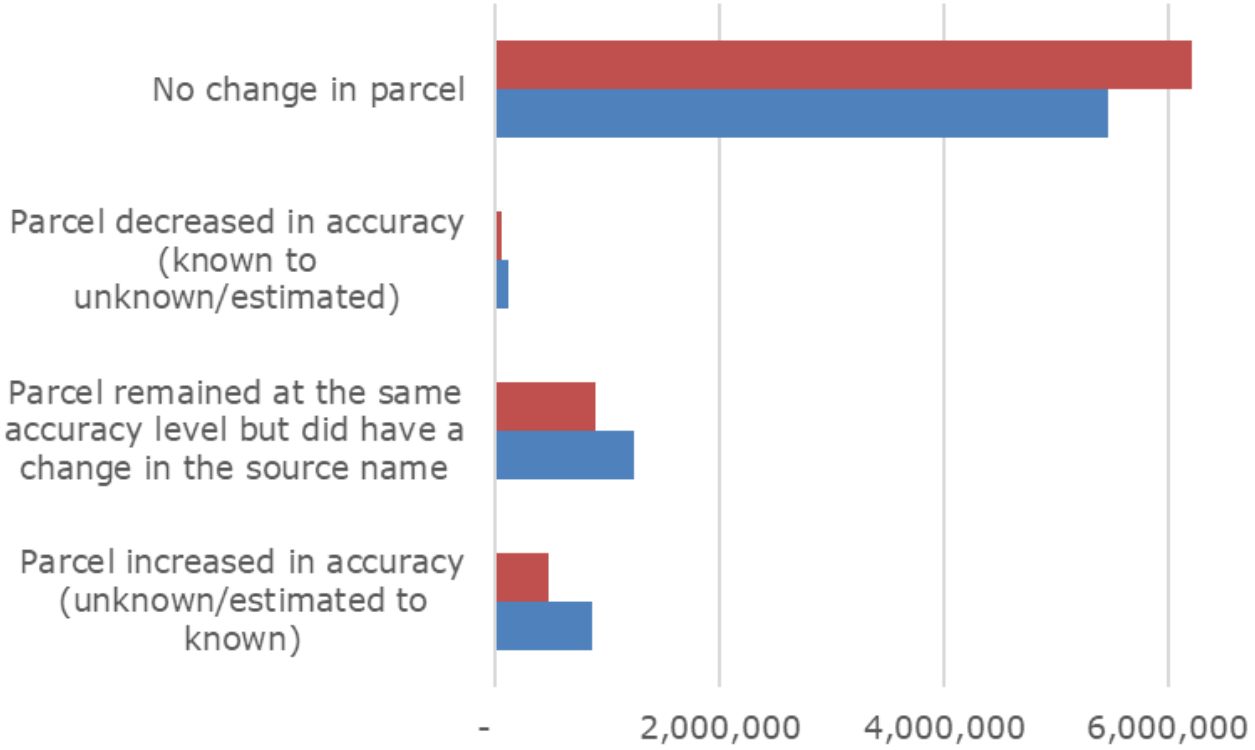
Florida Water & Wastewater Breakdown

9.7 million total parcels with 7.7 million built parcels



- % Known Sewer
- % Known Septic
- % Undetermined Wastewater
- % Estimated Sewer
- % Estimated Septic
- % Unknown Wastewater
- % Known Public
- % Known Well
- % Undetermined Drinking Water
- % Estimated Public
- % Estimated Well
- % Unknown Drinking Water

Changes to Individual Parcel Accuracy



	Parcel increased in accuracy (unknown/estimated to known)	Parcel remained at the same accuracy level but did have a change in the source name	Parcel decreased in accuracy (known to unknown/estimated)	No change in parcel
Wastewater	487,282	902,030	58,024	6,220,724
Drinking Water	868,170	1,238,614	116,449	5,468,699

Summary of Onsite Wastewater in Florida

Counties with highest proportion of onsite systems (comparing total built to onsite)

County	Sum of Highest Proportion of Onsite
Levy	89.22%
Dixie	89.13%
Union	87.09%
Taylor	86.94%
Glades	86.50%
Gilchrist	85.64%
Holmes	85.20%
Putnam	81.20%
Washington	80.61%

Counties with most onsite systems

County	Sum of Total Onsite (Known + Estimated)
Polk	117,893
Dade	107,344
Marion	102,484
Lee	96,822
Orange	93,610

Next Steps

Cycle 3: Starting now using available funds

Proposed focus

- Update parcel data to the most recent Department of Revenue data
- Fill in Cycle 2 data gaps
- Update existing utility data
- Refine estimating assumptions

Updates on the OSTDS Funding Investigation

OSTDS Funding Sources

- The **Florida Spring Protection Fund** is currently the most important funding source for spring protection, providing an anticipated $1.0 billion for the next 20 years, plus possible local matches, total about $2.0 billion.

- The **Septic Upgrade Incentive Program Fund** is designed to offset homeowner costs by providing certified installers and licensed plumbers with up to $10,000 after the installation of enhanced nitrogen-reducing systems to replace conventional OSTDSs in the priority focus areas of the basins for nitrogen-impaired Outstanding Florida Springs.

Other Possible Funding Sources for Decentralized Systems

1. U.S. Environmental Protection Agency (EPA) Clean Water State Revolving Fund (CWSRF, a.k.a. SRF)

   Available funding each year is between $250 million and $260 million

2. EPA Nonpoint Source Section 319 Grants

   Available funding each year is between $5 million and $6 million

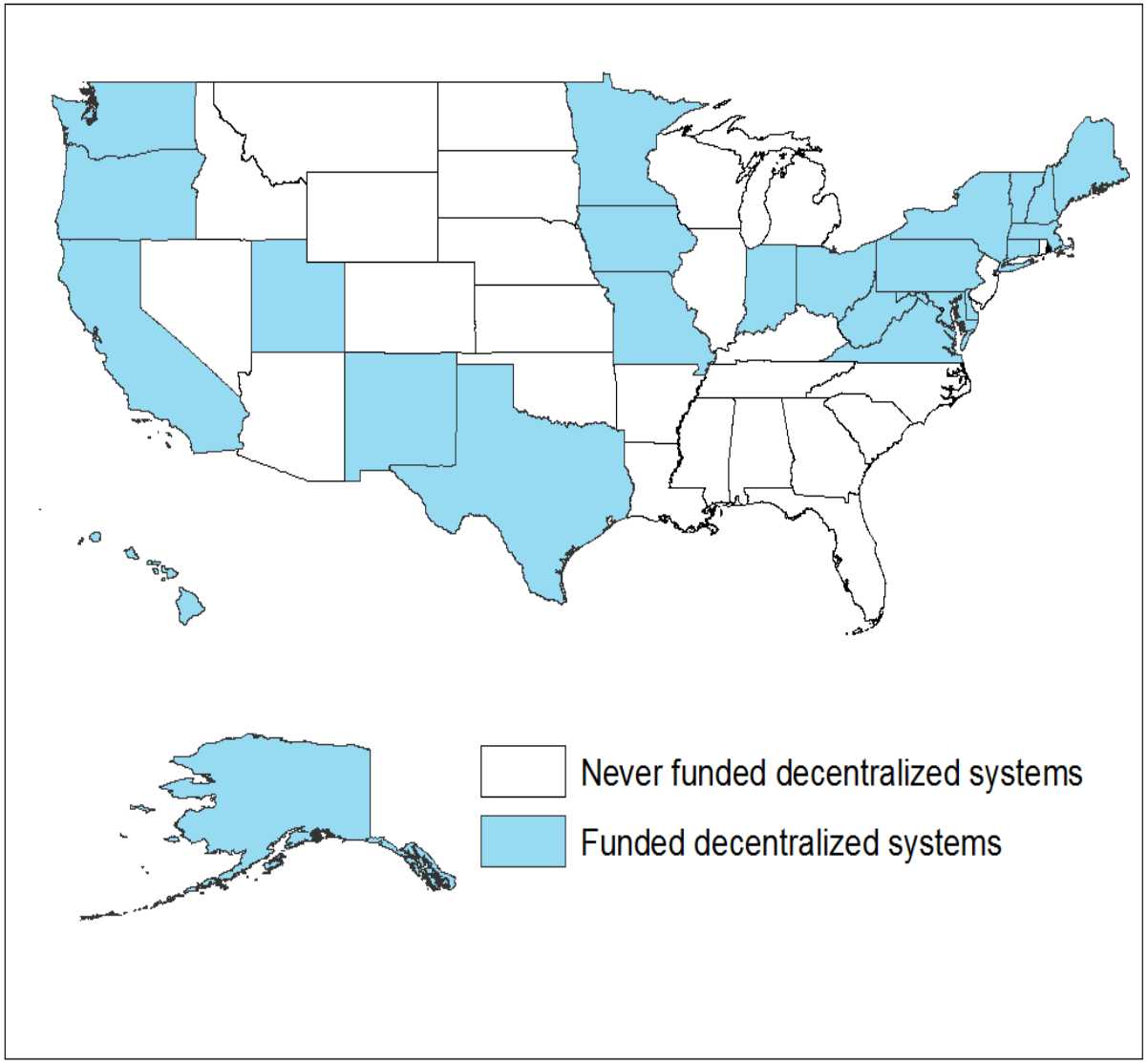
Other Possible Funding Sources for Decentralized Systems - Continued

3. U.S. Department of Agriculture, Rural Development Housing Program – Single Family Housing

   Available fund each year is $700,000 loan + $800,000 grant. Administered directly through USDA state office.

4. U.S. Department of Housing and Urban Development through Florida Department of Economic Opportunity

   Available funding each year is between $18 million and $26 million administered by the Small Cities Community Development Block Grant Program.



CWSRF funded decentralized systems in 24 of 50 states.

Funding Disbursement Approaches (from the perspective of an entity that provides funding)

- Direct lending
- Linked deposit
- Pass-through funding

Florida CWSRF

1. Capital grants received to date total $1.47 billion.
2. Made over $4.6 billion in loans.
3. Type of projects being funded in fiscal year 2016-2017 included:
   a) Secondary treatment.
   b) Advanced treatment.
   c) Infiltration/Inflow.
   d) Sewer system rehabilitation.
   e) New collector sewers.
   f) New interceptors.
   g) Stormwater grey infrastructure.
   h) Energy efficiency.
   i) Renewable energy.
   j) Recycled water distribution.

Florida CWSRF - Continued

4. Theoretically, DEP CWSRF can be used to fund privately decentralized systems.
5. The program does not disburse funds directly to individual homeowners because of lack of staff resources.
6. Pass-through funding through local governments is a funding approach that DEP prefers.
7. DEP contacted several local governments, but **no interested parties were identified**.

Why No Local Interest in SRF??

1. Conducted a survey.
2. Started with the DOH County Health Departments (CHDs).

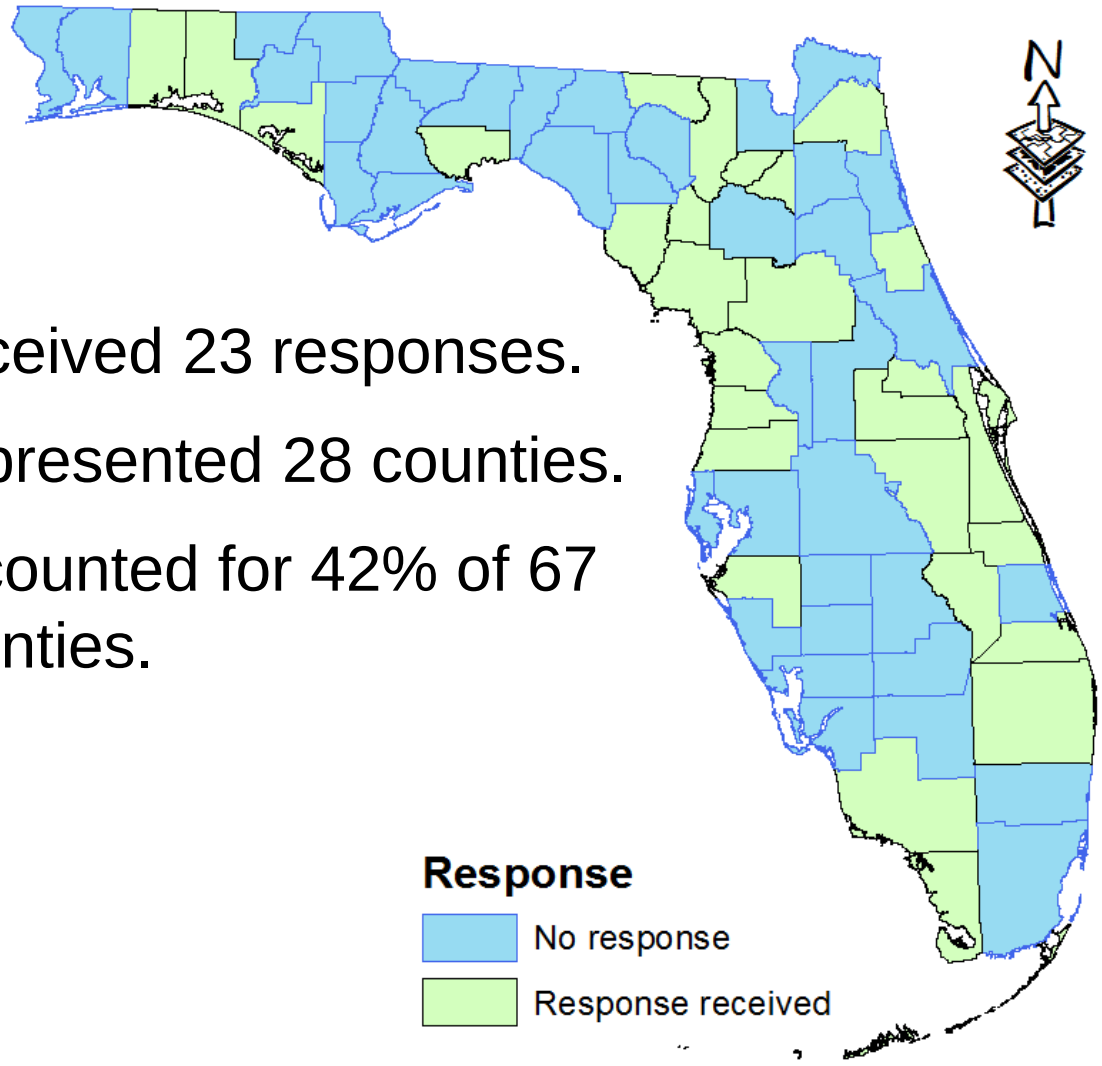
3. Sent a set of questions to all 67 CHDs.
4. Targeted environmental health directors.
5. Received 23 responses so far.

