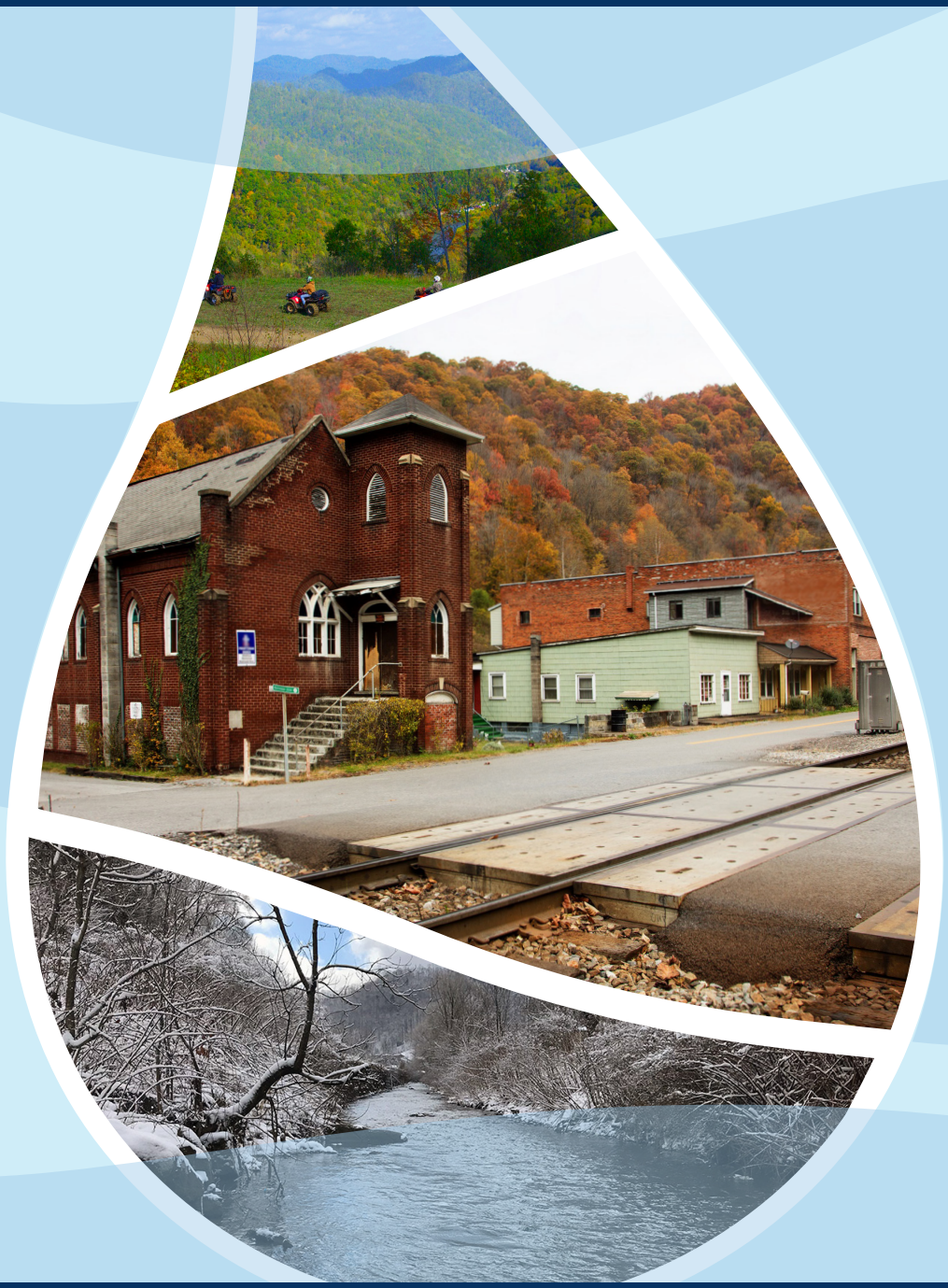
EPA United States Environmental Protection Agency

USDA U.S. DEPARTMENT OF AGRICULTURE

Options for Clean Water Solutions in Keystone and Northfork, West Virginia



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Closing America's Wastewater Access Gap Community Initiative

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Keystone's and Northfork's Options for Clean Water Solutions

For decades, coal mining and resource extraction in the Town of Keystone and the City of Northfork, West Virginia, played an important role in the industrial development and economic growth of the United States. During the late 1800s and early 1900s, these communities developed rapidly and helped create a booming coal industry. However, development did not focus on long-term, sustainable sanitation services such as wastewater infrastructure. Many houses were built without indoor plumbing. Since this early development, ongoing financial limitations and declining population have made it difficult for these communities to develop wastewater infrastructure.

