EPA United States Environmental Protection Agency

USDA U.S. DEPARTMENT OF AGRICULTURE

Options for Clean Water Solutions

for East Log Cabin Road, Duplin County, North Carolina

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Closing America's Wastewater Access Gap Community Initiative

Contents

East Log Cabin Road's Options for Clean Water Solutions

East Log Cabin Road is an unincorporated area in Duplin County, North Carolina, with approximately 15 homes. The area is located between the Towns of Teachey and Wallace. Many residents of the East Log Cabin Road area currently have inadequate wastewater treatment services.

With the passage of the Bipartisan Infrastructure Law and new Water Technical Assistance services, there is momentum to bring wastewater treatment solutions to homes on East Log Cabin Road. This document describes technical options and financial resources for wastewater treatment. It is the product of the combined efforts of many organizations and individuals and provides options for clean water solutions for the community.

Cover: Aerial view of the Town of Wallace's wastewater treatment plant (bottom). Photo by the Town of Wallace.

Closing America's Wastewater Access Gap Community Initiative Pilot: EPA/USDA-RD Partnership

Introduction

The U.S. Environmental Protection Agency (EPA) and the U.S. Department of Agriculture Rural Development (USDA-RD) partnered with six states and three Tribes (two federally recognized and one state-recognized) on the Closing America's Wastewater Access Gap Community Initiative. As a pilot program, this initiative was the first of its kind for EPA and USDA-RD. This initiative provides technical assistance to support capacity to improve wastewater management for the 11 participating communities. EPA and USDA have grant and loan programs to help pay for wastewater system improvements. Recent increases in federal funding offer an opportunity for communities to invest in septic upgrades, connect to nearby treatment systems, or build new sewer and wastewater treatment systems that meet their needs.

EPA offers a range of Water Technical Assistance (WaterTA) for communities to identify water challenges and solutions, build capacity, and develop application materials to access water infrastructure funding. EPA collaborates with states, Tribes, territories, community partners, and other stakeholders to implement WaterTA efforts. The result: more communities apply for federal funding to have quality water infrastructure and reliable water services. Communities can learn more about EPA WaterTA and how to indicate interest in receiving assistance by visiting EPA's WaterTA website.[1]

USDA offers a wide range of water and wastewater assistance for rural communities to obtain the technical assistance and financing necessary to develop drinking water and waste disposal systems. USDA's Water and Waste Disposal Technical Assistance and Training Grants program helps qualified, private nonprofits provide technical assistance and training to identify and evaluate solutions to water and waste problems. It also helps applicants prepare applications for water and waste disposal loans and grants, and it helps associations improve the operation and maintenance (O&M) of water and waste facilities in eligible rural areas with populations of 10,000 or fewer. Communities can learn more about USDA Water and Waste Disposal Technical Assistance and Training Grants and how to indicate interest in receiving assistance by visiting USDA's website.[2]

> *Members of the East Log Cabin Road community deserve a wastewater system that allows them to live safely and comfortably.*
>
> — Duplin County Commissioner Wayne Branch

1 https://www.epa.gov/waterta

2 https://www.rd.usda.gov/programs-services/water-environmental-programs/water-waste-disposal-technical-assistance-training-grants

Purpose

EPA and USDA-RD pilot program staff members worked with the pilot program team—the Town of Teachey; Duplin County; EPA and USDA-RD state leadership; a local technical assistance provider, the North Carolina Rural Water Association (NCRWA); and the North Carolina Department of Environmental Quality (NCDEQ)—to develop solutions for East Log Cabin Road's wastewater issues. This document, *Options for Clean Water Solutions for East Log Cabin Road, Duplin County, North Carolina,* outlines potential solutions to address the needs for improved wastewater treatment approaches on East Log Cabin Road. Residents and Teachey town leadership can use this information to help identify and select potential wastewater solutions that meet today's challenges and help the community thrive.

Over the past year, the pilot program team has:

1. **Conducted a community wastewater assessment.** The pilot program team reviewed existing information on wastewater systems on East Log Cabin Road and found areas that need improvement. This review did not include collecting site information on soils or existing septic systems.
2. **Identified wastewater solutions.** The team identified wastewater solutions and estimated their costs. They considered the community's long-term needs and outlined a path to apply for funding. State and local officials and community members played a key role in developing these options.
3. **Helped the community identify and apply for funding opportunities.** This document outlines federal funding sources and how to apply for funding. It also shows how to pay for construction and long-term costs. Duplin County applied for and received a Special Evaluation Assistance for Rural Communities and Households (SEARCH) grant from USDA-RD to develop a Preliminary Engineering Report (PER) and Environmental Information Document.
4. **Developed a plan to pay for ongoing costs.** To install and operate the selected wastewater system, the appropriate management entity will have to develop a plan to pay for construction and ongoing costs. These ongoing costs could include management, O&M, and any potential construction loan repayments. This document offers ideas to get started, such as programs with low-income rate assistance and non-rate revenue programs that other utilities have used.

East Log Cabin Road, Duplin County, North Carolina

The East Log Cabin Road community is in an unincorporated area located just west of the Town of Teachey in Duplin County, North Carolina (Figure 1). East Log Cabin Road is a few miles west of Interstate 40 and connects with Log Cabin Road at its southern end. The approximately 15 residences on East Log Cabin Road are the focus of this pilot.

According to the 2020 Census, Teachey had an estimated population of 448. The town operates its own wastewater collection system and pumps wastewater to a treatment facility in Wallace. There is a sewer line directly adjacent to East Log Cabin Road, on Log Cabin Road, with a pump station 0.3 miles from East Log Cabin Road. The Town of Teachey is currently allocated 14,000 gallons per day (gpd) capacity from the Town of Wallace.

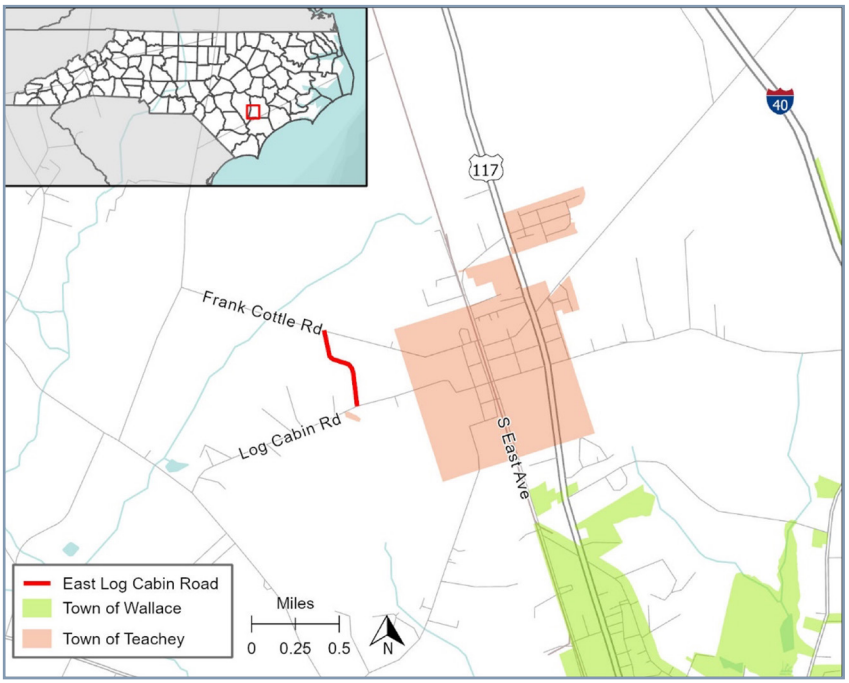

Figure 1. East Log Cabin Road, located west of the Town of Teachey in Duplin County, North Carolina.

