Onsite Wastewater
Promoting Health & Protecting Our Resources
2022 MEGA-CONFERENCE
NOWRA NAWT SOPA Missouri Small Flows Organization

November 1, 2022

Decentralization in the Context of Resilient Utilities: North Carolina's Viable Utilities Program

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NC Division of Water Infrastructure

Outline

- Introduction/Background
  - Division of Water Infrastructure
  - Viable Utilities Program
- Decentralization Activities
  - Septic Funding programs
  - Closing the Wastewater Access Gap
- Considerations for VU Program
  - System Architecture
  - Management

Division of Water Infrastructure – Background

- DWI created by the North Carolina state legislature in 2013 through NCGS 159G to consolidate funding programs in DEQ
  - Division of Water Quality
  - Division of Water Resources
  - Department of Commerce
  - Also established State Water Infrastructure Authority (SWIA)

- DWI funding programs
  - Drinking Water State Revolving Fund (DWSRF)
  - Clean Water State Revolving Fund (CWSRF)
  - Community Development Block Grant-Infrastructure program (CDBG-I)
  - State Wastewater and Drinking Water Reserve programs
    - Merger/Regionalization Feasibility Grants (MRF)
    - Asset and Inventory Assessment Grants (AIA)
  - **Viable Utilities Reserve (VUR)**

Viable Utility Program – Background

Legislation signed into law on July 1, 2020 (Reform of Water and Wastewater Public Enterprises, S.L. 2020-79)

- Foster the viability of water and wastewater operations across the state by:
  - Identifying distressed LGUs, and
  - Providing a process to develop viable water/sewer utilities.
- Formalizes SWIA and ***Local Government Commission (LGC)*** partnership
- Created Viable Utility Reserve (VUR) fund
  - Initial funding = $9 million non-recurring
  - $456M of ARPA funds in 2021 State budget
- Codified in NCGS 159G, Water Infrastructure

Distressed Unit Identification - Statutory

NCGS 159G-45 requires that SWIA and the LGC develop criteria to determine how local government units should be assessed and reviewed, and stipulates that the following criteria shall be addressed:

1. Whether the public water or wastewater system serves less than 10,000 customers.
2. Whether the public water or wastewater system has an established, operational, and adequately funded program for its repair, maintenance, and management.
3. Whether the annual debt service is disproportionate to the public water or wastewater system's annual revenue.
4. Whether the local government unit has appropriated funds from its utility or public service enterprise fund in accordance with G.S. 159-13(b)(14) in two or more of the preceding five fiscal years without maintaining a reserve fund sufficient to provide for operating expenses, capital outlay, and debt service.
5. Whether the local government unit has appropriated funds to supplement the operating expenses, capital outlay, or debt service on outstanding utility or enterprise bonds or notes in excess of the user fees collected in two or more of the preceding five fiscal years.

Distressed Unit Identification - Criteria

Approved by SWIA and the LGC in November 2020:

1. An LGU whose fiscal affairs are under the control of the Commission pursuant to its authority granted by G.S. 159-181 (“under Commission fiscal control”), or
2. An LGU that has not submitted its annual audits for the last two (2) fiscal years to the Commission as required by G.S. 159-34, or
3. An LGU with a total Assessment Criteria score that:
   a. 20 separate parameters with values ranging from 1-4 points
   b. Equals or exceeds 9 for LGUs providing both drinking water and wastewater services, or
   c. Equals or exceeds 8 for LGUs providing only one service, either drinking water or wastewater, or
4. An LGU for which other information is available to or known by the Authority or LGC that reflects and is consistent with, but does not expressly appear in, the Assessment Criteria to account for situations in which the Assessment Criteria score does not wholly or accurately reflect a system’s level of risk due to the limitations of available data.

Unit Assessment Criteria

Parameter	Weight	Description
Criteria Required by Statute		
Service Population	1	Identifies smaller systems (less than 10,000 people served).
Transfers Out	1	Point scored when money is transferred out of the system's dedicated utility fund in 2 or more of the last 5 fiscal years if the system also has a negative surplus in the fiscal year of the transfer, or if the system has no debt and there is a negative surplus with debt service for a $1 million "test" project. This indicates that money generated by the utilities is not being put back into the system for improvements.
Transfers In	1	Indicates that the system is not generating enough money to cover expenses. Point scored when money is transferred into the primary water/sewer fund from other sources in 2 or more of the last 5 years.
Debt Service Coverage Ratio (DSCR)	1	Measures unit's ability to cover loan payments by looking at revenue, expenses, and loan payments (principal and interest). Threshold value is less than 1.1.
Established, operational, and adequately funded program for repair, maintenance, and management		This criterion is measured by other parameters that are identified by an asterisk (*) including compliance, flow moratorium, and UAL control issues.

Parameter	Weight	Description
Infrastructure/Organizational Criteria		
DW Compliance (*)	1	Point scored for more than 5 MCL violations in a 5-year period or for ongoing treatment technique violations.
WW / CS Compliance (*)	1	• WW: Point scored if either in the top 10% for number of violations in a 5-year period, or a combination of in the top 20% for number of violations in a 5-year period and more than 50% of inspections document violations for wastewater treatment operations. • CS: Point scored if either the following occur: ○ The system is in the top 10% of systems for the number of SSO violations in a 5-year period and the top 20% for the number of SSOs per mile of collection system, or ○ The system is in the top 20% of systems for the number of SSO violations in a 5-year period and the top 10% for the number of SSOs per mile of collection system.
Flow Moratorium (*)	4	Points scored when the system is under a moratorium preventing service expansion due to inability to treat wastewater or because the system has reached 90% of permitted capacity.

Unit Assessment Criteria

Parameter	Weight	Description
Infrastructure/Organizational Criteria		
Revenue Outlook	4	Reflects service unit's ability to generate income in the future. Points scored when the system has high rates AND declining population.
Affordability	1	Identifies economically disadvantaged communities by comparing the service area's population change rate, poverty rate, median household income (MHI), unemployment rate, and property valuation per capita to established state benchmarks. Point scored if 4 or 5 of these indicators are worse than the state benchmark. **Note that the benchmark values are updated every year.**
Rates	1	Point scored when rates are already high. Indicates that the system is unlikely to be able to increase rates to improve revenue. High rates thresholds are: > $100/month for combined water and sewer service; > $50/month for water service only; and > $60/month for wastewater service only.
DW Pop / Mile	1	Evaluates population density. Lower density areas tend to face more service challenges. Threshold value is less than 100.
Sewer Pop / Mile	1	Evaluates population density. Lower density areas tend to face more service challenges. Note that there is a significant lack of data on miles of sewer line for small systems. Threshold value is less than 100.
Financial Criteria		
UAL Missing Audit	3	If audit not submitted, then treat as if on the UAL for control issues (for FY 19 audits)
Surplus (deficit) w/ Debt	2	Identifies systems that are not generating enough revenue to cover expenses, asset depreciation, and debt payments. Threshold value is less than or equal to $0.
No Debt DSCR Test	1	Similar to the DSCR calculated above but includes $1 million "test" project if system has no debt to allow evaluation of the ability to finance a simple project. Threshold value is 1.1.
% Depreciated	1	Evaluates the financial impact of depreciation of water and sewer assets as they age. Threshold value is greater than 50%.
Operating Margin	1	Point scored if the system is not generating enough revenue to cover operating expenses. Threshold value is less than 0.
Quick Ratio	1	Evaluates a system's ability to meet short-term financial obligations with cash or easily accessible funds. Threshold value is less than 1.1.
Receivables Ratio	1	Measures how well the system is collecting money from customers. Point scored for 3-year average greater than or equal to 2.3 or if there is an increase of greater than or equal to 0.2 in each of the last two years which demonstrates a declining trend in bill payment.