We Want to Understand

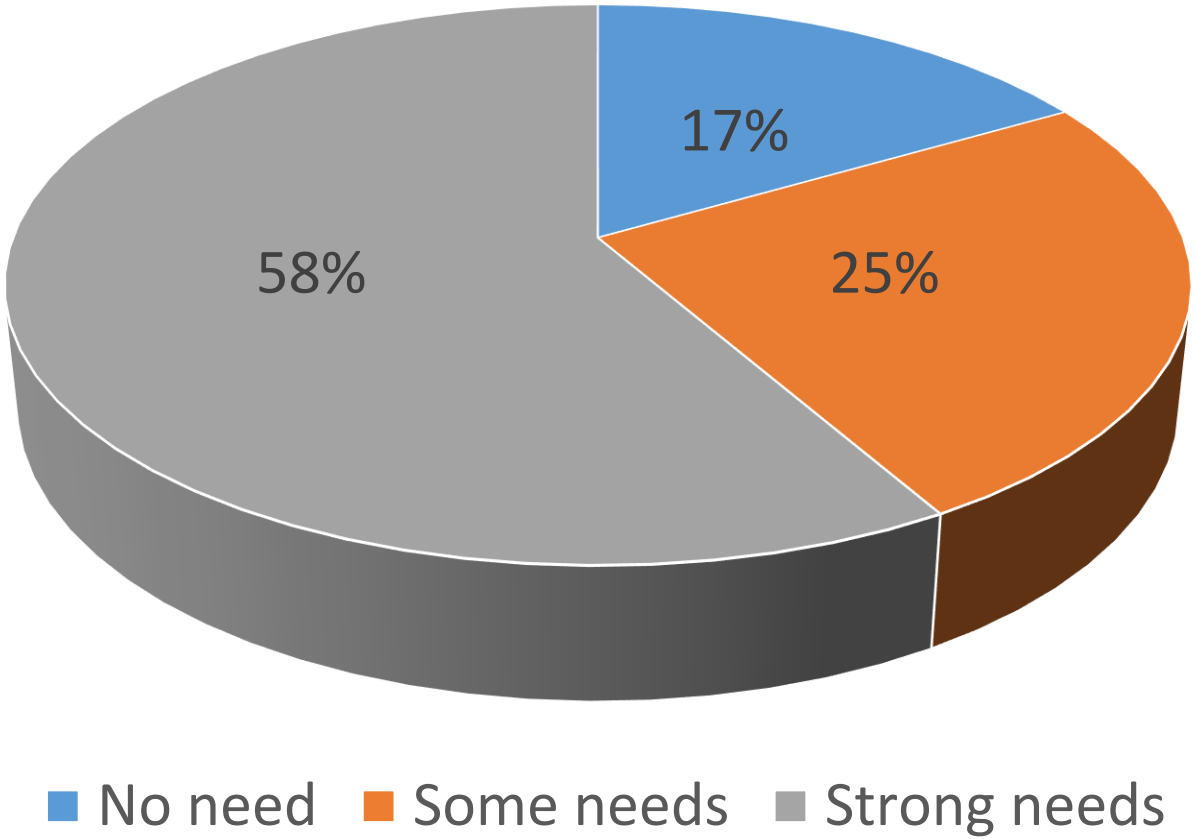
1. Whether there are strong needs for financial assistance to support OSTDS repairs and modifications.
2. How OSTDS failures are addressed without sufficient funding support.
3. Whether there lenders available in local area to provide funding, and, if yes, who are they?
4. If no lenders are locally available, whether there are discussions of establishing local funding mechanisms.
5. What entities in local areas may be able to manage a loan fund from DEP and dispense money to homeowners.
6. What are major challenges for local jurisdictions to become or establish such entities.

Responses Received

1. Received 23 responses.
2. Represented 28 counties.
3. Accounted for 42% of 67 counties.



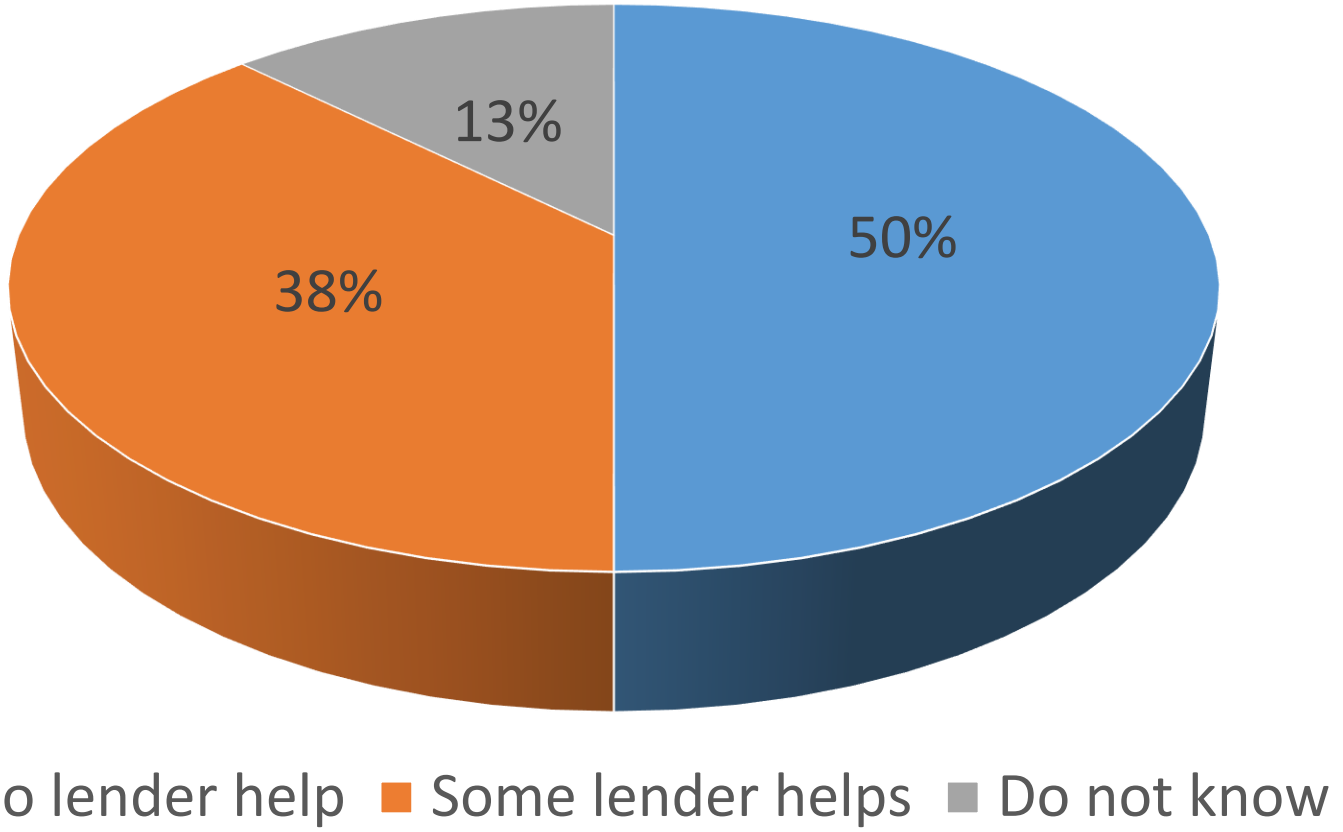
Whether there are strong needs for financial assistance to support OSTDS repairs and modifications



How are OSTDS failures addressed without sufficient funding support?

1. About 91% of the responses reported some sort of local assistances. Nine percent reported no assistance.
2. Sources and forms of assistance:
   - CHD assistance with time, materials, and contractor volunteering.
   - Family members, Church, Council of Aging, United Way.
   - Septic contractor payment arrangement.
   - Florida Keys Aqueduct Authority.
   - Northwest Jacksonville Economic Development Fund
   - Suwanee River Economic Council.
   - Florida Environmental Health Association assistance.
3. Assistance is limited and some failures have to be addressed through legal processes.

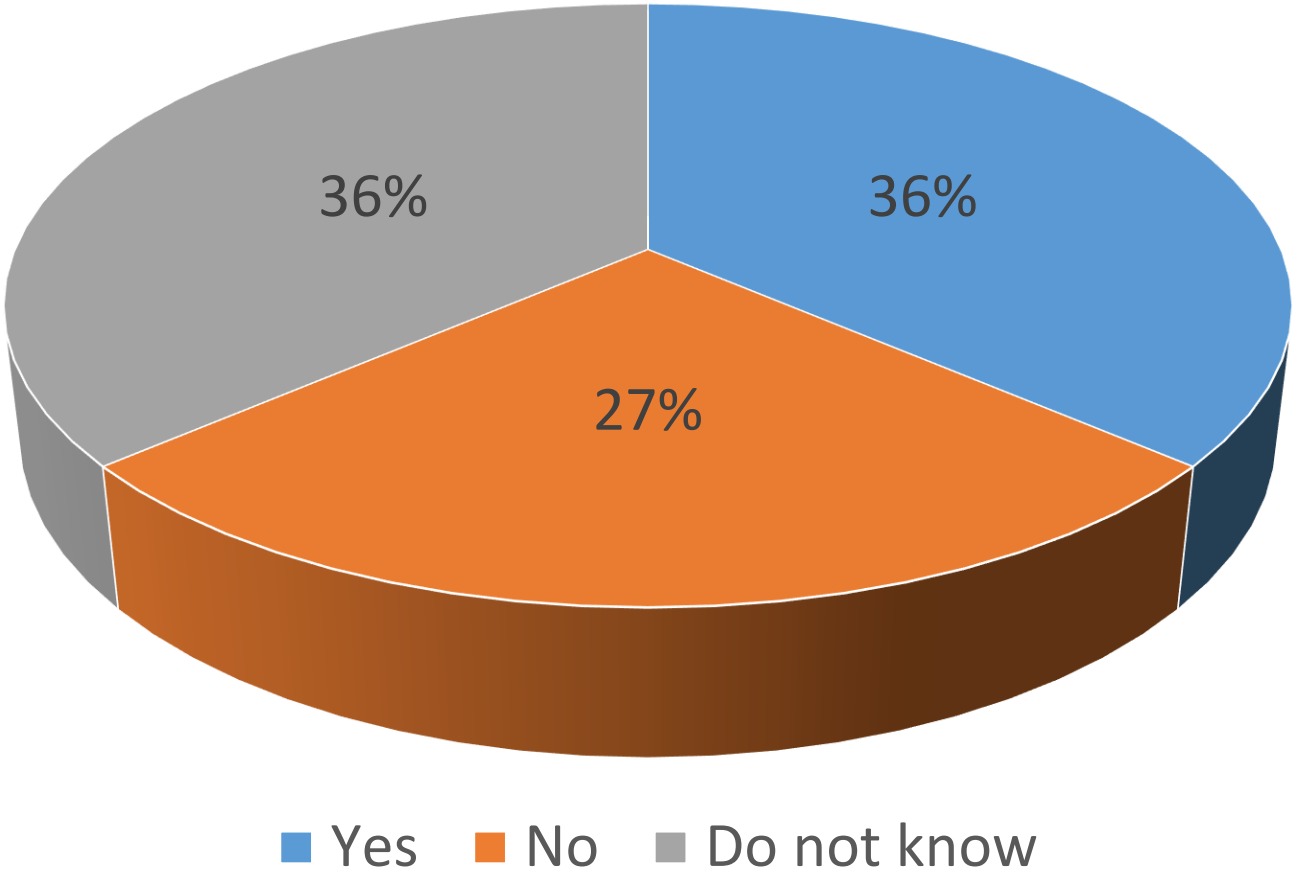
Whether there are lenders in local area to provide funding.



