

Sustainable Wastewater Management for Underserved Communities using Federal Infrastructure Funds: Barriers, Bottlenecks, and Tradeoffs

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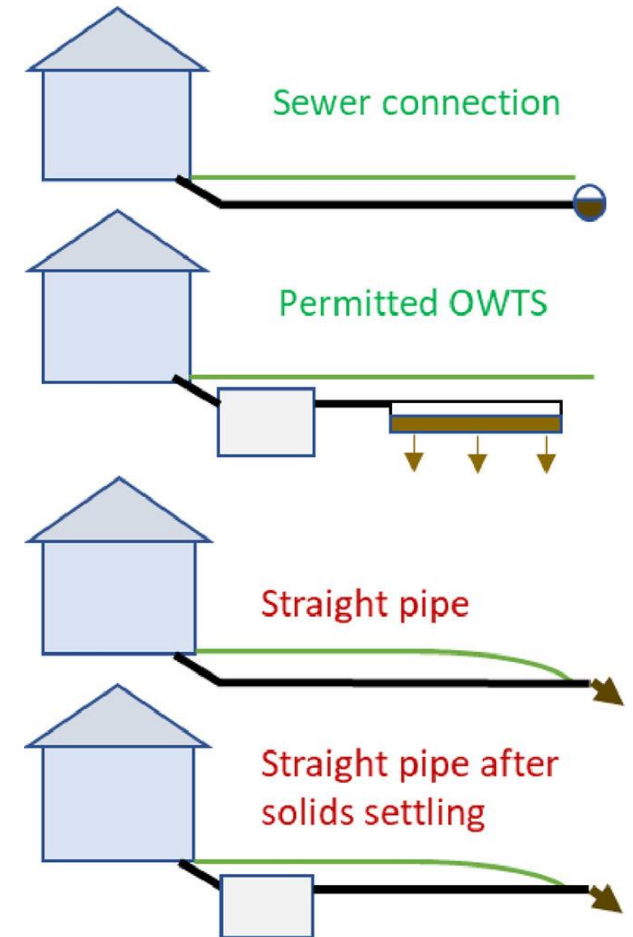
⁵Grant Management, LLC

⁶Black Belt Unincorporated Wastewater Program



Poor wastewater management in underserved US communities

- Emerging evidence demonstrates that the U.S. and many other high-income countries have persistent wastewater management deficits
- Rural areas with a confluence of challenges: little sewer access, low population density, poverty, plus various challenging soil/geology/water table conditions
 - Alabama Black Belt (impermeable clay)
 - Appalachia (rocky, slopes)
 - Louisiana, Minnesota (high water table)



Numerous challenges in underserved U.S. communities

Many unsafe household wastewater technologies in use across the U.S.:

- Straight pipes
- Failing septic systems
- Bucket latrines
- Unimproved outhouses
- Cesspools

