

# Increasing demands for public dollars amplify needs to manage OUR infrastructure

- Issue
  - Public health
  - Environmental Quality
  - Community investment
  - Homeowner investment
  - Tax base
- Responsible Party
  - Health Department
  - Environmental agency
  - Elected officials
  - Tax payer
  - Elected officials

# **Operation and Management Keys to a Sustainable Onsite Wastewater Infrastructure**

Presentation to NAWT Education Day Seminar  
Louisville, Kentucky

By

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# Acknowledgement

Thanks to Tom for organizing this Education day session as a part of the Pumper Show and Convention



# History

- Over 100 years performance history –
- Recent interest in performance monitoring
  - System performance
  - Environmental impacts
  - Management systems

# Recognition

- The USEPA recognizes onsite and decentralized wastewater systems as a permanent and essential element of the nations wastewater infrastructure...
- Onsite systems **MUST** be managed as an element of infrastructure...
- Partnerships Essential

# **Decentralized Program Strategy**

**(Grumbles, 2005)**

## **Vision:**

Decentralized wastewater systems are appropriately managed, perform effectively, and are widely acknowledged as components of our nations' wastewater infrastructure.

## **Mission:**

EPA will serve as a catalyst for improving system performance through partnering to upgrade professional standards of practice and institutionalize the concept of perpetual management.

# Responsible Management

- Where site and soil conditions allow, traditional, low maintenance options remain the option of choice
- Where site and soil conditions pose some limitations, alternative treatment and dispersal options become the option of choice
- Regardless – systems must be managed



# Responsible Management Entity (RME)

- Responsible for activities necessary to sustain systems in service area
- Legal entity with Managerial, Financial, and Technical capacity to assure long term, cost effective management
- Professionals staff required functions

# Treatment Systems/Dispersal Systems and the Organization

- **Treatment** – Component of System that Facilitates Physical, Chemical, Biological Processes that Render Liquid Suitable for Dispersal into Receiver Environment
- **Dispersal** – Component of System that Facilitates the Uniform Distribution of Liquid into Receiver Environment
- **Organization** – Component that assures MFT capacity in perpetuity

# These management services/activities include, but are not limited to:

1. Inspection of onsite systems to assure operational status
2. Monitoring vital system functions
3. Operate and maintain system components (pumps, tanks, controls, field)
4. Measuring indicators of system performance and status
5. Reporting status of systems to homeowners, regulatory agencies, and manufacturers
6. Collect operational records regarding components of systems (pumps, controls, tanks, etc.)
7. Provide information to stakeholders in community
8. Repair or replace system components as required
9. Assure financing available to sustain systems, people, and organization
10. **Management: all activities required to conduct routine inspections and monitoring, necessary maintenance and repair, and collect revenue to sustain program**

# Early Detection-Timely Correction

- Assure long term operation
- Facilitate remedial operations
- Prevent failures
- Protect public health, environmental quality, property values, community values, and create opportunity

Figure 1, USEPA Program Elements and Activities

Element	Essential Activity
Public Education	Educate owners regarding proper system care
Planning	Coordinate with local planning agencies
Performance	Establish appropriate performance criteria and indicators of success/failure
Training/certification	Develop and administer programs as required
Site Assessment	Establish appropriate site requirements
Design	Establish appropriate design requirements
Construction	Oversee construction/installation
Operation/maintenance	Establish operation and maintenance requirements
Residuals management	Administer system for residuals management
Compliance monitoring	Establish program for compliance monitoring
Corrective action	Establish program for corrective action
Record keeping/reporting	Administer record keeping/reporting program
Financial assistance	Consider program of financial support to users to assure sustainability of local efforts

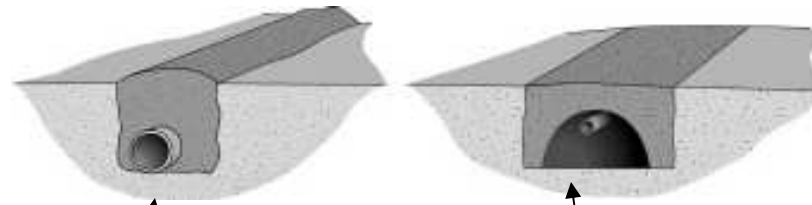
Source: Guidelines for Management of Onsite and Decentralized Wastewater Systems (USEPA/OWM, 2003)

