Florida Department of Environmental Protection

Division of Environmental Assessment and Restoration

Wekiva River, Rock Springs Run, and Little Wekiva Canal Basin Management Action Plan (BMAP) Onsite Sewage Treatment and Disposal System (OSTDS) Remediation Plan

Moira R. Homann

October 13, 2016





Agenda

1. Welcome and Opening Remarks
2. Updates/Action Items from Last Meeting
3. New Items/Discussion
   a) Public Education for Remediation Plan
   b) OSTDS Projects for Remediation Plan
   c) Science Needs for Remediation Plan
   d) Advanced Onsite Sewage Treatment Systems in Florida/Rule Making Updates – *Dr. Xueqing Gao, Florida Department of Health*
   e) Alternative Technologies for OSTDS – *Roxanne Groover, Florida Onsite Wastewater Association*
4. Public Comments
5. Summary and Action Items
6. Adjourn

Sunshine Law Reminders

- OSTDS Advisory Committee will operate under the Sunshine Laws (Article 1, Section 24, Florida Constitution and Section 286.011, Florida Statutes [F.S.]).
- Discussion or any form of communication between committee members on matters reasonably expected to come before the committee is **prohibited** outside of a publicly noticed meeting.
  - Communication includes but not limited to phone calls, writing, texting, and emailing another committee member.
  - Discussion between a committee member and non-committee members, including staff, is permissible.
  - Discussion of committee topics between a committee member and their alternate representative is permissible.

Advisory Committee: Updates

- OSTDS Advisory Committee members:
  - Represent the sectors that are affected by the OSTDS Remediation Plan.
  - Have expertise to lend to the process and to successful outcomes to reduce nitrogen loadings from OSTDS sources.

Sector	Representative	Entity/Group
DOH *+	Bart Harriss (Primary) Stephanie Daugherty (Alternate 1) Nancy Smith (Alternate 2)	Orange County Lake County Seminole County
County *+	Nicholas Mcray (Primary)/Mary Hamilton (Alternate) Julie Bortles Kim Ornberg	Lake County Orange County Seminole County
City *+	Jessica Schilling (Primary)/Bob Elmquist (Alternate) Danielle Marshall (Primary)/Travis Hollman (Alternate)	City of Apopka City of Altamonte Springs
Public/Private Utilities *+	Megan Nelson (Primary)/Elisabetta Natale (Alternate)	Orange County Utilities Department
Environmental Interest +	Michael D. Cliburn (Primary)/Jay Exum (Alternate)	Friends of Wekiva, etc.
Homeowners +	Charles Whitaker (Primary)/Bob Samson (Alternate)	Property owners
Other interests +	Roxanne Groover	Florida Onsite Wastewater Association (FOWA)

*Required by Legislation

+ Per the BMAP

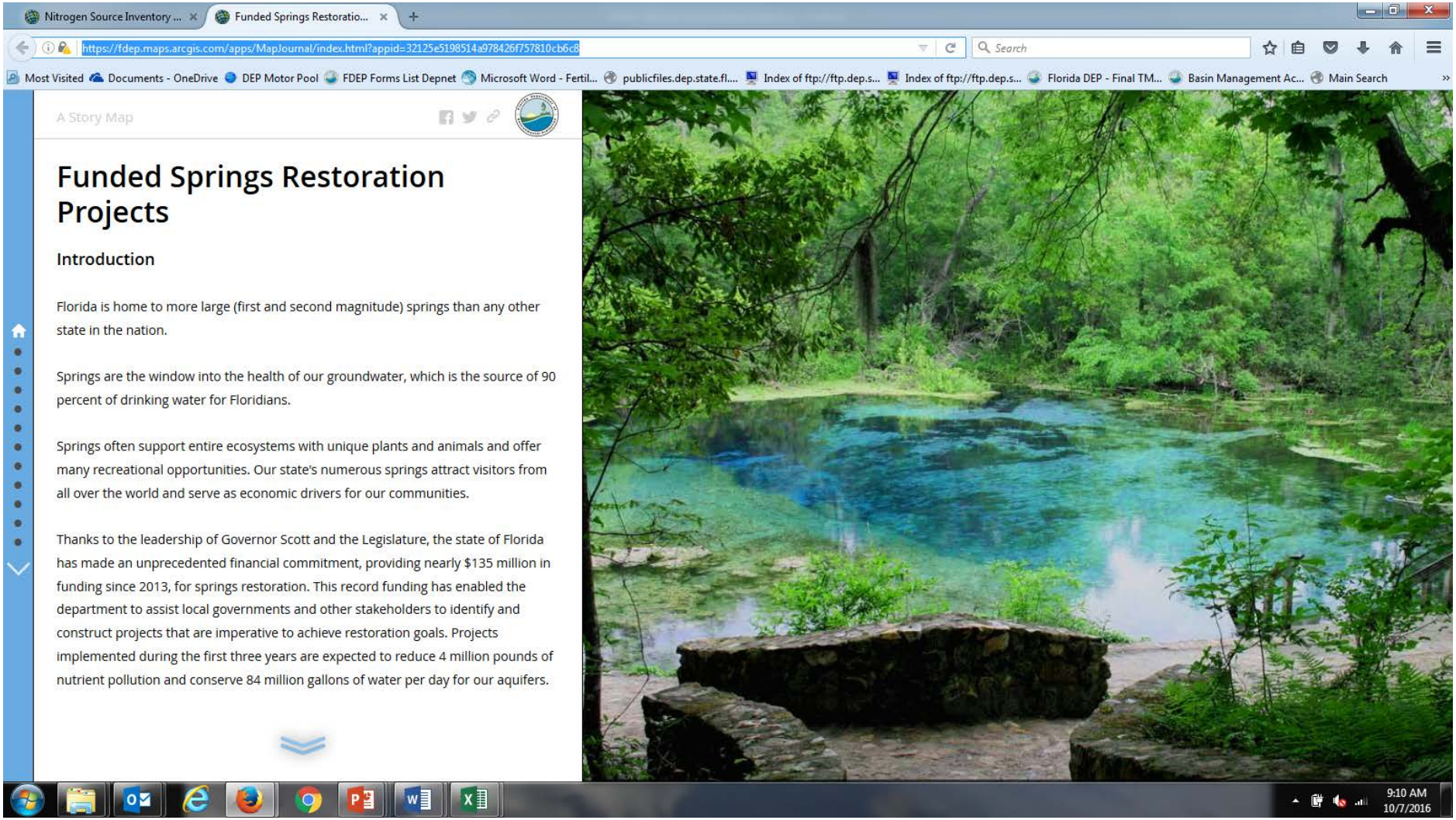
Funding

Springs Project Funding

- $50 million in funding was appropriated for springs restoration projects in Fiscal Year (FY) 2016/17.
- Each Water Management District (WMD) identifies potential springs projects in their respective areas to receive the funding.
- DEP evaluates projects based on the following criteria:
  - Improve water quality.
  - Conserve water quantity.
  - Are shovel-ready.
  - Can provide a local commitment.
  - Are capital improvement projects.
- Funding questions should be directed to:

  Division of Water Restoration Assistance (850-245-2836)

Springs Project Story Map



https://fdep.maps.arcgis.com/apps/MapJournal/index.html?appid=32125e5198514a978426f757810cb6c8

SJRWMD Springs Projects

- **Projects funded primarily for Wekiva River / Spring System, Volusia Blue Spring, Silver Springs and Lower Santa Fe River Springs**
- **General project types**
  - **Water conservation**
  - **Reclaimed water system enhancements**
  - **Alternative water supply development**
  - **Water quality improvements**
    - **Wastewater treatment plant upgrades, septic tank conversions and stormwater treatment**
  - **Innovative technologies**
    - **Potable reuse, biologically active media in RIBs, etc.**

SJRWMD Cost-Share Opportunities

Agricultural

- Ongoing, submittal deadline 9/9/16

Innovative/REDI

- ~ Mid-September to ~ November 1
- Current Solicitation Applications Due 10/13/16 (Today)

General

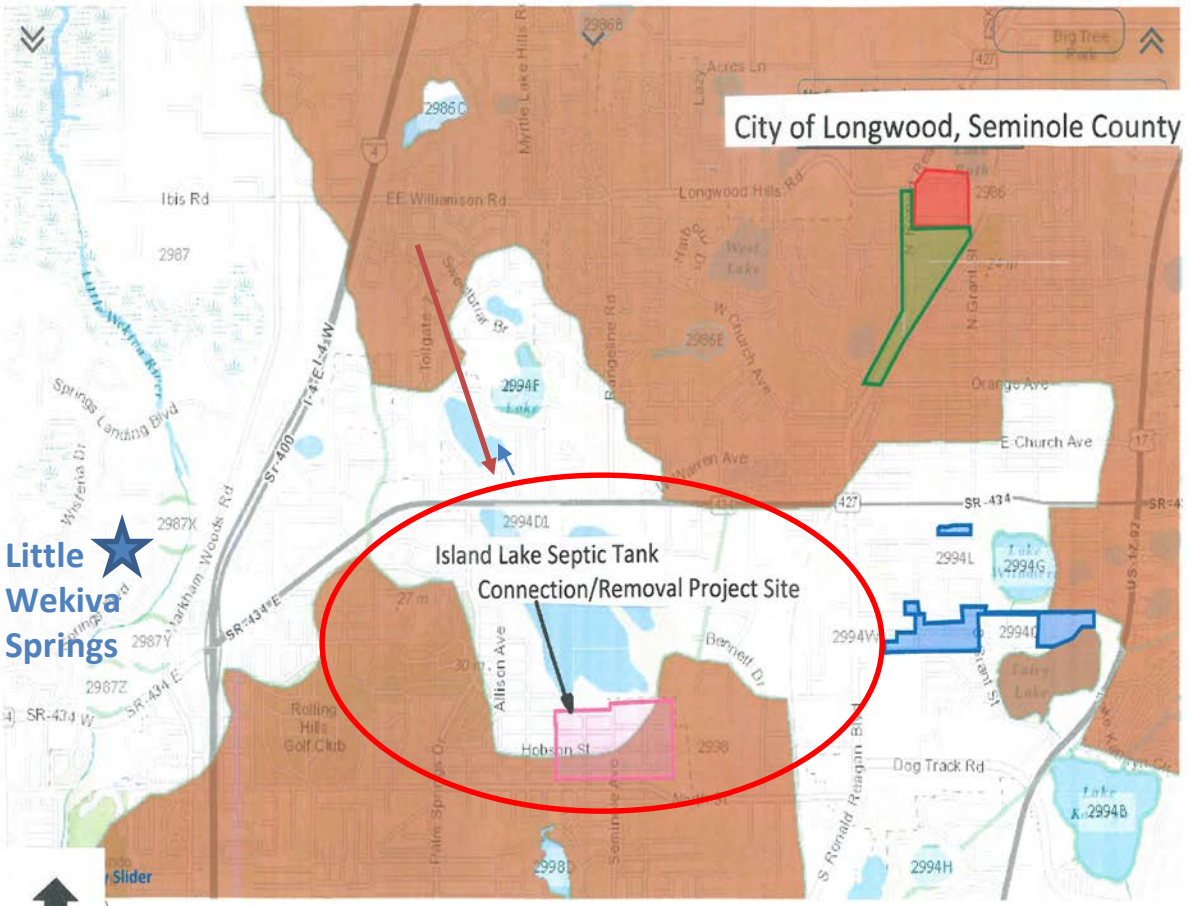
- ~ Mid-March to May 1
- Springs Projects provided to DEP from this solicitation process for Springs funds