The East Log Cabin Road community is currently served by individual onsite septic systems, which frequently fail due to challenging conditions for onsite wastewater treatment and dispersal. Residents of East Log Cabin Road have long struggled with drainage problems and high water tables, which cause wastewater to surface. Straight piping in the area is inadequate for handling wastewater. North Carolina Department of Transportation ditches along the road do not drain properly, which causes water to run onto the road and into yards, affecting septic systems during rain events. Ditches were recut to pull water away from the dispersal fields. However, the land cannot support modern septic system requirements, which has led to a lack of development that causes concern for residents. One resident surveyed neighbors and learned that 4 percent did not want any change, 20 percent wanted septic repairs, and 76 percent wanted sewer lines.

The East Log Cabin Road area, located in the Coastal Plain region of North Carolina, is known for its flat terrain and its history of forestry and agriculture. The predominant soil types in the East Log Cabin Road area are Rains fine sandy loam (63.7 percent) and Goldsboro loamy sand (29.5 percent). The high water tables beneath these soils, as well as their moisture content, make them poorly suited for onsite and cluster wastewater treatment systems. Moreover, the flat terrain of the East Log Cabin Road area limits the subsurface flow and treatment of wastewater, making onsite and cluster systems even less feasible and likely necessitating the use of fill systems. The community is in a high-rainfall area, which predisposes it to flooding and storm and sewage drainage issues. Onsite upgrades and small community systems were identified as options but would require additional treatment or fill material.

The Potential of Infrastructure Investment

East Log Cabin Road residents have expressed support for capital investment in sanitation infrastructure, and they understand monthly bills are necessary for maintenance of infrastructure. They want a community where their children can safely play in their backyards without risking exposure to untreated wastewater. The ability to do laundry and take a shower at the same time, even during rain, is another basic need. An affordable wastewater system in the East Log Cabin Road area is key to maintaining a vibrant, productive community.

Community Engagement Feedback

County, community, federal, and state representatives held monthly meetings to discuss community engagement efforts. NCRWA and Duplin County Commissioner Wayne Branch led community engagement efforts and corresponded with residents to provide updates on progress and next steps, and to solicit feedback on preliminary options and educational materials. They also led interactions with Duplin County staff, Town of Teachey representatives, and East Log Cabin Road area residents. They intend to conduct public outreach meetings once more detailed options are available and financing is completed. Summaries of the meetings to date are below.

In October 2022, a kickoff meeting was held with federal, state, and local partners to establish a vision for success, field questions and feedback, and create a plan for achieving the project's goals. The following unique community challenges were identified:

- Concern from residents about higher fees, either from annexation or from out-of-town sewer rates if connecting to nearby sewer systems.
- Reluctance of homeowners to disclose existing failed septic systems due to concerns about enforcement actions.
- Hesitancy from Duplin County on becoming a wastewater system provider.

The Duplin County Health Department discussed repair options, such as a fill system to address high groundwater levels. Many residents pump septic tanks multiple times per year due to improper system performance, which costs up to $250 each time. These costs could instead help pay for new sewer bills. However, many residents are elderly and on fixed incomes, so any cost increases would be difficult to manage.

The project team held meetings with the Teachey Public Works Director, Town Clerk, and former Mayor to discuss wastewater options for the East Log Cabin Road area, including a cluster system and connection to the town sewer system. These options were also presented at a Teachey Town Council meeting, where the town expressed interest in continuing to support the project. In November 2023, Teachey voters elected a new mayor and two new councilmembers. It is unknown at this time whether these leadership changes will affect the project.

Community members expressed concern over the Teachey ordinance requiring residential areas to be annexed to receive sewer services. Discussions are still ongoing with Teachey and East Log Cabin Road residents to address this issue and assess how annexation affects the affordability of proposed solutions.

Figure 2. STEP system demonstration during a meeting with community leaders.

Members of the project team met with community leaders in December 2023 to provide progress updates and propose next steps. Representatives from the engineering firm selected to develop a PER provided a demonstration of a septic tank with effluent pump (STEP) system that could be installed at homes (Figure 2). The project team recommends additional community outreach and meetings to further discuss options and inform the community that more detailed costs will be included in the PER.

Wastewater Treatment Options for East Log Cabin Road

Beyond a no-action option, the project team identified and evaluated three different options for improved wastewater management in the East Log Cabin Road community. These options are summarized in the next section. Preliminary design and cost estimates assume an estimated service capacity of 15 individual residences or equivalent dwelling units with an average daily design flow of 117 gpd per residence (based on historical water records) and a total peak design flow of approximately 3,000 gpd. These design flows are subject to change during final design but serve as a baseline for this options evaluation. All the existing homes are within the service area for public water from the Duplin County Water Department; however, only six homes are currently connected to public water, while the rest are served by private wells. Most of the occupied lots have limited space for onsite septic system repairs, especially fill dispersal fields. Competing uses of yards could also impair the long-term function of any new systems (in addition to contributing the failure of existing dispersal fields).

Because the Town of Teachey owns and operates a sewer collection main directly adjacent to the East Log Cabin Road community on Log Cabin Road, the primary alternative under consideration is extending this force main to provide centralized sewer services with added capacity in the sewer design to accommodate additional dwelling units in the future. The estimated service capacity may change during final design based on the number of actual occupied dwellings, the addition of future developed lots that are currently undevelopable due to septic limitations, and the willingness of existing residents to connect to the community sewer. This alternative would involve installing a grinder pump system at each residence that would connect to a pressure community sewer (Figure 3). The Town of Teachey is willing to provide sewer services to the East Log Cabin Road area under its existing capacity arrangements with the Town of Wallace wastewater treatment facility. However, residents connecting to wastewater services through this alternative must also connect to the Duplin County water system, which would require the nine properties on East Log Cabin Road currently served by private wells to connect to public water. While the previous Mayor of Teachey has expressed willingness to provide sewer services without annexing the East Log Cabin Road unincorporated area, the current Town Board would need to modify the town's ordinance to allow out-of-town utility services to the area. The estimated O&M costs for sewer extension in this preliminary options evaluation are based on Teachey's 2023–2024 out-of-town sewer rates and assume that sewer would be extended without annexation, as East Log Cabin Road residents have expressed a strong desire to avoid annexation.

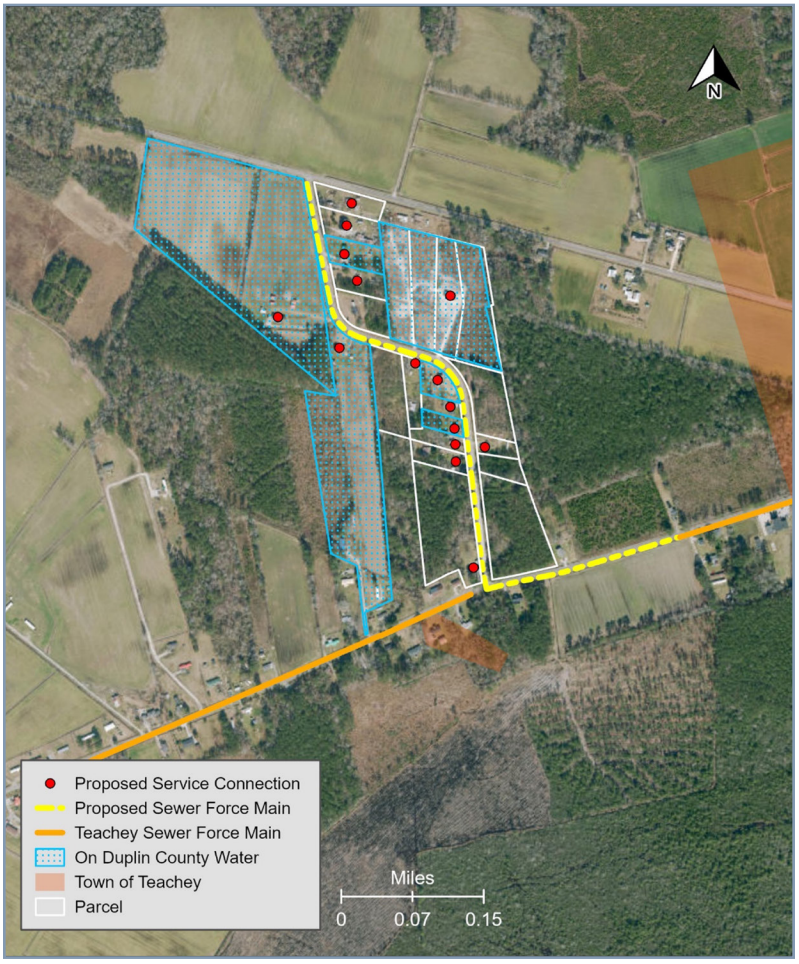

Figure 3. Proposed sewer extension option for East Log Cabin Road.