Figure 2, Management Models Developed by USEPA,

Model Program	Application	Potential cost
Inventory/awareness	Simple technology, little risk	Low user cost, amplification of ongoing operation
Contract	Mechanical technology, little risk	Moderate user cost,
Performance base, operating permits	Mechanical technology, moderate risk	Moderate costs, permits require renewal and performance review
Management entity operation	Mechanical technology, significant risk	Moderate costs, permits require renewal and performance review
Management entity ownership	Mechanical technology, serious potential risk	Potentially high user costs, permits require renewal and performance review

Source: Guidelines for Management of Onsite and Decentralized Wastewater Systems (USEPA/OWM, 2003)

# Trench Material



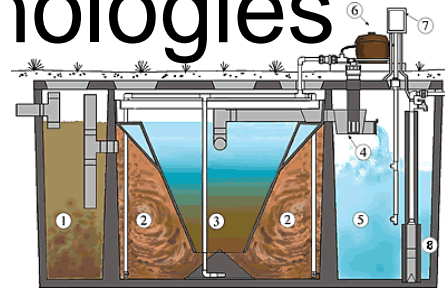
Gravelless or Gravel Filled  
Trench

Open bottom chamber

# Performance of Onsite Treatment Technologies

## SEPTIC TANK EFFLUENT

BOD: 110 - 200 mg/L  
 TSS: 50 - 100 mg/L  
 TN: 40 - 100 mg/L  
 TP: 5 - 15 mg/L  
 Fecal:  $10^6 - 10^8$  col/100 ML

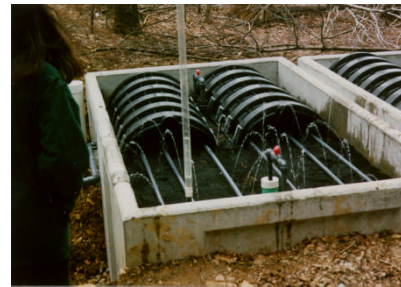


## AEROBIC UNIT EFFLUENT

BOD: 5 - 50 mg/L  
 TSS: 5 - 100 mg/L  
 TN: 25 - 60 mg/L  
 TP: 4 - 10 mg/L  
 Fecal:  $10^3 - 10^4$  col/100 ML

## SAND FILTER EFFLUENT

BOD: 2 - 15 mg/L  
 TSS: 5 - 20 mg/L  
 TN: 10 - 50 mg/L  
 TP: <1 - 10 mg/L  
 Fecal:  $10^1 - 10^3$  col/100 ML



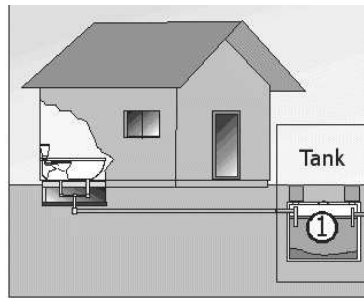
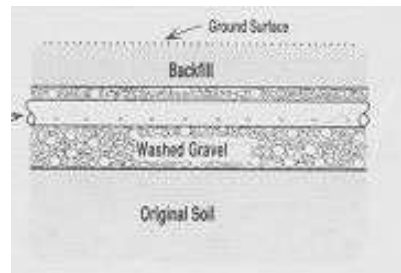
## FOAM/TEXTILE FILTER EFFLUENT

BOD: 5 - 15 mg/L  
 TSS: 5 - 10 mg/L  
 TN: 3 - 60 mg/L  
 TP: 5 - 15 mg/L  
 Fecal:  $10^1 - 10^3$  col/100 ML