Website: *http://www.sjrwmd.com/funding/*

City of Longwood Island Lake Septic Tank Connection/Removal

- **Connect 100 existing residential OSTDS to central sewer**
- **Reduces an estimated 3100 lbs of nitrogen per year**
- **Within the Wekiwa Springshed in the City of Longwood, East of I-4 and South Island Lake**
- **Within proximity to Little Wekiva springs; in the Cranes Roost watershed that contributes to the Little Wekiva and Wekiva Rivers**

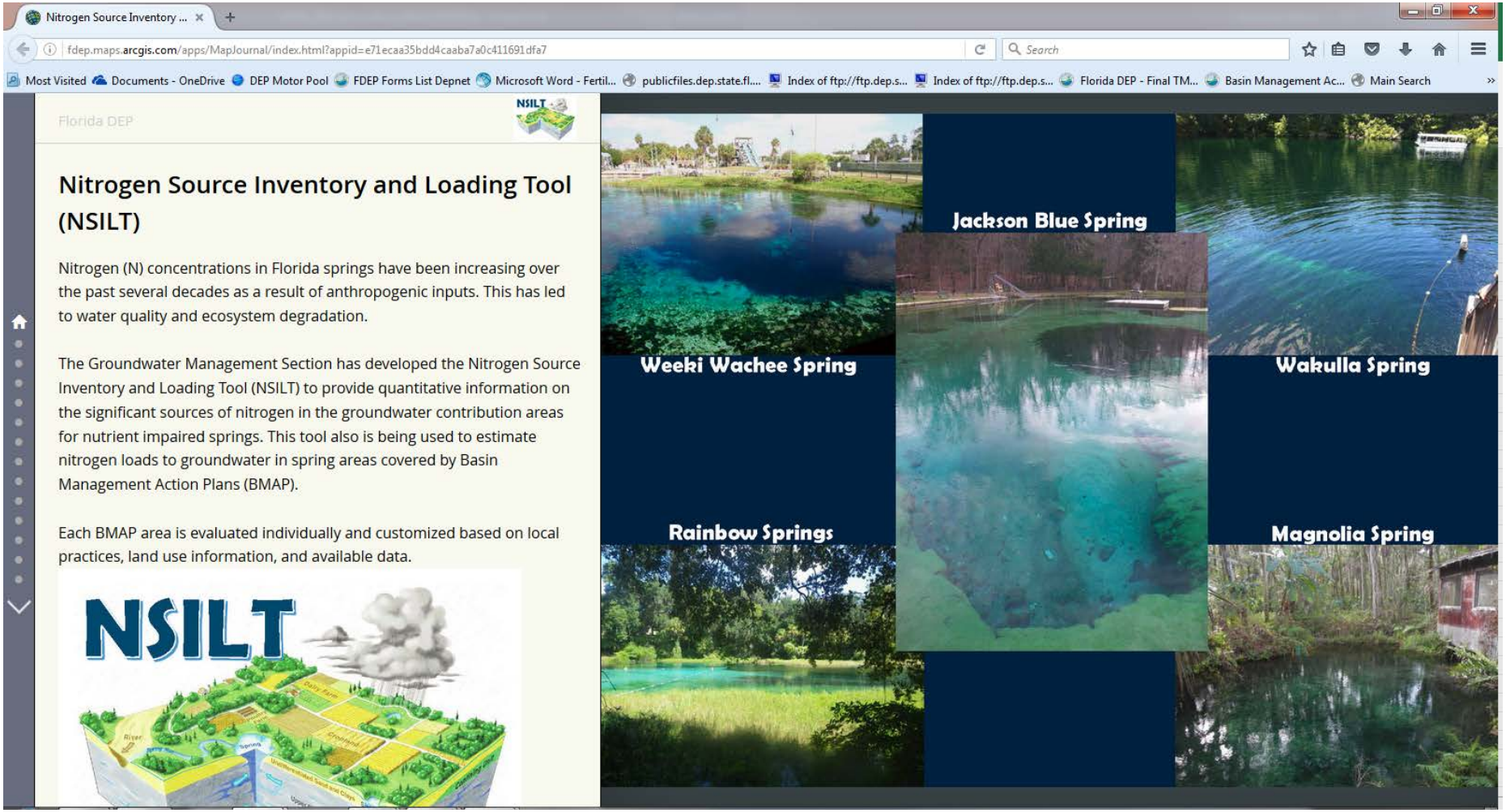
City of Longwood Island Lake Septic Tank Connection/Removal



City of Longwood Island Lake Septic Tank Connection/Removal
Exhibit 1: Location Map

Updates – Nitrogen Source Inventory Loading Tool (NSILT) Priority Focus Area (PFA) Springs Project Funding Site

NSILT Story Map



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PFA

PFA Requirements

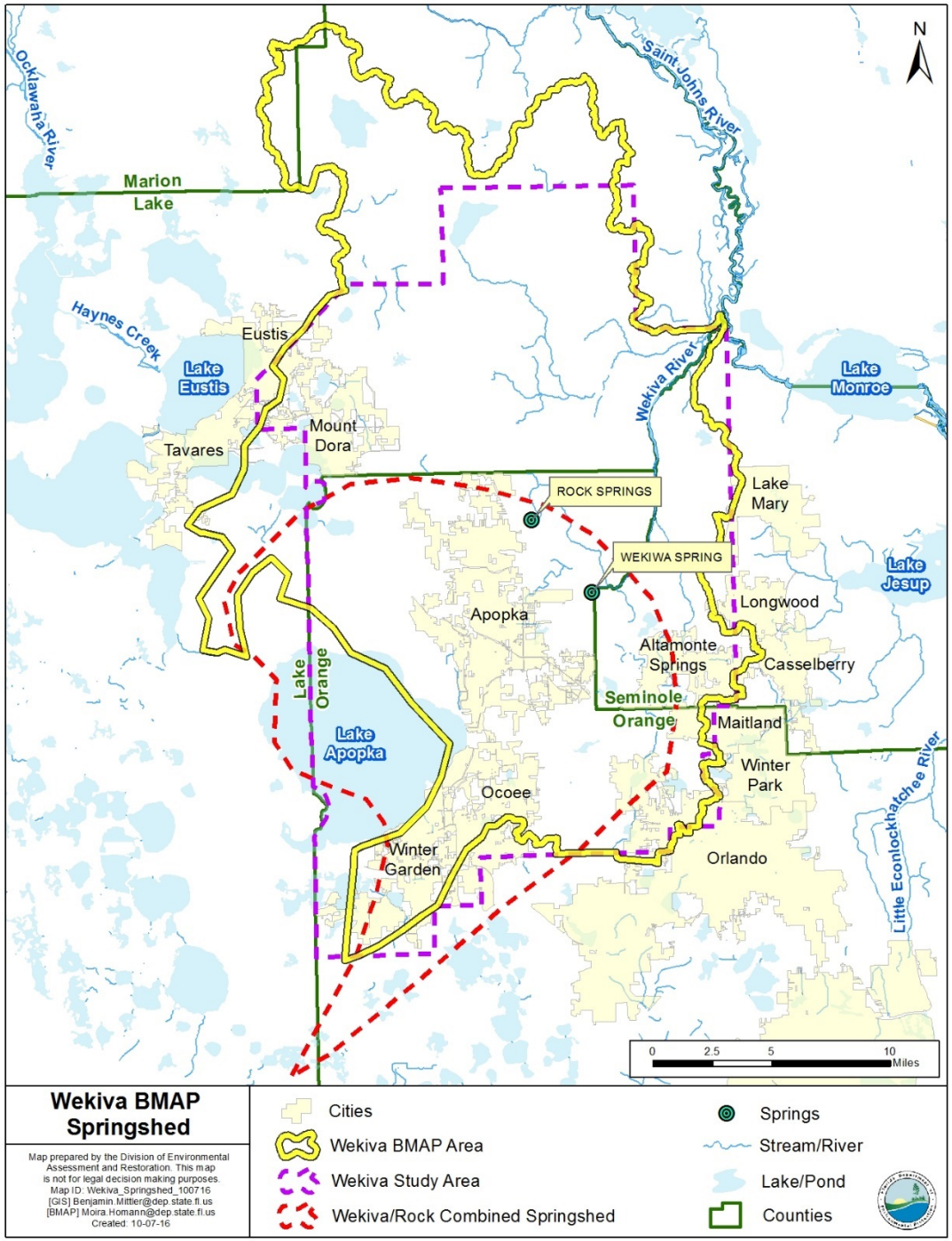
- Sub-Section 373.802, Chap. 2016-1 Laws of Florida:
  - Definition: Area or areas of a basin where the Floridan Aquifer is generally most vulnerable to pollutant inputs where there is a known connectivity between ground water pathways and an Outstanding Florida Spring (OFS).
- Sub-Section 373.803, Chap. 2016-1 Laws of Florida:
  - To be delineated considering factors that may lead to degradation of an OFS, such as:
    - Groundwater travel time to spring.
    - Hydrogeology.
    - Nutrient load to spring.
    - Additional factors.
      - Soil types.
      - Pollutant sources.
    - Identifiable boundaries.

PFA Determination

- Establish groundwater **contributing area (CA)** for the spring.
- Identify regions within the CA where greatest **recharge** occurs.
- Identify regions within the CA where Floridan Aquifer is most **vulnerable**.
- Consider **nitrogen loading and travel time**.
- Identify regions within CA to exclude or include based on **land use** and **potential occurrence of pollutant sources.**
- Create PFA boundary that corresponds with identifiable boundaries.