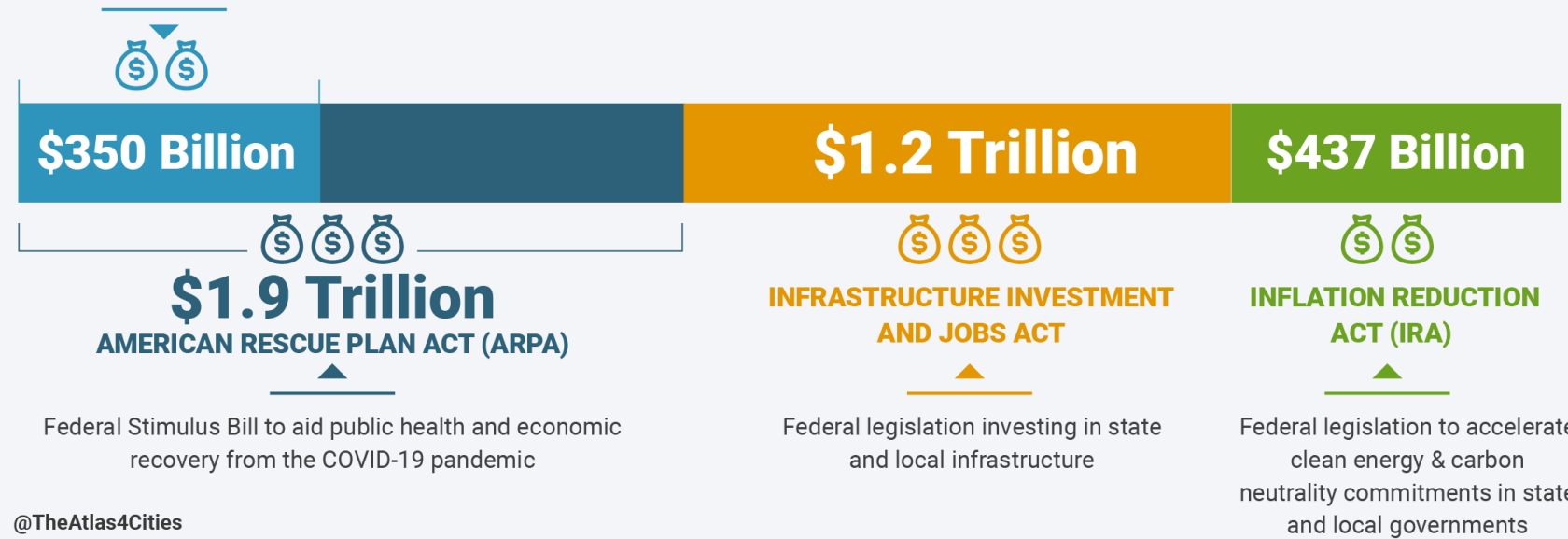


Federal infrastructure bills passed in 2021-22

Federal Infrastructure Funding for State & Local Governments

Signed in 2021 - 2022

CORONA VIRUS STATE AND LOCAL FISCAL RECOVERY FUNDS Additional emergency ARPA funding for state, local, territorial and tribal governments



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American Rescue Plan Act (ARPA)

Infrastructure Investment and Jobs Act (IIJA) – later referred to as Bipartisan Infrastructure Law (BIL)



Source: <https://the-atlas.com/iija-one-year-later-report/introduction/>

Grants and fully forgivable loans for low-income communities

- Widely believed to provide an ideal solution for small, underserved communities
 - Preference for disadvantaged communities (e.g., Justice40)
- However, many of these communities have struggled to access funding
- Federal funding mechanisms generally biased toward:
 - Large municipalities with engineering, accounting, and other professional staff
 - Large projects that serve thousands of homes
 - Conventional technologies (e.g., centralized gravity sewer and activated sludge treatment)