Alternatives to sewer extension include onsite wastewater treatment, either through a community cluster system (Option 2) or onsite upgrades (Option 3). Like the sewer extension option, a community cluster system would require a pressure sewer; however, the cluster system would use STEP systems at each lot instead of grinder pump systems. The community sewer would then pump the effluent to one or more larger parcels for treatment and dispersal. Given the soil moisture conditions and shallow water tables in the East Log Cabin Road area, preliminary cost estimates assume advanced treatment and drip dispersal system to minimize the vertical separation requirements between the dispersal field lines and the water table. Depending on the results of preliminary soil investigations, this option could require a surface dispersal/land application system treated to reclaimed water standards. This option is contingent upon the system owner's ability to acquire a parcel close to East Log Cabin Road with moderately suitable soil conditions for onsite wastewater dispersal.

Onsite upgrades to fill systems with low-pressure pipe dispersal (Option 3) was also considered for the East Log Cabin Road community. Although this option could work for some parcels, other parcels would have insufficient area to install a new system as a repair to an existing septic system. Detailed investigations of each parcel will need to be conducted to determine the final feasibility of this alternative. However, developing cost estimates for this option provides useful information for preliminary assessment and evaluation as part of this initial pilot project.

Although this study provides a range of cost estimates, a full understanding of the alternatives and their costs will require an in-depth analysis. In March 2024, Duplin County received grant funding from USDA-RD to develop a PER.

Options for Wastewater Infrastructure Improvements

Option 1: Sewer extension to Teachey via Log Cabin Road

This option examines the installation of approximately 3,840 feet of public sewer serving 15 residences. Grinder pump systems would be installed at each service connection. Ownership and maintenance responsibilities of the grinder pump stations will be determined during PER and design efforts.

Expected capital cost: $504,750

Expected annual operating costs: $4,200 for grinder maintenance and $13,320 in sewer fees to Teachey. This estimate is based on the Town of Teachey's 2023–2024 water and sewer rates for out-of-town residents and assumes 3,500 gallons per month average water usage. It does not include additional water service fees (about $46 per month) for residents not currently connected to public water.

Pros:

- Eliminates health and environmental hazards from overflowing and failing septic tanks.
- Provides consistent service throughout the community.
- Reduces burden on residents for maintenance and replacement of onsite septic systems.
- Encourages economic growth and development of parcels currently limited by septic feasibility.

Cons:

- Requires residents to connect to the sewer system and public water if not currently connected.
- Requires ongoing maintenance and replacement for grinder pumps, which varies in cost and frequency based on residents' use.
- Requires revising a Teachey ordinance to allow out-of-town customers so that the East Log Cabin Road area does not have to be annexed.

Option 2: Community cluster system

This option examines the installation of a pressure community sewer to serve the East Log Cabin Road community, with a STEP system for primary treatment at each household. Wastewater would be pumped to a community dispersal field for advanced treatment and dispersal based on in situ soil conditions (i.e., soil texture and depth to restrictive layer). This option is contingent upon the acquisition of open land adjacent to East Log Cabin Road suitable for a large onsite wastewater system. Although this option would require fewer homeowner maintenance responsibilities than existing onsite septic systems, it would still require intermittent septic tank pump-out and pump replacement.

Expected capital cost: $727,500

Expected annual operating cost: $9,190

Pros:

- Eliminates health and environmental hazards from overflowing and failing septic tanks.
- Provides consistent wastewater service throughout the community.
- Allows for growth within the community.
- Gives the community greater control over the wastewater system and fee structure.
- Reduces maintenance, as STEP systems require less maintenance than grinder pumps.

Cons:

- Requires most of the current residents to connect to the sewer system for it to be affordable.
- Requires residents to maintain both septic tanks and effluent pumps, including pump replacement as needed (assumed once every 7 years).
- Requires land acquisition for treatment parcel as part of capital costs.
- Requires a licensed operator for O&M of the community treatment and dispersal system.
- Requires establishment of a Responsible Management Entity (RME) for the community.
- Requires the system be owned by a public entity (county, town, sanitary or sewer district) so the project can be eligible for funding through the Clean Water State Revolving Fund (CWSRF) program.

Option 3: Onsite system upgrades

This option explores replacing existing systems with a fill septic system where lot space is available. Most systems would require a pump-to-gravity distribution, although some sites may be able to use gravity distribution. Where site conditions limit feasibility of a fill system, alternative onsite options will need to be considered (e.g., treatment standard-1 [TS-1] or TS-2 pretreatment, drip dispersal) during final permitting and design.

Expected capital cost: $520,500 ($34,700 per connection)

Expected annual operating cost: $5,400

Pros:

- Eliminates health and environmental hazards from overflowing and failing septic tanks.
- Requires residents to perform periodic system maintenance instead of paying monthly fees.
- Is effective for large lots.
- Does not require a certified operator for maintenance of gravity distribution systems requiring just one pump (certified operators are required for advanced pretreatment, low-pressure pipe, or drip dispersal).
- Allows for quickest implementation to address immediate needs.

Cons:

- May not be feasible for all lots.
- Requires homeowners to maintain and replace systems, unless an RME is established for the community.
- May limit future lot development along East Log Cabin Road, as more advanced systems can be cost-prohibitive, even with grant funding.
- May require premature system replacement if homeowners fail to maintain the septic system.

Table 1 compares the wastewater treatment options described above.

Table 1. Comparison of Wastewater Treatment Options

Evaluation Criteria	Sewer Extension	Community Cluster	Onsite Upgrades
Estimated capital cost	$504,750	$727,500	$520,500
Eliminates the current public health concern	Yes	Yes	Yes
Provides a long-term solution	Yes	Yes	Yes
Requires new local sewer management authority	No	Yes	No
Includes existing local sewer management authority	Yes	No	No

Financing Options

The financing options evaluated include:

- **North Carolina CWSRF.** Up to $500,000 grant or principal loan forgiveness. Low-interest loans through NCDEQ.
- **Community Development Block Grant (CDBG).** Up to $3 million over 3 years for wastewater or water infrastructure projects. Eligibility includes residential areas that meet the U.S. Department of Housing and Urban Development's (HUD's) low- and moderate-income thresholds. This grant could help cover the costs of new water or wastewater service lines or extensions.
- **USDA-RD Water and Environmental Programs (WEP), Water and Waste Disposal Loan and Grants.** Low-interest, long-term loans up to 40 years. Grant funds may be combined with a loan to keep user cost

reasonable.

