



Wastewater Needs for Rural Underserved Communities - the Alabama Black Belt

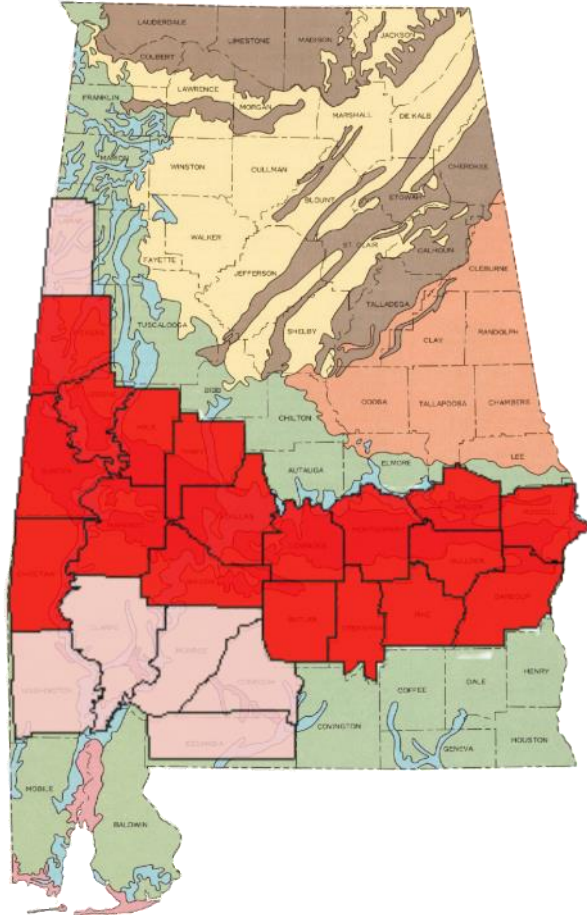
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October 31, 2022



UNIVERSITY OF
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The Alabama Black Belt



- Named for the fertile black topsoils that span parts of Mississippi and Alabama
- Located in the mostly-rural area of central Alabama
- Typically defined as 17 counties:
 - Barbour, Bullock, Butler, Choctaw, Crenshaw, Dallas, Greene, Hale, Lowndes, Macon, Marengo, Montgomery, Perry, Pike, Russell, Sumter, and Wilcox

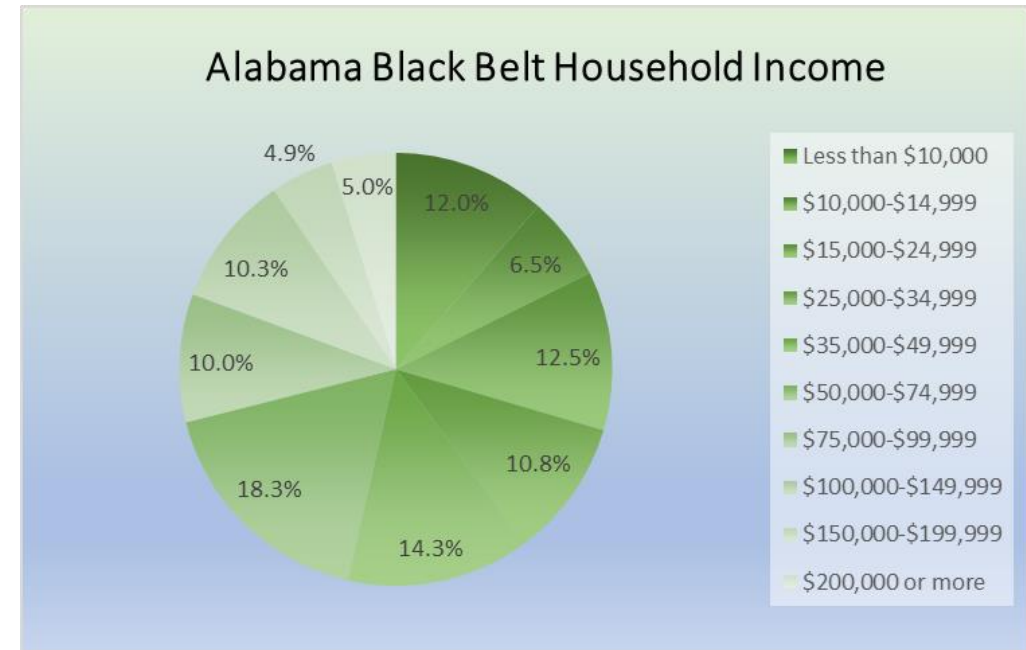
The Current State of Wastewater in the Alabama Black Belt