Residents of Keystone and Northfork currently have inadequate wastewater treatment services. For many years, community members have worked to change this situation. With the passage of the Bipartisan Infrastructure Law and new Water Technical Assistance services, there is momentum to bring wastewater treatment solutions to homes in Keystone and Northfork. 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 Keystone and Northfork communities.

Cover: ATVs driving on the Hatfield-McCoy Trail System (top). Photo by Lisa Strader, Visit Southern West Virginia. Elkhorn Creek (bottom). Photo by Michael Evanko, Wooly Bugged.

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]

Purpose

EPA and USDA-RD pilot program staff members worked with the pilot program team—the mayors of Keystone and Northfork; the McDowell County Public Service District (PSD); a local technical assistance provider, DigDeep; the West Virginia Rural Community Assistance Program (WVRCAP); the West Virginia Department of Environmental Protection (WVDEP); the West Virginia Region 1 Planning and Development Council; the West Virginia Department of Health and Human Resources; a local engineering consultant, E.L. Robinson Engineering; and the McDowell County Health Department—to develop solutions for Keystone's and Northfork's wastewater issues. This document, *Options for Clean Water Solutions in Keystone and Northfork, West Virginia*, outlines potential solutions to address the needs for improved wastewater treatment approaches in Keystone and Northfork.

1 www.epa.gov/waterta

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

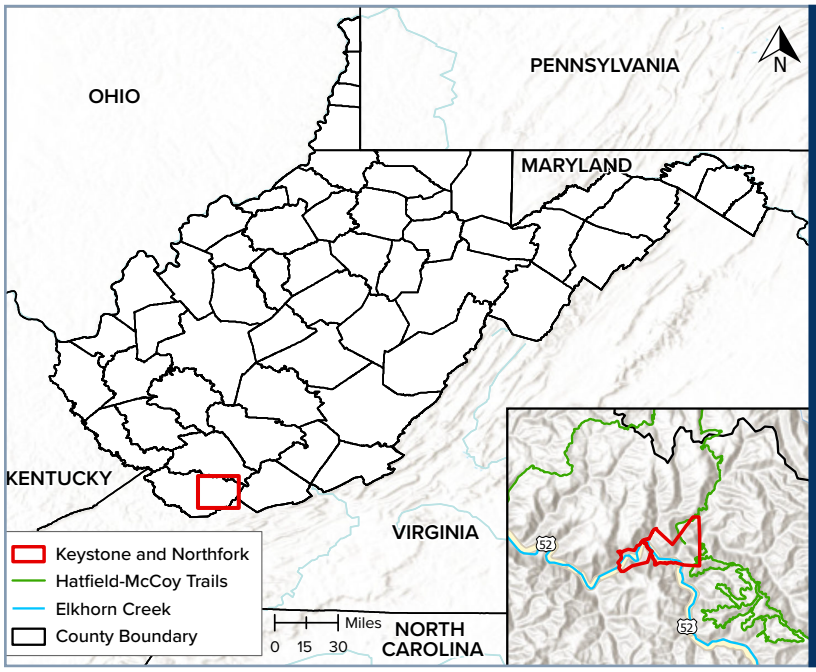
Residents and community leaders can use this information to estimate costs and select a wastewater solution that meets today's challenges and helps the community thrive.

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 in Northfork and Keystone and found areas that need improvement. The team conducted a community survey of residents in Northfork and Keystone to determine how much the residents knew about their wastewater 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 communities find and apply for funding opportunities.** The McDowell County PSD 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 Report. The PER and Environmental Report are critical for design and construction funding applications for the Clean Water State Revolving Fund (CWSRF) and USDA programs. This document outlines other federal funding sources for design and construction of a wastewater system and how to apply for funding. It also shows how to pay for construction and long-term costs.
4. **Developed a plan to pay for ongoing costs.** To install and operate the selected system, the McDowell County PSD will have to develop a plan to pay for construction and ongoing costs. These costs could include management, operations, maintenance, 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.

The Communities of Keystone and Northfork, West Virginia

Keystone and Northfork are located along U.S. Route 52 in eastern McDowell County, the southernmost county of West Virginia (Figure 1). McDowell County was formed in 1858 and soon developed a booming coal mining industry. Laborers migrated to McDowell from around the world. McDowell became the largest coal mining county in the United States by the early 20th century. In the 1950s, coal mining began to rely less on human labor, leading to economic and population decline in McDowell County.



McDowell County PSD Keystone and Northfork Utilities Fast Facts

- Keystone and Northfork current water customers: 197
- Median household income, Northfork: $32,604
- Median household income, Keystone: $17,344
- PSD current water customers: 3,500+
- PSD current average water bill: $32.26
- PSD current wastewater customers: 72
- Anticipated customers for wastewater projects underway: 407
- PSD current wastewater bill: $57.22
- PSD current utility staff: 17

Figure 1. Location of Keystone and Northfork in West Virginia.