- **USDA Single Family Housing Repair Loans and Grants.** For low- and very-low-income homeowners, up to a $10,000 grant (age 62 or older) and up to a $40,000 loan with a 1 percent interest rate and 20-year term. Grants must be used to remove health and safety hazards. Loans may be used for those purposes or to repair, improve, or modernize homes.
- **Southeast Rural Community Assistance Project, Inc. (SERCAP) Individual Septic Loan Program.** Up to a $15,000 loan with a 1 percent interest rate for low-income residents of rural communities to pay for installing a new standard/alternative septic system or to repair an existing malfunctioning system.
- **Water Well Trust Loan Program.** Funding for well and/or septic systems repairs for low-income families nationwide.

Capital and Financing Costs and Fees

Table 2 shows the options for constructing new wastewater infrastructure and the estimated capital costs for each option. The table also shows information on potential additional costs if the construction was partially or fully funded with a grant.

Table 2. Capital and Financing Costs for Wastewater Treatment Options

Option	Name	Estimated Total Capital Cost	Estimated Capital Cost Per Connection	Monthly Bill Addition for Financing Options of Capital Costs *(CWSRF Principal Forgiveness Loan[a])*	Monthly Bill Addition for Financing Options of Capital Costs *(USDA-RD 25% Loan 75% Grant[b])*
1	**Sewer extension via Log Cabin Road**	$504,750	$33,650	$0	$27
2	**Community cluster system**	$727,500	$48,500	$0	$39
3	**Onsite system upgrades**	$520,500	$34,700	Financing dependent on individual situations.	Financing dependent on individual situations.

a Full principal forgiveness is possible but not guaranteed. Funding availability depends on several factors. The Town of Teachey or Duplin County will need to engage with NCDEQ along the way to determine principal forgiveness funding availability.

b Assumes 75% of the total project cost is funded with grant or forgivable loan, and the remainder is funded with a loan. Also assumes 15 existing developed lots repay the loan at a 2.325% annual interest rate and 40-year loan term.

Table 3 shows the estimated monthly costs for operating the various wastewater management options. Note that these costs should not be considered monthly bills, as some of them represent amortized costs to replace major system components (e.g., dispersal fields), pump septic tanks, or hire operators. The only mandatory monthly bills would be utility fees for Option 1 and monthly power bills that cover STEP or grinder pump energy consumption.

Grinder pump O&M costs for Option 1 (sewer extension) are estimated raw costs. It is not known at this time what the Town of Teachey would charge for the additional grinder system maintenance. If an RME was established for Option 2 (community cluster), a monthly fee would be needed to cover the amortized costs included in Table 2

and necessary overhead costs to operate the RME and handle permitting, monitoring, and reporting requirements. Future grants could be utilized to cover system replacement costs for Options 2 and 3, which would lower (or fully negate) the estimated dispersal field replacement costs.

Table 3. Potential Monthly Costs for East Log Cabin Road Customers

Option	Name	Utility Fee[a]	STEP or Grinder Pump O&M[b]	STEP or Grinder Pump Energy Cost[c]	Amortized Septic Tank Pump-Out[c]	Dispersal Field O&M Costs[d]	Amortized Dispersal Field Replacement[e]
1	**Sewer extension to Teachey via Log Cabin Road**	$74	$20	$3	$0	$0	$0
2	**Community cluster system**	$0	$25	$2	$2.30	$23.10	$18.40
3	**Onsite system upgrades**	$0	$6[c]	$1	$2.30	$20[c]	$36[d]

a Sewer fee estimate is based on Teachey's 2023–2024 out-of-town rates, $47.50 monthly base charge, and average monthly water usages of 3,500 gallons per residence ($26.40).

b Estimated raw O&M costs to maintain grinder pump or STEP systems. Final costs are to be determined by the Town of Teachey or RME based on overhead requirements.

c Responsibility of homeowner. Could be managed by a homeowners association (HOA) or RME if established for community.

d Capital and O&M costs for onsite/septic systems and community cluster systems could be reduced based on results of soil testing. Costs are based on unsuitable soils as noted in the USDA Web Soil Survey.

e Assumes 30-year life span for onsite fill systems and 60-year life span for cluster drip systems with pretreatment.

Funding Opportunities

The Bipartisan Infrastructure Law provides additional funding to the CWSRF for loans and grants to small, rural, and disadvantaged communities that can be leveraged with USDA-RD funds to address inadequate water and wastewater systems. There are multiple potential funding sources for Duplin County, including USDA-RD and the CWSRF administered by NCDEQ.

Overview of the CWSRF Program Administered by NCDEQ

- The CWSRF program provides low-interest loans (up to half the market interest rate) to finance public infrastructure improvements.
- The program can provide up to $500,000 in grants or principal loan forgiveness and up to $35 million in loans.
- Applications are evaluated based on the Priority Rating System, which awards points for project purpose, project benefits, system management, and affordability.
- Eligibility for grant or principal loan forgiveness is based on NCDEQ's affordability criteria, which include population trends, poverty rate, median household income (MHI), unemployment rate, and sewer bills.
- Loans are administered by NCDEQ and must be approved by the North Carolina Local Government Commission.
- Three years of financial audits are required for the application process.
- Construction must begin within 24 months of receiving the letter of intent to fund.
- Application forms[3] and application training[4] can be found on NCDEQ's website.

Overview of HUD's CDBG Program

- The CDBG program provides grants for states, cities, and counties to develop housing and certain public utilities, including water and sewer facilities.
- Funding from the North Carolina CDBG program is administered by the NCDEQ Division of Water Infrastructure. Maximum grant funding is $3 million over a 3-year period.
- The project area must have at least 51 percent low- to moderate-income persons, according to HUD's low- and moderate-income threshold.
- The CDBG infrastructure program has one funding cycle per year, typically in September.
- Application forms[3] and application training[4] can be found on NCDEQ's website.

Overview of NCDEQ's Merger/Regionalization Feasibility Grants

- The Merger/Regionalization Feasibility grants provide up to $50,000 from the Wastewater Reserve fund for studying the feasibility of regionalizing or extending wastewater sewer services.

3 https://www.deq.nc.gov/about/divisions/water-infrastructure/i-need-funding/application-forms-and-additional-resources

4 https://www.deq.nc.gov/about/divisions/water-infrastructure/application-training

Overview of USDA-RD's Water Programs for Septic System Upgrades

Single Family Housing Repair Loans and Grants

- The Single Family Housing Repair Loans and Grants program, also known as the Section 504 Home Repair program, provides loans to very-low-income homeowners to repair, improve, or modernize their homes, as well as grants to elderly, very-low-income homeowners to address health and safety hazards, including septic systems.
- To qualify, applicants must be the homeowner and occupy the house, must be unable to obtain affordable credit elsewhere, and must have a household income that does not exceed the very-low-income limit for their county. In Duplin County, the limit is $34,600 for households of four or fewer and $45,700 for households of five or greater.
- Grants go up to $10,000, specifically for those aged 62 and older. Grants can be combined with full loans.
- Loans go up to $40,000 and are termed for 20 years with a 1 percent fixed interest rate.
- Applications are accepted through the North Carolina RD Office.[5]

Rural Decentralized Water Systems Grant

- The Rural Decentralized Water Systems Grant program helps qualified nonprofits create a revolving loan fund for eligible individuals who own and occupy a home in an eligible rural area (i.e., areas with a population of 50,000 or fewer). The fund may be used to construct, refurbish, or service individually owned septic systems.
- The nonprofit must contribute at least a 10 percent match.
- The maximum loan amount is $15,000 at a 1 percent fixed interest rate, repaid over a 20-year period.
- Applications for nonprofits to apply are accepted through Grants.gov (see USDA's website for current posting).[6] Nonprofits currently administering loans include SERCAP and the Water Well Trust Loan Program, listed below.