VUR Eligible Project Types

NCGS 159G-32 establishes the project types eligible for grants from the VUR:

1. Provide physical interconnection and extension of public water or wastewater infrastructure to provide regional service.
2. Rehabilitate existing public water or wastewater infrastructure.
3. **Decentralize an existing public water system or wastewater system into smaller viable parts.**
4. Fund a study of any one or more of the following:
    a. Rates.
    b. Asset inventory and assessment.
    c. Merger and regionalization options.
5. Fund other options deemed feasible which result in local government units generating sufficient revenues to adequately fund management and operations, personnel, appropriate levels of maintenance, and reinvestment that facilitate the provision of reliable water or wastewater services.
6. Provide emergency grants for operating deficits… *(only for units whose finances are under the control of the LGC)*

Asset Inventory and Assessment Grants

Asset Inventory and Assessment (AIA)

- **Distressed System** AIA's scope must include :
  - Identifying and locating system components
  - Performing a risk analysis to determine critical components
  - Determining the condition of critical components
  - Establishing capital and O&M costs
  - Creating a prioritized list of projects
  - Preparing a realistic Capital Improvement Plan (CIP)
  - *Conducting a rate study*
- A new AIA is not required if a *sufficient* AIA has recently been conducted (i.e., within past 5 years)
- An AIA Grant may be used to further the results of previous AIA activities

Viable Utility Program – Study Grants

- **Merger and Regionalization Feasibility (MRF)**
  - Does NOT need to include physical infrastructure interconnection
  - Robust comparison of ALL reasonable alternatives (including *Decentralization*)
  - Expect regional cooperation (e.g., resource sharing)
  - Must identify MRF study lead (typically, a viable LGU with sufficient management and technical capacity)
  - Requires a resolution by the governing board of all LGUs committing to process and identifying all partners
  - Public and private, not-for-profit systems are eligible as applicants AND partners

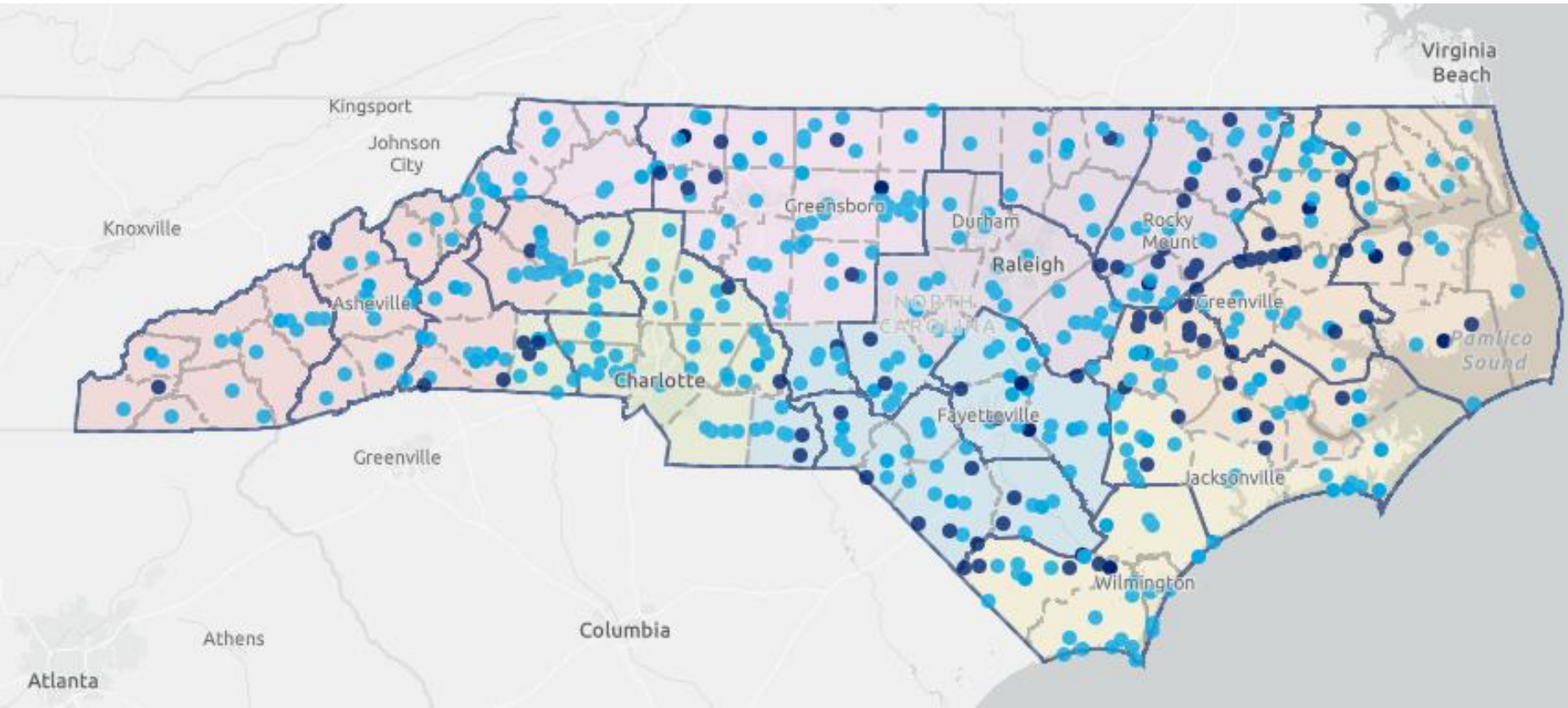
Viable Utility Program – Statutory Requirements

Statutory Requirements of Distressed Units

- Conduct an **asset assessment** and **rate study**
- Participate in a **training and education** program
- Develop an **action plan**, taking into consideration the following:
  - A **short-term** and a **long-term** plan for
    - infrastructure repair, maintenance, and management;
  - Continuing education; and
  - Long-term **financial management** to ensure sufficient revenue to fund:
    - Management and operations,
    - Personnel, and
    - Maintenance.

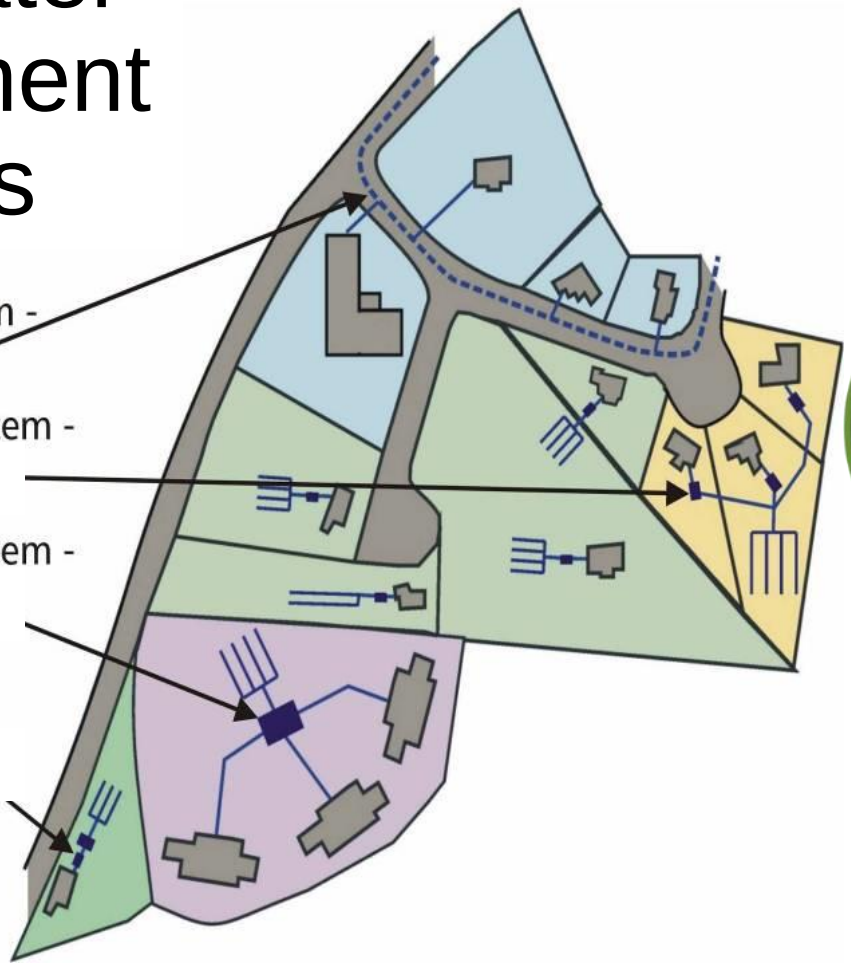
Viable Utility Program – Distressed Units