Time is now to address needs of underserved communities

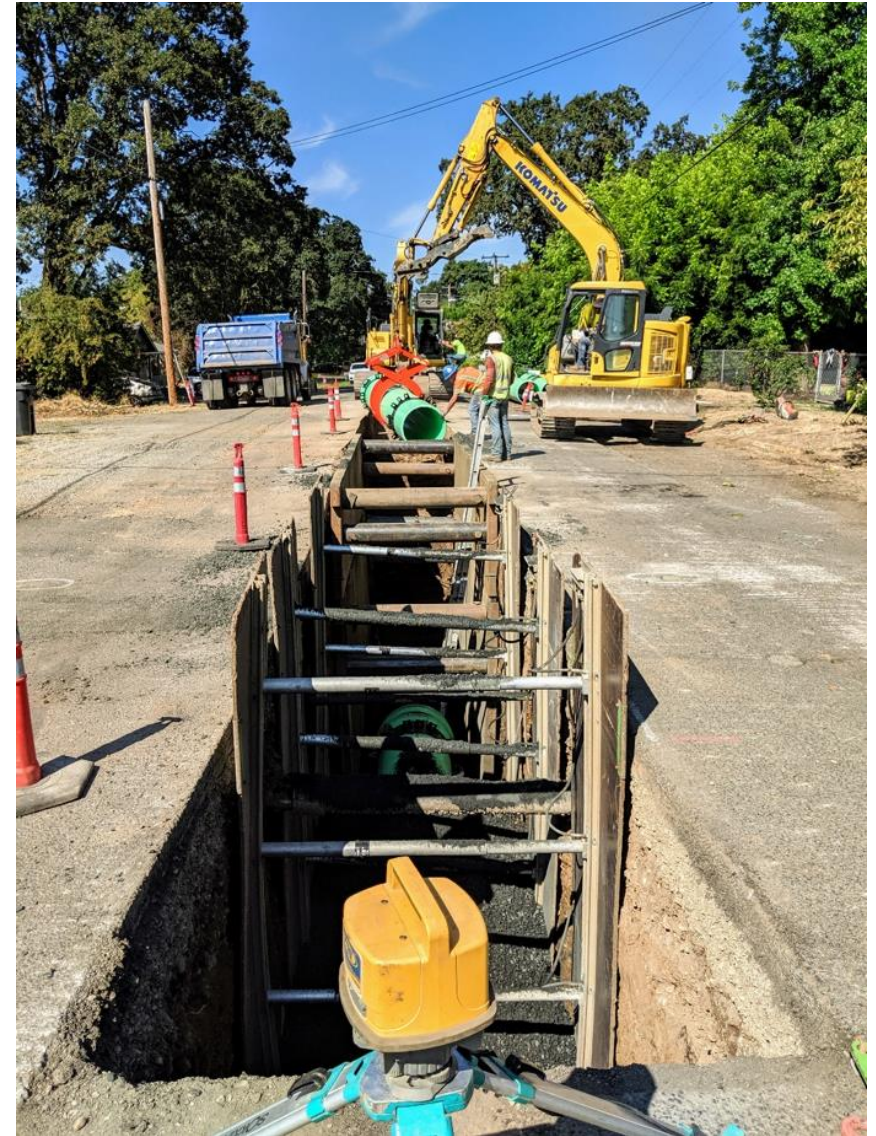
- Small, underserved communities often lack the capacity and expertise to:
 - assess their needs
 - apply and receive for funding
 - manage system, permits and finances
- ARPA and BIL funding must be spent or it expires in Dec 2026



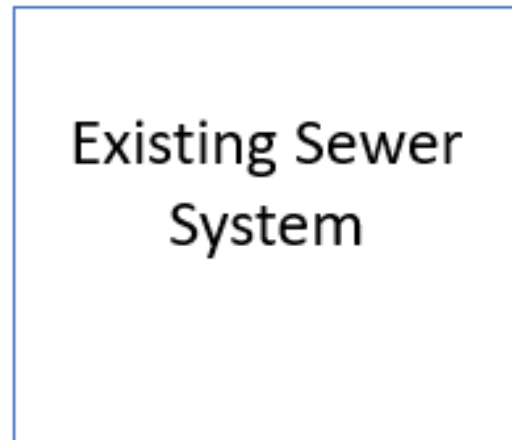
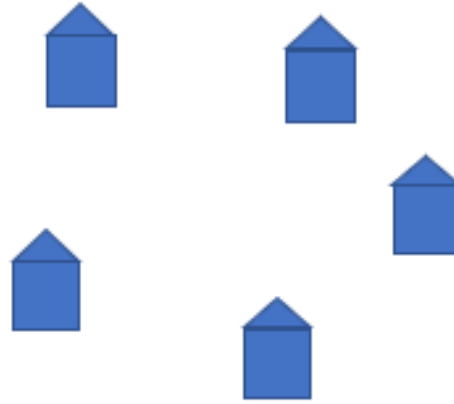
Source: <https://www.treadbylee.com/p/he-became-the-first-black-mayor-of>