Wekiva PFA Update

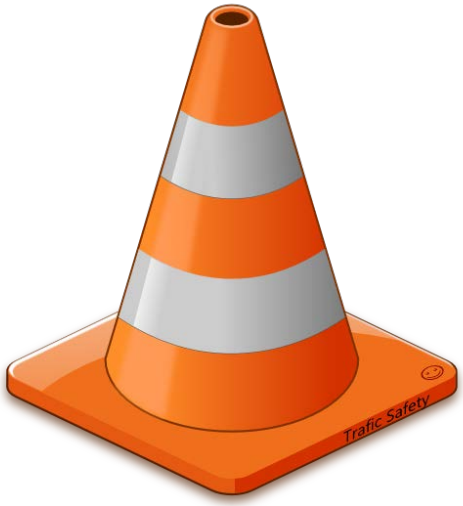
- Florida Department of Environmental Protection (DEP) has been working with St. Johns River Water Management District (SJRWMD):
  - Combined springshed for Wekiwa and Rock Springs (map on following slide).
    - PFA will fall within this springshed area.
  - District has recently provided DEP with a *very draft* PFA area based on recharge.
    - Currently under review by the department.
- Draft PFA scheduled for distribution for stakeholder comments sometime in December 2016.
- The PFA provides an area for stakeholders to focus on restoration efforts.
  - Area where efforts will be focused to reach 5-year target.
- Restoration activities will have to occur in entire BMAP area.
  - 2016-1 provisions will apply in entire BMAP area/PFA.

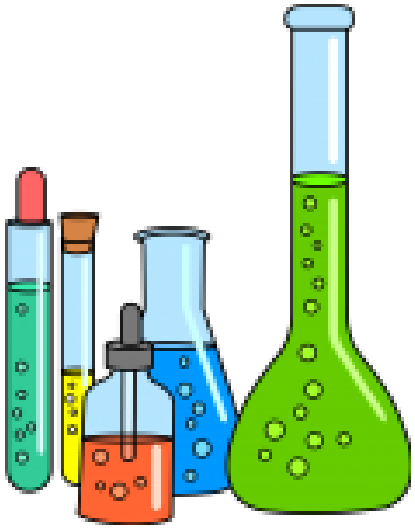


OSTDS Remediation Plan Components

OSTDS Remediation Plan Components

1. Public education strategy.
2. Projects.
3. Scientific information on OSTDS effects.





Public Education

Public Education Discussion

- Discussion objectives:
  - Confirm key audiences.
  - Further refine who are the audiences.
  - Identify some major themes for communications/education.
  - Identify major misconceptions.
  - “Piggyback” opportunities.
- Future discussion:
  - Prioritize actions.
  - Measuring improvements in knowledge.

Public Education

- Who are the key audiences to target with the Wakulla Springs public education plan?
  - Homeowners.
  - Elected officials/leadership.
- What specific points do you think we need to convey about OSTDS nitrogen loads?
- Are there additional misperceptions we need to overcome? What are they?
- Are there existing public education efforts with which we could piggyback communications?

Public Education

- Inventory of public education components.
  - Ongoing education efforts?
  - Education needs?
- Overall goal:
  - What do we need in order to increase public education/awareness about:
    - Springs.
    - Local groundwater systems and nutrient connections.
    - Septic tanks, etc.
- Action item for next meeting
  - Complete public education inventory.

FDOH - Advanced Onsite Sewage Treatment Systems in Florida/Rule Making Updates

Advanced Onsite Sewage Treatment Systems in Florida

Onsite Sewage Program

Bureau of Environmental Health

October 13, 2016

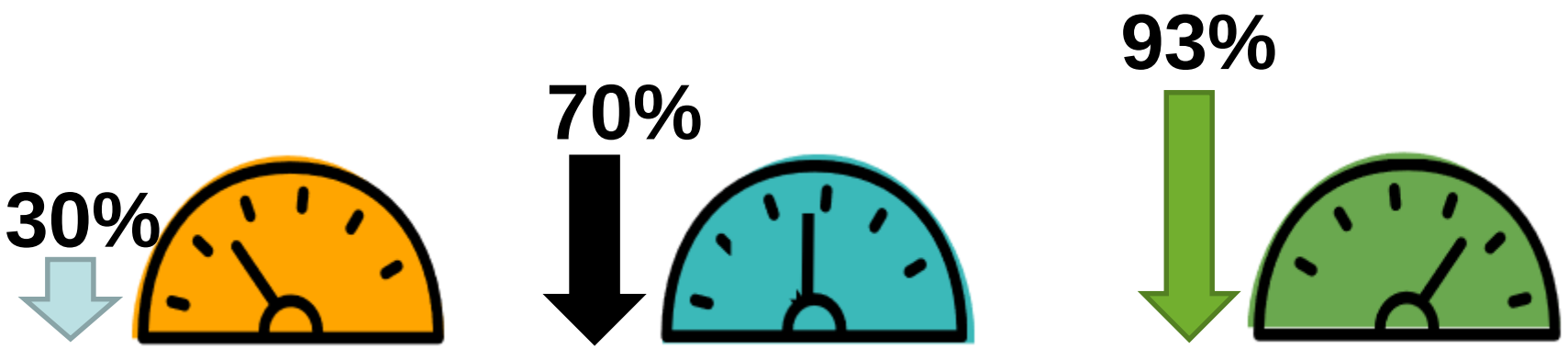
Acknowledgment

Slides created by:

Dr. Eberhard Roeder

Ms. Elke Ursin

Nitrogen Reduction Options for Onsite Wastewater



Conventional systems

Lined drainfield & existing advanced technologies

Nitrogen reducing systems

Nitrogen Removal

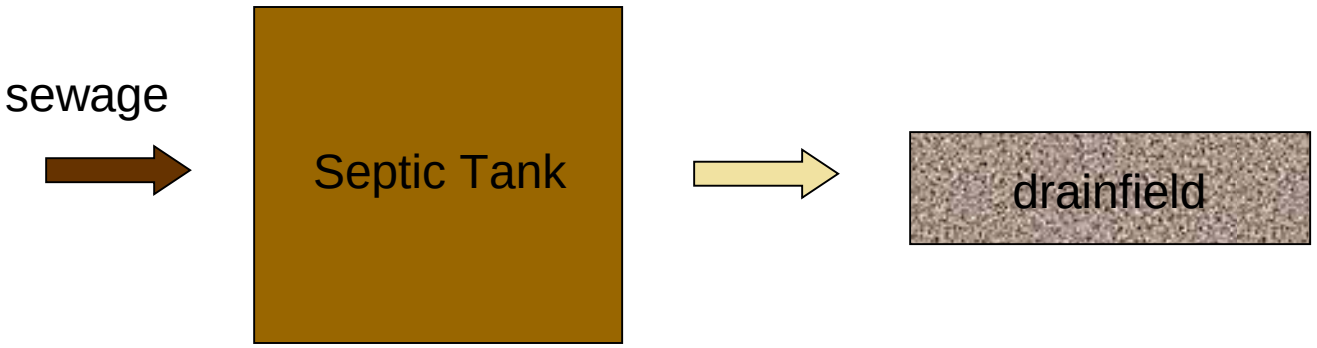
Nitrogen exists in various forms and must be dealt with progressively in each form to ensure removal

Conceptually:

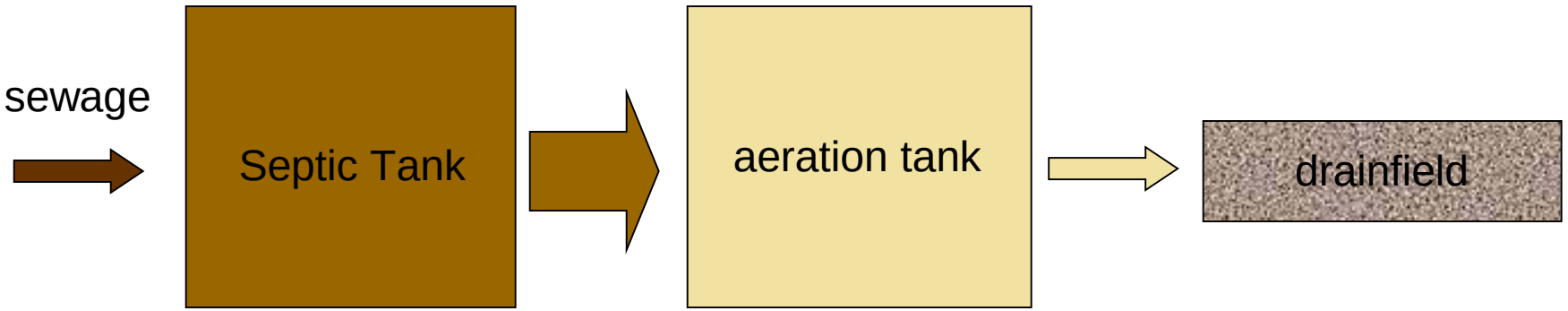
organic nitrogen-> ammonia -> nitrate -> nitrogen gas

ammonification septic/anaerobic *nitrification aerobic* *denitrification anoxic (need food)*