Today, residents in Keystone and Northfork lack adequate wastewater infrastructure and do not have access to a wastewater treatment facility. Homes in these communities generally rely on straight pipes that dispense raw sewage into nearby Elkhorn Creek. These pipes, many of which were installed by coal mining companies in the early 20th century, service approximately 221 homes and other buildings across Keystone and Northfork.

> *The motto **'Come Grow with Us'** best encapsulates McDowell County's current state.*
>
> — Former McDowell County Commissioner Gordon Lambert

Because homes in these communities are built along the steep slopes of the Cumberland Mountains (Figure 2), little space exists for a large wastewater treatment facility. Retaining walls throughout McDowell County maintain the structural integrity of homes on slopes, but the placement of these walls, the narrowness of the lots, and the exposed bedrock limit engineering options for onsite septic systems or decentralized treatment systems. Much of the flat land in Keystone and Northfork falls within a 100-year floodplain and any wastewater treatment plant or electrical equipment would need to be elevated above the floodplain.

The McDowell County PSD has made significant progress in addressing drinking water issues caused by failing infrastructure. Since its formation in 1990, the PSD has provided drinking water services to more than 3,500 customers.[3] The PSD maintains 16 water systems in McDowell County, more than any other PSD in West Virginia.[4] Three wastewater projects are currently underway: the Coalwood Sewer Project Phase 1, which will serve 71 residents; the Iaeger Regional Sewer Project, which will serve 119 residents; and the Ashland-Crumpler Collection and Treatment System, which will serve approximately 120 residents. However, none of these projects address wastewater infrastructure challenges in Keystone or Northfork.

Figure 2. Homes located on steep slopes.

The lack of wastewater treatment infrastructure in Keystone and Northfork presents environmental, public health, and economic challenges. The disposal of raw sewage into Elkhorn Creek generates high fecal bacteria counts, which threaten the health of residents and affect economic and recreational opportunities such as trout fishing and all-terrain vehicle (ATV) trail use. Residents of Keystone and Northfork enjoy access to the Hatfield-McCoy Trail System, a 700-mile off-highway vehicle trail park accessible by ATV and dirt bike. While the trail generates millions of dollars from tourism annually and could expand to over 2,000 miles, the lack of wastewater infrastructure in McDowell County limits the county's ability to take advantage of the state and local economic revitalization efforts to continue to improve the area.

The Potential of Infrastructure Investment

Keystone and Northfork residents have expressed support for capital investment in sanitation infrastructure, and they understand that monthly bills are necessary for the maintenance of infrastructure. They want to eliminate sewer backups and create a future where their children can safely play without risking exposure to untreated wastewater. An affordable wastewater system is key to maintaining a vibrant, productive community.

3 Bennett, E. (2022, December 26). McDowell County PSD working to connect thousands without drinking water. *WSAZ*. https://www.wsaz.com/2022/12/26/mcdowell-county-psd-working-connect-thousands-without-drinking-water/

4 McDowell County Commission. (2021, April). *McDowell County Comprehensive Plan*. 35. https://mcdowellcountycommission.com/wp-content/uploads/2021/04/mcdowellcocompplan-1.pdf

Community Engagement Feedback

The project team conducted a kickoff meeting on November 2, 2022. Federal, state, and community partners learned about the project, provided feedback on community needs, and established a vision for project success during this meeting. Keystone and Northfork community partners specified the following conditions for success:

- A wastewater system similar in accessibility to the current water system in Keystone and Northfork.
- Productive community outreach and engagement, including education on additional costs and sewer bills.
- Opportunities for growth in tourism and recreation, especially fishing and ATV trail use.
- Ability to support a hotel and other economic activity.
- Infrastructure that can sustain future generations of the community.

On April 13, 2023, the project team presented to Keystone and Northfork mayors and councils on options, costs, and benefits of wastewater investment given the historic funding opportunity provided by the Bipartisan Infrastructure Law. The community leaders provided positive feedback on the pilot approach and goals, stating that a wastewater project was overdue, and that new infrastructure would support community vitality. Community leaders expressed concerns over costs but recognized monthly fees as a necessary factor.

Between July and September 2023, the project team surveyed Keystone and Northfork residents to gather demographic and household wastewater data. Residents received a pre-survey letter and handout on the project scope and objectives.