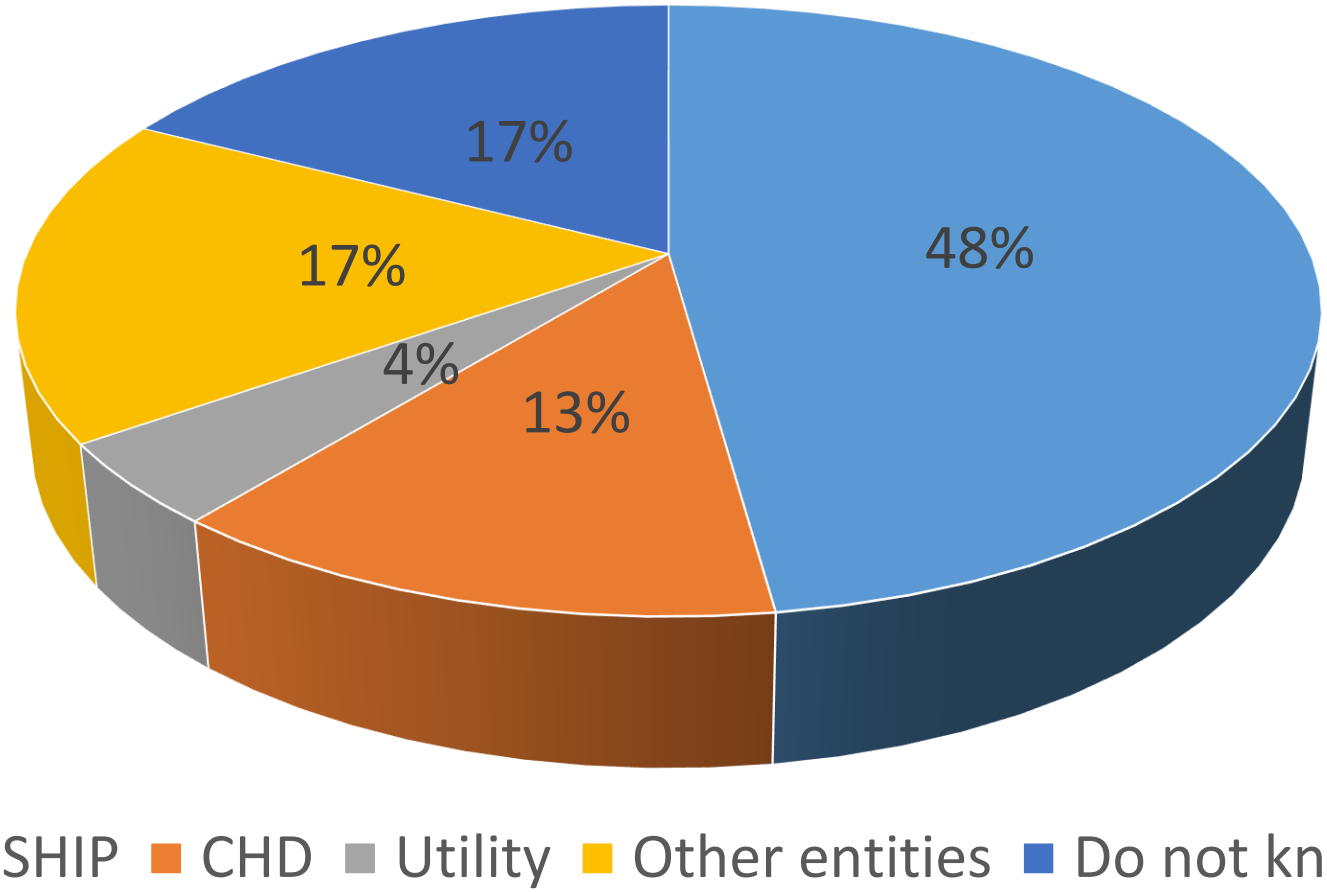
If lenders are available, who are they?

1. Local lenders (Cities, Counties and private):
   - DEO Community Development Block Fund (Community Development Block Grant Program). Title I, Housing and Community Development Act, 1974. Cities and Counties must apply for grant awards.
   - State Housing Initiative Partnership (SHIP) Fund.
   - United States Department of Agriculture low interest loan.
   - Commercial banks.
   - Jacksonville Utility Tap-In Program
2. Loan amounts are limited.

If lenders are not available locally, whether there are discussions of establishing local funding mechanisms?



What entity in local areas may be able to manage the SRF loan?



Major challenges for local jurisdictions to become or establish SRF managing entities - Impressions from EH

Challenges	Percent Responses
Lack of staff resource	28%
Application too complicated	6%
Not familiar with SRF	44%
Do not know	17%
No intention to pursue	6%

Conclusion and Next Step?

1. Conclusion
   - Needs for (SRF) low interest loan exist.
   - Local entities appear to not know how or do not have staff to use SRF to support OSTDS-related activities.
2. Next steps?
   - DEP provides education on using SRF on OSTDS.
   - Contact local entities and SHIP for more detailed perspectives
   - Look for pilot entity.

- Related Developments
  - HB 63 proposes funding mechanism for OSTDS-upgrades/sewer connections

Updates on the Continued Monitoring

"Passive" Nitrogen Reduction Systems (PNRS)

Reduce effluent N using **reactive media** for denitrification and a **single liquid pump**, if necessary.

Wastewater from home

Stage 1 (nitrification)

nitrification media sand & expanded clay

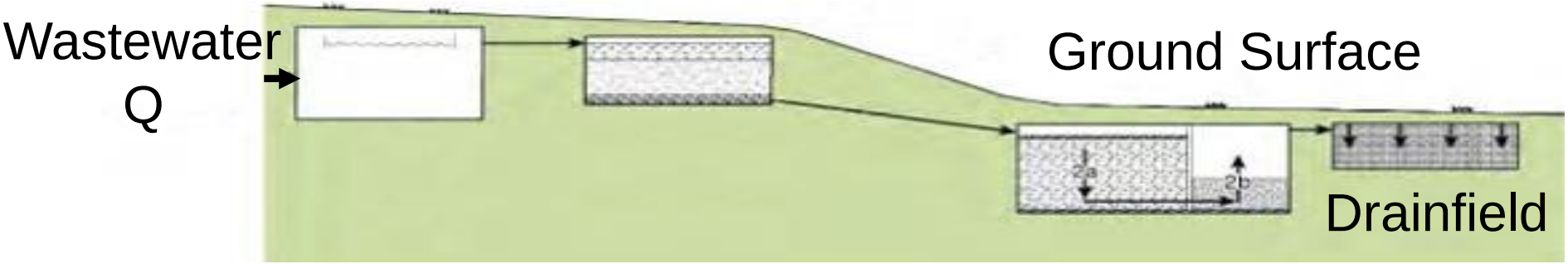
Dispersal

Stage 2 (denitrification)

denitrification media lignocellulosic & elemental sulfur

In-Tank PNRS

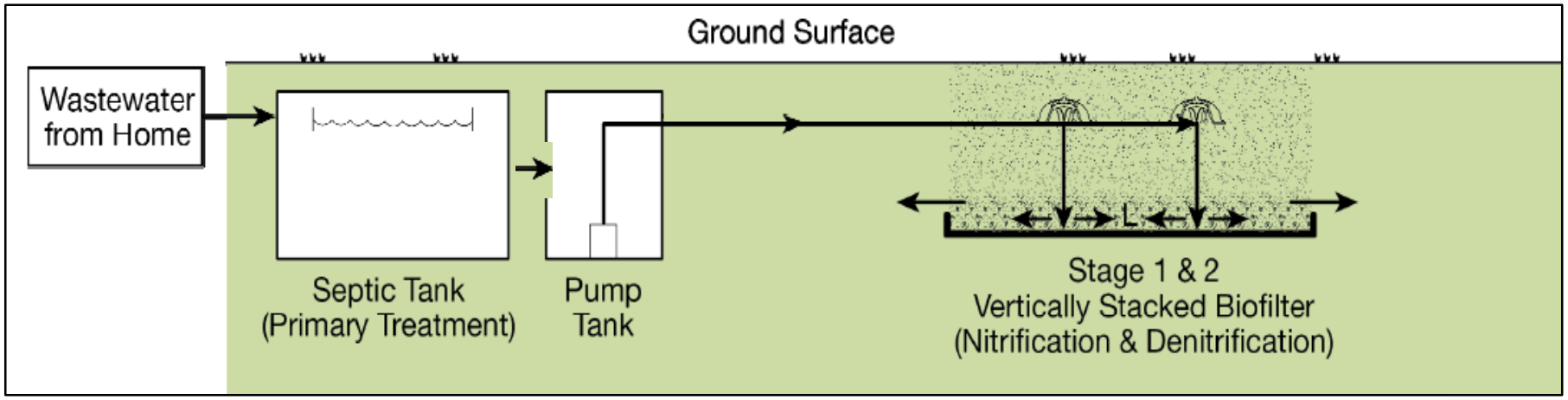
In-Tank Two Stage Biofilter with Stage 1, Dual Media Stage 2 Lignocellulosic (2a) followed by Elemental Sulfur (2b).



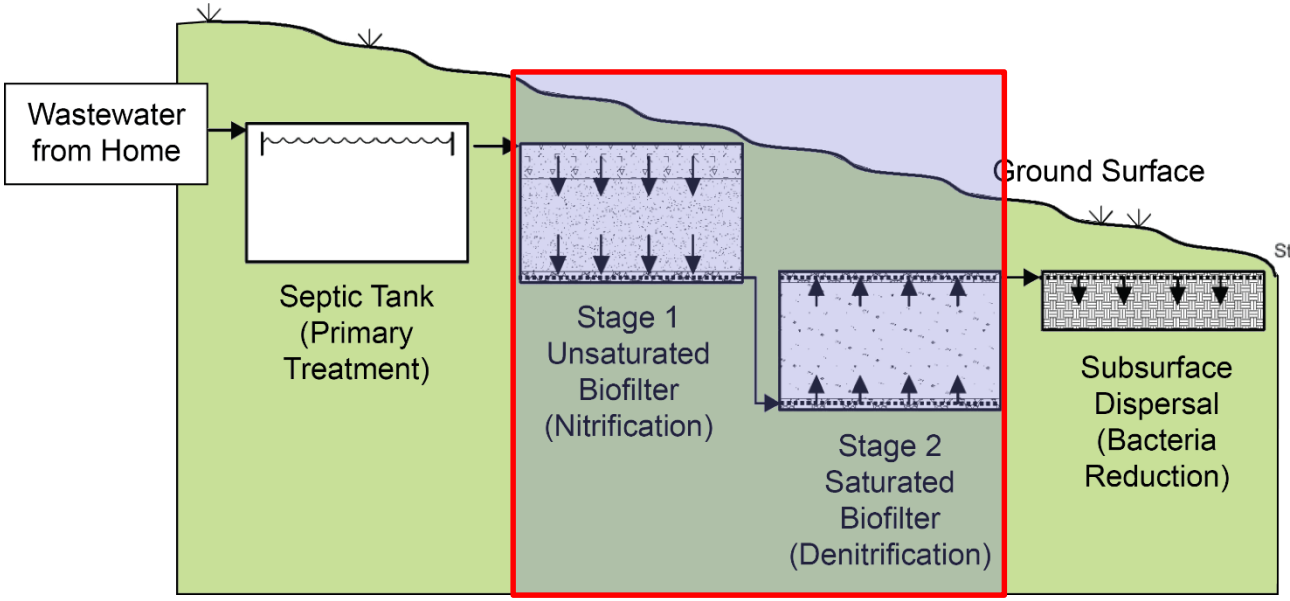
Note: In flat landscapes may need up to a single pump.