Objectives of this presentation

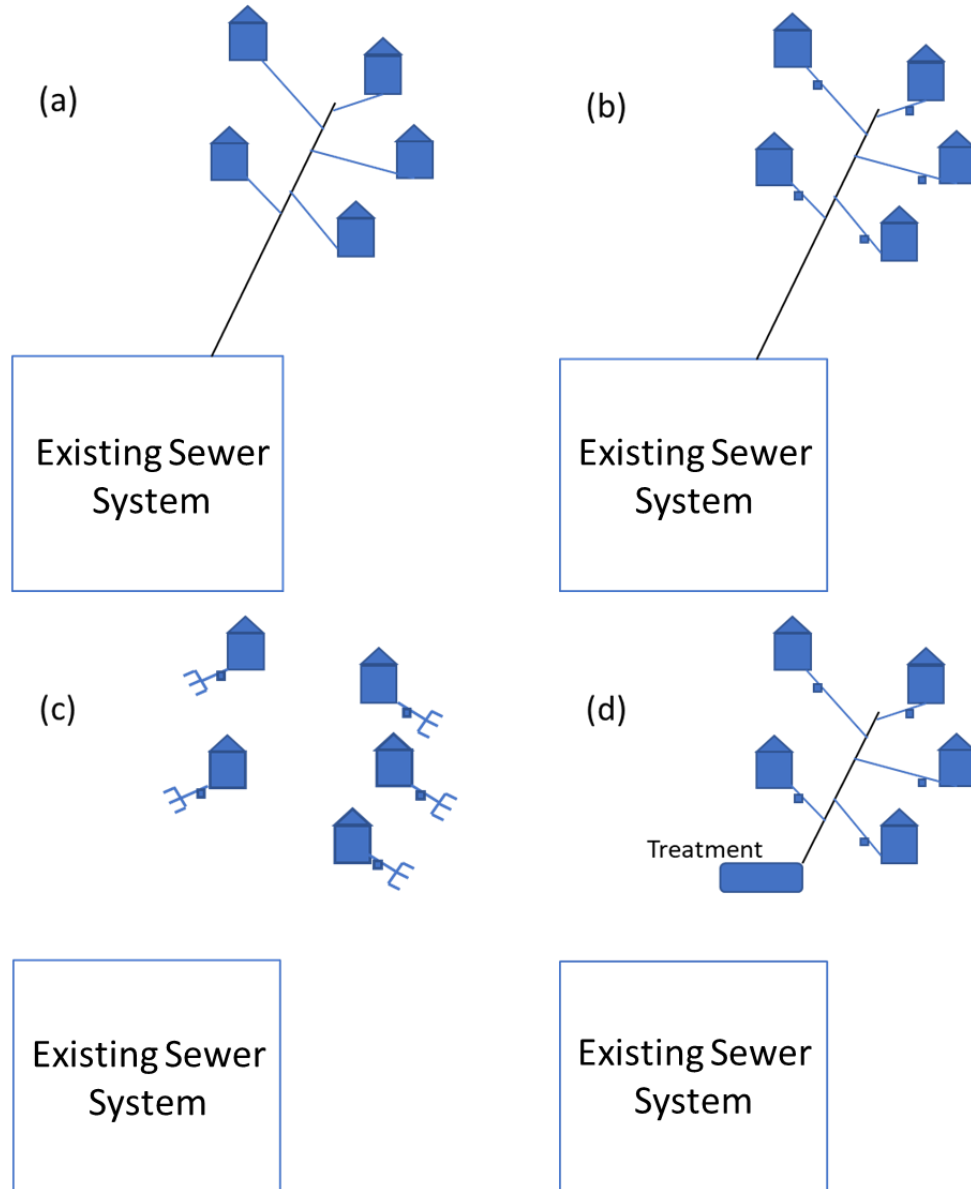
- Describe briefly the major system typologies and the criteria by which they can be selected
- Provide an overview of the shortcomings of Federal funding mechanisms for small, underserved communities
- Discuss the major obstacles for small communities and promising approaches to address them



Wastewater management options for a small community



Major wastewater system typologies



- a) Expand existing gravity sewer system
- b) Connect "liquid-only sewer" to existing gravity sewer system
- c) Single-home onsite treatment (OWTS)
- d) Decentralized clustered system with liquid-only sewer and standalone treatment