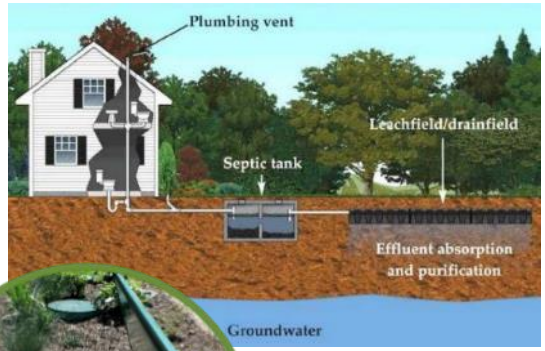
- Total of 131 designated out of 487 LGUs
- Regional partnerships encouraged
- LGU engagement, commitment, and accountability



Wastewater Management Options

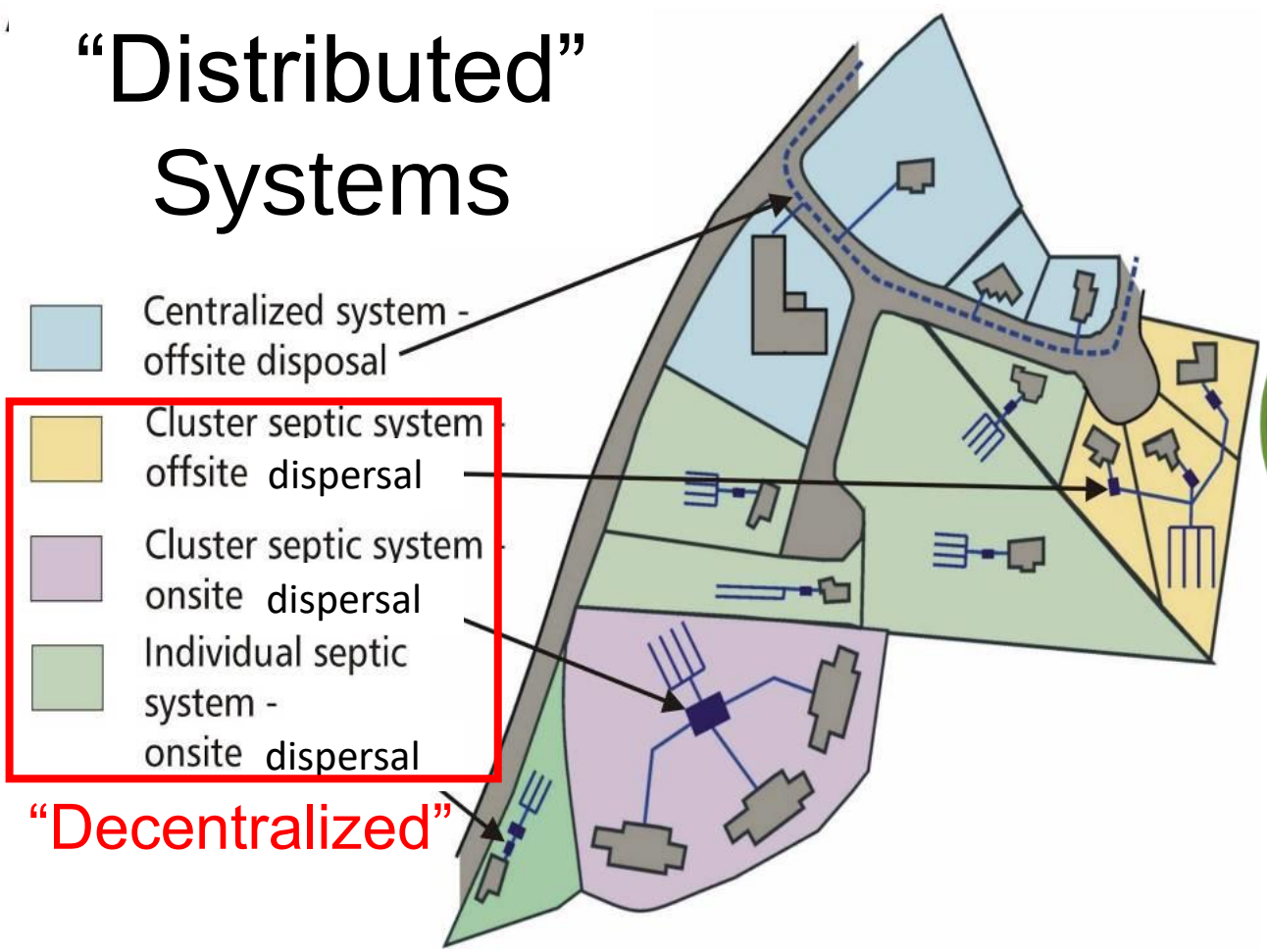
Wastewater Management Options

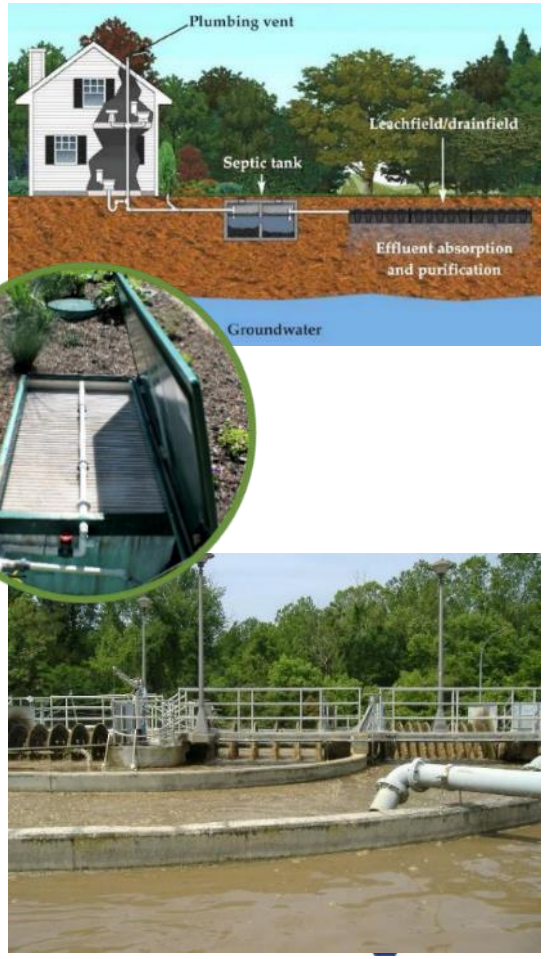




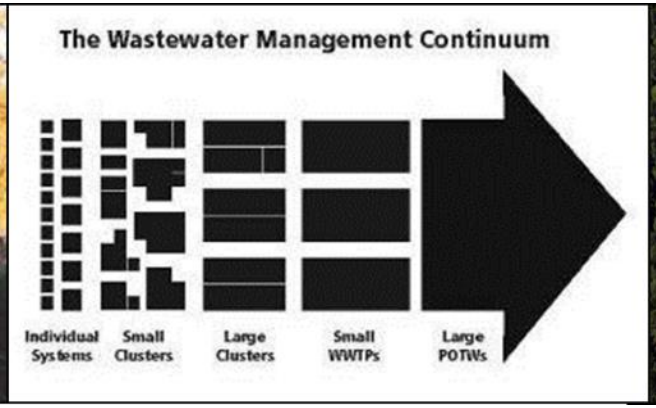
"Distributed" Systems

"Distributed" Systems





Wastewater Management in North Carolina



Onsite Systems

- Ownership/management by user
  - Contract operator if needed
- Regulatory oversight typically by local health departments
- Funding of private systems may be limited
- Niche group of specialized technical professionals

"Distributed" Systems

- "Professional" management
  - Variety of ownership & management models
- System scale and type based on context
- Capacity varies greatly by state and locality

Centralized Systems

- Utility ownership and management
  - Operators typically on staff
- Regulatory oversight typically by DEQ (USEPA delegated)
- Well-established funding mechanisms
- Established group of technical professionals

What's the Importance?