## FURTHER ATTENUATION BY SOIL

BOD: >90%  
 TSS: >90%  
 TN: 10 TO 20%  
 TP: 0 - 100%  
 Fecal: >99.99%



## WASTEWATER FROM HOME

BOD: 110 - 400 mg/L  
 TSS: 100 - 350 mg/L  
 TN: 40 - 100 mg/L  
 TP: 5 - 15 mg/L  
 Fecal:  $10^6 - 10^9$  col/100 ML

## SEPTIC TANK EFFLUENT, WITH RECYCLE

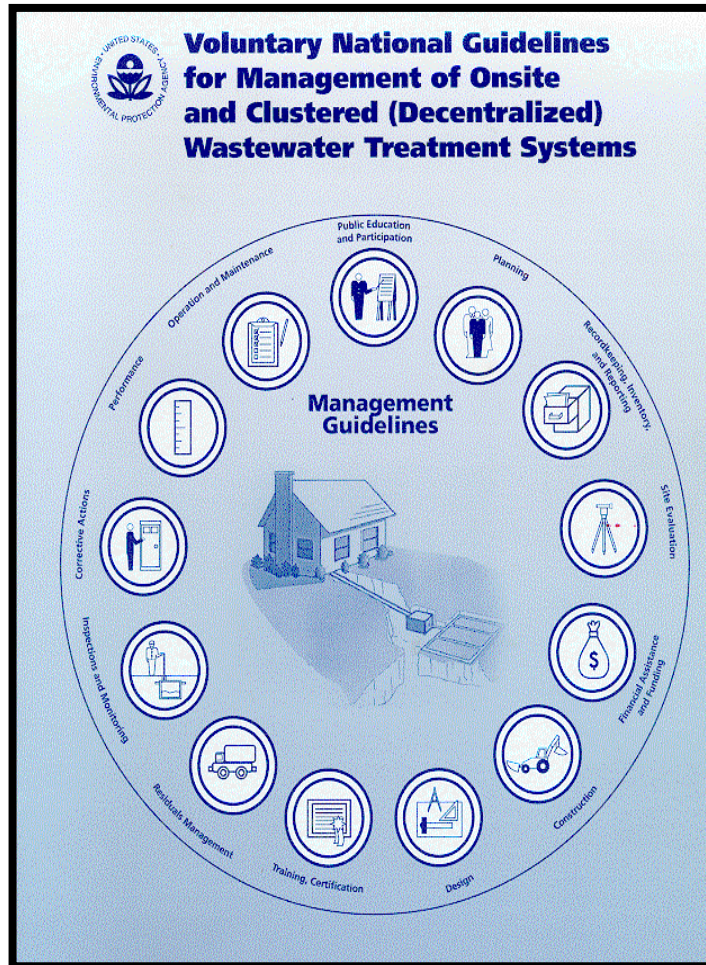
BOD: 80 - 120 mg/L  
 TSS: 50 - 80 mg/L  
 TN: 10 - 30 mg/L  
 TP: 5 - 15 mg/L  
 Fecal:  $10^6 - 10^9$  col/100 ML



# Management Programs

Program Level	Feature
1. Inventory/awareness	Traditional system, low risk environment
2. Contract	Mechanical systems, low risk environment
3. Performance	Performance base, moderate risk environment
4. RME Operation	Performance base, professional operation
5. RME Ownership	Performance base, professional operation, high risk

# Goals of the Management Guidelines



- To raise the level of onsite/cluster system performance through improved management programs
- To provide conceptual models that may be used by local units of government to assist them in upgrading their programs

# Social and Market Issues

- Marketing/Public Participation
  - Education!!!
  - Customer satisfaction
- Management and Sustainability
  - Highest level of local and state management must be involved
  - Funding essential to assure sustainability
    - Design
    - Build
    - Own/operate

# **Decentralized Approaches to Wastewater Treatment**

**Recognizing Managed Onsite and Decentralized Systems as a  
Permanent and Sustainable Element of the Nations Wastewater  
Infrastructure  
and a Mechanism to Assure Protection of Watersheds**



**U.S. Environmental Protection Agency  
Office of Wastewater Management**

# Elements in a Comprehensive Wastewater Management Program-Sustainability Goal

- Public Involvement
- Planning
- Performance Requirements
- Training & Certification/Licensing
- Site Evaluation
- Design
- Construction

Appendix A: Management Models

### MANAGEMENT MODEL 3: OPERATING PERMITS

Objective: To issue renewable/revocable operating permits to system Owner that stipulate specific and measurable performance criteria for the treatment system and periodic submittals of compliance monitoring reports. The performance criteria are based on risks to public health and water resources posed by wastewater disposal in the receiving environment. Operating permits allow the use of clustered or onsite systems on sites with a greater range of site characteristics.