SERCAP's Individual Septic Loan Program

- SERCAP's Individual Septic Loan program offers loans of up to $15,000 to residents of rural communities to pay for installing a new standard/alternative septic system or to repair an existing malfunctioning system. The interest rate is locked in at 1 percent, and these loans are not readily available from other lending institutions.
- Applications are accepted on SERCAP's website.[7]

Water Well Trust Loan Program

- The Water Well Trust Loan program provides funding for wells and/or septic system repairs for low-income families nationwide who need safe drinking water or wastewater systems. This program primarily serves residents living in rural, unincorporated areas, as well as minority communities.
- To qualify, applicants must have deed or mortgage in their name, occupy the property, and meet eligibility criteria for gross annual household income based on North Carolina's MHI.
- Applicants can fill out the information form[8] on the Water Well Trust website[9] to begin the process.

5 https://www.rd.usda.gov/nc

6 https://www.rd.usda.gov/programs-services/water-environmental-programs/rural-decentralized-water-systems-grant-program

7 https://sercap.org/about/who-we-serve/programs-and-services-homeowners

8 https://www.waterwelltrust.org/online-app-info/

9 https://www.waterwelltrust.org/

Overview of USDA-RD's Other Water Programs

SEARCH Grant

- The SEARCH grant program helps very small, financially distressed rural communities with predevelopment feasibility studies, design, and technical assistance on proposed water and waste disposal projects.
- State and local government entities, nonprofits, and federally recognized Tribes may apply.
- The area to be served must be rural, with a population of 2,500 or fewer, and must have an MHI below the poverty line or less than 80 percent of the statewide MHI.
- Applications are accepted year-round through RD Apply.[10] Duplin County received SEARCH grant funding in March 2024.

WEP Water and Waste Disposal Loan and Grants

- Through the Rural Utilities Service WEP, this program provides funding to rural communities with populations of fewer than 10,000 to obtain the technical assistance and financing necessary to develop drinking water and waste disposal systems.
- USDA-RD has long-term, low-interest loan financing programs to assist communities with infrastructure costs. Qualifying communities have opportunities for grants combined with loans.
- For communities receiving loans, the loan term can be up to 40 years based on the expected life of the system. The interest rate is adjusted quarterly.
- Borrowers must have the legal authority to construct, operate, and maintain the proposed services or facilities.
- USDA-RD loans and grants require financial audits, as well as a commitment to revenue collection during the life of the loan.
- USDA-RD accepts applications year-round on a rolling basis through RD Apply.[10]

10 https://www.rd.usda.gov/programs-services/rd-apply

Benefits of Investing in Adequate Wastewater Infrastructure

Public and Community Heath Improvement

Exposure to sewage can have negative health impacts and spread diseases such as salmonellosis, shigellosis, cholera, giardiasis, amoebiasis, hepatitis A, viral enteritis, and other diarrheal diseases.[11] There are many different types of microbes in wastewater, which make it challenging to determine specific causes of illness. Detecting and identifying microbes in wastewater takes time and resources.[12] However, it is well known that exposure to untreated waste negatively affects residents' health and well-being.

Investing in adequate wastewater infrastructure creates a healthier environment for the residents of East Log Cabin Road. Children can play outdoors, residents do not have to worry about their families and pets encountering raw sewage, household plumbing is more functional, and sewage odors are not persistently present. Well-maintained and properly built wastewater treatment systems protect residents from viruses and bacteria. They also reduce environmental pollution, function during rain and storms, and provide a foundation for economic development.

Economic Impact of Wastewater Infrastructure Investment

Developing wastewater systems can bring economic benefits and jobs for communities. The *Economic Benefits of Investing in Water Infrastructure* study, commissioned by the Value of Water Campaign and completed by the U.S. Water Alliance in 2017, found that for every $1 million spent on infrastructure construction, over 15 jobs are generated. Rural wastewater infrastructure also increases property values and development potential, which enhances the overall wealth of a community while reducing out-migration of residents. This creates a positive feedback loop that further benefits the community, as the increased tax base reinvests in public services and other supporting infrastructure.

Although East Log Cabin Road is not within the Town of Teachey's or Town of Wallace's municipal boundary, East Log Cabin Road residents contribute to the economies of these towns as patrons of local businesses and service providers. Expanding the growth and prosperity of East Log Cabin Road residents via sustainable wastewater infrastructure will have economic benefits for both the towns and the county. Extended sewer service from the town would likely be a revenue-positive venture upon implementation (assuming that most of the construction costs were covered by grants), yielding additional investment capital for the town. If Option 2 of the proposed alternatives is selected, additional jobs could be created to maintain and operate the decentralized wastewater infrastructure.

11 World Health Organization. (2006). *WHO guidelines for the safe use of wastewater, excreta, and greywater* (Vol. 2). https://www.who.int/publications/i/item/9241546832

12 Kaushal, S., & Singh, J. S. (2017). Wastewater impact on human health and microorganism-mediated remediation and treatment through technologies. In J. Singh & G. Seneviratne (Eds.), *Agro-environmental sustainability.* Springer. https://link.springer.com/chapter/10.1007/978-3-319-49727-3_12

Sustaining the Investment Through Operations and Maintenance

Option 1: Sewer Extension to Teachey via Log Cabin Road

For Option 1, the Town of Teachey would maintain the public wastewater collection system that connects to the Town of Wallace's sewer collection system and wastewater treatment plant, and Duplin County would own and maintain the public water system that currently serves residents of East Log Cabin Road. If the sewer extension were implemented, the sewer collection system would be owned and maintained by the Town of Teachey. The town's Public Works Department has had issues maintaining grinder pump systems within their service area and had to turn over ownership and maintenance of these systems to the residents. Given that the town does not currently own, operate, or have interest in maintaining grinder pump systems in their sewer network, further discussion is needed regarding pump system ownership, and analysis is needed to determine additional fees. Option 1 leverages the existing resources of the town's Public Works Department without requiring new operator certifications or specialty equipment and training.

Potential options for O&M:

- The Town of Teachey could maintain ownership of the sewer collection system.
- Duplin County and the Town of Teachey could implement an interlocal agreement that would allow the Duplin County Water Department to bill and collect sewer fees in conjunction with the county's water billing process.
- Additional fees (beyond the town's out-of-town sewer rates) could be charged to East Log Cabin Road customers to cover additional grinder pump system maintenance. However, a fee structure could also be developed to incentivize preventative maintenance of the grinder system, with a "three-strike" clause that would require customers with repeat pump damage to take over full O&M of their grinder systems.
- Residents could receive reduced fees or rebates for completing training on grinder system preventative maintenance.
- The town could also contract with a private entity to manage all grinder pump and pressure sewer maintenance within the East Log Cabin Road community.

Option 2: Community Cluster System

Option 2 would require establishing a new ownership entity such as a HOA, sanitary/sewer district, or equivalent legal structure with maintenance agreements for the offsite wastewater system. As with the sewer extension option, residents would have to pay monthly or annual fees to cover O&M; however, O&M could be contracted to certified contractors or managed through a new private or public RME. The Town of Teachey Public Services Department could manage the community cluster system option, but because the town does not currently operate onsite wastewater treatment and dispersal systems, this would require additional administrative procedures and staff training and certification. Alternatively, the Town of Teachey could own, operate, and maintain the system.

Potential options for O&M:

- The county could establish a cost-effective, private ownership and management entity (e.g., RME, HOA) consistent with North Carolina laws and local ordinances. This entity could be set up for both system ownership and O&M, or just for O&M.
- The county could take over both ownership and O&M for the system by establishing a publicly owned RME or sanitary/sewer district, which could benefit other properties in the county that depend on onsite systems.
- Advanced technology, such as remote monitoring and reporting, could be used in community systems or a wastewater treatment plant to reduce O&M.
- Residents could receive reduced fees for completing training on STEP system preventative maintenance.