- In a Delta Regional Authority infrastructure study:
 - 11 Black Belt counties surveyed (Barbour, Bullock, Butler, Choctaw, Dallas, Greene, Hale, Lowndes, Macon, Marengo, Perry, Russell, Sumter, Wilcox)
 - >50% of residents lack access to wastewater service
 - <4% of land area has access to wastewater service
 - 1/6 wastewater treatment facilities over design capacity
- In a 2005-2006 field study of 2,000 homes in Bibb county:
 - 35% of homes with septic tanks showed signs of system failure
 - 15% of homes used straight pipes for direct discharge
 - 50% of homes had untreated wastewater on the ground
 - Similar results found in Wilcox & Hale county in 2016-2017

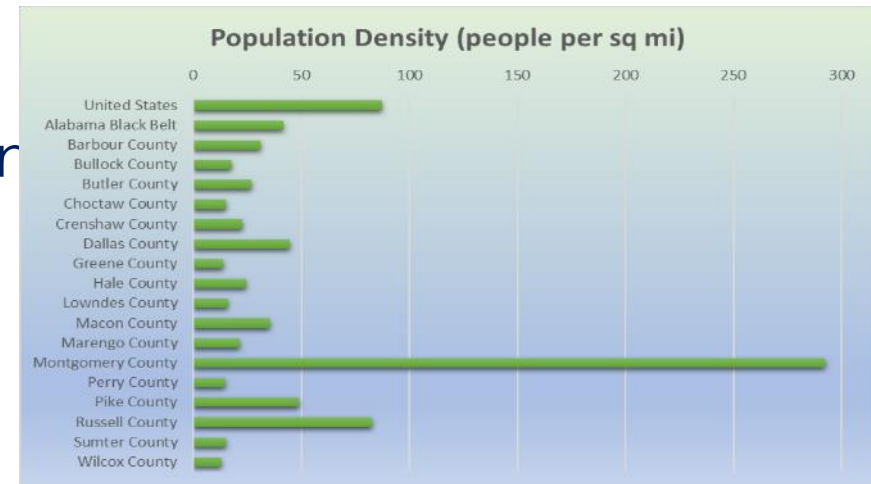
Economic Barriers to Wastewater Solutions

- Low income residents can not afford onsite solutions
 - 20% of Alabama Black Belt residents have poverty status
 - Median household income 54% of the national average & 67% of the Alabama average
- Low income communities lack tax base to afford community wastewater systems
- Insufficient infrastructure further limits economic development
- Small local governments often do not know how to obtain grants/other funding



Physical Barriers to Wastewater Solutions

- Low population density communities have significantly higher cost per person for infrastructure
 - Population density less than 1/2 national average and 1/60 urban average
 - Alabama Black Belt: 42 people per sq mi
 - U.S.: 87 people per sq mi
 - U.S. urban areas: 2,534 people per sq mi
- Black Belt clay soils shrink and swell in response to moisture levels
- Shrink/swell soils have inadequate infiltration of water (200+ minutes/inch)
- Inability for water infiltration = septic drain field failures