PROGRAM ELEMENT	RESPONSIBLE PARTY	ACTIVITY*
PUBLIC EDUCATION AND PARTICIPATION	Regulatory Authority	<ul style="list-style-type: none"> <li>Educate Owner/User on purpose, use, and care of treatment system.</li> <li>Provide public review and comment periods of any proposed program and/or rule changes.</li> </ul>
	Service Provider	<ul style="list-style-type: none"> <li>Be informed of existing rules, and review and comment on any proposed program or rule changes.</li> <li>Participate in advisory committees established by the Regulatory Authority.</li> </ul>
	Owner/User	<ul style="list-style-type: none"> <li>Be informed of purpose, use, and care of treatment systems.</li> <li>Be informed of existing rules, and review and comment on any proposed program or rule changes.</li> <li>Participate in advisory committees established by the Regulatory Authority.</li> </ul>
PLANNING	Regulatory Authority	<ul style="list-style-type: none"> <li>Coordinate program rules and regulations with state, tribal, and local planning and zoning and other water-related programs.</li> <li>Evaluate potential risks of wastewater discharges to limit environmental impacts on receiving environments during the rule making process.</li> <li>Limit potential risks of environmental impacts from residuals management program and evaluate available handling/treatment capacities.</li> <li>Inform local planning authority of rule changes and recommend its evaluation of potential impacts on land use.</li> </ul>
	Developer	<ul style="list-style-type: none"> <li>Hire planners, certified site evaluators, and designers to ensure that all lots of proposed subdivision plats meet requirements for onsite treatment prior to final plat.</li> </ul>
PERFORMANCE	Regulatory Authority	<ul style="list-style-type: none"> <li>Establish system failure criteria to protect public health, e.g., wastewater backups in building, wastewater ponding on ground surface, insufficient separation from ground water or wells.</li> <li>Establish minimum maintenance requirements for approved systems.</li> <li>Establish performance criteria necessary to protect public health and water resources for each defined receiving environment in Regulatory Authority's jurisdiction.</li> </ul>
	Owner/User	<ul style="list-style-type: none"> <li>Operate and regularly maintain system in proper working order.</li> <li>Operate system to comply with performance criteria stipulated in operating permit.</li> </ul>
TRAINING AND CERTIFICATION/LICENSING	Issuance Board/ <sup>1</sup> Regulatory Authority	<ul style="list-style-type: none"> <li>Develop and administer a training, testing, and certification/licensing program for site evaluators, designers, contractors, operators, pumpers/haulers, and inspectors.</li> <li>Maintain a current certified/licensed Service Provider listing.</li> </ul>
	Service Provider	<ul style="list-style-type: none"> <li>Obtain appropriate certification/license(s) and continuing education as required.</li> <li>Obtain training from the manufacturer or vendor regarding appropriate use, installation requirements, and O&amp;M procedures of any proprietary equipment to be installed.</li> <li>Comply with applicable federal, state, tribal, and local requirements.</li> </ul>
	Owner/User	<ul style="list-style-type: none"> <li>When using third party services, contact with only the appropriate certified/licensed Service Providers.</li> </ul>
SITE EVALUATION	Regulatory Authority	<ul style="list-style-type: none"> <li>Codify prescriptive requirements for site evaluation procedures.</li> <li>Codify criteria for treatment site characteristics suitable for permitted design that will prevent unacceptable impacts on ground and surface water resources.</li> <li>Establish defining characteristics for each receiving environment in the Regulatory Authority's jurisdiction.</li> </ul>
	Site Evaluator	<ul style="list-style-type: none"> <li>Obtain certification/license to practice.</li> <li>Describe site and soil characteristics, determine suitability of site with respect to code requirements, and estimate site's hydraulic and treatment capacity.</li> <li>Comply with applicable federal, state, tribal, and local requirements in the evaluation of sites for wastewater treatment and dispersal.</li> </ul>
	Owner	<ul style="list-style-type: none"> <li>Hire a certified/licensed site evaluator to perform site evaluation.</li> </ul>