- The town could be contracted to manage both the STEP and cluster treatment systems. However, town public services staff currently do not have the appropriate certifications to operate onsite wastewater systems.
- The Duplin County Environmental Health Department could provide additional education and outreach on preventative maintenance and O&M of onsite systems.

Option 3: Onsite System Upgrades

Onsite upgrades to fill systems or advanced pretreatment and drip dispersal would require residents of the East Log Cabin Road community to be responsible for their own O&M. Under this option, each property owner would maintain system ownership and perform O&M on their own systems. Depending on the complexity of their systems, residents might need to contract an authorized service provider for maintenance.

Potential options for O&M:

- Residents could work collaboratively with an independent contractor to perform regular inspections and as-needed O&M to provide economy-of-scale cost benefits to individual owners.
- The Duplin County Environmental Health Department could provide additional education and outreach on preventative maintenance and O&M of onsite systems.

Homeowner Responsibility for O&M

All these wastewater management options would require the homeowners to accept responsibility for proper O&M of their wastewater systems or connections. As such, it will be critical to educate homeowners on how to maintain their systems. For sewer connections, the utility would perform O&M and charge monthly rates for this service. This solution could be the most sustainable one because the sewer system would be operated by a functioning utility with an active asset management program. For onsite replacements where the homeowner would be solely responsible for O&M, homeowners would have an opportunity to remove any current health or environmental hazards, improve how they use their property, and have a reliable property asset, which would help maintain property values. The Duplin County Environmental Health Department would be responsible for addressing any future health or environmental violations that could occur due to system misuse or lack of maintenance.

Paying for O&M and the Affordability Challenge

Across the United States, utilities use sewer bills to pay for management, O&M, and loan repayments for wastewater systems. The Town of Teachey or another management entity will need to keep rates affordable for low-income customers but high enough to collect funds to operate and maintain the system. This challenge is a key obstacle for utilities across the United States. Traditionally, wastewater-only projects are considered "affordable" if the sewer bill is 2 percent of MHI or less. Given the MHI of $42,283[13] for East Log Cabin Road, a wastewater fee of $70 per month would represent approximately 2 percent of MHI. Although this rate might be affordable for some households, a portion of the population has an income less than the MHI. The monthly rates would also increase if there were loan repayment costs. Because low-income residents struggle more with paying utility bills than high-income residents do, using MHI as an indicator can make it challenging to understand the community's affordability needs.

13 U.S. Census Bureau. (2021). *Median household income in the past 12 months (in 2021 inflation-adjusted dollars)*. American Community Survey 5-Year Estimates. data.census.gov/table/ACSDT5Y2021.B19013

Table 4 shows the financial impact of O&M costs at various household income levels and the percentage of income that would be spent on each of the wastewater infrastructure options. All options will have a high financial impact on the lowest-income residents of East Log Cabin Road. Additionally, many homes that are not currently connected to the public water system would have to connect, which would add another monthly fee for some households that cannot meet the affordability index. This water connection requirement would exist for the sewer extension option, and could be required for the cluster system option if the cluster system is owned and operated by a public utility (though not necessarily if it is owned by a community HOA).

Table 4. Percent of Household Income Spent on Wastewater Services for East Log Cabin Road Options (Considering O&M Costs and Assuming 100 Percent Principal Forgiveness for Capital Costs)

Income Range	$0–$14,999	$15,000–$29,999	$30,000–$44,999	$45,000–$75,000	$0–$42,283 (MHI)
Percent of Households in Income Range[a]	**10.7%**	**28.4%**	**15.5%**	**25.4%**	**50.0%**
Sewer extension via Log Cabin Road	7.8%	3.9%	2.6%	1.6%	2.8%
Community cluster system	5.7%	2.8%	1.9%	1.1%	2.0%
Onsite system upgrades	5.2%	2.6%	1.7%	1.0%	1.9%

Households spending 2% or more of household income on sewer bills are considered "high financial impact."

a Based on 2021 American Community Survey 5-year estimates.

If a partial loan is part of the funding solution, an additional monthly cost would further challenge the affordability of all options for low-income residents, as shown in Table 5.

Table 5. Percent of Household Income Spent on Wastewater Services for East Log Cabin Road Options (Considering O&M and Potential USDA-RD Loan Repayment Costs)

Income Range	$0–$14,999	$15,000–$29,999	$30,000–$44,999	$45,000–$75,000	$0–$42,283 (MHI)
Percent of Households in Income Range	**10.7%**	**28.4%**	**15.5%**	**25.4%**	**50.0%**
Sewer extension via Log Cabin Road	9.9%	5.0%	3.3%	2.0%	3.5%
Community cluster system	8.8%	4.4%	2.9%	1.8%	3.1%
Onsite system upgrades[a]	18.0%	9.0%	6.0%	3.6%	6.4%

Households spending 2% or more of household income on sewer bills are considered "high financial impact."

a Based on USDA Single Family Housing Repair Loan.

Addressing the Affordability Challenge

It is possible to lower the financial burden of these investments, especially for low-income households. Some local communities and states are developing affordability programs to provide rate assistance to low-income customers. The Low Income Household Water Assistance Program, created in response to the COVID-19 pandemic, was the first program of its kind in the United States, but it is only authorized by Congress through 2024. It is unclear whether Congress or the State of North Carolina will continue this program.

The Town of Teachey and Duplin County, like other local governments and utilities, can build local affordability programs by charging different rates on commercial accounts, new customers, or other customer bases that incorporate funding for a local affordability program. This creates a pot of money to help other customers during times of need. Customers who have a temporary medical issue or qualify for assistance based on income guidelines can take advantage of this rate structure to pay for water and wastewater services. However, this solution might not work if the Town of Teachey and Duplin County do not have many commercial or industrial accounts to pay extra to fund it.

The East Log Cabin Road community will need multiple approaches to address the financial burden of water utilities for low-income residents, beyond just the programs discussed above. For example, the Town of Teachey or Duplin County could consider non-rate revenue opportunities such as leasing space on water towers or offering non-traditional services. They could also provide construction services to new projects related to the utilities connections and charge for the time, although this option would require contract documents with the private sector.

Key Takeaways on Affordability

All the wastewater treatment options have a high financial impact on the lowest-income residents of East Log Cabin Road. **Rate assistance programs may be necessary for some households on East Log Cabin Road.**

Loan repayments will cause any option to have a high financial impact on residents of East Log Cabin Road. The Town of Teachey or Duplin County will need to work with the funding agencies to **maximize the amount of grants** for construction of their system.

Economic growth can lower monthly user costs of central treatment systems; therefore, **the community should carefully weigh multiple factors in deciding on a system.**

Partners and Roles

The path to clean water is not an easy one. The East Log Cabin Road community has options to choose from when it comes to new wastewater systems. Many partners in this pilot program will continue to support East Log Cabin Road along this journey (Figure 4), including:

- **U.S. Department of Agriculture Rural Development (USDA-RD).** Lead agency (with EPA) providing jointly leveraged technical assistance resources in this pilot program. Funding partner.
- **U.S. Environmental Protection Agency (EPA) Headquarters and Region 4.** Lead agency (with USDA) providing jointly leveraged technical assistance resources in this pilot program.
- **North Carolina Department of Environmental Quality (NCDEQ), Division of Water Infrastructure.** State agency overseeing funding programs such as CWSRF, CDBG, and Merger/Regionalization Feasibility grants.
- **North Carolina Rural Water Association (NCRWA).** Nonprofit organization providing technical assistance for drinking water and wastewater service. Lead for community outreach support.
- **Duplin County.** Applicant for USDA SEARCH grant funding and entity providing community outreach support. With Town of Teachey, providing support for wastewater service options.
- **Town of Teachey.** Entity potentially providing wastewater service options and applying for funding.
- **Southeast Rural Community Assistance Project, Inc. (SERCAP).** Program assisting with USDA SEARCH grant funding applications.