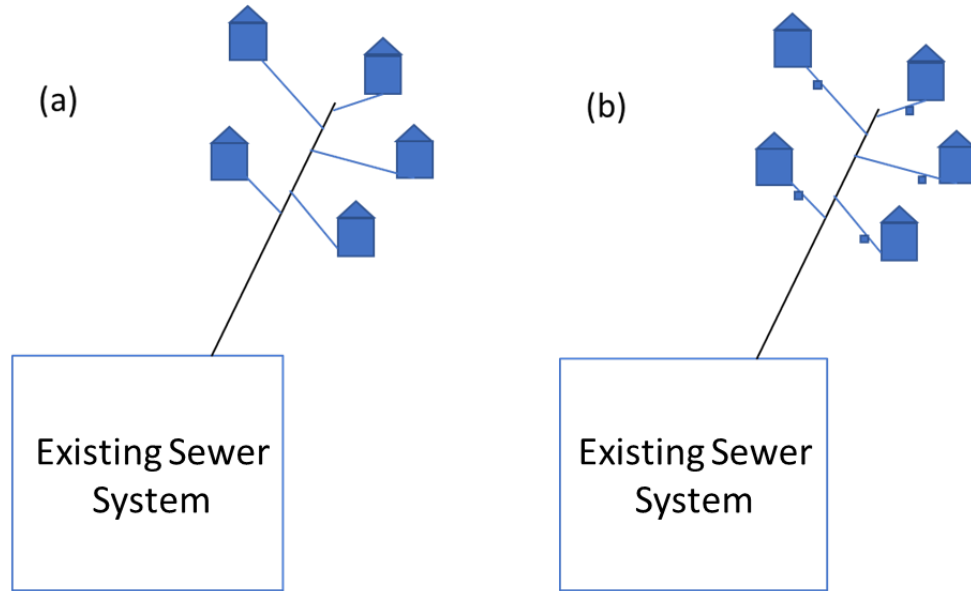
Can have a hybrid of multiple system types managed by one entity

Criteria for selecting a system typology

- Proximity to existing sewer
- Population density
- Community preferences
- Costs (capital costs, grants and ongoing costs)
- Good soil for septic systems
- Operator?
 - Certification level
 - Must be at treatment facility how many hours/day or week
 - Potential for remote monitoring and management (circuit rider)?
 - Managed by adjacent system?



Major wastewater system typologies: Connect to existing sewer



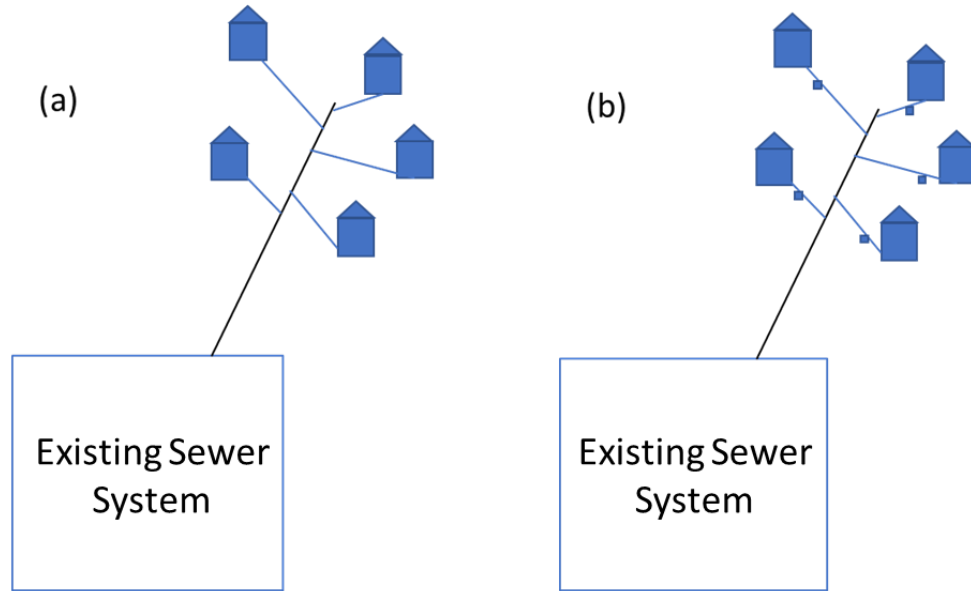
- a) Expand existing gravity sewer system
- b) Connect "liquid-only sewer" to existing gravity sewer system (e.g., septic tank effluent pressure STEP sewer)

Option (a): conventional gravity sewer costs at least \$1 million per mile, just for conveyance, not including cost of connecting each home.

Option (b): conveyance of liquids only costs only \$35,000-\$50,000 per mile, but each home has a tank and pump, which cost about \$9000-\$12,000 per home.