\*Activities in bold are activities added to program elements from the preceding Management Model.

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- O&M
- Residuals Management
- Inspections/Monitoring
- Corrective Actions
- Record-Keeping/Reporting
- Financing

# Elements

- Planning
  - Coordination between agencies at all levels
  - Watershed planning, water supply planning
  - Development patterns
  - Jurisdictions
  - Authorities

# Elements (cont.)

- Outreach and Education
  - Educated/informed stakeholders
  - Elected and appointed officials
  - Public
- Performance
  - Success/malfunction criteria
  - Boundaries
    - Hydrologic
    - System
    - property

# Elements (cont.)

- Site and Soil Evaluation
  - Landscape
  - Soil Morphology
  - Hydrology
  - Site limitations- assimilative capacity
- Design
  - Conventional – prescriptive standards
  - Performance
    - Soil
    - components



# Elements (cont.)

- Construction and installation
  - Criteria
  - Oversight
  - Seasonality/site conditions
- Operation and Maintenance
  - Service providers
  - Frequency
    - monitor, measure, maintain, inspect, repair

# Elements (cont.)

- Residuals
  - Septage
  - FOG
  - Options
  - 503
- Certification and licensing
  - All Professionals
  - competencies

# Elements (cont.)

- Inspection and monitoring
  - Competencies
  - Frequency
  - components
- Corrective action
  - Responsibility
  - Authority
  - Consistent enforcement

# Elements (cont.)

- Records and reports
  - Permits
  - Operational data/performance
  - Collection frequency
  - Reporting frequency
- Financial sustainability
  - Financial support for management agency essential
  - System funding (link loan)

# Program 1: System Inventory/ Maintenance Awareness

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- ◆ Conventional septic systems
  - ◆ Database of system locations
  - ◆ Proper siting, sizing, installation
  - ◆ Record location, reminder of maintenance
  - ◆ Minimum level of management recommended
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# Albemarle Regional Health District

- Originally PPCC Health District now 14 County region in NE North Carolina
- Data-base of all systems in 4 county core and all innovative systems in remaining counties
- Management contract with counties
- Special Legislation passed
- \$1.00/gal permit fee then 50-200/yr fee

# ARHD Success?

- Albemarle region:
  - Shallow Watertable soils
  - Slowly Permeable Clays
- Repair rate:
  - Over 30 % failure and repair prior to implementation of management entity
  - Today, over 95 % successful system operation

# Expanded ARHD Activities

- Stormwater management
- Surface water quality monitoring
- Well water sampling
- MOU with state to monitor non-municipal facilities permitted by state water quality agency and state solid waste agency



# Program 2: Management through Maintenance Contract

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- ◆ Enables more complex options
  - ◆ Homeowner contracts with trained/competent service provider
  - ◆ Routine maintenance assured
  - ◆ Appropriate where mechanical systems used
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# Charlotte County, FL

- NSF Standard 40 Requires 2 year Maintenance Contract
- Charlotte County maintains data base, Requires advanced systems within 100 feet of surface water or on lots 10,000 ft.sq. or less
- Tax support and operating fees

# Program 3: Management through Operating Permits

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- Performance requirements requiring approved designs
  - Renewable/revocable operating permits issued (Dated)
  - Service afforded by competent personnel
  - Regular reporting, monitoring
  - Homeowner retains responsibility
  - Appropriate in sensitive areas where performance base is critical
-