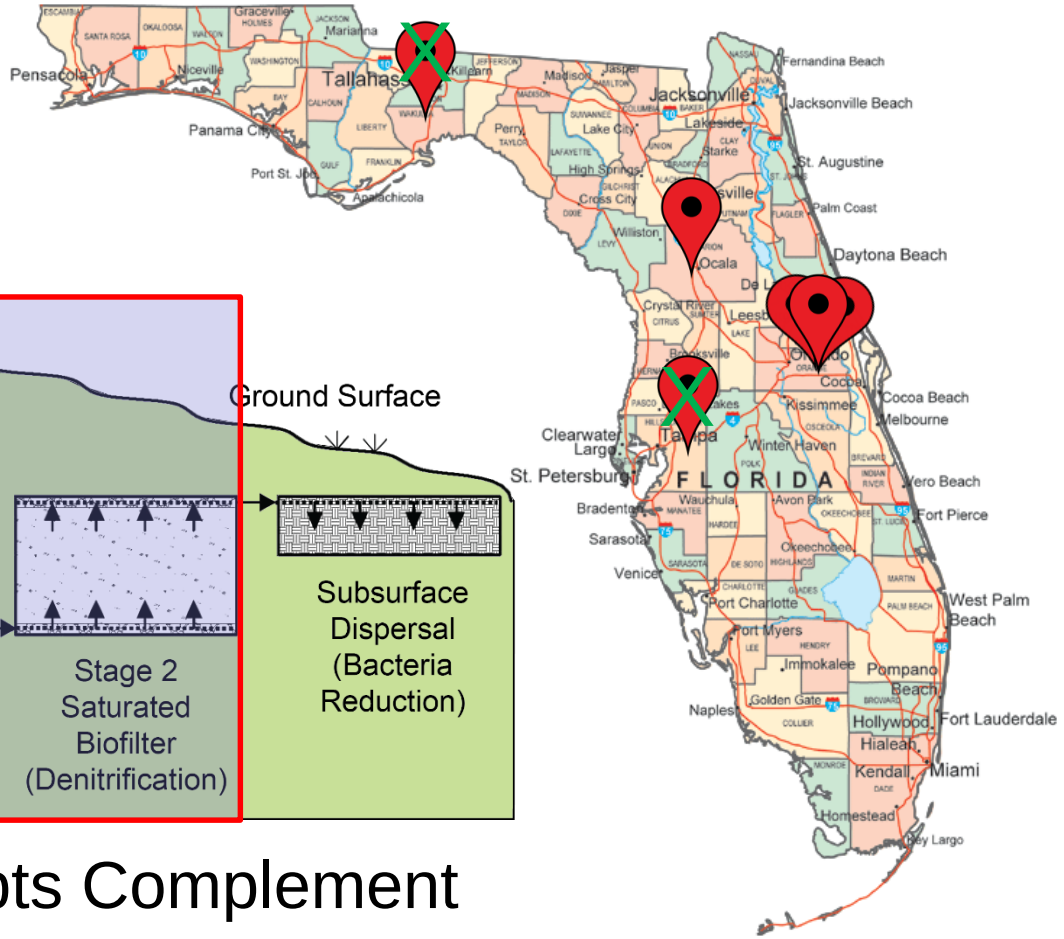
In-Ground Passive Nitrogen System

Conventional OSTDS + In-Ground Two Stage System: Stage 1 Sand, and Stage 2 Lignocellulosic Materials



Nitrogen Reduction at Field Sites





Full Scale Concepts Complement Existing Septic Systems

Goals of the Monitoring Project

Goals

- Establish long-term performance of the two-stage passive nitrogen removal technology
- Provide guidance for possible system refinement and future implementation
- Monitor operation and maintenance requirements

Application for EPA 319 Grant Support

1. The application for 319 Grant support was approved by DEP on December 20, 2017.
2. A draft work plan and related documents were submitted to DEP on March 1, 2018.
3. The draft work plan was approved by and a contract agreement was received from DEP on May 11, 2018.
4. The contract agreement document was signed by DEP and DOH on June 25, 2018.

Application for EPA 319 Grant Support - Continued

5. The continued monitoring project will be funded with $72,000 319 Grant fund and $48,000 DOH match. The grant agreement end date will be September 30, 2021.

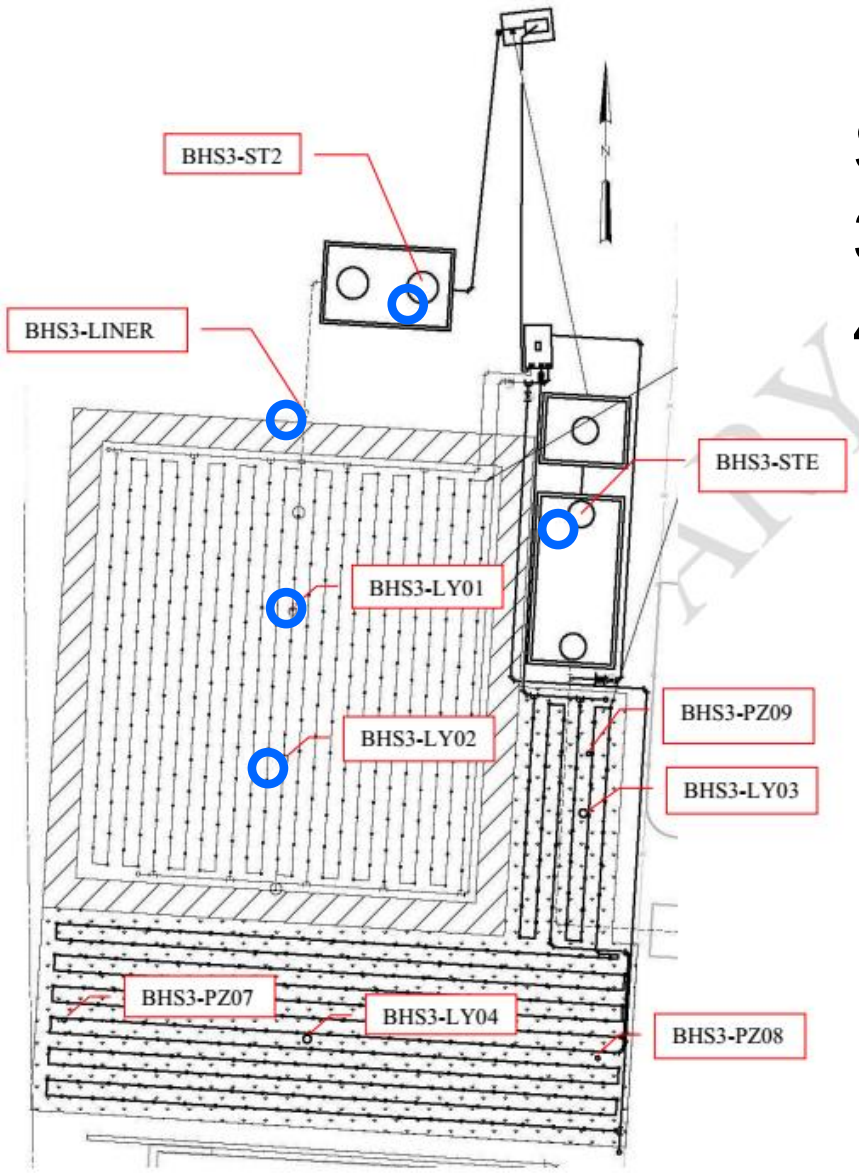
6. The four systems will be sampled quarterly eight times.

7. The Quality Assurance Project Plan was approved by DEP on October 30, 2018.

8. System sampling was conducted in the period from November 10 through 16, 2018.

Seminole County System B-HS3

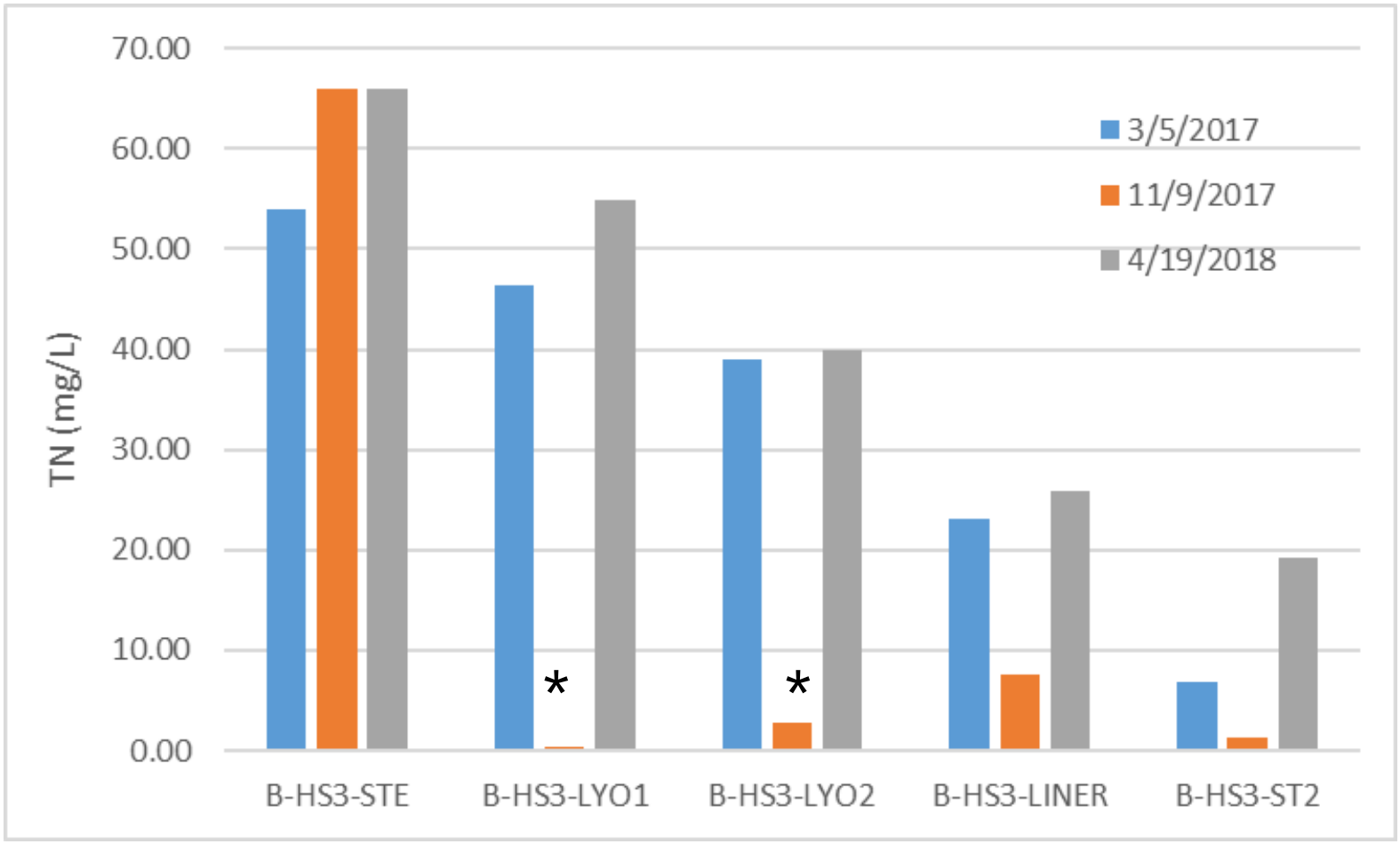
Seminole County System B-HS3



Samples were collected on 3/15/2017, 11/09/2017, and 4/19/2018 from:

a) BHS3-STE (Septic/Pump tank)
b) BHS3-LY01 (Bottom of stage 1 medium)
c) BHS3-LY01 (Bottom of stage 1 medium)
d) BHS3-LINER (Effluent from stage 2 medium)
e) BHS3-ST2 (Sulfur tank)