- 20-25% of U.S. population is on decentralized systems
- In North Carolina, number is closer to 50% (~2,000,000 systems)
- Trends toward urbanism ⬇ & increased suburban/exurban growth ⬆
- Sustaining viable rural communities: existing infrastructure models are not always appropriate
- Economic, environmental and societal benefits

"…decentralized systems are an integral component of our nation's wastewater infrastructure and can protect public health and water quality if they are properly planned, sited, designed, installed and maintained"

USEPA's 1997 "Response to Congress on the Use of Decentralized Wastewater Treatment Systems"

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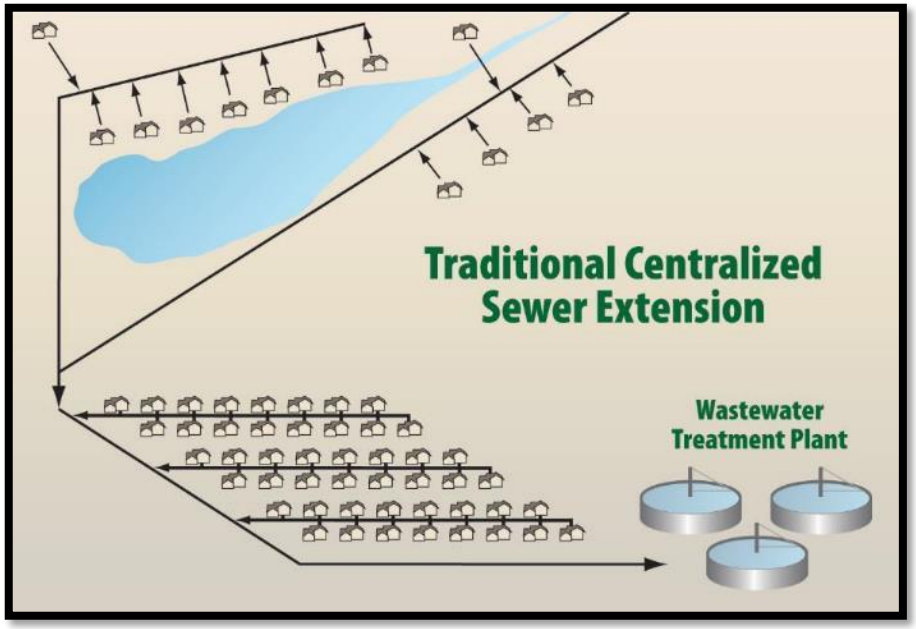
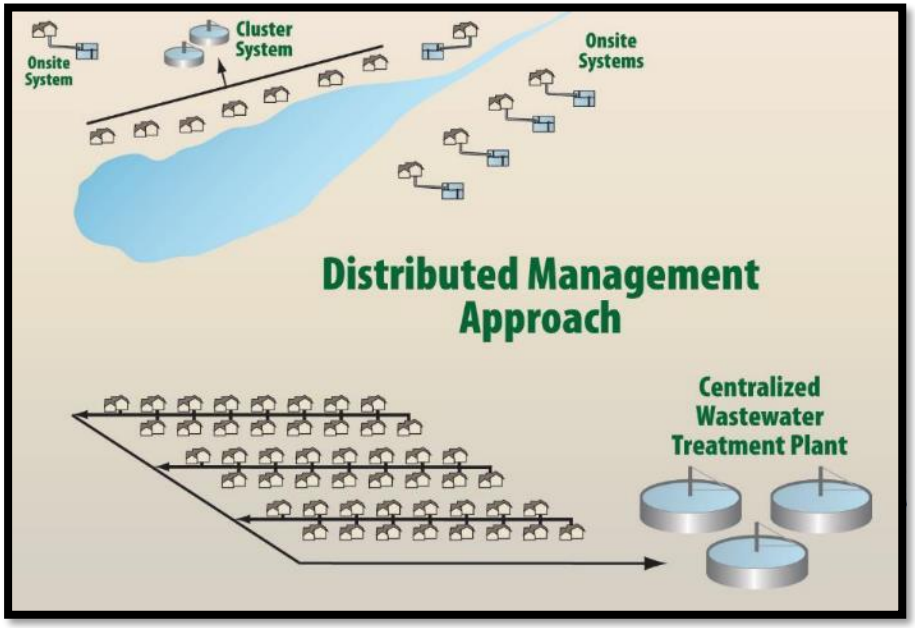
Wastewater Management Based on Context

- **Sewer extension**: Economically viable where close to existing sewer with capacity
- **Cluster**: Economies of scale for advanced treatment, where existing lots/systems are close enough to limit collection
- **Onsite**: Rural, dispersed areas – can use advanced treatment systems or other improvement management if needed





Decentralized System Applications

- Rural areas
  - Management intensity tied to risk
- New development outside of sewer service areas
- Existing unsewered communities with needs ("stuck" communities)
  - "Septic to sewer" may be $20,000-80,000/home
- Repurposing or downsizing/rightsizing existing sewered areas (troubled utilities)
- Enabling *localized* resource recovery and reuse for utilities (and even private system owners)

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Onsite Wastewater SRF Pilot Project

- DWI & DHHS-OWPB & EPA partnership
- State Law restricts CWSRF funding to Local Government Units (LGUs) only (i.e., no funding for private systems)
- Pilot Project Concept
  - Award capitalization funds to LGUs (most likely Counties)
  - LGUs set up local grant/loan funding program
- Memorandum of Understanding
  - Establishes responsibilities of different pilot project partners
  - DWI
  - Recipient
  - Service Provider (if applicable)
  - DHHS onsite wastewater (may be optional)
  - Demonstrates commitment of partners to effectively utilize funds

Septic Health Initiative

Program Components

Incentivize Maintenance

Inspections- Free
Pump Outs- residents receive water bill credit

Repairs

Inspections assist in identifying system repairs

Low-Interest Lending

Provide low-interest loans to residents to conduct system replacements/repairs

Inspections

Conduct 200-300 septic tank inspections annually

Pump Outs

Coordinate 50-100 septic tank “pump-outs” annually

Engagement

Distribution of pamphlets, stickers, water conservation, presentations

Septic Health Initiative

"Doesn't quite fit"

Program is funded via local funds only

Potential Funding Resources

FEMA- Building Resilient Infrastructure and Communities (BRIC)

Capability and Capacity Building for project scoping or planning projects.

NCDEQ- Water Resources Development Grant

General navigation, recreational navigation, water management, stream restoration, water-based recreation, NCRS-Environmental Quality Incentives Program stream restoration projects and feasibility/engineering projects.

Clean Water State Revolving Fund

Wastewater treatment, wastewater collection, reclaimed water, stormwater BMP's, stream restoration, energy efficiency at treatment works or collection systems

Funding is limited for non-traditional infrastructure

Septic Health Initiative

Holistic Approach

Climate Change
An increase in the intensity and frequency of storm events

Flooding
Increase –areas impacted – depth of flooding- duration of flooding

Groundwater
An emerging concern w/rise in subsurface levels

Water Quality
Increased risk for pollutants from stormwater/wastewater to impact groundwater/surface water

Stormwater
Infrastructure connects to surface waters. Majority of system age is greater than 50 yrs old.