# Sea Ranch, CA

- 1560 systems onsite and 870 community
- District inspects to assure compliance
- Homeowner responsible for permitting, installation, maintenance and repair
- Fee – 900-1200/yr
- Flexible Permitting
  - 3 year if properly functioning
  - 1 year if marginal
  - 6 month if malfunctioning

# Program 4: Independent Third Party Operation and Maintenance

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- ◆ Independent management entity
  - ◆ Responsible for O&M
  - ◆ Permit issued to Management entity
  - ◆ Routine inspections
  - ◆ Consistent performance
  - ◆ Private ownership retained
  - ◆ Appropriate in very sensitive receiver environments
-

# Charles City County, Va

- MOU with State DOH/DEQ
- Options and alternatives considered
- County management of alternatives
- All reasonable options allowed to protect health and environment
- Wide range of alternatives
- COUNTY MANAGEMENT IN SENSITIVE ENVIRONMENT

# Program 5: Independent Third Party Ownership and Management

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- Professional management of all program functions and activities
    - Consistent with other professional or utility services (gas, electric, phone...)
    - Enables area-wide planning
    - Appropriate in sensitive receiver environments where consistent performance essential
-

# Shannon City, IA

- 36 systems, unanimous vote for retaining onsite systems and developing clusters
- 3 compliant systems/33 non-compliant
- \$ 3.1 Million to sewer vs. \$ 0.76M for managed onsite
- \$ 38.00 month water and sewer bill
- SIRWA Operates through interlocal agreement



# Tennessee Onsite Utility Company (Pickney Brothers)

- Statewide franchise granted by TUC
- Cluster systems serve community/builder need
- Developer involvement
- Density benefits
  - Integrated green space
  - Lower infrastructure cost
  - Site specific technologies utilized
- \$ 40.00/month sewer bill



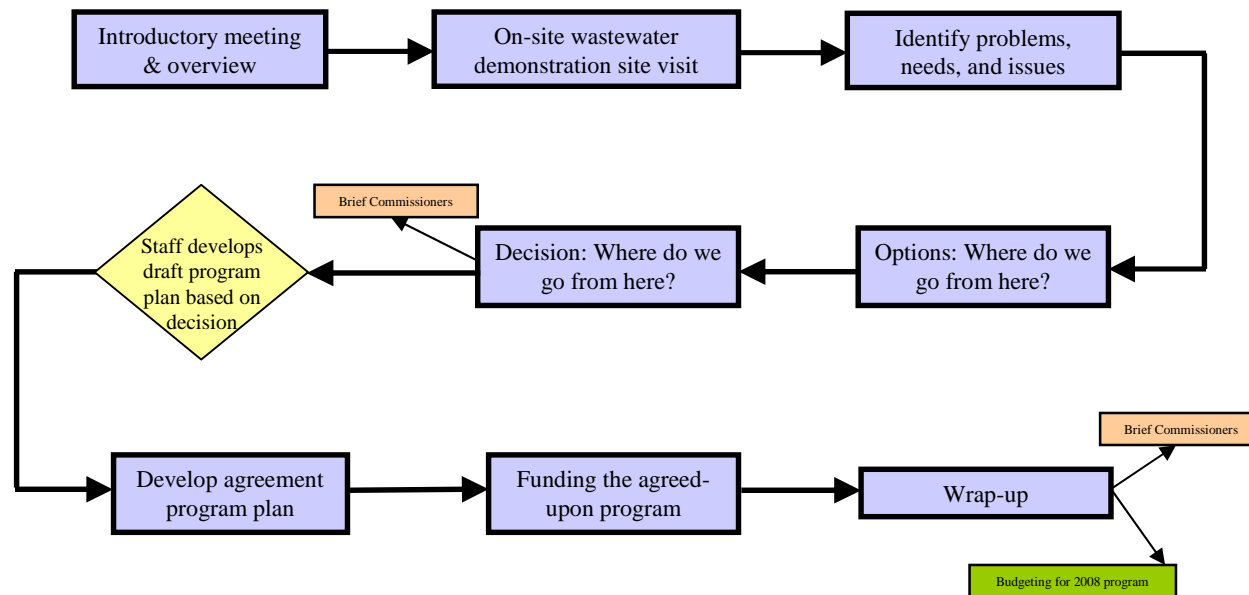




# Management requires cooperation

- Stakeholders must be involved from outset
- Example stakeholders
  - Health or permitting agency
  - Realtors
  - Pumpers, installers and other service providers
  - Concerned citizens
  - University personnel/Extension