"Grinder pump" systems not suitable for low-income homes; \$3000+ for pump replacement, must be carried out immediately.

Major wastewater system typologies: Connect to existing sewer

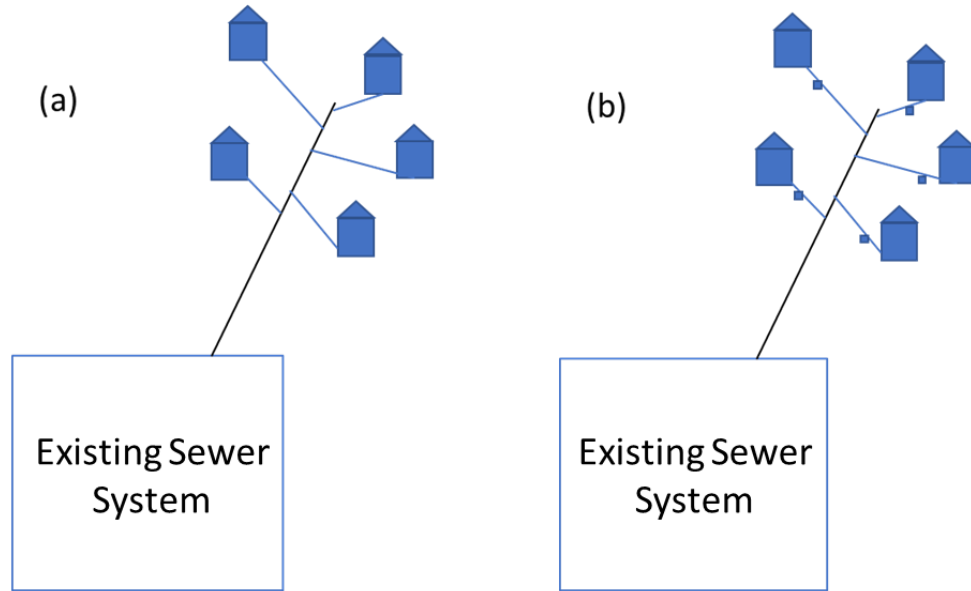


- a) Expand existing gravity sewer system
- b) Connect “liquid-only sewer” to existing gravity sewer system (e.g., septic tank effluent pressure STEP sewer)

Major advantages: connecting to existing sewer enables reliance on...

- Existing utility’s “responsible management entity,” financial audit, certified operators, bill collection, discharge permits, sewer board, revenue stream, ability to apply for capital funding, etc.

Major wastewater system typologies: Connect to existing sewer



- a) Expand existing gravity sewer system
- b) Connect “liquid-only sewer” to existing gravity sewer system (e.g., septic tank effluent pressure STEP sewer)

However, obstacles to connecting to existing sewer may include...

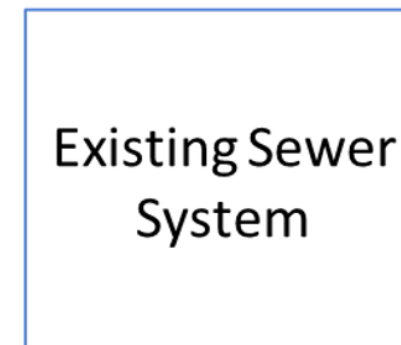
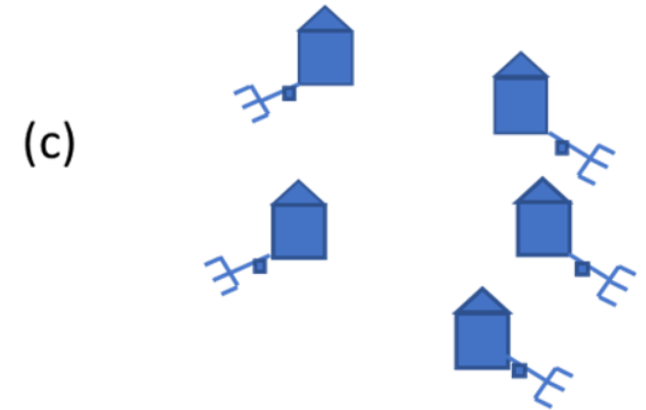
- The system is in violation of its permit or design flow
- Community preferences of smaller community to not be under authority and billing from larger neighboring town
- Political challenges (e.g., annexing, mayors)
- Utility by-laws governing monthly bills