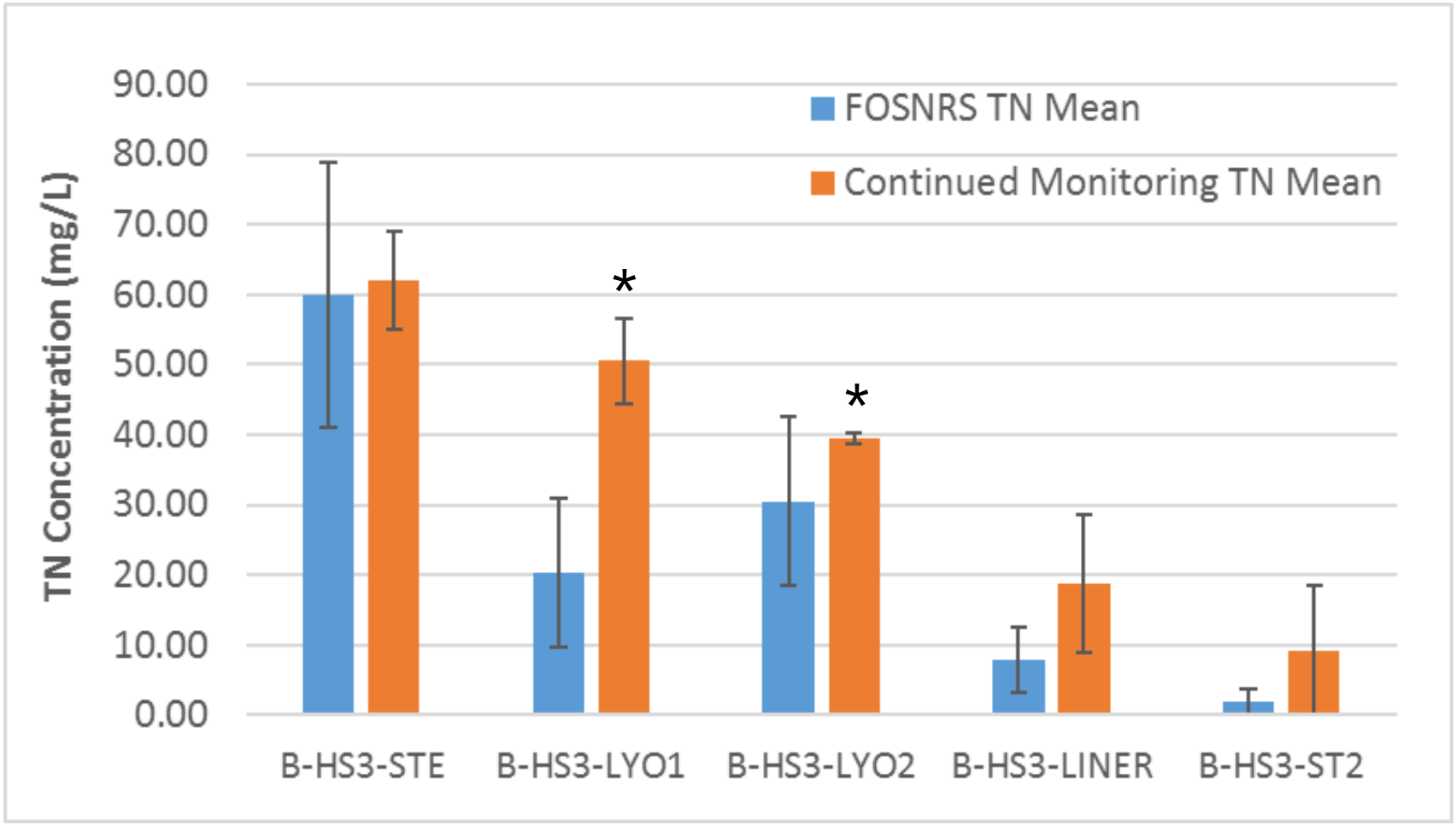
Seminole County System B-HS3



TN: Total Nitrogen

*: Not enough sample for nitrate/nitrite. Values represent sum of organic nitrogen and ammonia.

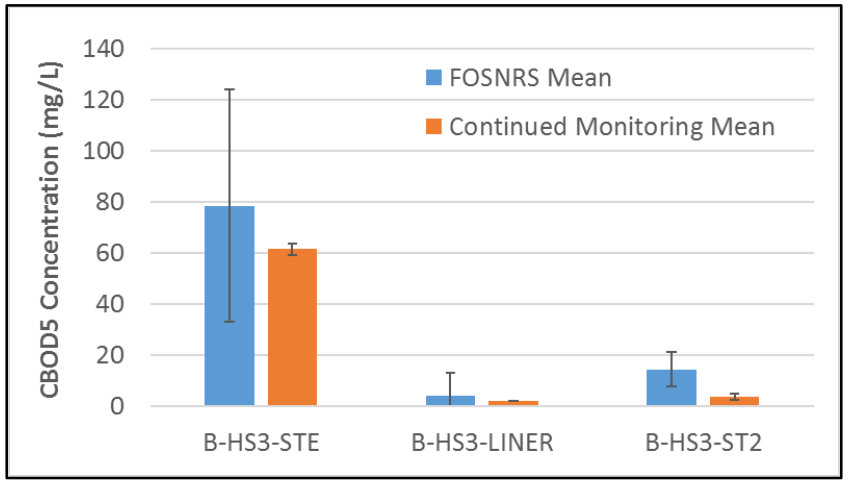
Seminole County System B-HS3 - Continued

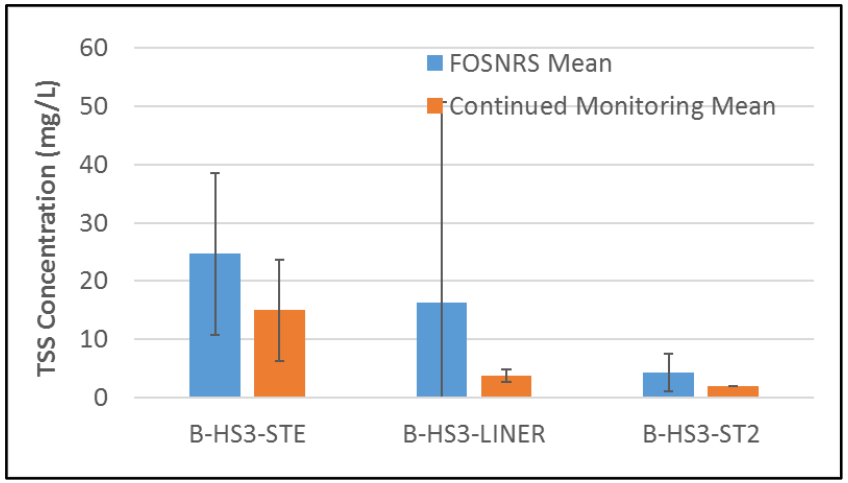


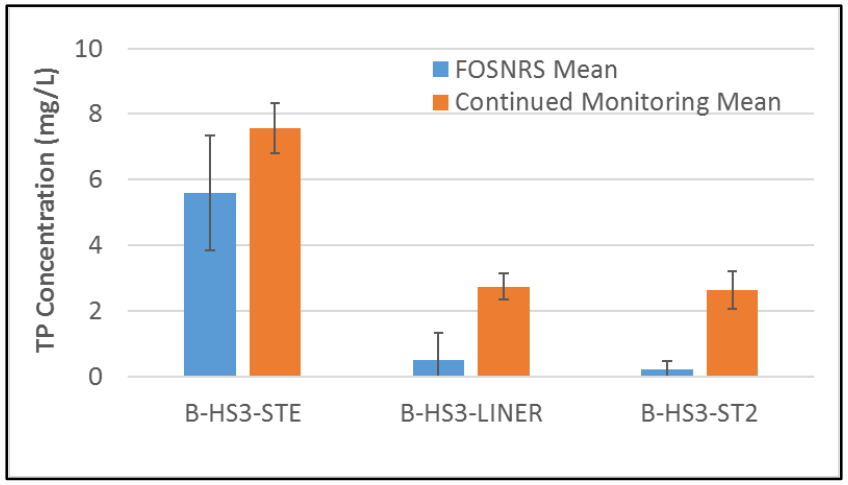
TN: Total Nitrogen

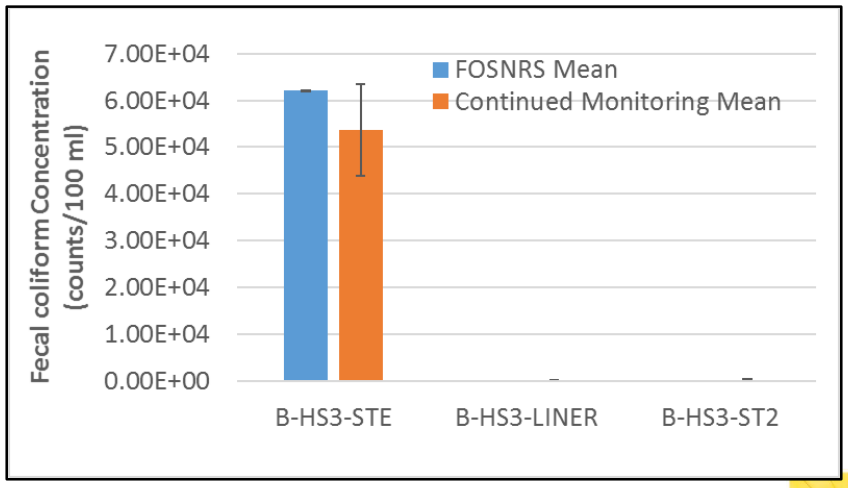
*: Mean and standard deviation calculated based on data for 3/15/2017 and 4/19/2018.

Seminole County System B-HS3 - Continued







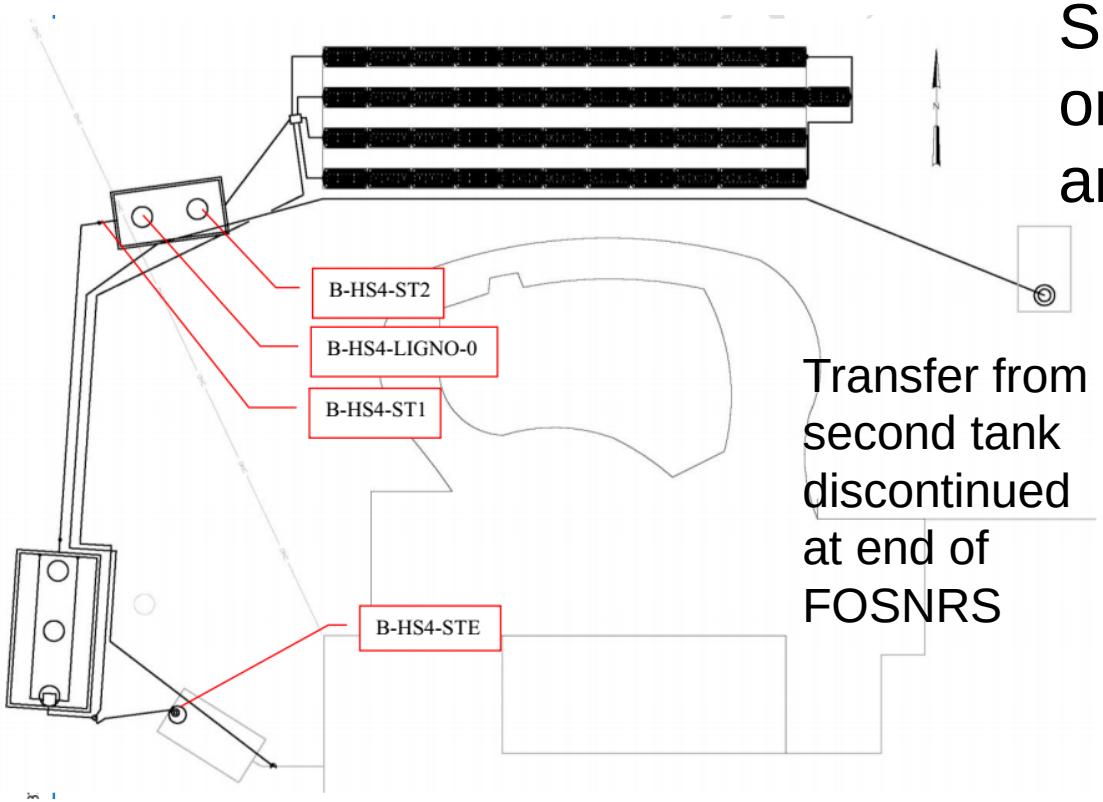


CBOD5: 5-day carbonaceous biochemical oxygen demand;
TSS: total suspended solid; TP: total phosphorus;
FOSNRS: Florida Onsite Sewage Nitrogen Reduction Strategies Study