Conventional OSTDS

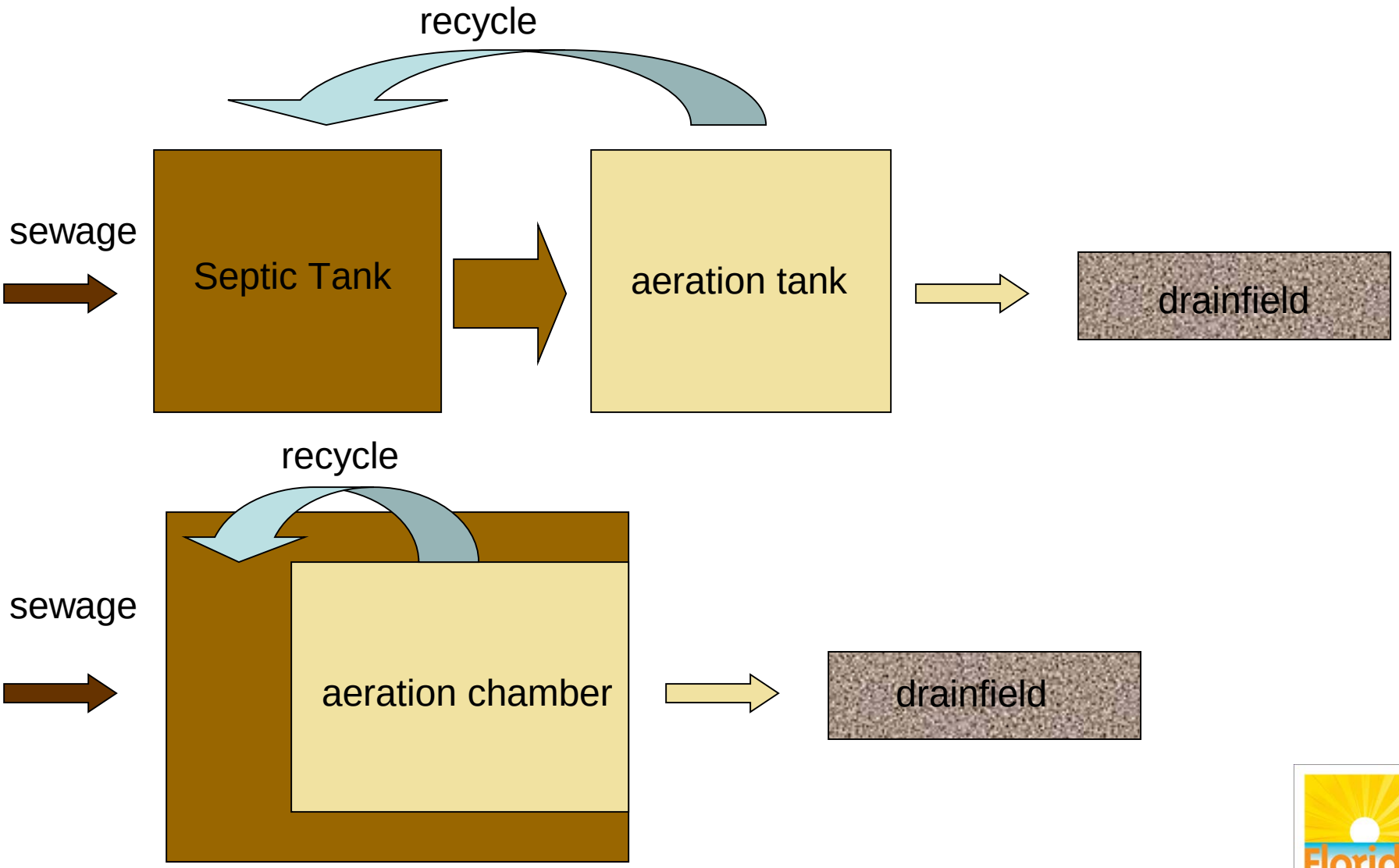


Aerobic Treatment Unit (ATU)

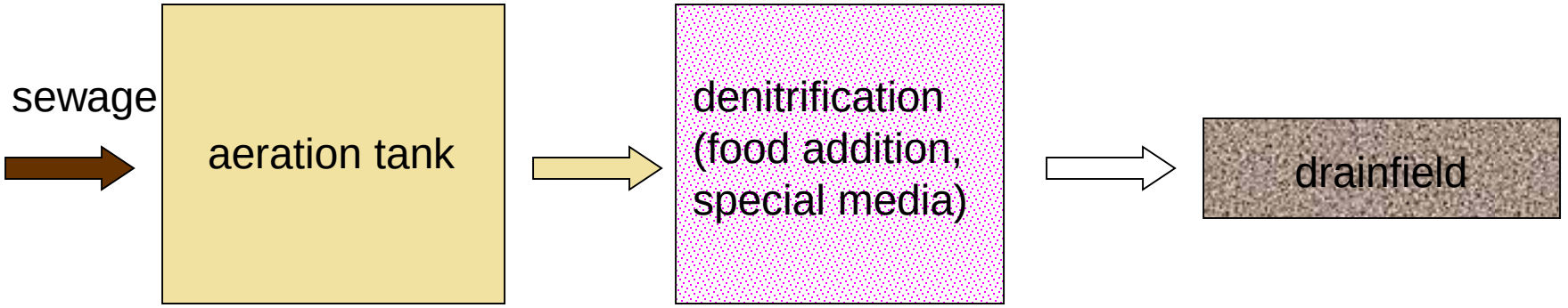


NSF40 Certification

NSF245 Certified ATU



Additional Nitrogen Removal Processes
Performance Based Treatment System (PBTS)



“Passive” Nitrogen Reduction Systems

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

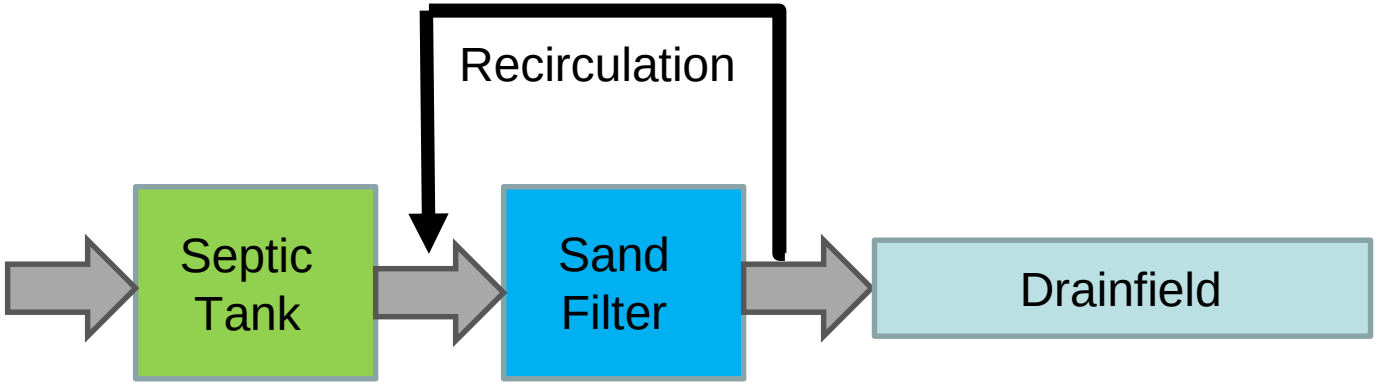
Dispersal

Stage 2

(denitrification)

denitrification media:
lignocellulosics & elemental sulfur

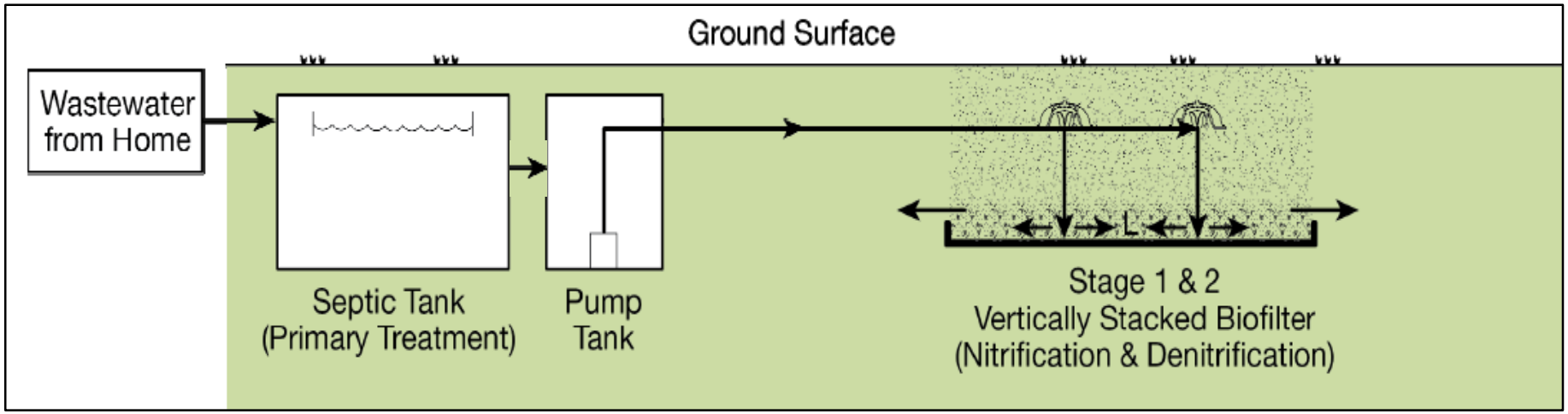
In-Tank Passive Nitrogen System



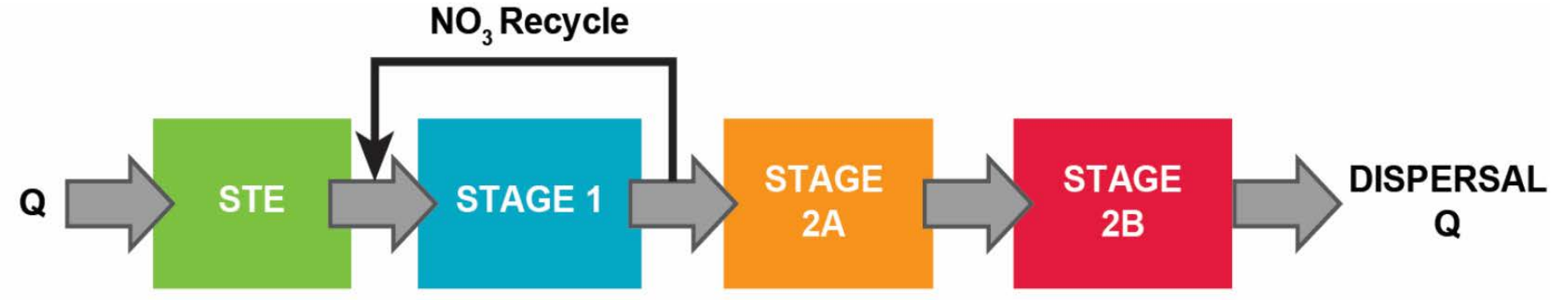
Conventional OSTDS + In-Tank Sand Filter