# Involving Stakeholders



# Decisions, Decisions, Decisions

- Fees – how to pay for program
- Inclusion
  - All inclusive
  - Gradual
    - Point of sale
    - Repair
- Oversight and management review

# NC Pumpers/Managers

- TTT – Boone, NC
- Stallings Septic Service, Greenville, NC
- Cannaday Brothers, Roseboro, NC
- Atlantic Nutrients, Nags head, NC
- Stanley Septic Service, Dallas, Stanley, NC
- And Many More

# Comprehensive Water Management Approach

- Water supply – Wellhead protection
- Wastewater – All systems
- Stormwater
- Appropriate level of support (Funds, personnel)

# Information sources

- Federal
- State
- Local
- Associations
- Colleges and universities
- Manufacturers
- Service providers



# EPA Onsite and Decentralized Web Site

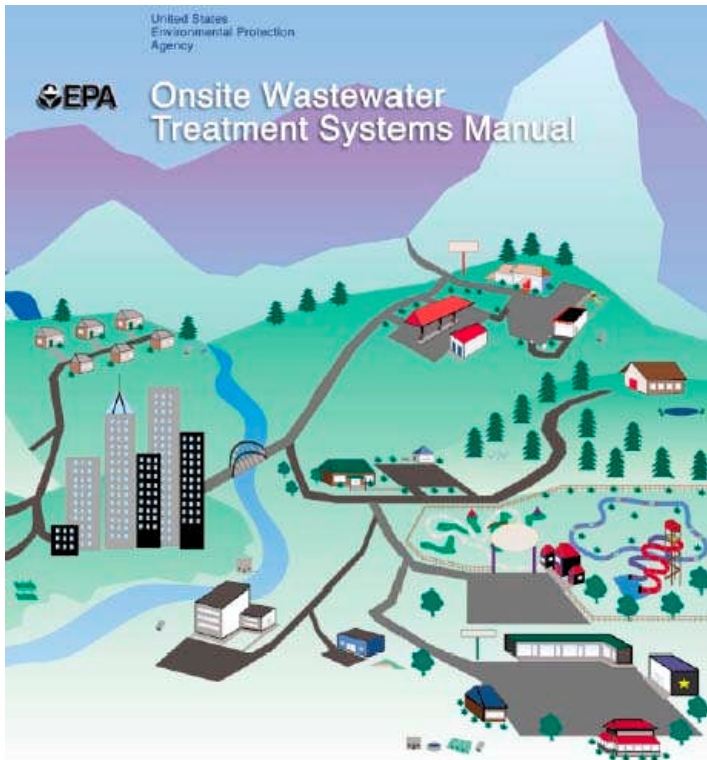
<http://www.epa.gov/owm/septic>



# EPA Site

- Links to all EPA partners
  - NAWT
  - NEHA
  - NATAT
  - WEF
  - NACO
  - NOWRA

# Onsite Wastewater Treatment Systems Manual (2002)



- Background and Use of Onsite Wastewater Treatment Systems
- Management of Onsite Wastewater Treatment Systems
- Establishing Treatment System Performance Requirements
- Treatment Processes and Systems
- Treatment System Selection

# Training and Certification

- Many states require training and certification of individuals (designers, installers, operators)
- Needs-to-know developed
- Training by organizations and universities
- Certification by state
- It's a profession!!!





## Conclusions:

1. Onsite and distributed systems are permanent element of infrastructure and support is essential
2. The USEPA, State and Local Governments recognize importance of proper management for all wastewater treatment systems (USEPA, Response to Congress, 1997)
3. Management programs currently exist which address variety of technologies, environmental conditions, public health issues and local needs
4. NAWT Training excellent source of information for system managers