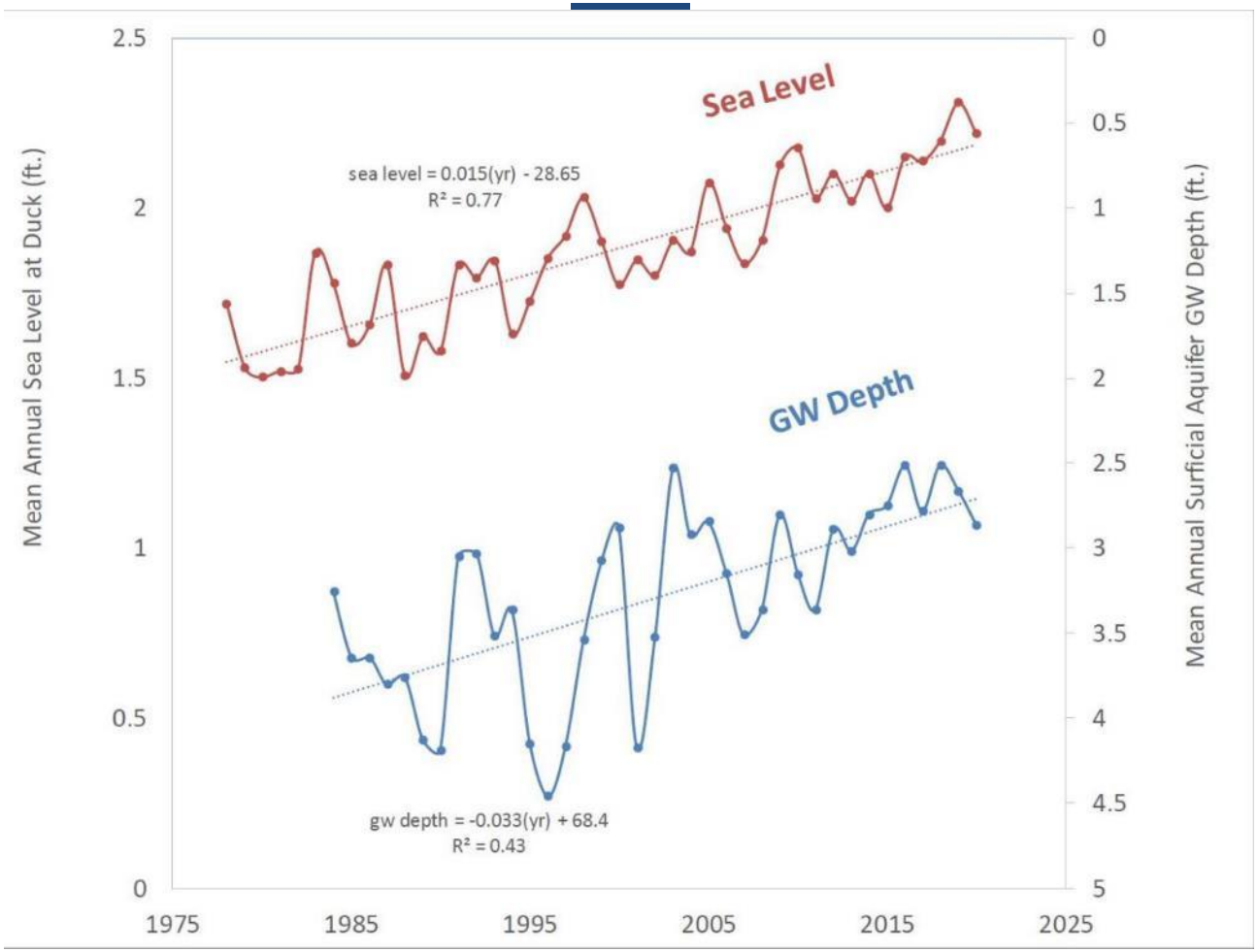
Development
Intensity of development is located in low-lying areas.

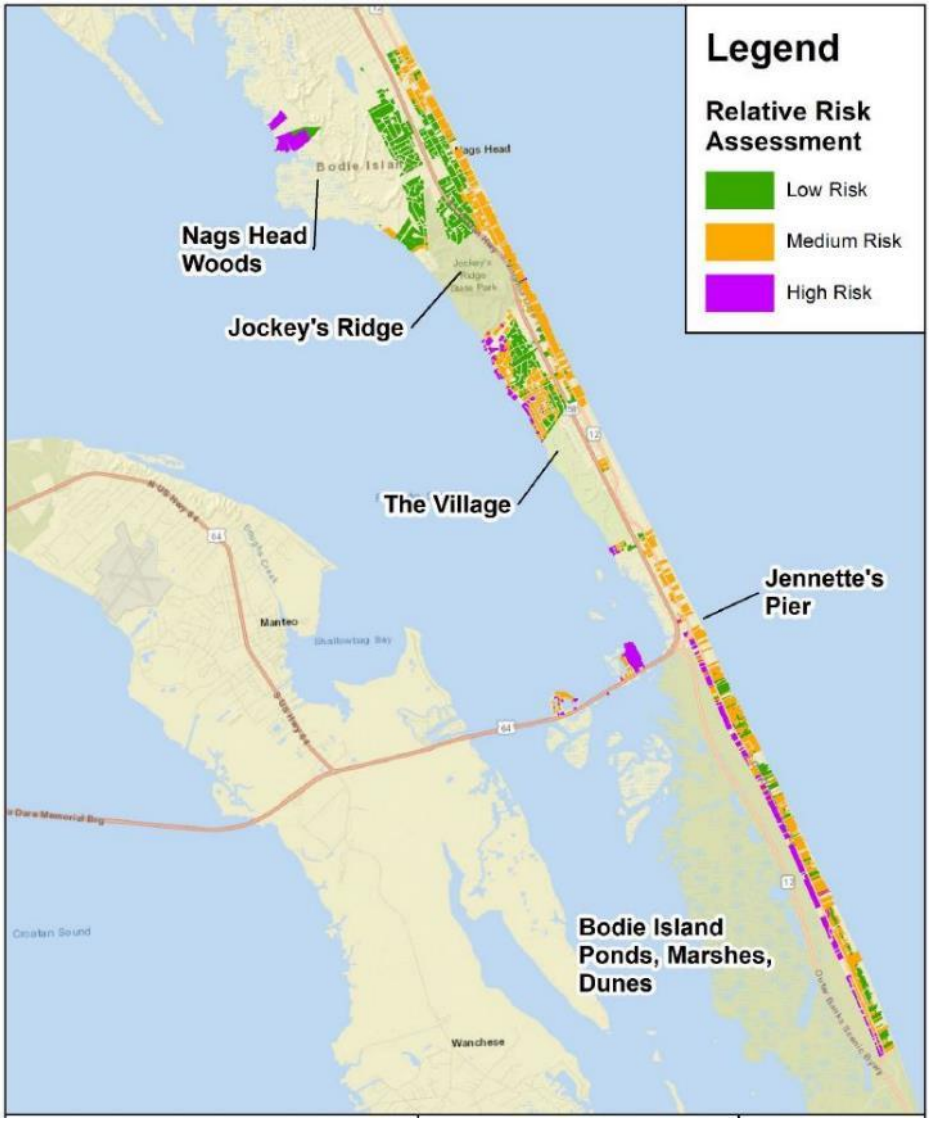
Wastewater
Reduction in vertical separation from ww drainfields to seasonal high water table.

"One Water "

Septic Health Initiative

Groundwater Comparison to Sea Level Rise





Septic Health Initiative

Risk Assessment

Closing America's Wastewater Access Gap

- Closing America's Wastewater Access Gap Community Initiative
  - **Alabama, Kentucky, Mississippi, New Mexico, North Carolina, West Virginia, as well as the tribal nations of Santo Domingo Pueblo and San Carlos Apache**
    - Halifax County, NC
    - Duplin County, NC

- BIL provides $11.7 billion through the Clean Water State Revolving Fund (CWSRF)
  - 49% of funding available as grants or principal forgiveness, which can provide a pathway for underserved communities that might not otherwise be able to access traditional CWSRF
  - BIL funding can also be leveraged with other key federal funding sources such as USDA's Rural Development (USDA-RD) Water and Environmental Programs funding.

Decentralization Alternatives

USEPA and USDA-RD will:

- Develop and implement the pilot, in collaboration with participating states, tribes, pilot communities and technical assistance providers.
- Co-chair project implementation teams for each pilot location.
- Develop templates for the Community Solutions Assessments and Community Solutions Plans that facilitate co-leveraging of USEPA CWSRF and USDA-RD funding.
- Develop a national project summary report that identifies best practices and further collaborative opportunities to close America's wastewater access gap.
- Develop a national Community of Practice that brings together participants from all pilot states, tribes, communities and technical assistance providers.
- Provide technical assistance resources via EPA contractors, the USDA Rural Partner Network, and the EPA Rural, Small and Tribal Clean Water Training and Technical Assistance Program.