Figure 4. Partners to the East Log Cabin Road community.

Technical Assistance and Support for East Log Cabin Road Moving Forward

Both EPA and USDA-RD fund technical assistance programs that support small, rural, and disadvantaged communities and help them navigate the CWSRF, Drinking Water State Revolving Fund (DWSRF), and USDA-RD funding programs. The ultimate goals of the technical assistance (e.g., WaterTA) programs are to help communities identify water challenges and solutions, build capacity to address those needs, and develop application materials to access water infrastructure funding. Technical assistance providers can help Duplin County and the Town of Teachey understand the funding available through the SRF and USDA-RD programs, as well as deadlines and application requirements. **EPA WaterTA and USDA-RD technical assistance providers can also help prepare and submit funding applications.** NCRWA, SERCAP, and North Carolina Environmental Finance Center can assist with community outreach, education, training of professionals, and utility rate studies. These providers can offer advice as communities consider infrastructure options, financing, and rate structures. Their connections with EPA, USDA-RD, and NCDEQ can help the community successfully complete projects and programs. Other technical assistance support for the East Log Cabin Road community can include:

- **Developing a wastewater rate program to build a local "affordability assistance" and asset management program.** Duplin County or the Town of Teachey could establish a rate program where new, commercial, or industrial customers contribute to an affordability assistance program for low-income residents. EPA's network of Environmental Finance Centers partners with technical assistance providers that specialize in these types of rate programs.

- **Supporting workforce development and staff training.** Duplin County and the Town of Teachey will need operations staff for new and existing systems. The technical assistance providers have staff training programs available.
- **Engaging residents in the needs and benefits of a wastewater treatment system.** Customers play a large part in the success of a wastewater treatment system or sewer connection. Technical assistance providers can help engage and educate residents on topics such as "What Not to Flush," "Management of Fats, Oils, and Grease," why having a wastewater system is important, and how to maintain a septic system. Educational materials are available for residents.

More information can be found at EPA's WaterTA website.[14]

14 https://www.epa.gov/waterta

Road Map for Implementation

Both the Town of Teachey and Duplin County have committed to continuing with planning and preliminary design of a wastewater solution for the East Log Cabin Road community. This detailed planning, in addition to community engagement, is required to achieve a successful outcome. Advancing a large wastewater infrastructure project to full implementation (as well as sustained O&M) takes time and commitment from all parties and is typically best achieved by evaluating all feasible options using a triple-bottom-line framework (i.e., considering social, environmental, and economic outcomes). Formal community engagement (e.g., public listening sessions) should be conducted after this document is finalized to solicit input from East Log Cabin Road residents on the various wastewater management alternatives evaluated. Further details on proposed next steps for project implementation are described below.

Immediate Next Steps Ongoing Through 2024

Duplin County received a SEARCH grant from USDA-RD to fund a formal PER and supporting environmental documentation. This step is necessary for soliciting funding for design, permitting, and construction from CWSRF and USDA's other programs. Extending beyond the scope of this document, the PER will likely include the following tasks as part of the scope of work:

- Individual parcel evaluations to determine the condition of existing septic systems, as well as verification of occupied status.
- Refinement of design flow for preliminary solutions design and cost estimation.
- Parcel screening and identification for potential cluster treatment areas, followed by preliminary soils investigation to assess suitability for onsite wastewater disposal.
- Refinement of all cost estimates for identified solution alternatives.
- Further engagement (e.g., community meetings, site visits and demonstrations, presentations at Town Council meetings) with the East Log Cabin Road community and the Town of Teachey to select a preferred system option. Topics to consider include:
    - Annexation: will Teachey consider amending existing ordinances to permit extension of sewer services without annexation? Alternatively, will East Log Cabin Road residents voluntarily agree to annexation?
    - The future: how can this investment shape the next 20 years for the community?
    - Monthly bills:
        - Do the potential grants and low-interest loans make monthly bills affordable enough for the community?
        - If not, are there programs like the Low Income Household Water Assistance Program that could make them affordable?
    - If the town does not act now with the current funding, will it ever be able to act? How can the community encourage action?

Ideally, the PER will yield a proposed solution that has been vetted by the East Log Cabin Road community and the involved stakeholders, and that is affordable to East Log Cabin Road residents with or without 100 percent grant funding. Once this solution is selected, the next step will be selecting one or more funding sources to move the project to detailed engineered design, permitting, and construction. These funding sources and their eligibility and application requirements are detailed above in the "Financing Options" section.

Activities After Alternatives Selection

Figure 5 provides a general flow of major project milestones for each of the alternatives evaluated. Note that the sequential order is typical and subject to change based on the funding source used.

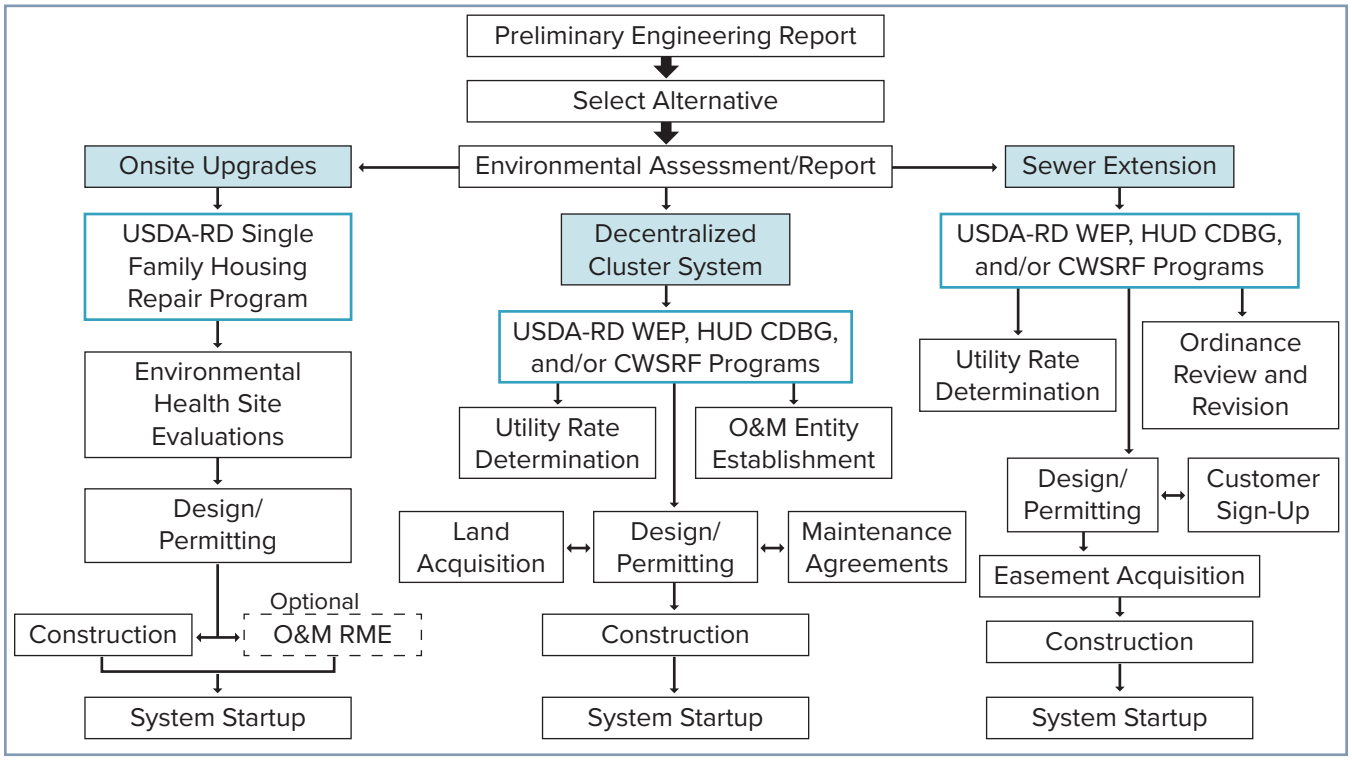

Figure 5. Major project milestones for each option.