The Consortium — ruralwastewater.southalabama.edu

Consortium for Alabama Rural Water/Wastewater Management (CARWW) was formed in 2018 to address the Wastewater issues in the Alabama Black Belt:



Current CARWW Projects



ADPH (USDA): Black Belt Unincorporated Wastewater Project



USA/UA/AU/ADPH (USDA): Technical Assistance and Training for Innovative Regional Wastewater Treatment Solutions



USA/UA (USEPA): Reinventing Rural Wastewater Management



UNLEASH Hack: Alabama Black Belt Sanitation



Columbia/UA/USA/UNC/UC-Irvine (Columbia World Projects): Transforming Wastewater Infrastructure in the U.S.



ADPH/USA (DigDeep): Decentralized Wastewater Innovation Cohort



USA/CARWW (AL-ARPA)

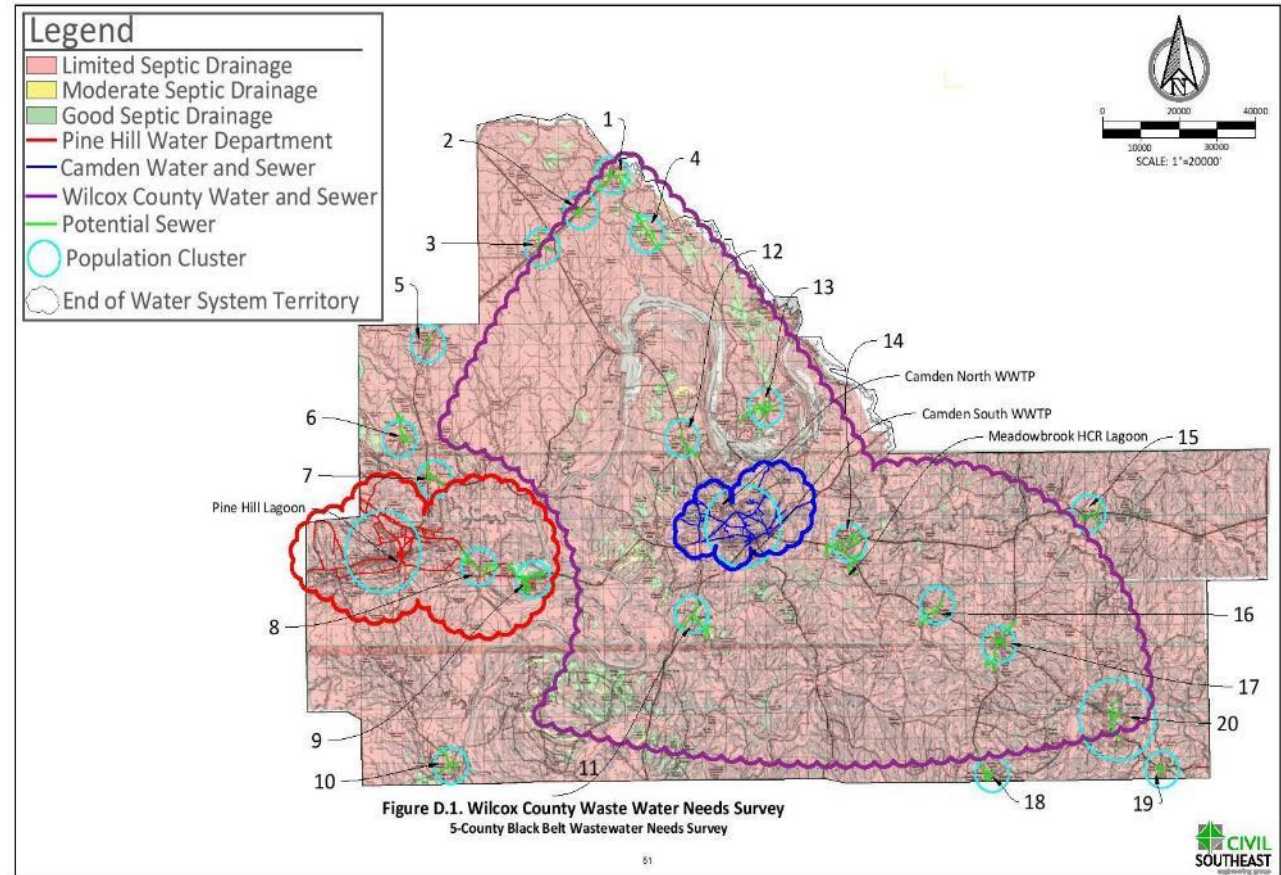


Our Plan Forward

- 1** Identifying and expanding service areas of **existing municipal sewer** systems with additional capacity
- 2** Establishing **decentralized cluster system models** of wastewater infrastructure for small clustered communities
- 3** Developing and testing **cost-effective individual onsite wastewater** systems to recommend to residents
- 4** Identifying and evaluating **applicable management structures** for decentralized wastewater treatment models