Seminole County System B-HS4 Stage Two Tank

Seminole County System
B-HS4 Stage One Tank

Seminole County System B-HS4

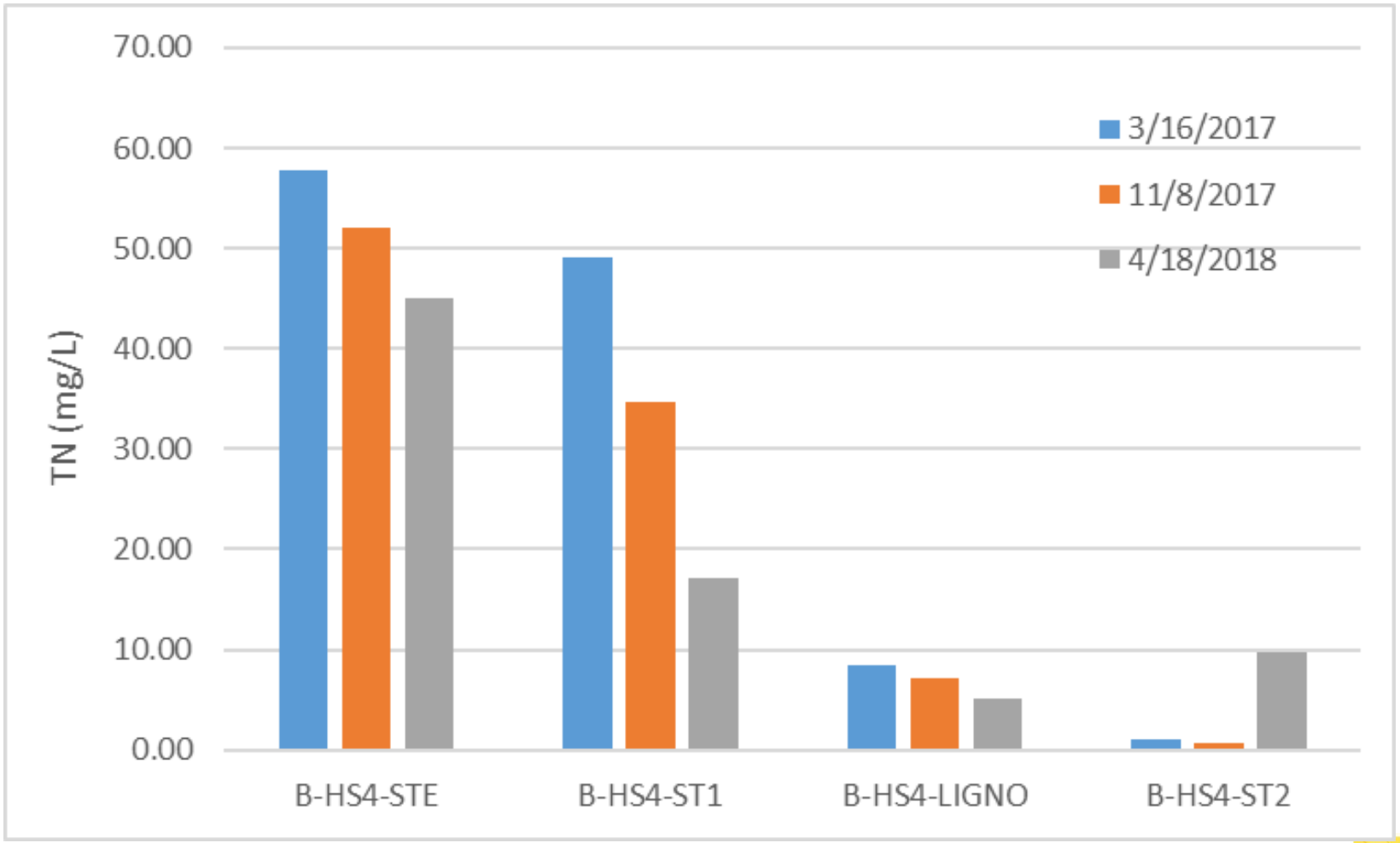


Transfer from second tank discontinued at end of FOSNRS

Samples were collected on 3/16/2017, 11/08/2017, and 4/18/2018 from:

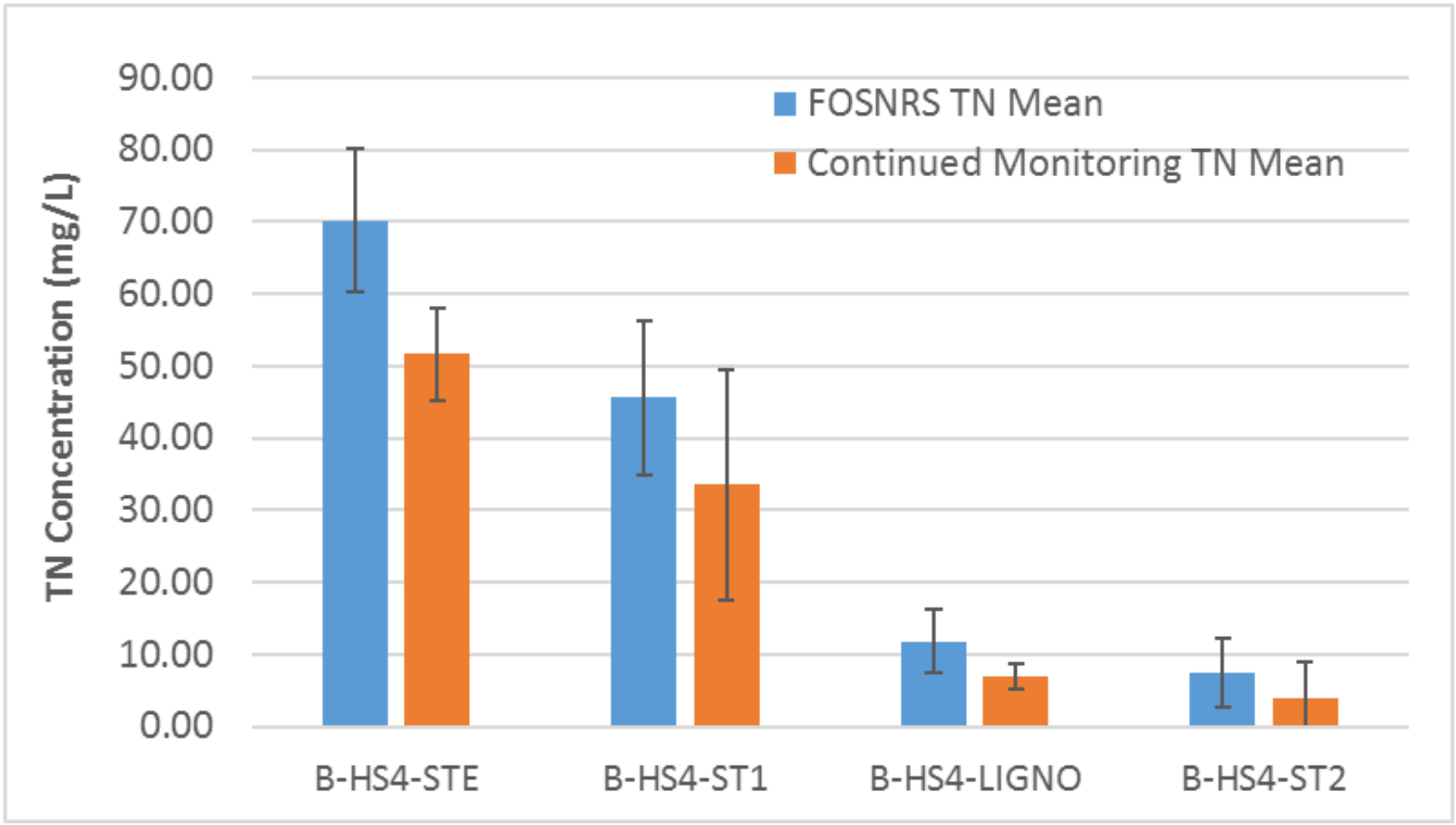
a) BHS4-STE (Septic tank)
b) BHS4-ST1 (Sampling port)
c) BHS4-LINER-0 (Bottom of ligno layer)
d) BHS4-ST2 (Sulfur tank)

Seminole County System B-HS4



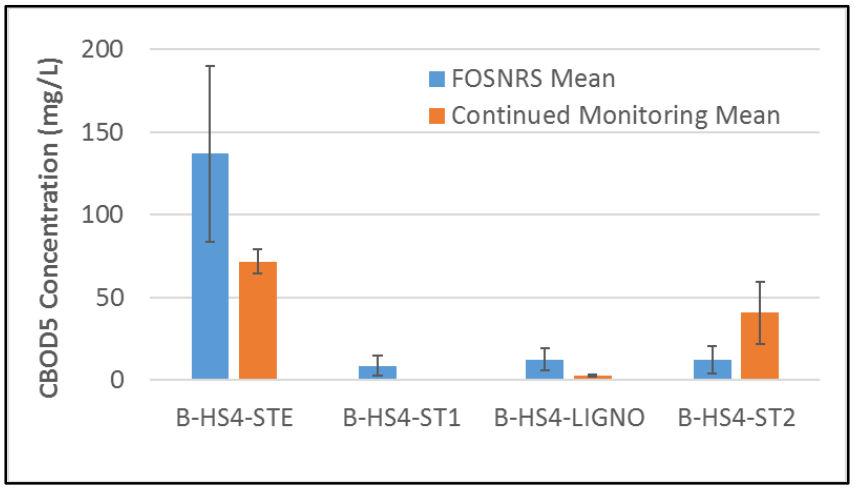
TN: Total Nitrogen

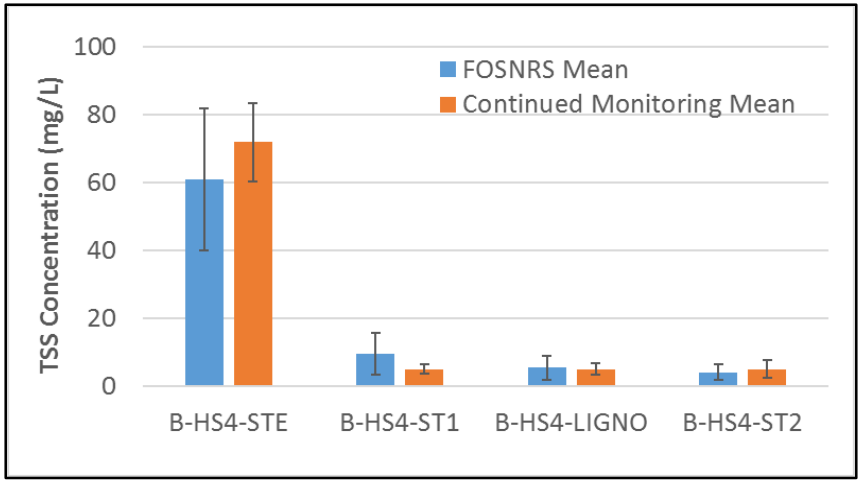
Seminole County System B-HS4 - Continued