Potential Project Timeline

The schedule in Figure 6 is estimated and subject to change once a specific alternative is selected and the overall project progresses.

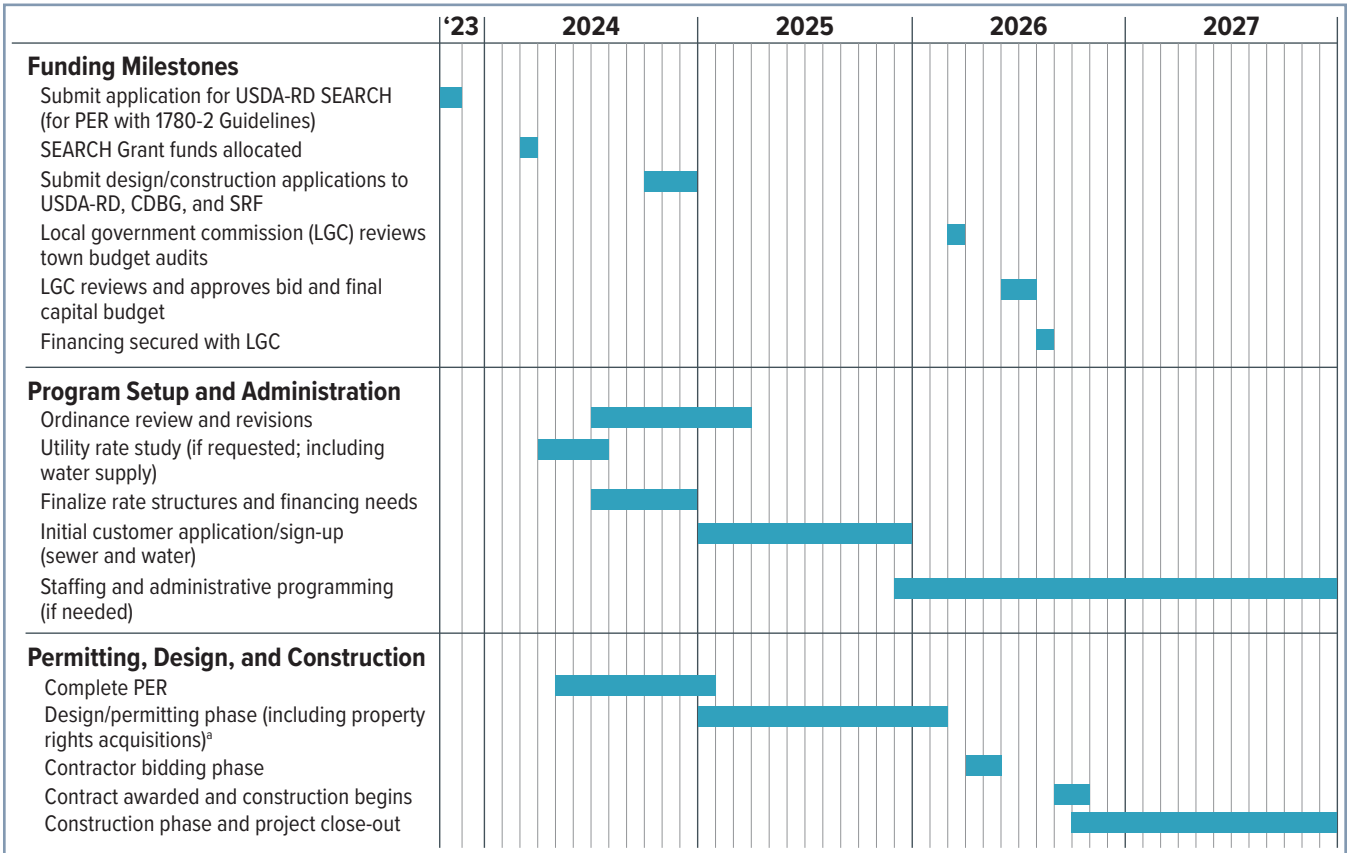

Figure 6. Potential timeline for project completion.

Concluding Thoughts

As Duplin County and the Town of Teachey move forward with an in-depth analysis of their options for wastewater service, EPA and USDA-RD staff and technical assistance providers are ready to support the East Log Cabin Road community with funding opportunities through the Bipartisan Infrastructure Law and other funding sources. This is a historic time for water and wastewater infrastructure funding for small, rural communities such as Duplin County, North Carolina. New funding can help Duplin County and the East Log Cabin Road community address their current and persistent health challenges and build a prosperous future.

Definitions

Central wastewater treatment facility. A wastewater treatment system that is larger than 15,000 gallons per day and permitted through Duplin County or the North Carolina Department of Environmental Quality. It usually has a surface water discharge permit to discharge treated water into a surface water source. Certified operating staff and monitoring are required for these systems.

Community or cluster treatment system. A small wastewater treatment system of less than 15,000 gallons per day with a dispersal field for subsurface or surface discharge. These systems are permitted either through the Duplin County Health Department (subsurface) or the North Carolina Department of Environmental Quality (surface).

Fill system. A system in which all or part of the dispersal field media are installed in fill material. Per North Carolina Department of Health and Human Services rules, suitable fill material shall be sand or loamy sand, containing not more than 10 percent debris. Fill systems use gravity or low-pressure pipe for distribution of wastewater.

Grinder pump. A type of sewage pump designed to handle solids without pretreating the raw wastewater. Grinder pumps contain cutter blades that pulverize wastewater solids into a slurry that can easily be pumped through smaller diameter discharge pipes (e.g., 2 inches or less). Grinder pumps typically cost more to purchase and operate than effluent pumps but do not require a septic tank.

Onsite/septic system. A traditional system includes a settling (i.e., septic) tank and dispersal field. Advanced or engineered systems can include media filtration systems, aeration systems, disinfection (chlorination or UV), and pressure dispersal for the dispersal field.

Pressure sewer system. A system that uses effluent or grinder/sewage lift pumps to convey wastewater to a treatment system and/or disposal system and different from gravity sewer systems, which use larger pipes. Effluent pumps typically follow septic tank treatment, while grinder pumps can handle raw wastewater before discharging to pressurized, small-diameter pipes.

Responsible Management Entity (RME). A legal entity responsible for providing various management services, with the requisite managerial, financial, and technical capacity to ensure the long-term, cost-effective management of decentralized onsite and/or cluster wastewater treatment facilities in accordance with applicable regulations and performance requirements.

Septic tank effluent pump (STEP) sewer system. A sewer system with a septic tank and pump at the customer's building. Effluent from the septic tank is pumped through a pressure sewer system to a treatment facility. Septic tanks need to be pumped out periodically. This system is the responsibility of the homeowner, utility, or common Responsible Management Entity depending on ownership and the operations and maintenance model.

Limitations

Any systems and associated cost estimates discussed in this draft analysis are preliminary and not intended to serve in lieu of a Preliminary Engineering Report prepared by a professional engineer licensed in the relevant jurisdiction.

Alternatives have been developed at a high level with desktop tools and have not been informed with survey data or field reconnaissance work. Further field evaluation is needed to verify these alternatives in subsequent work following this assessment and solutions plan.

Treatment and dispersal systems designed by licensed design professionals are based on soil evaluations, flood elevation evaluations and variances, permitted discharge limit determinations, and unforeseen factors that cannot be determined without onsite field surveys and evaluations beyond the scope of this draft assessment.