Major wastewater system typologies: onsite systems (OWTS)

c) Single-home onsite wastewater treatment

For small communities, single-home OWTS are often the most affordable

- However, local conditions (soil, groundwater table) can preclude use of the most affordable systems (conventional septic systems)
- Advanced, engineered systems may require maintenance and management
- For properties with multiple homes on one parcel, the cost per home can be quite low even for engineered systems
- Much less Federal funding available for OWTS than for options (a), (b) and (d)

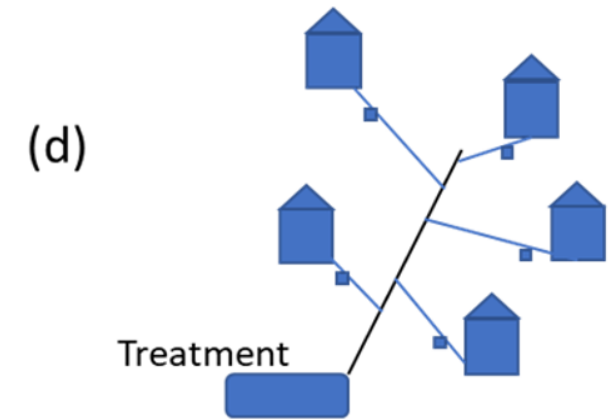


Major wastewater system typologies: decentralized clusters

d) Decentralized clustered system with liquid-only sewer and standalone treatment

For some communities, decentralized clusters are the best option

- 90+ homes, far from sewer, and with soil or geology that precludes septic systems
- If a grant can cover capital costs, this can be the most affordable option
- Community maintains control
- Liquid-only conveyance, with septic tank at each home
- Treatment process generally should be simple, attached growth



Existing Sewer System



Federal Funding Parameters

- Funding authorized under the Clean Water Act can be used to establish the system (capital and management)
- Systems must have financially sustainable revenue; recurring costs are not eligible
- Trend toward loans (fewer grants) and funding larger systems; “revolving loans”
- For low-income communities, ARPA and BIL provide grants or fully forgivable loans
 - Preference for disadvantaged communities



Federal Funding: Needy Communities

- Neediest communities are struggling to qualify for funding
 - Legally recognized public entity (many are in unincorporated areas)
 - Need current financial audit
 - Need a (preliminary) project proposal and basic design from an engineer
- Small communities are dependent on “hungry” engineering firms who assist with funding application in hope of getting project



Biases of Key Decisionmakers

- **Engineering firms** are typically compensated with a design fee that is based on a percentage (e.g., 10%) of the total cost of a job
 - Large projects pay more; design is much easier the more similar it is to a firm's previous projects
- Engineering firms are very busy now and there are many large projects available
- Why take a small project with an unfamiliar approach?