- 5** Seeking **regulatory changes and “special permitting districts”** to meet the unique needs of the region

Addressing the Issues: Wastewater Needs Studies

- Identifying/categorizing potential wastewater infrastructure projects
 - Communities that can connect to existing systems with capacity
 - Communities that need decentralized cluster treatment systems
 - Individual spread out homes that need onsite wastewater treatment
- Providing cost estimates



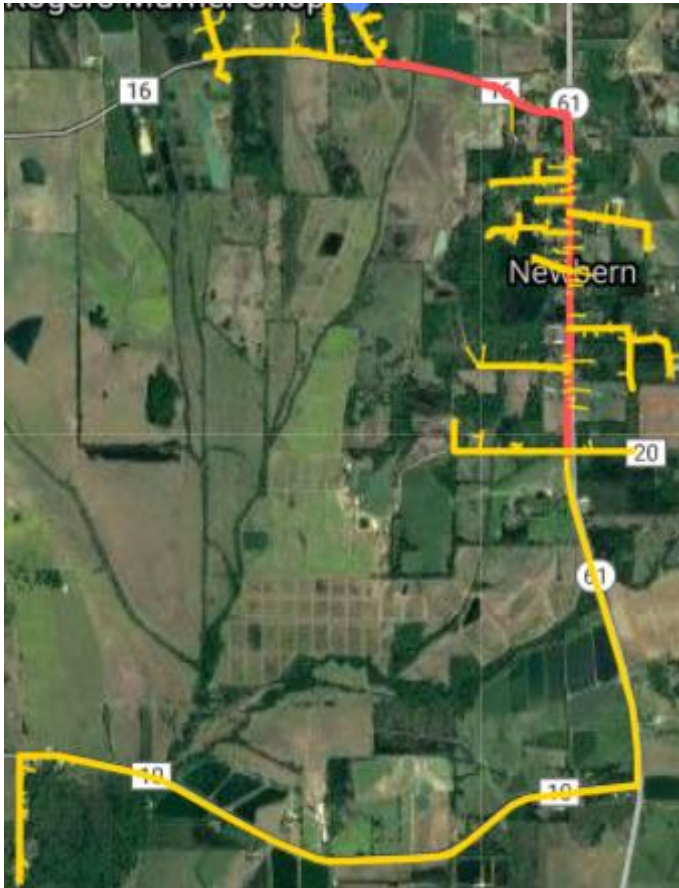
Addressing the Issues:

Decentralized Wastewater Demonstrations

- Demonstrating the applicability and sustainability of decentralized technologies
 - Liquid-only Septic Tank Effluent Pump (STEP) collection systems
 - Small diameter pipes (2-4 in)
 - Directional boring instead of large excavations
 - Do not rely on gravity/function on all terrains
 - Modular treatment systems
 - Low operation and maintenance
 - Small footprints
 - Low energy requirement
 - Remote sensing used for monitoring
 - Effluent dispersal via surface application
 - Spray irrigation, drip irrigation, or overland discharge
 - Provides plants with nutrients for growth