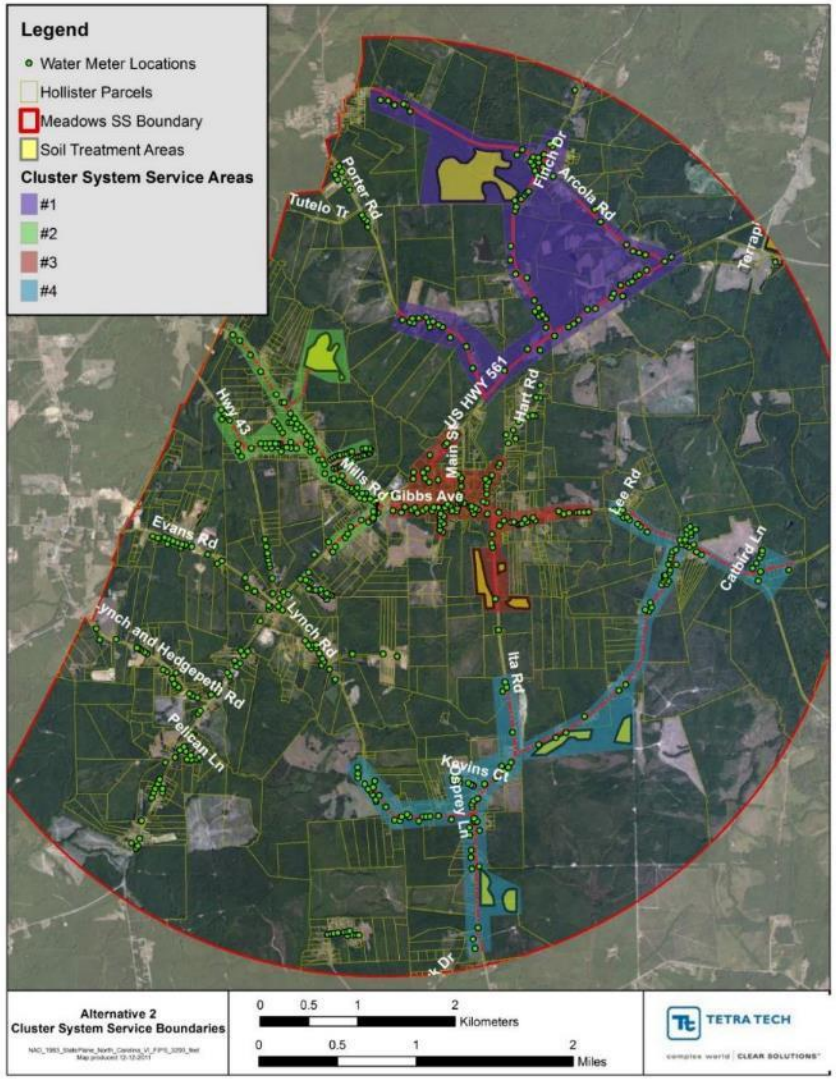
Participating communities/tribes will:

- Receive a Community Wastewater Assessment and Community Solutions Plan.
- Have one or more local leaders participate on their community's project implementation team who collaborate with USEPA, USDA-RD (or other agencies as needed (i.e., IHS) and their state/ tribe to implement the pilot.
- Provide relevant background information (like prior assessments, engineering studies, funding applications, etc) and participate in project interviews as requested.
- Facilitate onsite access as necessary.
- Help spread the word about the public-facing community listening sessions.

Meadows Sewer District

- Sanitary Survey showed ~37% non-compliant or problematic septic systems
- Previous engineering study recommended sewer extension at $22,000 per home connection and $95/month service
- Preliminary Engineering Review specific to distributed cluster wastewater management approach
  - Match needs with suitable large parcel sites
- Multiple stakeholders: Halifax County, Haliwa-Saponi Tribe, Hollister REACH, NC RCAP

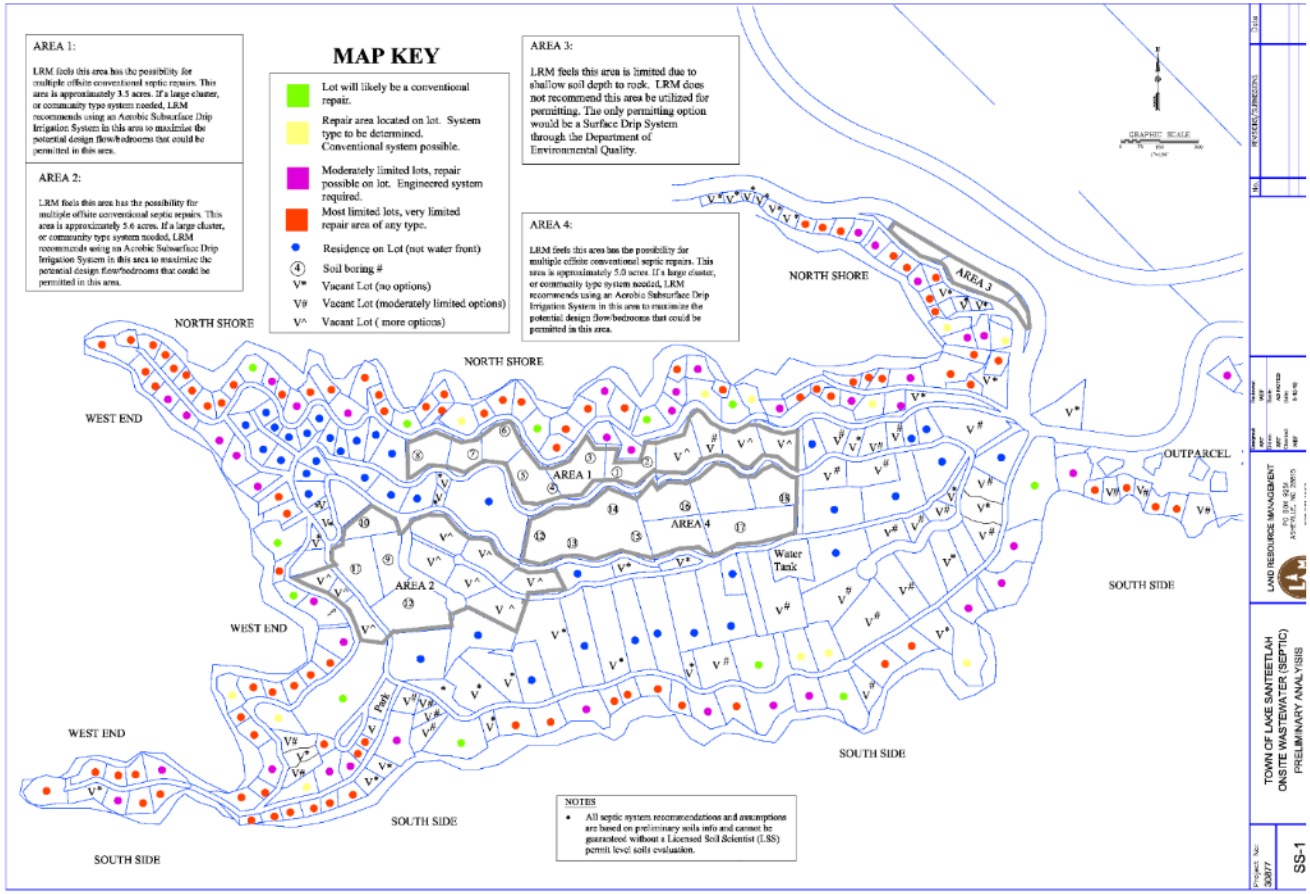
MSD: Decentralization Alternatives



Alternatives

- Sewer connection… $22K/home
- Single cluster… $12.8K/home
- **Multi-cluster… $8.8K/home**
- Smaller clusters…?

Town of Lake Santeetlah Sewer Study



- Cursory on-site evaluation
- Reviewed Lake water quality data
- Permit review/database
  - Parcel number
  - Current/historical address
  - Year built
  - # Beds/Baths
  - Current owner/date
  - Previous owners/dates
  - Septic tank size
  - Pump tank size
  - Design #bedrooms/flow
  - New system permit date/type
  - Malfunction/repair permit dates/types
  - Other system details and notes
- Preliminary evaluation of potential cluster system sites