In-Ground Passive Nitrogen System

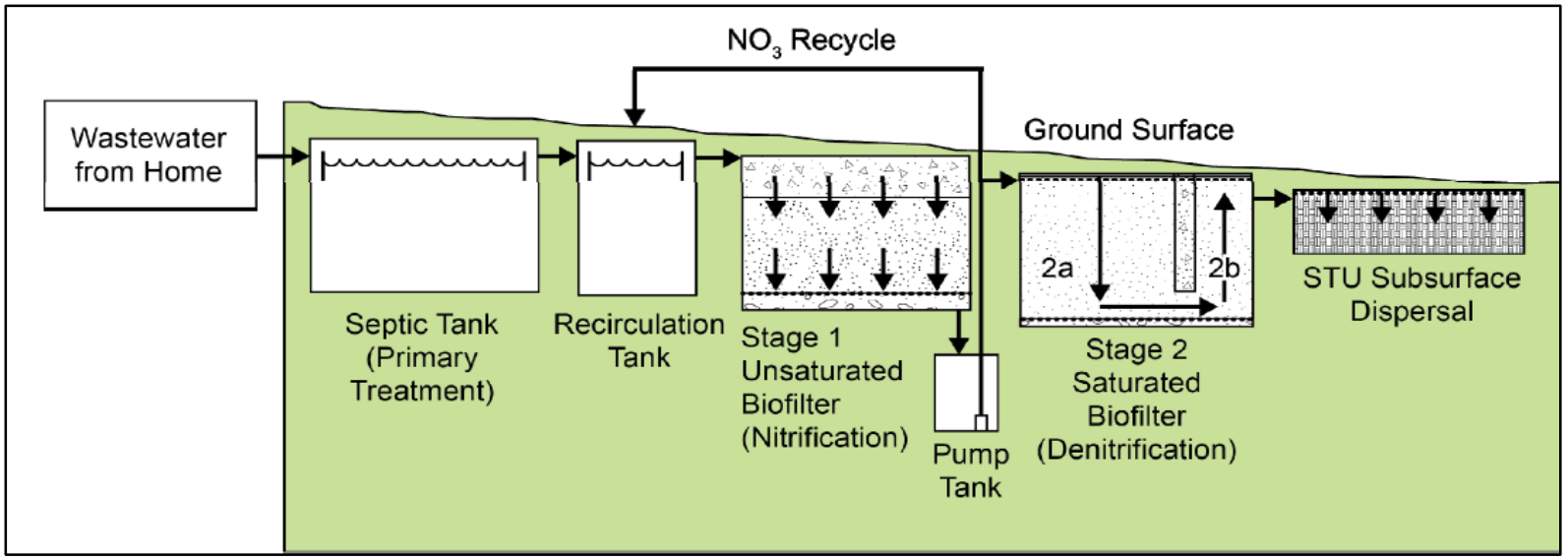
Conventional OSTDS + In-Ground Two Stage System: Stage 1 Sand, and Stage 2 Lignocellulosic Materials



In-Tank Passive Nitrogen System



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



Combined Passive Nitrogen System

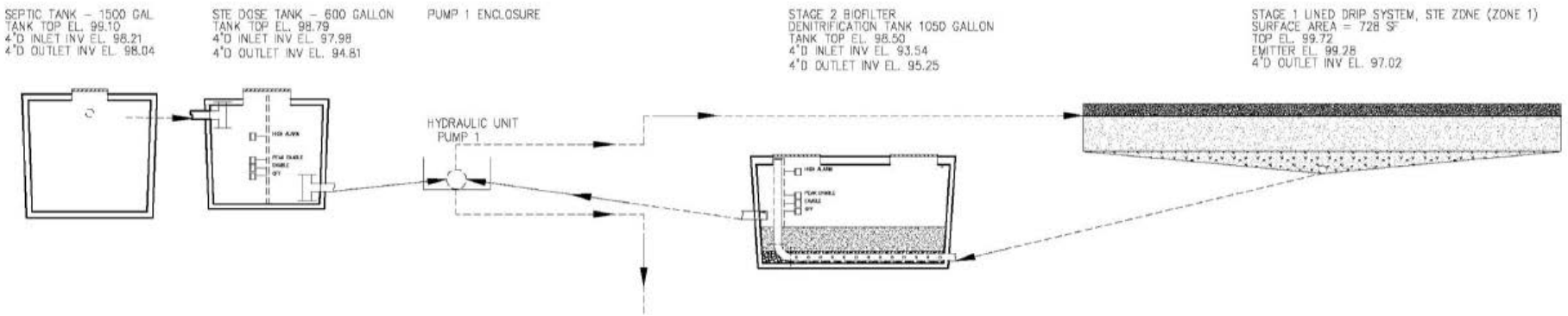


Image from Hazen and Sawyer (2013)

Permitting Categories

Three categories include elements of performance-based permitting

- Aerobic Treatment Unit (ATU)
- Performance-Based Treatment System (PBTS)
- Innovative System (sub-category of performance-based treatment system)

ATU Definition

- "A sewage treatment unit which introduces air into sewage to provide biochemical stabilization within a treatment receptacle"
  Florida Administrative Code (FAC) Rule 64E-6.002(2)
- Sprinkle water through air or loose filter material
- Bubble air through water
- Certification by NSF International or other certification organization for $CBOD_5$ and TSS Treatment based on NSF40 standards
- Some NSF40 certified systems may also be certified for NSF245 standard for nitrogen.

Performance-Based Treatment System (PBTS) Definition

- Specialized onsite sewage treatment and disposal system
- Achieves a specific and measurable established performance standard for multiple parameters.
- Designed by a professional engineer with a background in wastewater engineering, licensed in Florida
- Using appropriate application of sound engineering principles
- Additional requirements in FAC Chapter 64E-6 Part IV

Innovative Systems: A Special Category of PBTS

- "Employ materials, devices, or techniques that are novel or unique and that have not been successfully field-tested … in this state"
  Section 381.0065(2)(g), Florida Statutes (FS)
- Require NSF/Environmental Technology Verification (ETV) data for approval as innovative systems
  FAC Rule 64E-6.026(1)(b)
- Included in permitting category PBTS
  FAC Rule 64E-6.025(10)

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OSTDS
It's not just septic tanks anymore

Roxanne L. Groover
Executive Director
Florida Onsite Wastewater Association (FOWA)

It’s time to discuss onsite solutions

- Septic tanks were never designed to treat nitrogen

Available technologies

- Proprietary Aerobic Treatment Technologies (ATUs)
  - This includes media filters
- Performance Based Treatment Systems (PBTS)
- Innovative Systems
- Passive Nitrogen Study Technologies

Proprietary Aerobic Treatment Technologies (ATUs)

- **Standard 40: Residential Wastewater Treatment Systems**
- **Standard 245: Wastewater treatment systems**

NSF Testing & Certification Process

- Application/engineering review - 1-3 months
- Test unit installation at test facility - 1-3 days
- Test administration - 6 months
- Test data analyzed by program office & engineering - 4-6 weeks
- Issuance of the Wastewater Technology Report

NSF Evaluation Criteria - 40

Influent Wastewater Characteristics:

- BOD_5 = 100 mg/L - 300 mg/L
- TSS = 100 mg/L - 350 mg/L
- pH = 6 – 9
- Temperature = less than 30°C

Effluent Criteria (Class 1; 30-day average):

- $CBOD_5$ = 25 mg/L
- TSS = 30 mg/L
- Color, Odor, Oily Film & Foam (MBAs) – 3 times during test
- pH = 6 – 9
- Temperature = no criteria
- DO = no criteria

NSF/ANSI Standard 245 Nitrogen Reduction

Standard 245: Any residential system with a treatment capacity of 400-1500 gpd; Nitrogen reduction.

- **Must also meet the requirements of Standard 40 effluent.**

ETV Nutrient Reduction

Only a verification process

- **Systems can be adjusted daily**

Nitrogen Testing

Testing Aspect	*NSF/ANSI 245*	*ETV Nutrient Reduction*
Duration of testing	6 months; up to 37 weeks total	1 year
System start-up	Up to 3 weeks	Up to 8 weeks
Influent requirements	Average required over course of test: CBOD5 100 – 300 mg/L TSS 100 – 350 mg/L TKN 35 – 70 mg/L Alkalinity >120 mg/L Temperature 10°C - 30°C Allows chemical addition to adjust influent – sodium bicarbonate for alkalinity; urea and methanol at a C:N ratio of not less than 5:1 for TKN.	Only suggested ranges: CBOD5 100 – 450 mg/L TSS 100 – 500 mg/L TKN 25 – 70 mg/L Phosphorus 3 – 20 mg/L Alkalinity >60 mg/L Temperature 10°C – 30°C Allows chemical addition to adjust influent – sodium bicarbonate for alkalinity.

Nitrogen Testing

Testing Aspect	*NSF/ANSI 245*	*ETV Nutrient Reduction*
Temperature impacts (temperatures below 10°C impact process bacteria)	Allows for suspension of Nitrogen sampling when temperature drops below 10°C, with extension of sampling to obtain a minimum of 55 valid sample sets	No allowance, test runs 1 year and all data is reported
Maintenance during testing	None – same as NSF/ANSI 40	Maintenance allowed, but documented and reported in final report
Stress Sequences	4 - wash day, working parent, equipment/power failure, vacation	5 - wash day, working parent, equipment/power failure, low loading, vacation

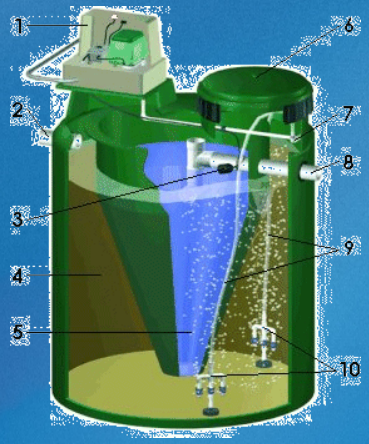
Nitrogen Testing

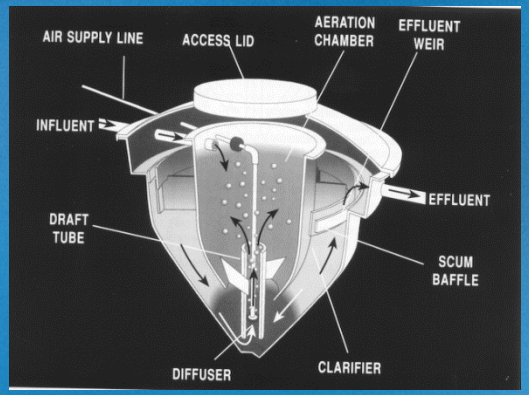
Testing Aspect	*NSF/ANSI 245*	*ETV Nutrient Reduction*
Sampling	3 times/week during design loading (weeks 1–16 and weeks 24½–26); 2 times during the week following each stress test	Minimum 1 time/month; same as NSF/ANSI 40 during stress sequence; also for 5 consecutive days at end of test
Acceptance criteria	For pass/fail, only samples collected during design loading periods (samples during stress sequence reported, but not included in the pass/fail criteria calculation). Average of all effluent samples may not exceed: CBOD5 25 mg/L TSS 30 mg/L TKN <50% of average of all influent pH 6.0 – 9.0 SU	None; all data is reported