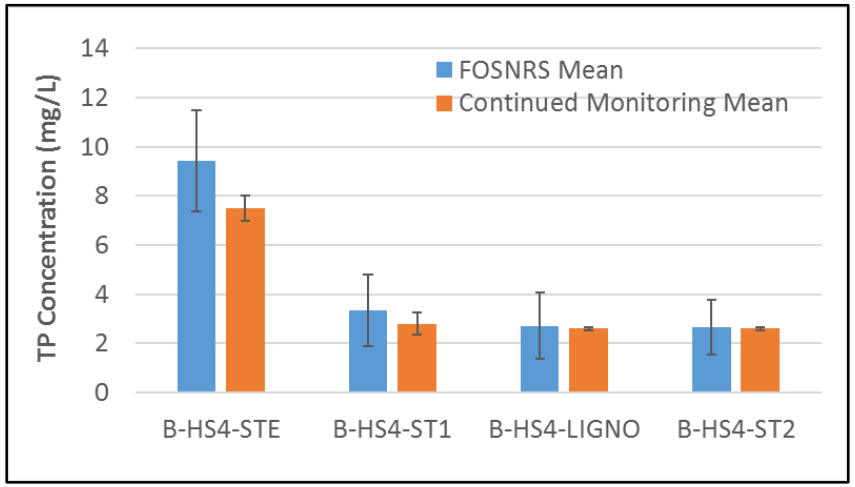


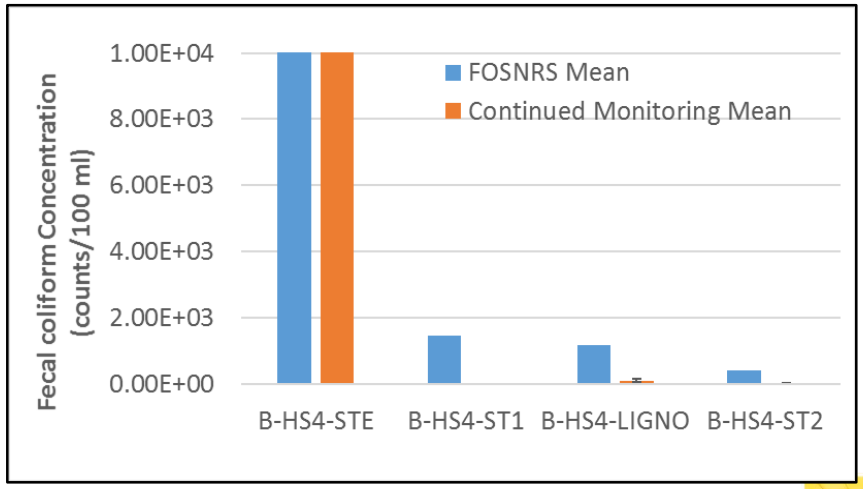
TN: Total Nitrogen

Seminole County System B-HS4 - Continued







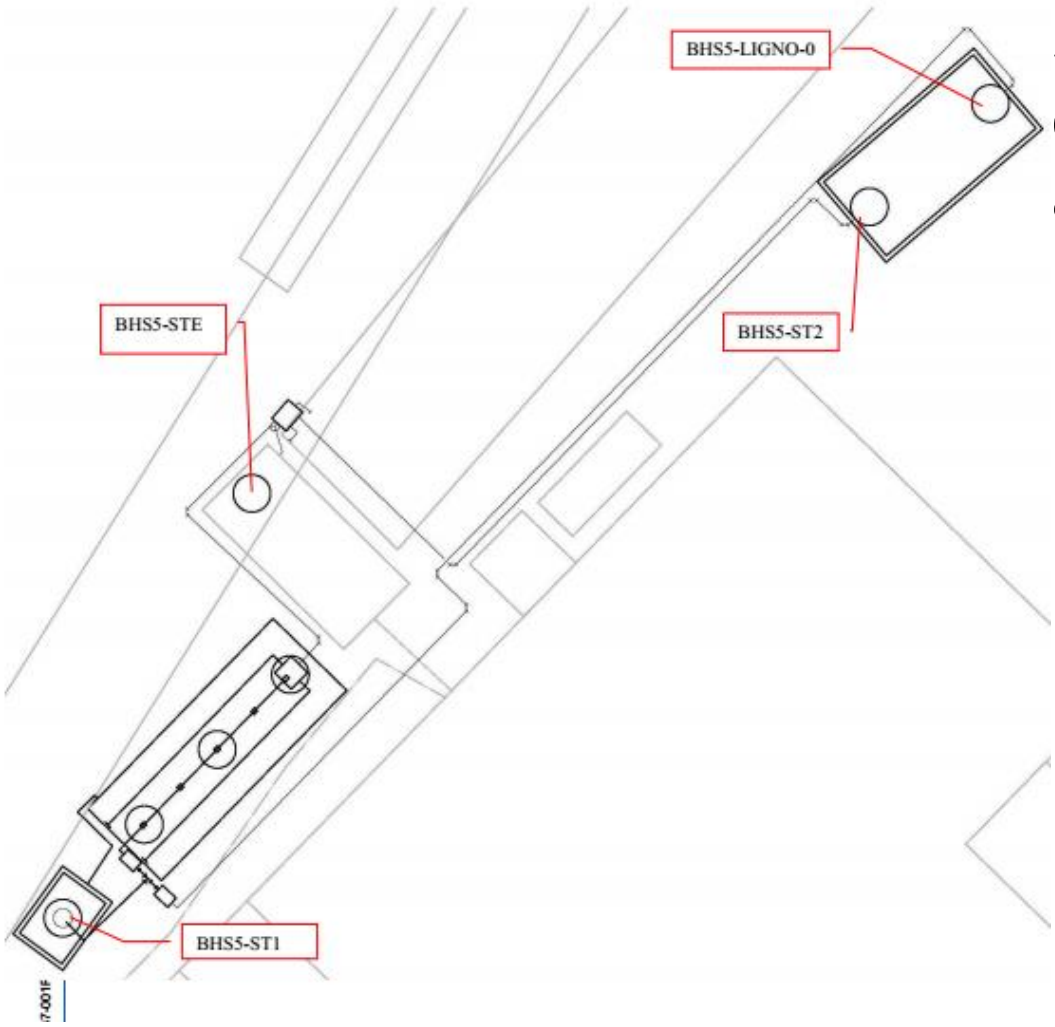


CBOD5: 5-day carbonaceous biochemical oxygen demand;
TSS: total suspended solid; TP: total phosphorus;
FOSNRS: Florida Onsite Sewage Nitrogen Reduction Strategies Study

Seminole County System B-HS5

Seminole County System B-HS5

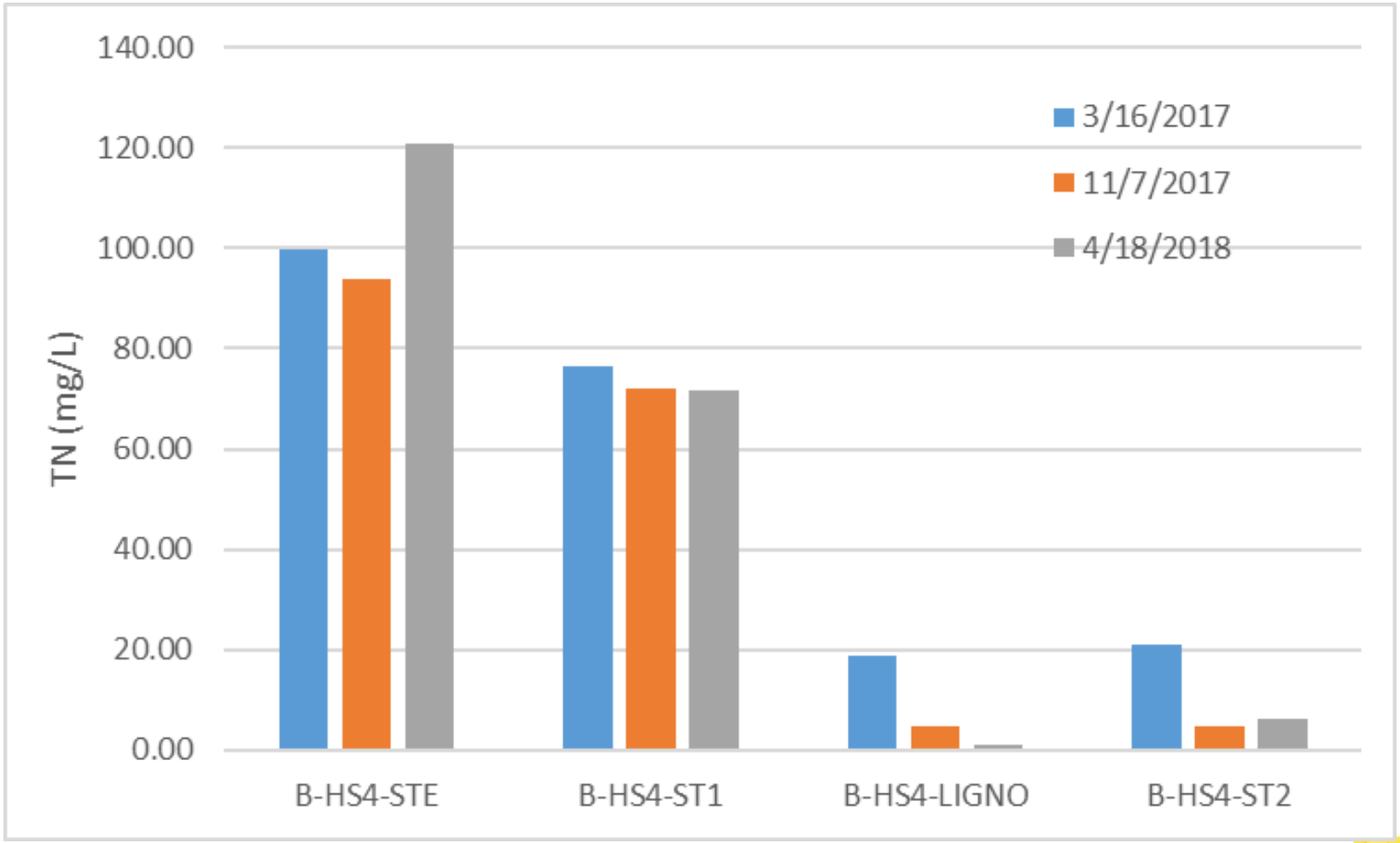
Seminole County System B-HS5



Samples were collected on 3/16/2017, 11/07/2017, and 4/18/2018 from:

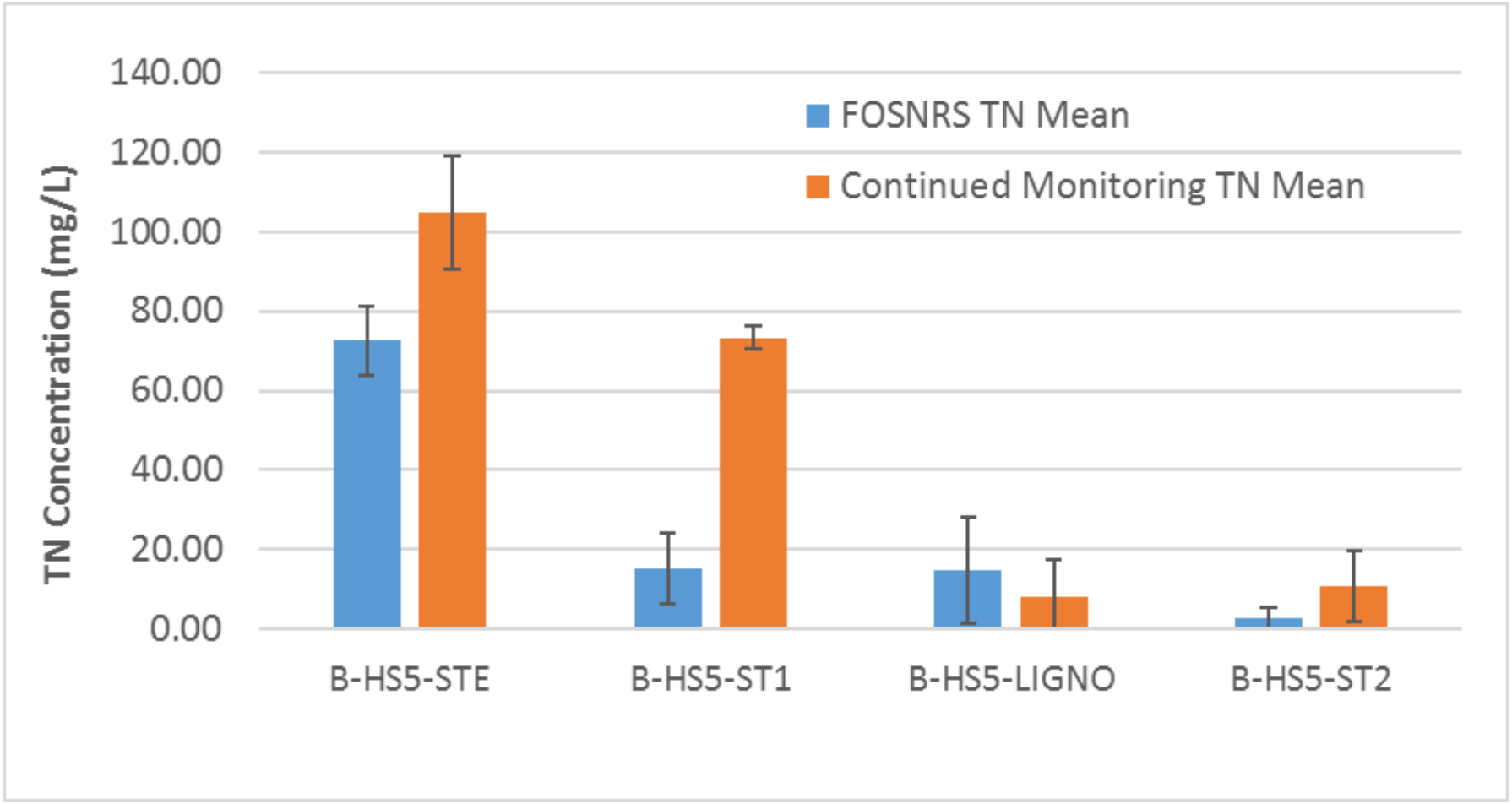
a) BHS4-STE (Septic tank)
b) BHS4-ST1 (Pump tank)
c) BHS4-LINER-0 (Bottom of ligno layer)
d) BHS4-ST2 (Sulfur tank)

Seminole County System B-HS5



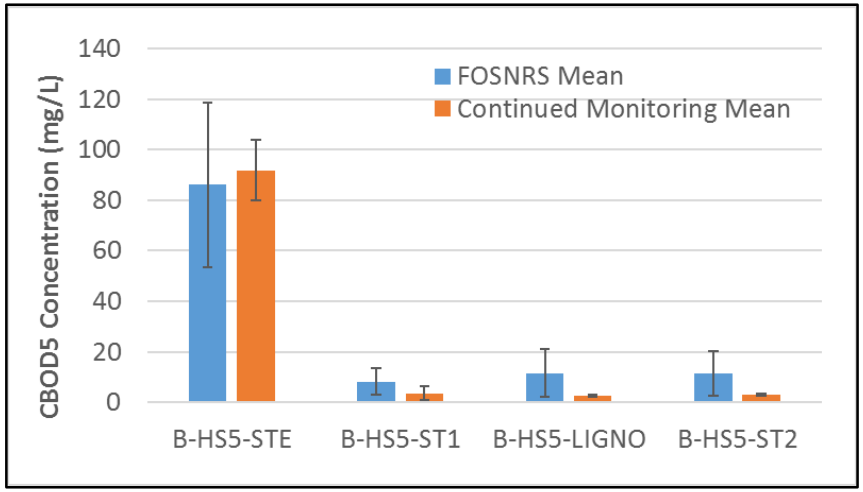
TN: Total Nitrogen

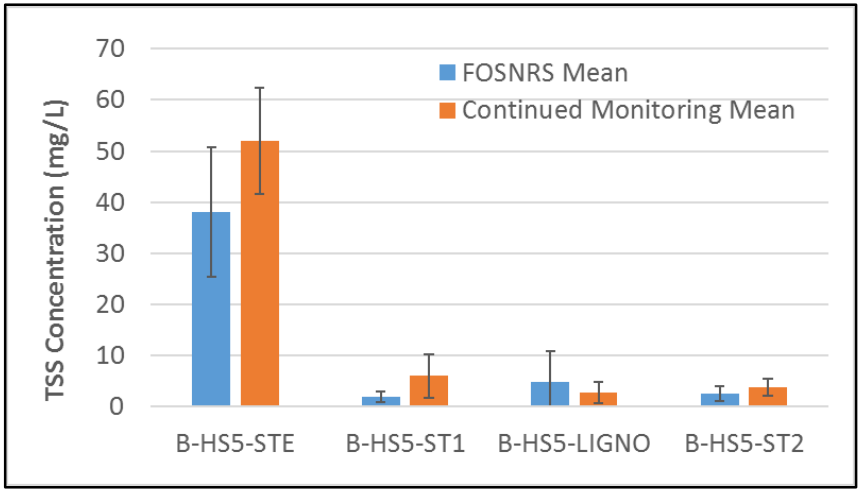
Seminole County System B-HS5 - Continued