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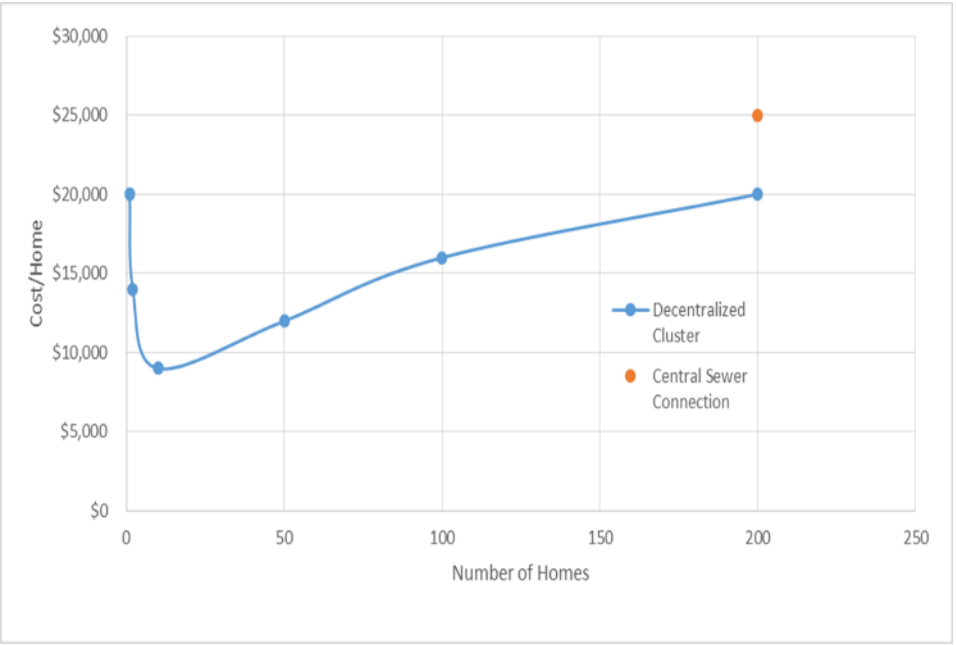
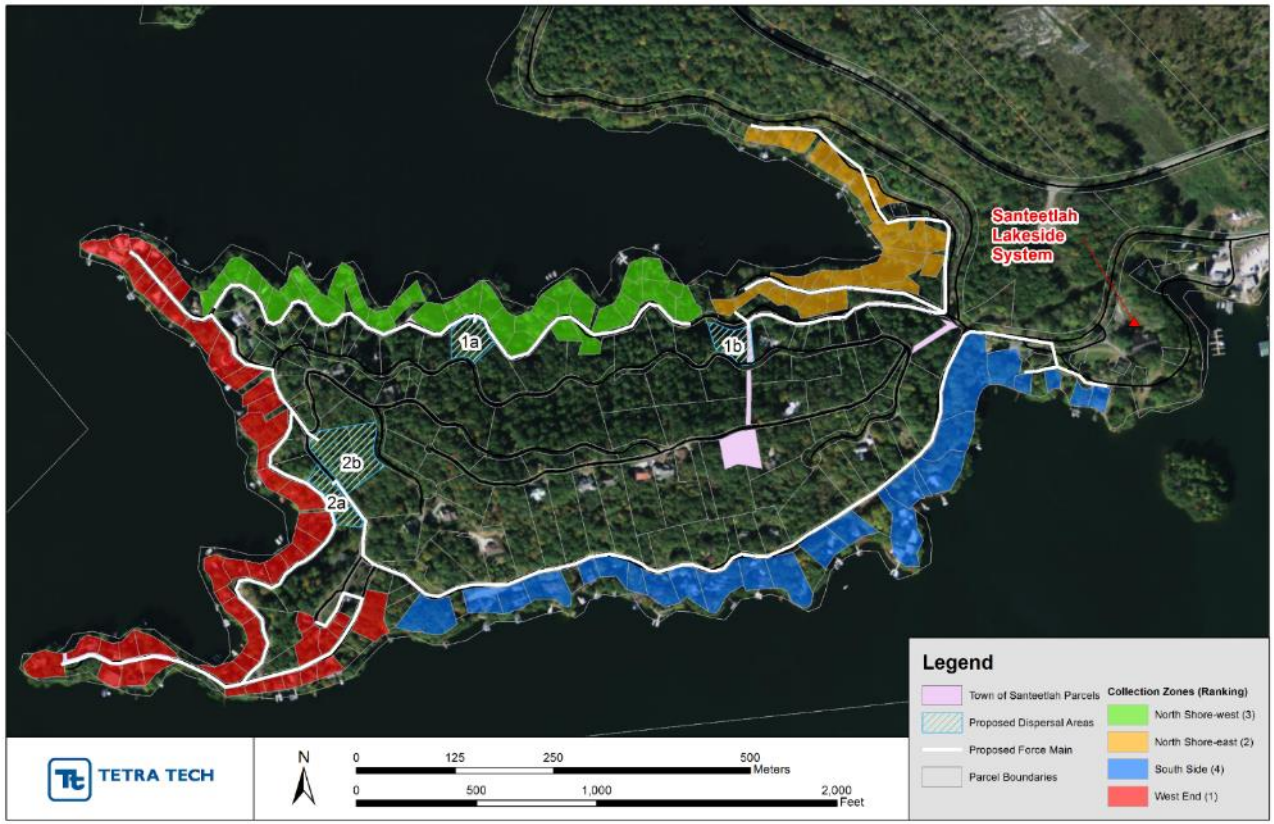
Decentralization Alternatives

Collection Zone	# of Homes	Percent Repairs	Repair Area Availability	Required Area (ac)	Total Cost[1]	Unit Cost (w/ land purchase)[1]	Unit Cost (w/o land purchase)
North Shore (west)	37	41%	Limited	0.6	$453,647	$12,261	$9,017
North Shore (east)	31	26%	Limited	0.5	$391,413	$12,626	$9,400
South Side	24	13%	Good	0.4	$353,008	$14,709	$11,375
West End	52	29%	Very Limited	0.8	$648,297	$12,467	$9,390



System Type	Unit Cost (w/o land purchase)
Cluster (STEP, aerobic pretreatment and drip)	$9,000-12,000
Advanced onsite system repair/replacement	$15,000-20,000
Centralized system connection to Robbinsville	~$25,000 ??

Town of Lake Santeetlah Sewer Study



- Raise awareness through an educational campaign
- Better understand existing OWTS using field inspections and property owner survey
- Better understand impacts on water quality, by sampling nearshore during high use periods
- Provide options for individual and groups of property owners, including brokering access to land for small cluster systems
- Take proactive steps to mitigate potential future problems by securing access to potential cluster sites

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VU Program Considerations

Government Financing for On-Site Wastewater Treatment Facilities in North Carolina

Jeff Hughes and Adrienne Simonson

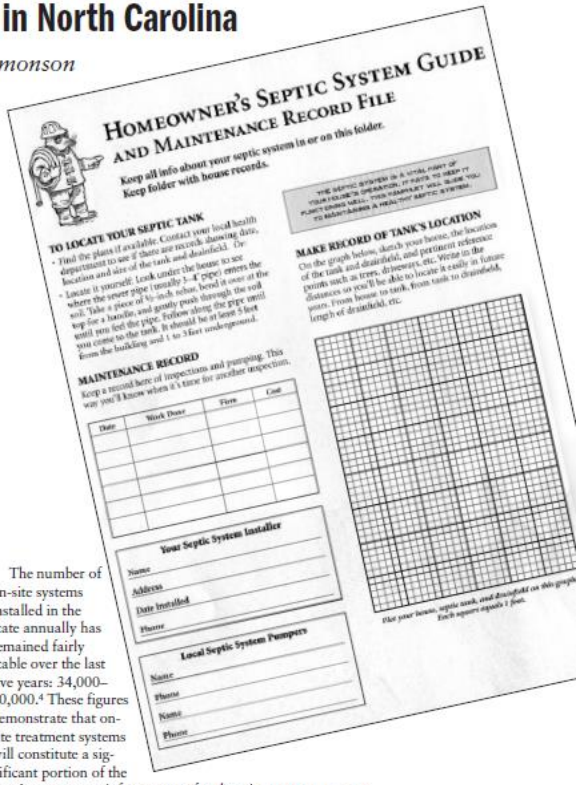
In the kitchen, the laundry, and the bathroom, people use clean water, and it becomes wastewater. In urban areas, sewer systems carry the wastewater to centralized treatment facilities, but for millions of North Carolinians, treatment occurs in their own backyards. The private citizens who operate a majority of these backyard facilities often lack the knowledge and the experience to maintain them properly. When the facilities fail, they pose unique challenges to human and environmental health, not only on that property but also to the wider community.

This article presents data on the extent of "on-site" (decentralized) wastewater treatment facilities in North Carolina.[1] It outlines some of the challenges inherent in operating, managing, and funding on-site systems, and it examines several local and regional initiatives to expand funding options and implement management programs.

On-Site Systems in North Carolina

Calculating the number of existing on-site systems in North Carolina is a challenge. Current knowledge relies mostly on data from the 1990 Census that were self-reported. Those data indicate that about one-half of the North Carolina population uses on-site systems to treat wastewater, compared with an estimated one-fourth of the nation's population.[2] Nationally, one-third of new housing uses on-site systems.[3]

Hughes is director of the Environmental Finance Center, the University of North Carolina at Chapel Hill. Simonson is a budget analyst for the U.S. Department of the Interior. Contact them at jhughes@iogmail.iog.unc.edu and adrienne_simonson@ios.doi.gov.