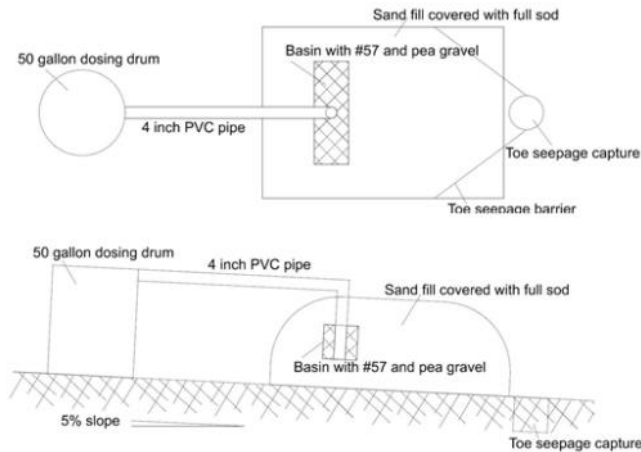


Hale County Decentralized Demonstration



- Funded by American Rescue Plan Act (ARPA)
- Will serve 400+ residents
- Demonstration goal is to show the efficacy of and minimization of O&M costs with:
 - Decentralized STEP collection system technology
 - Modular decentralized treatment technology
 - Pine forest spray irrigation disposal of effluent
 - Remote monitoring
- If successful, will serve as a blueprint for the implementation of additional decentralized wastewater cluster treatment systems within the Alabama BlackBelt and beyond

Addressing the Issues: Onsite Wastewater Solutions



- Developing and testing onsite systems
 - Modified sand filters
 - Modified constructed wetlands
 - Alternative disposal systems for treated effluent
- Collecting and providing cost and performance information for various advanced treatment technologies
- Evaluating and providing advice on various methods of impacting onsite wastewater management
 - Flow reduction via modified behaviors
 - Flow reduction via low-flow fixtures
 - Separation of greywater and black water

Addressing the Issues: Viable Funding Mechanisms

- Identifying funding mechanisms for
 - Establishment of decentralized clusters
 - Installation of onsite systems
 - Expansions and repairs to existing infrastructure
- Educating residents and local governments on how to qualify and apply for funding
- Potential funding sources:
 - USDA Rural Development
 - Clean Water State Revolving Fund
 - Community Development Block Grants
 - Bipartisan Infrastructure Law
 - American Rescue Plan Act



Addressing the Issues: Alternative Regulator Strategies



- Addressing the effluent disposal issues caused by clay soils in the Alabama Black Belt by making regulatory changes
 - Following the example set by other states that allow spray irrigation and overland discharge
 - Developing new rules to allow a form of ground-surface discharge for onsite wastewater systems in areas with Black Belt clay soils
 - Experimental disposal trench: 1 ft x 1 ft x 250 ft, 8 in gravel fill & 4 in sand fill

Addressing the Issues:

Responsible Management Entities

- Identifying long-term responsible management entities (RME) to prevent
 - Inadequate treatment level to protect public health and environment
 - Concerns regarding performance and reliability
- Identifying and evaluating major activities performed by RME
 - Billing/service charge fees, maintaining permits/licensing, ensuring adequate system performance, preventative maintenance & system repairs
- Identifying and evaluating management aspects and characteristics
 - Type: Public service providers (e.g., municipal utilities), private agencies (e.g., community development corporations), and non-profit corporations
 - Scale: Community-level, county-level, regional-level, or state-level management
- Identifying and evaluating potential socio-technical barriers
 - Difficulty to obtain public funds, communities' limited capacity to pay for O&M services, limited financial incentives to manage alternative systems, and lack of communities' awareness to risks associated with failing wastewater systems

For More Information

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<http://ruralwastewater.southalabama.edu/>