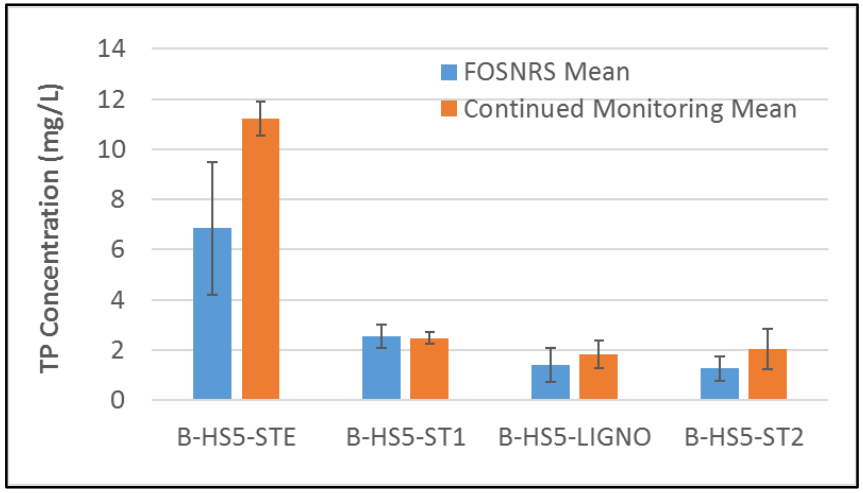


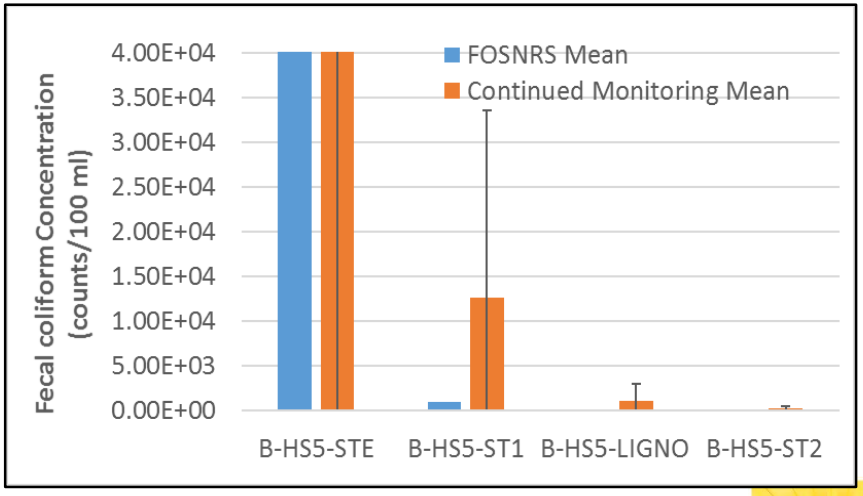
TN: Total Nitrogen

Seminole County System B-HS5 - Continued







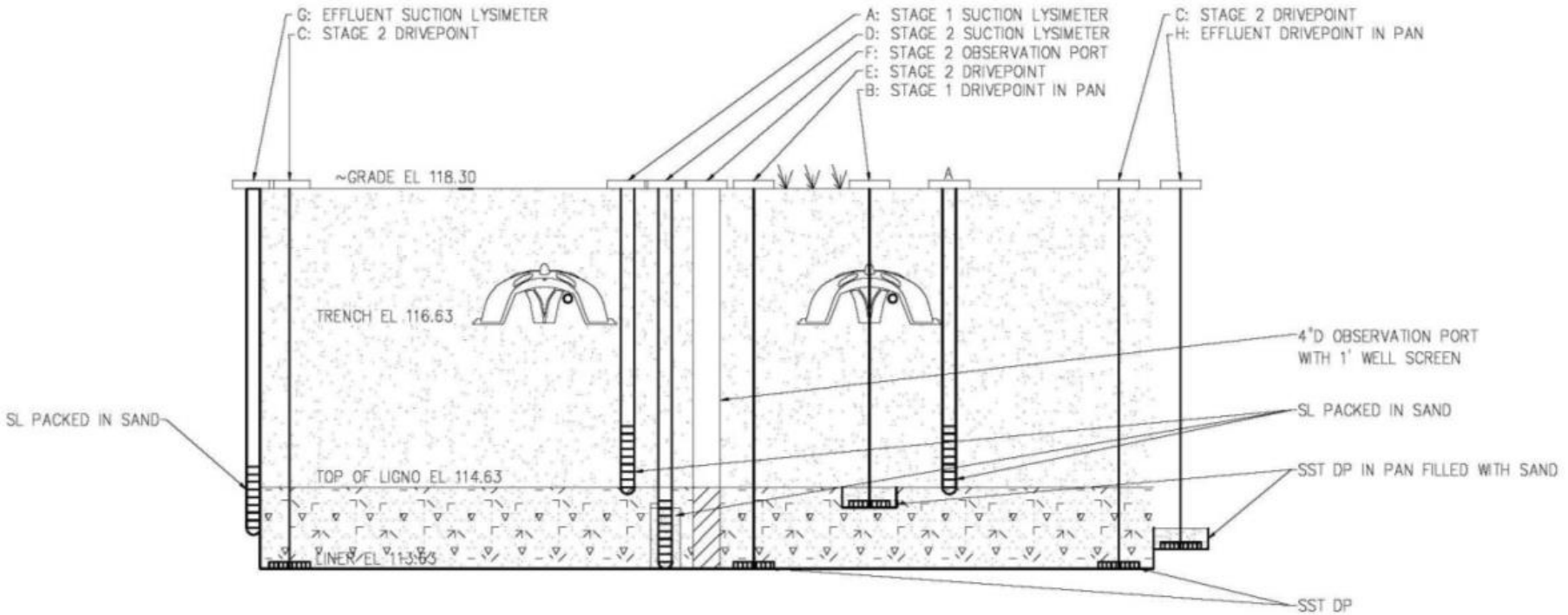


CBOD5: 5-day carbonaceous biochemical oxygen demand;
TSS: total suspended solid; TP: total phosphorus;
FOSNRS: Florida Onsite Sewage Nitrogen Reduction Strategies Study

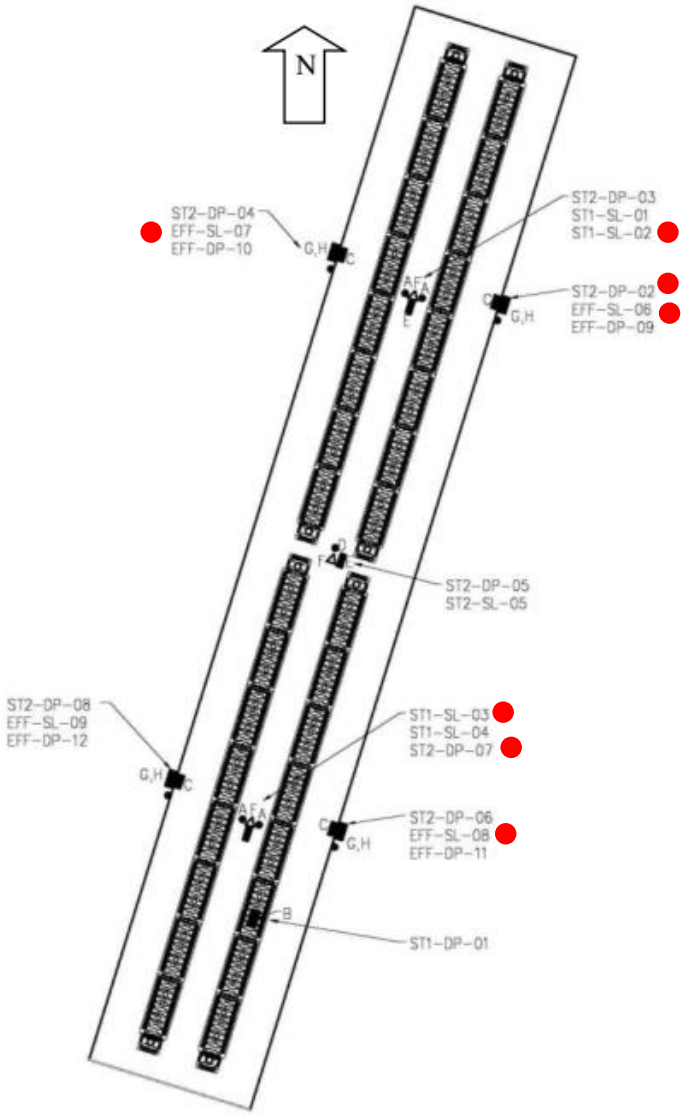
Marion County System B-HS7

Marion County System B-HS7 Drainfield

Marion County System B-HS7 Drainfield Cross Section



Marion County System B-HS7



Samples were collected on 4/26/2017, 12/05/2017, and 4/26/2018 from:

a) BHS7-Pump (Pump tank)
b) BHS7-ST1-SL-02 (Stage 1 media)
c) BHS7-ST1-SL-03 (Stage 1 media)
d) BHS7-ST2-DP-02 (Stage 2 media)
e) BHS7-ST2-DP-07 (Stage 2 media)
f) BHS7-EFF-SL-06 (Peripheral soil)
g) BHS7-EFF-SL-07 (Peripheral soil)
h) BHS7-EFF-SL-08 (Peripheral soil)

Marion County System B-HS7 - Continued

4/26/2017 (Unit: mg/L)				
Sampling Points	Nitrate/Nitrite	Ammonia	TKN	TN
BHS7-Pump	0.03	66.7	63.4	63.4
BHS7-ST1-SL-02	0.67	0.02	1.3	2.0
BHS7-ST1-SL-03	0.16	0.05	2.5	2.7
BHS7-ST2-DP-02				
BHS7-ST2-DP-07				
BHS7-EFF-SL-06				
BHS7-EFF-SL-07	0.03	0.05	1.2	1.2
BHS7-EFF-SL-08	0.18	0.52	7.1	7.3

TKN: Total Kjeldahl Nitrogen = Ammonia + Organic Nitrogen

TN: Total Nitrogen = TKN + Nitrate/Nitrite

Marion County System B-HS7 - Continued

12/5/2017 (Unit: mg/L)				
Sampling Points	Nitrate/Nitrite	Ammonia	TKN	TN
BHS7-Pump	0.01	63.0	75	75.0
BHS7-ST1-SL-02	0.39	0.01	1	1.4
BHS7-ST1-SL-03				
BHS7-ST2-DP-02	0.043	0.03	2.4	2.4
BHS7-ST2-DP-07				
BHS7-EFF-SL-06	2.9			
BHS7-EFF-SL-07	0.12	0.04	1.3	1.4
BHS7-EFF-SL-08	0.76			

TKN: Total Kjeldahl Nitrogen = Ammonia + Organic Nitrogen

TN: Total Nitrogen = TKN + Nitrate/Nitrite

Marion County System B-HS7 - Continued

4/26/2018 (Unit: mg/L)				
Sampling Point	Nitrate/Nitrite	Ammonia	TKN	TN
BHS7-Pump	0.01	39	49	49.0
BHS7-ST1-SL-02				
BHS7-ST1-SL-03				
BHS7-ST2-DP-02	0.051	0.06	1.5	1.6
BHS7-ST2-DP-07	0.01	0.21	2.2	2.2
BHS7-EFF-SL-06	1.4	0.05	0.65	2.1
BHS7-EFF-SL-07				
BHS7-EFF-SL-08	0.075	0.008	1.2	1.3

TKN: Total Kjeldahl Nitrogen = Ammonia + Organic Nitrogen

TN: Total Nitrogen = TKN + Nitrate/Nitrite

Public Comment

Closing Comments, Next Meeting, and Adjournment

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