HOMEOWNER'S SEPTIC SYSTEM GUIDE AND MAINTENANCE RECORD FILE

Keep all info about your septic system in or on this folder.
Keep folder with house records.

THE SEPTIC SYSTEM IS A VITAL PART OF YOUR HOME'S OPERATION. IT PAYS TO HELP IT PLAYS WELL. THIS PAMPHLET WILL ALSO TELL YOU TO REMEMBER A HEALTHY SEPTIC SYSTEM.

TO LOCATE YOUR SEPTIC TANK

- Find the plans if available. Contact your local health department to see if there are records showing date, location and size of the tank and drainfield. Or:
- Locate it yourself. Look under the house to see where the sewer pipe (usually 3–4" pipe) enters the soil. Take a piece of ½-inch rebar, bend it over at the top for a handle, and gently push through the soil until you feel the pipe. Follow along the pipe until you come to the tank. It should be at least 5 feet from the building and 1 to 3 feet underground.

MAKE RECORD OF TANK'S LOCATION

On the graph below, sketch your house, the location of the tank and drainfield, and pertinent reference points such as trees, driveways, etc. Write in the distances so you'll be able to locate it easily in future years. From house to tank, from tank to drainfield, length of drainfield, etc.

MAINTENANCE RECORD

Keep a record here of inspections and pumping. This way you'll know when it's time for another inspection.

Date	Work Done	Firm	Cost

Your Septic System Installer
Name
Address
Date Installed
Phone

Local Septic System Pumpers
Name
Phone
Name
Phone

Plot your house, septic tank, and drainfield on this graph. Each square equals 1 foot.

The number of on-site systems installed in the state annually has remained fairly stable over the last five years: 34,000–40,000.[4] These figures demonstrate that on-site treatment systems will constitute a significant portion of the state's wastewater infrastructure for the foreseeable future.

On-site systems are not limited to rural counties. For example, in 2003, Wake County, one of the state's most urban counties, issued the second-highest number of permits for new systems (1,308), Johnston County issuing the highest number (1,335) (see Figure 1).[5]

Challenges of On-Site Systems

Although the design and the scale are very different, many of the sophisticated biological processes that occur in large centralized wastewater treatment facilities also occur in on-site systems.[6] However, the procedures for operating,

BLACKSBURG, VIRGINIA

PROBLEM
Blacksburg, Virginia, like many growing communities, faced the challenge of meeting development needs with a decentralized system or extending the existing centralized sewer system. The town considered factors such as cost, construction-related traffic disruptions, floodplain and creek impacts due to centralized sewer main construction, collection system infiltration/inflow and leakage, treatment effectiveness, and other factors.

SOLUTION
The town established a workgroup to evaluate wastewater treatment system alternatives. After careful review, Blacksburg chose to conduct a pilot project to test the feasibility of a decentralized, clustered system.

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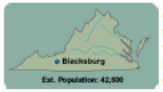

OVERVIEW
When Blacksburg, Virginia, began investigating wastewater alternatives in 2000, it recognized that management was the key to the success of the system (Mattingly and Tremel 2002). The town selected Management Model 5 as a pilot approach for the Tom's Creek community. The program consists of:

- **Operating permit requirements**
- **RME with enforcement authority**
- **Requirement for the use of trained personnel**
- **Remote monitoring and routine inspections conducted by RME**
- **System database maintenance**

PUBLIC WORKS DEPARTMENT SERVES AS RME
Blacksburg chose to have its existing public works department assume the role of wastewater utility—or RME—for the community of Tom's Creek. The town's public works department both owns and manages the clustered system as it does other wastewater infrastructure. The RME chose a hybrid collection system including a Septic Tank Effluent Pump (STEP) pressure system combined with a Septic Tank Effluent Gravity (STEG) system. Users of the clustered system pay the same residential water and wastewater rates as customers served by centralized sewers in the area.

Approximately 200 homes in the Village of Tom's Creek are served by the STEP/STEG system. Trained RME personnel inspect each tank every two years. Each house must have an individual septic tank for which residents have maintenance responsibilities, including avoiding practices such as dumping large quantities of fats, oils, grease, chemicals, or solid waste down drains or toilets. When inspections reveal recurring problems, the RME notifies the resident and takes corrective action.

REMOTE MONITORING RELAYS OPERATING PROBLEMS
Blacksburg uses internet-based, remote monitoring to relay system operating problems. The system sends emails or page alerts to designated maintenance personnel when it detects problems.

RESULTS
Selection of the STEP/STEG system has saved the community more than $1 million in construction, with operation and maintenance costs similar to that of conventional centralized systems. The town's public works department conducts annual inspections of each STEP/STEG system and pumps the 200 septic tanks as needed. The program estimates that pumping should occur every seven years and estimates an average cost of $150 per tank.

One of the town's concerns was centralized sewer collection system leakage. During heavy rains, the STEP/STEG system, by design, shows no infiltration/inflow or leakage and maintains a stable level of treatment. Also, the town is using septic tank effluent gravity collection systems for new developments, where possible, rather than the pump (STEP) approach, in order to minimize costs for maintaining and operating pumps and other equipment.

References and Resources
Mattingly K., and Tremel, M. 2002. A Unique Public Management Entity in the Town of Blacksburg, Virginia. http://loorralesnm.net/wasteWater/resources/21917162844.pdf. Accessed March 29, 2010.
Toms Creek Sewage Options Working Group. 2001. Recommended Decentralized System. http://www.tobsewer.org/MAIN/STEP.htm. Accessed March 31, 2010.
Population data—Census Bureau, State and County QuickFacts, Blacksburg(Town), 2010. http://quickfacts.census.gov/qfd/states/51/5107784.html

WERF - Distributed System Applications

- **Green Buildings/Sustainable Sites**
  - Integration into buildings/landscapes
  - Resource recovery and reuse
  - Education and recreation
- **Independent Communities**
  - Maintain fiscal control
  - Preserve community character
  - Underserved communities
- **Utility Optimization**
  - Managed distributed systems
  - Sewer mining
  - Satellite reuse
- www.werf.org/distributedwater
  - Includes decision-support tool

Case Studies Listed by Type

Green Building/Sustainable Sites (GB)

- Battery Park City, New York City (UO)
- Couran Cove Island Resort, Queensland, Australia (IC)
- Currumbin Ecovillage, Queensland, Australia (IC)
- Dockside Green, Victoria, British Columbia, Canada (UO)
- Philip Merrill Center, Annapolis, Maryland
- Sidwell Friends School, Washington, D.C.
- Workplace6 Recycled Water Factory, Sydney, Australia (UO)

Independent Communities (IC)

- Bethel Heights, Arkansas
- Gillette Stadium, Foxborough, Massachusetts (GB)
- Lake Elmo, Minnesota
- Piperton, Tennessee
- Warren, Vermont
- Weston Solar Aquatics, Weston, Massachusetts (GB)
- Wickford Village, Rhode Island

Utility Optimization (UO)

- LOTT Alliance, Lacey, Olympia, and Tumwater, Washington
- Loudoun Water, Loudoun County, Virginia (IC)
- Mobile Area Water and Sewer System, Mobile, Alabama
- Pennant Hills Golf Club, Sydney, Australia
- Sand Creek, Aurora, Colorado
- University of North Carolina at Chapel Hill, North Carolina (GB)

Responsible Management Entities (RME)

- Administrative tasks
  - Recordkeeping, financial tasks, planning, coordination
- System operation
  - Design, installation, operation, system maintenance
- Compliance assistance
  - Inspections, monitoring, compliance assurance

- Public entities
  - City/town departments
  - Utility/sanitation districts
  - Improvement districts
- Private entities
  - Nonprofit corporations
  - For-profit corporations
  - Property owners' associations

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Conclusions

- North Carolina's Viability Utility program explicitly lists decentralization as a project type eligible for grant funding
- NC LGUs could choose to decentralize to downsize/right-size infrastructure, improve organizational and operational efficiencies, or recover resources for local benefit
- State involved in several efforts to improve access to funding for decentralized systems
  - SRF funds to seed local/regional funding programs
  - Closing the Wastewater Access Gap builds on historical decentralized planning work in Halifax County
  - Local decentralized wastewater management plans (e.g., Nags Head)
- DWI developing guidance for long-term action plans which may incentivize the use of decentralized systems
  - Standard criteria for evaluating decentralized options
  - Cost per connection for centralized may be prohibitive

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