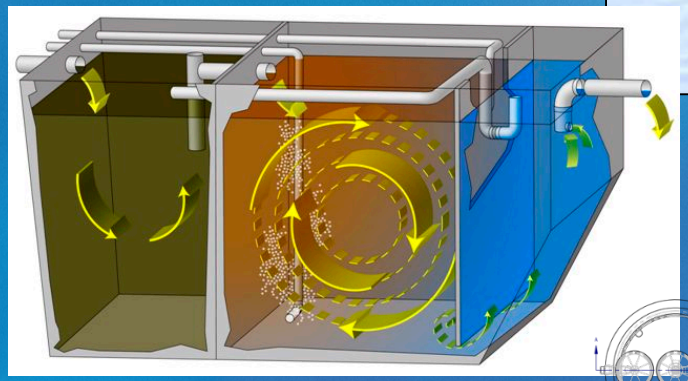
ATU/PBTS Units Approved in Florida

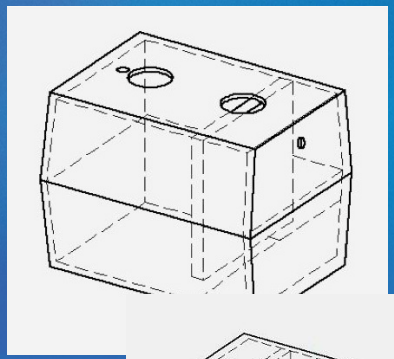
Hoot *
Nyadic
Multiflo
HydroAction
Norweco*
Clearstream
CajunAire
Delta Whitewater
Aero-Tech
AquaKlear
Mighty Mac
Bionest – fixed film
Aqua Safe
SCAT
Aqua Aire
American Wastewater
FAST – fixed film*
Jet – fixed film
Fuji Clean – fixed film

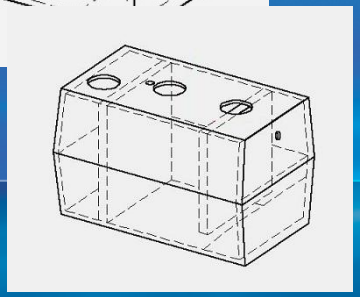
Suspended ATUs

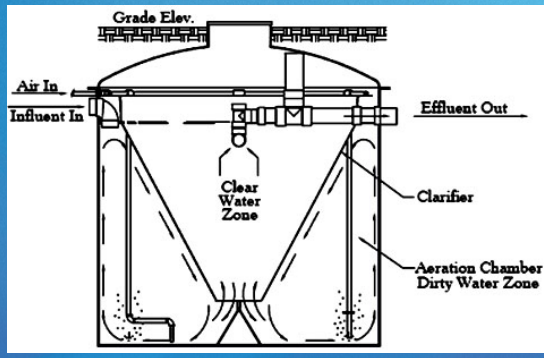


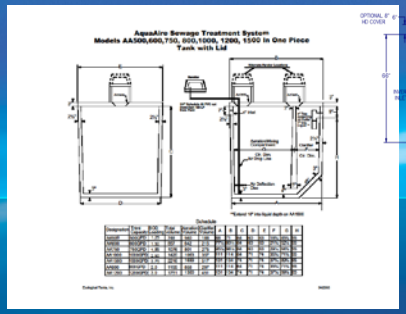


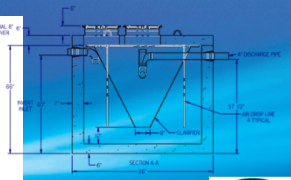


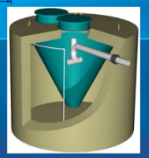




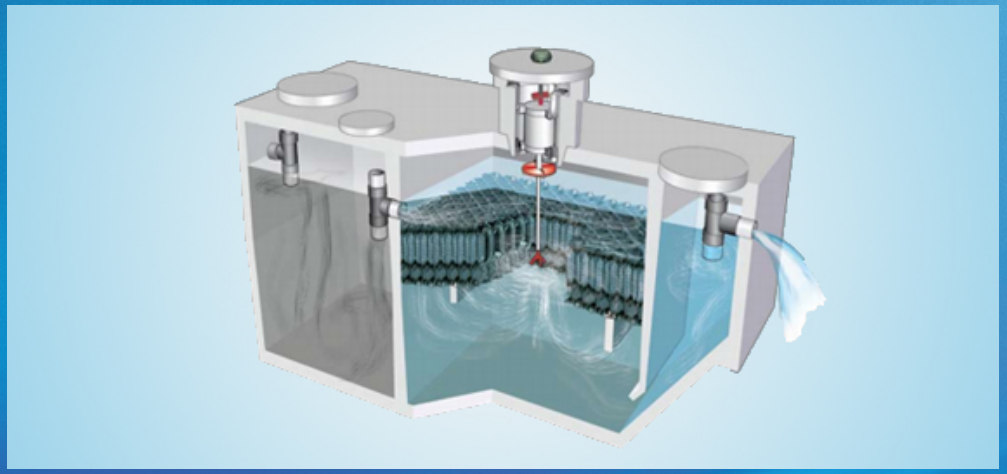








Fixed Film/Submerged Media ATUs



Treatment Process Overview

Fuji Clean's "contact filtration" treatment consists of a controlled, circuitous flow train through anaerobic and aerobic chambers and in direct contact with assorted proprietary fixed film medias on which biological digestion of organic matter occurs. Media is also designed and positioned to provide mechanical filtration of process wastewater.

The system includes two air lift pumps (see diagram below) The Recirculating Airlift Pump returns process water and sludge from the aerobic zone to the sedimentation chamber, recirculating 2-4 times inflow per day for CE models and 4-6 times inflow for CEN (enhanced denitrification) models. The Effluent Airlift Pump is designed to help equalize flow and discharge treated effluent.

[redacted]

Chamber 3B. Disinfection Chamber (final zone before discharge – option for chlorination tablet disinfection)

Chamber 3A. Storage Chamber (settling zone)

[redacted]

Outlet

Inlet

Powered by the MACBlower "R" Series Blowers Linear diaphragm air blowers manufactured by Fuji Clean sized to provide about 2.8 cubic feet per minute to most residential systems.

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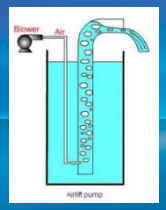

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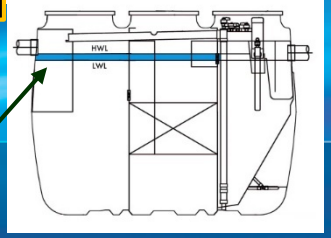


FujiClean USA LLC
Toward Clean Water...

NSF
Certified to
NSF/ANSI Standards 40 & 245

NSF/ANSI Data Summary

Fuji Clean USA Model CE5
NSF/ANSI 40 Data
450-gpd, straight septic, no septic tank.

BOD/CBOD (mg/l)		TSS (mg/l)		Nutrients					
				Total Nitrogen (1 sample/week)			Total Phosphorus (1 sample/week)		
Influent (Avg)	Effluent (Avg)	Influent (Avg)	Effluent (Avg)	Influent (Avg)	Effluent (Avg)	% Removal	Influent (Avg)	Effluent (Avg)	% Removal
152	**11**	259	**13**	24	**10**	62%	9	**7**	22%

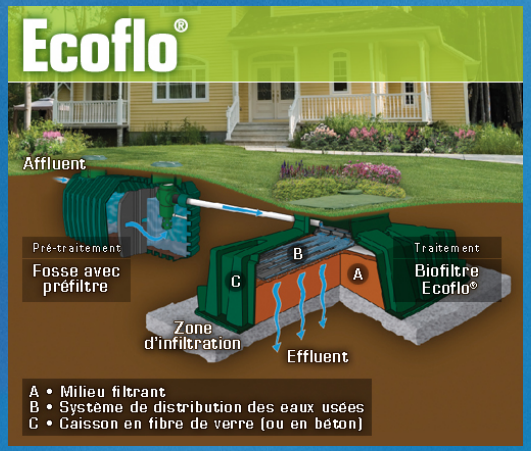
Fuji Clean USA Model CEN5
NSF/ANSI 40/245 Data
450-gpd, straight septic, no septic tank.

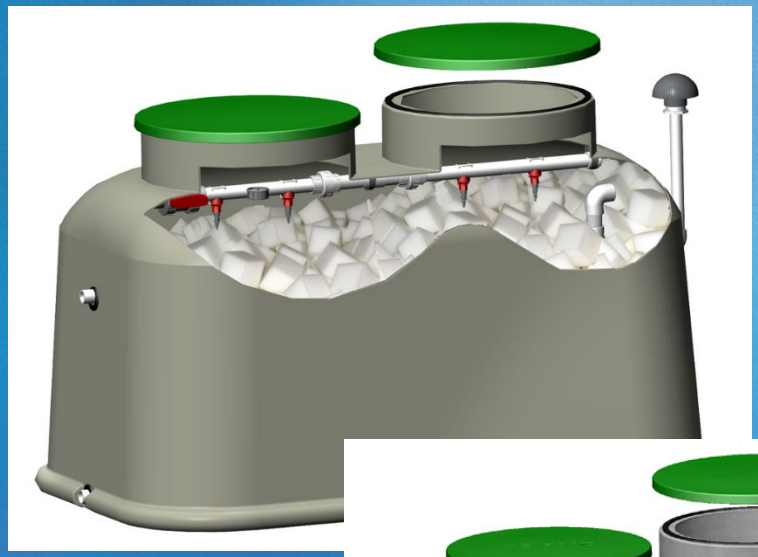
BOD/CBOD (mg/l)		TSS (mg/l)		Total Nitrogen		Fecal Coliform (w/ UV) Total Colonies /100 mL
Influent (Avg)	Effluent (Avg)	Influent (Avg)	Effluent (Avg)	Influent (Avg)	Effluent (Avg)	Effluent (Geomean)
190	**5**	305	**6**	40	**10**	**70**