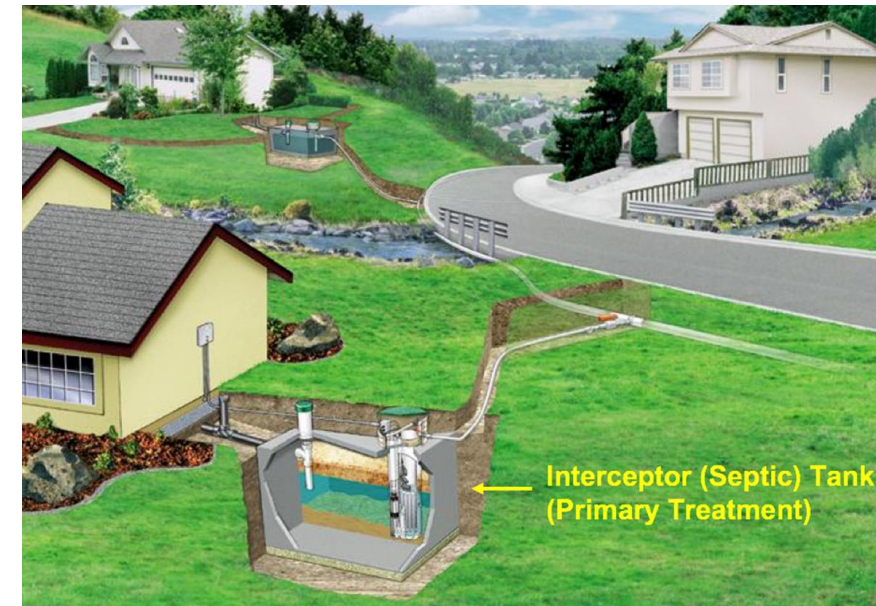
Biases of Key Decisionmakers

- **State funding and regulatory agencies** are more optimistic that large utilities will:
 - Have adequate revenue to fund operations and maintenance
 - Have growing populations → increasing revenue
 - Hire and retain certified operators
 - Avoid permit violations
- Small grants/loans may take more work than large grants/loans
- Poor experience with “package plants”
- Economies of scale mean that large grants often help more people per \$
- Why manage 30 small grants/loans instead of 3 large ones?



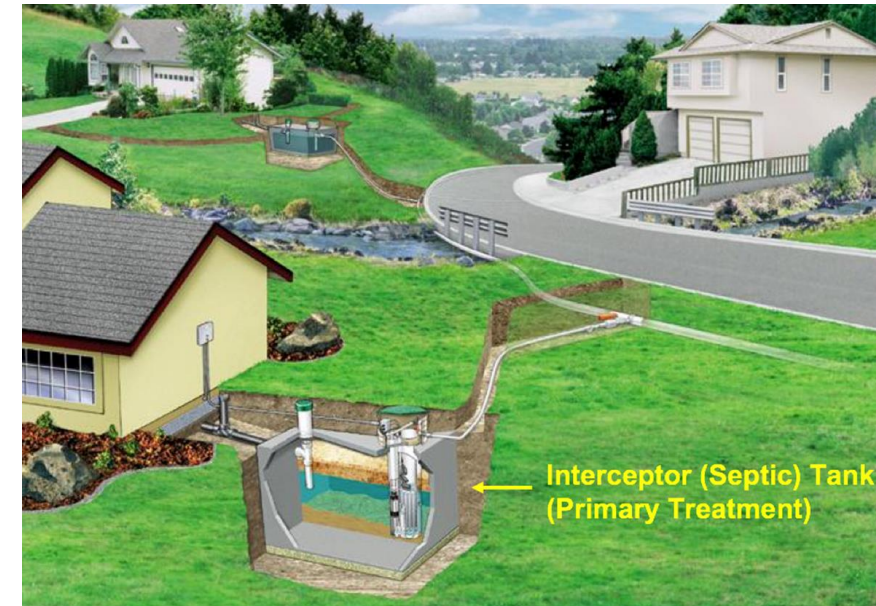
Promising Approaches for Small Communities

- Leverage existing:
 - Infrastructure (sewer, high-speed internet)
 - Operations and management capacity
 - Bill collection
 - Discharge permits
 - Regulatory approval
- With more recent innovations:
 - Liquid-only sewer (e.g., STEP)
 - Remote monitoring and management
 - Single-parcel clusters (e.g., four mobile homes)
 - Centralized management of decentralized infrastructure



Promising Approaches for Small Communities

- And creative approaches to funding, technical assistance, and regulation:
 - Distributed systems management
 - Regional management of onsite systems (e.g., semi-annual inspection)
 - Allowing use of state revolving fund for regional onsite system management
 - In most challenging soil conditions, allow surface discharge of treated, disinfected effluent
 - Supplement infrastructure funding with sources for homeowners (USDA, HUD)
- Note: more systems with a tank at the home (OWTS, STEP) means more septage generation
 - Must prepare for management of a greater volume of septage



Questions?

Feel free to contact me:

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Manuscript will be published open access in Fall 2023: Elliott et al. (2023) Sustainable Wastewater Management for Underserved Communities using Federal Infrastructure Funds: Barriers, Bottlenecks, and Tradeoffs. *Water Security* (Special Issue on Modular, Adaptive and Decentralized (MAD) Water Systems).