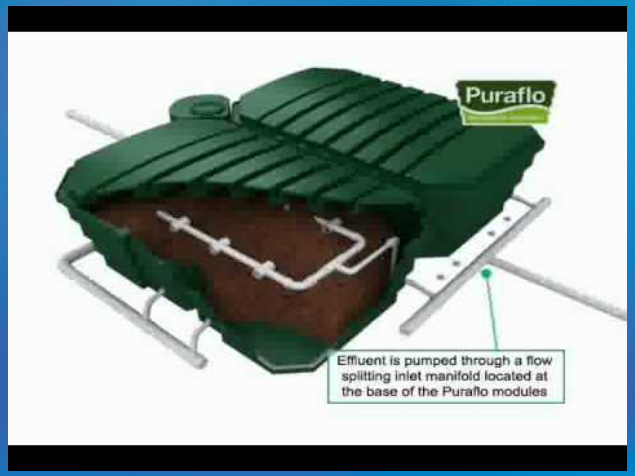
Media Units Approved in Florida

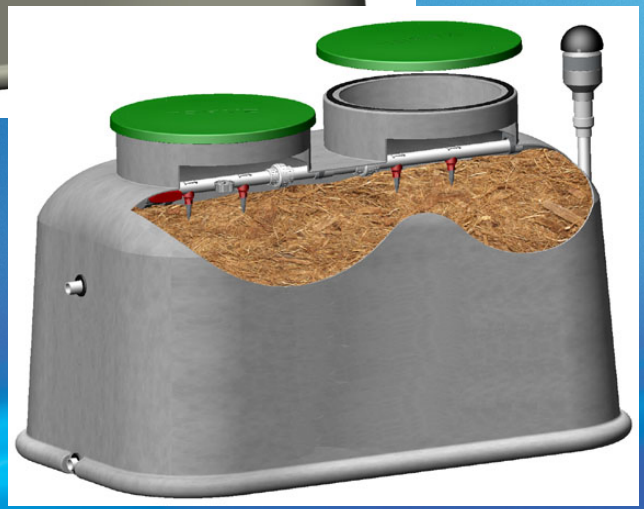
- Unsaturated - natural
  - Quanics – coconut coir*
  - Ecoflo
  - Ecopure*
  - Puraflo
- Unsaturated - artificial
  - Advantex*
  - Earthtek
  - Quanics – foam*

Unsaturated Media Filters

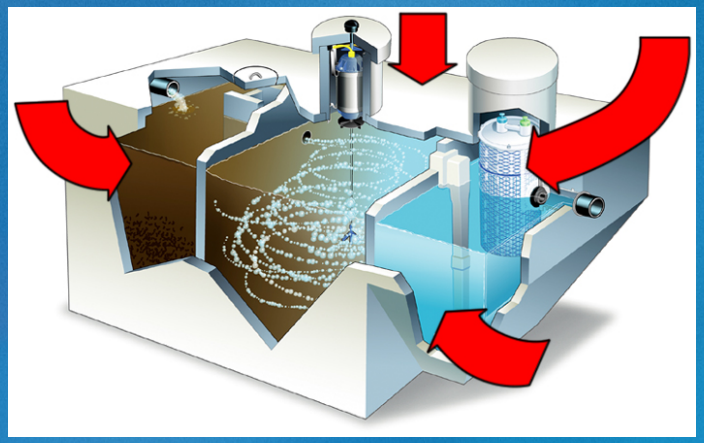


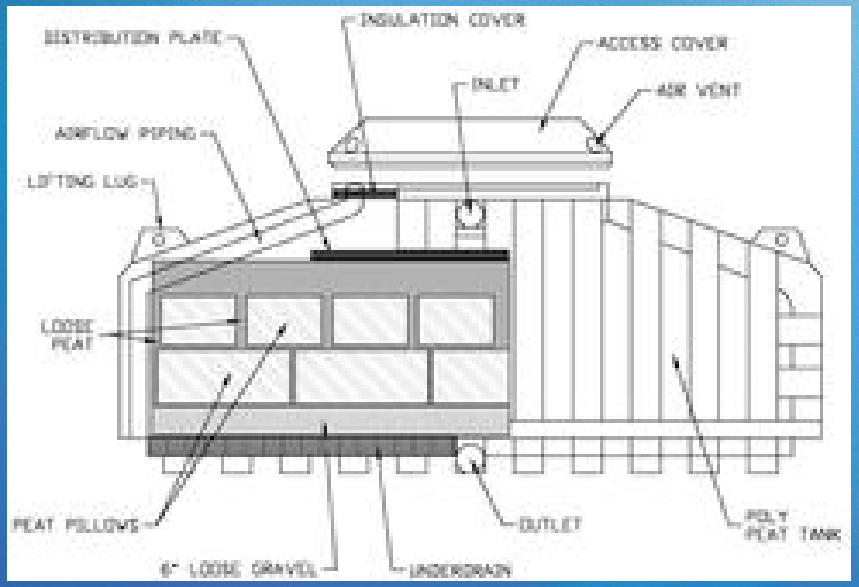






Currently Approved PBTS





Bio-Microbics, Inc.

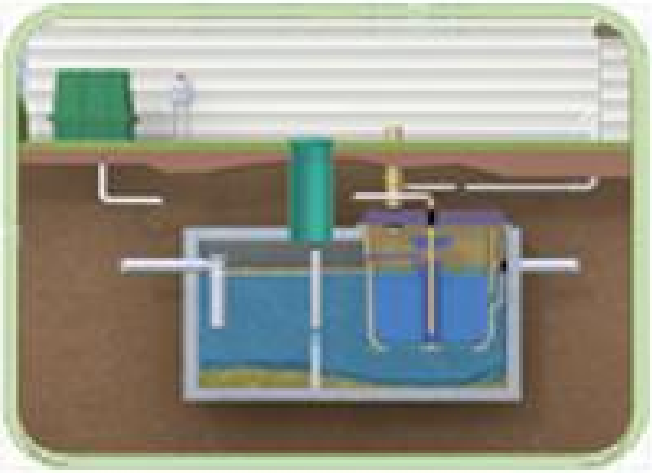
NSF/ANSI 245

Wastewater Treatment Systems - Nitrogen Reduction

- BioBarrier® MBR 0.5-N 500
- BioBarrier® MBR 1.0-N 1000
- BioBarrier® MBR 1.5-N 1500
- MicroFast 0.5[1] 500
- MicroFast 0.625 625
- MicroFast 0.75[2] 750
- MicroFast 0.9[3] 900
- MicroFast 1.5[4] 1500

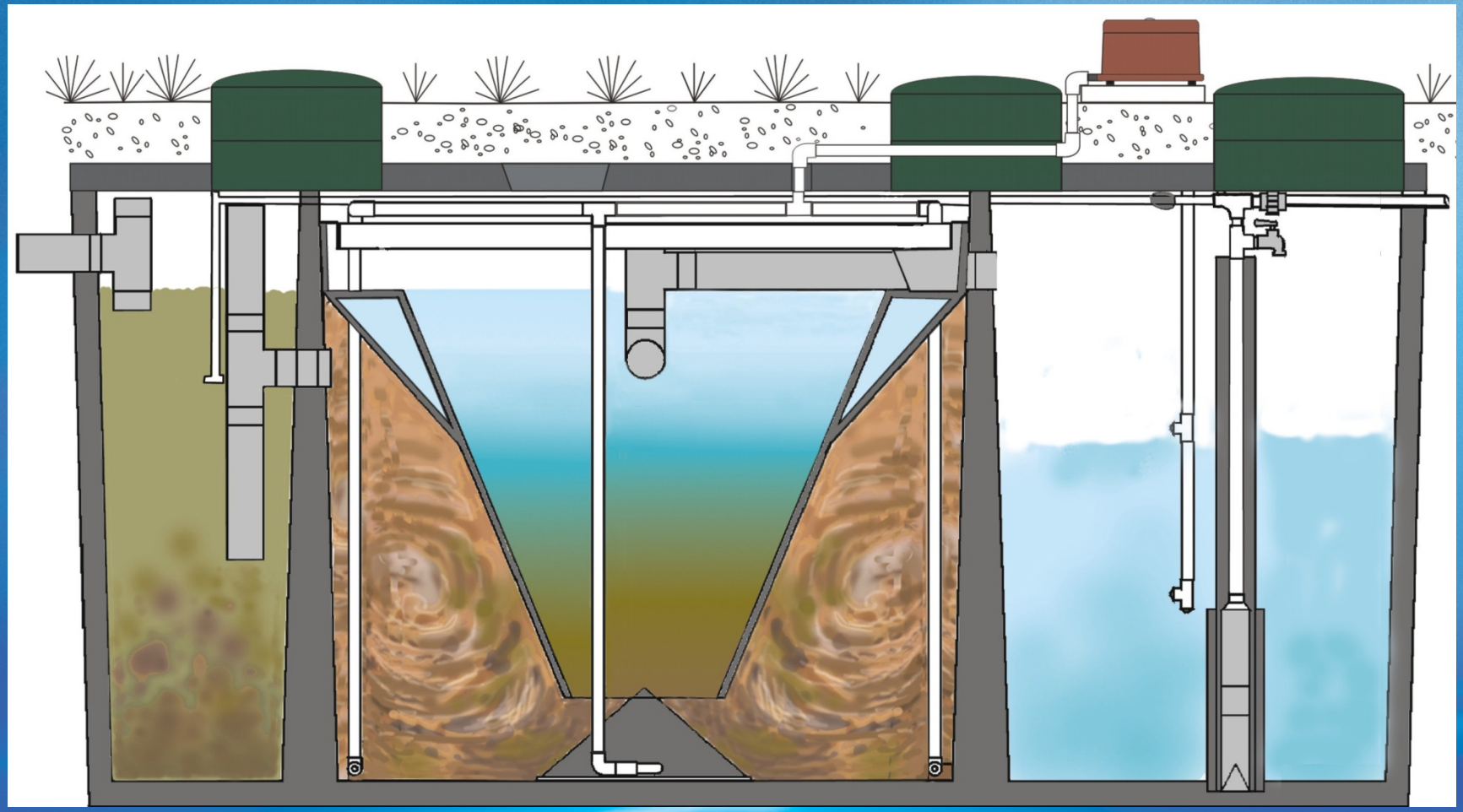
BioBarrier® Membrane Bioreactor

- NSF/ANSI Standard 40, Class 1 Certified (BioBarrier® 0.5, 1.0, & 1.5)
- NSF/ANSI Standard 245 (Nitrogen Reduction) Certified (BioBarrier® 0.5, 1.0, & 1.5)
- NSF/ANSI Standard 350, Class R (Water Reuse) Certified (BioBarrier® 0.5, 1.0, & 1.5 – FIRST system to achieve this Standard!)



HOOT SYSTEMS, LLC.
www.hootsystems.com
Install A Hoot Don't Pollute

Hoot BNR



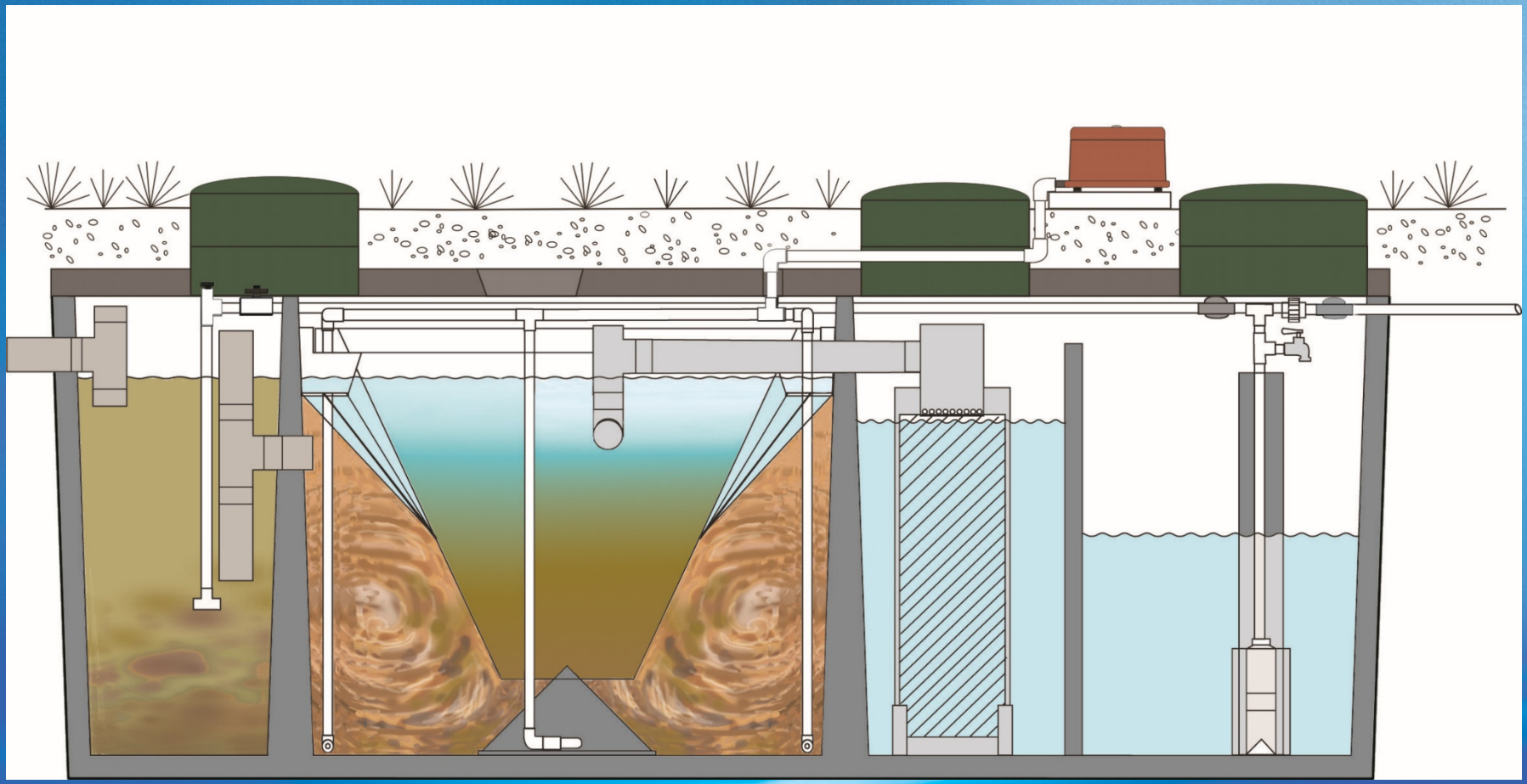
Hoot Systems, working today to protect tomorrow's environment.

History of the BNR

- BNR - Biological/Basic Nitrogen Reduction
- Tested in 1999, Introduced in 2001
- Thousands of installations in Florida
- Standard 40 Since 2001,
- Similar Model (Hoot-NR) is Std. 245
- Adds Total Nitrogen Reduction <60%
- Field Verification by Maryland Department of the Environment (MDE) of 62%.

HOOT SYSTEMS, LLC.
www.hootsystems.com
Install A Hoot Don't Pollute

Hoot ANR - RTS



Hoot Systems, working today to protect tomorrow's environment.

History of the Hoot ANR

- ANR – Advanced Nitrogen Reduction
- Research Began in 2001, Certified in 2007
- NSF Standard 40 & 245 Certified
- For BOD_5, TSS, TN & Fecal Reduction
- The only system in certification conditions to get below 10 mg/l, FDWS

Hoot Systems H-450ANR – Electrical Monitoring

NSF has completed a review of the Hoot Model H-450ANR treatment system for the average electrical consumption. The Hoot ANR system was monitored for electrical consumption during an extended period beyond the Standard 40/245 performance evaluation. There were no modifications made to the tested system during the 2nd six months of performance evaluation. During the 163 days of operation, the system used a total of 343 kW of electricity, averaging a daily electrical consumption of 2.1 kW per day.

Dispersal Options

- Low Pressure Piping (LPP)
- Drip Irrigation

Gives us the opportunity to build “treatment trains” for water reuse with additional uptake of nitrogen

Benefits of OSTDS

- Individualized
  - Single family
  - Decentralized
- Groundwater recharge
- Limited Collection/Transport Piping
  - Less opportunity for contamination
  - $$$ savings

Where do we go from here?

- Determine acceptable TN loading rate for area
- Determine “best fit” technology
  - Use – fulltime, seasonal, rental
  - Footprint
  - “Cradle to Grave” cost

Questions/Comments

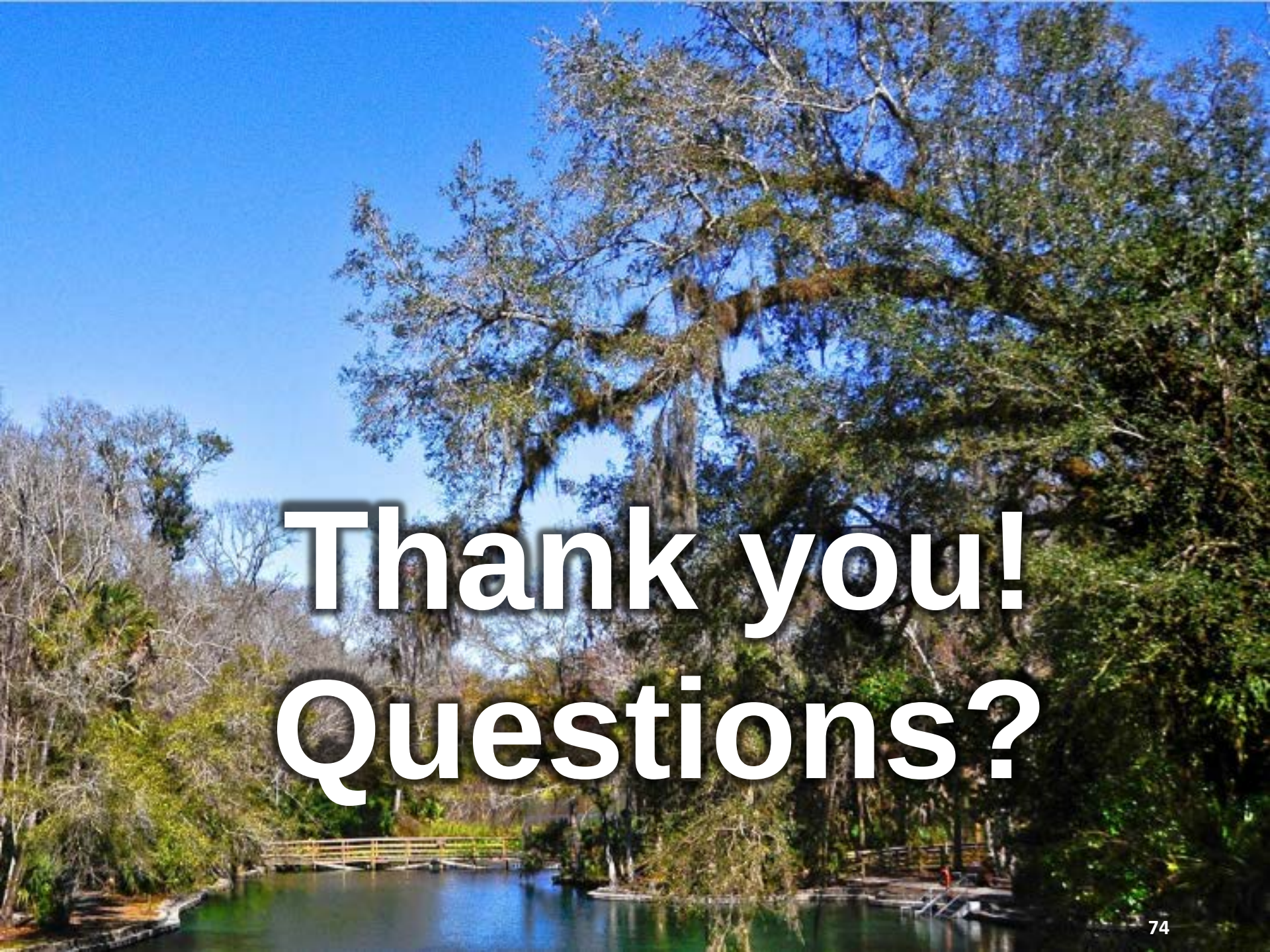
- I would like to suggest manufacturers be invited to present specifics of technologies at upcoming meeting(s).
- Or a fieldtrip to the FOWA Training Center to gain “hands-on” experience of various technologies.

Future Meeting Topics

- FDOH: Are there site conditions/limitations that should be considered for installation of field enhancements?
- All: Do we have the information we need to evaluate site conditions for field enhancements?
- FDOH: What are the site conditions that affect the cost estimates (up or down)?
- All: Do we have the information we need to estimate costs of field enhancements?

Wrap Up

- Next meeting date.
- Other comments/announcements.
- Action items.
- Prepare for next meeting.


Thank you!
Questions?

Contacts

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