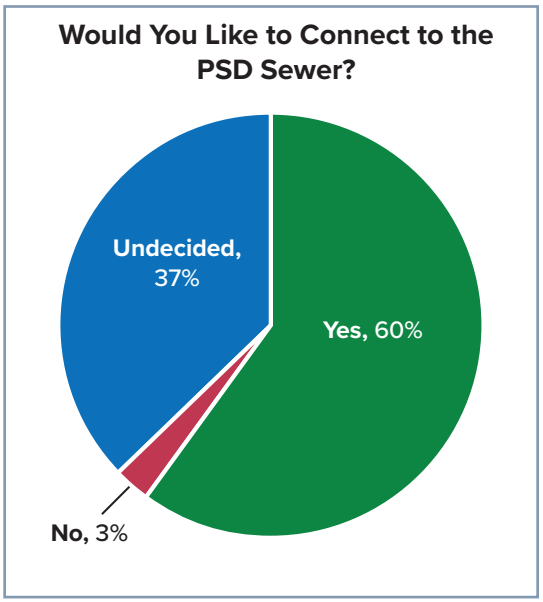


Figure 3. Community feedback results from door-to-door survey.

Project partners WVRCAP and DigDeep conducted the surveys by going door-to-door and asking residents about their household wastewater experiences. For residents that were not home, team members left survey handouts and returned later to collect them. Residents were surveyed on their household size, the type of wastewater system they use (i.e., septic system or collection system), the type and frequency of system issues, and whether they wished to connect to a potential wastewater treatment system from the McDowell County PSD (Figure 3). Of over 200 respondents, 10 percent indicated issues with their current system, including noticeable odors (9 percent), seepage (4 percent), and backups (8 percent). Most respondents indicated interest in connecting to a PSD sewer. Undecided respondents were primarily concerned with the costs of a new system.

> *These improvements are long overdue.*
>
> — Feedback from Northfork City Council

Wastewater Treatment Options for Northfork and Keystone

Currently, many homes in Keystone and Northfork dispense raw sewage via straight pipes into Elkhorn Creek (Figure 4). The steep terrain of the mountain valley in the McDowell County area makes it difficult to find suitable locations for wastewater treatment plants, which are typically on large, flat lots outside the floodplain. Steep terrain, narrow lot size, retaining walls, and exposed bedrock limit the use of onsite septic systems and drainfields, septic tank effluent pump (STEP) systems, and septic tank effluent gravity (STEG) sewer systems. However, the terrain does support the use of gravity sewer systems.

Regulatory Considerations

As the McDowell County PSD considers the many restrictions to providing wastewater service in Northfork and Keystone, it will also want to understand the permitting options through WVDEP. It is common for a wastewater treatment plant to discharge treated effluent to a surface water. To implement a surface water discharge, the PSD will need to obtain a National Pollutant Discharge Elimination System (NPDES) permit from WVDEP to authorize these discharges to state waters. WVDEP's antidegradation regulations specify three tiers of protection used to evaluate discharges and determine whether effluent limits are needed in the permit:

- **Tier 1.** Maintains and protects existing uses of a waterbody and the water quality conditions necessary to support such uses. Tier 1 protection levels are applied to existing permitted facilities.
- **Tier 2.** Maintains and protects "high-quality" waters—waterbodies where the level of water quality exceeds levels necessary to support recreation and wildlife and the propagation and maintenance of fish and other aquatic life. Tier 2 is the default assignment for a waterbody not listed as impaired on the state's 303(d) list. WVDEP evaluates plants under new and expanded permits using Tier 2 standards.
- **Tier 3.** Maintains, protects, and improves, where necessary, water quality in "Outstanding Natural Resource Waters."

Figure 4. Straight pipes from residences into Elkhorn Creek.

Per WVDEP Legislative Rule §60-5-5.6.a.I, any new or expanded activity that would significantly degrade water quality is required to undergo a Tier 2 antidegradation review process. Discharging raw sewage into a waterway via straight pipes is prohibited. Any new wastewater treatment plant discharge to Elkhorn Creek would be considered a new discharge of pollutants into a regulated West Virginia surface water that was not previously permitted, and would therefore require a Tier 2 antidegradation review. Existing wastewater treatment plants, or new discharges that undergo an alternatives analysis based on social economic justification (AASEJ), are required to meet Tier 1 protection standards.

WVDEP has provided a proposed waste load allocation and permitting standards for Tier 1 and Tier 2 protection for 5-day biological oxygen demand (BOD_5) and ammonia as nitrogen (NH_3-N). Tier 1 standards are 30 milligrams per liter (mg/L) BOD_5 and 10 mg/L NH_3-N as shown in Table 1. Tier 2 standards are 5 mg/L BOD_5 and 3 mg/L NH_3-N. Table 1 shows the anticipated annual load in pounds per year (lbs/year) for BOD_5 and NH_3-N under current conditions and for Tier 1 and Tier 2 protection levels.

Table 1. Anticipated Annual Waste Load Calculations for Various Scenarios

Parameter	Current Conditions *Concentration (mg/L)*	Current Conditions *Annual Load (lbs/ year)*	Tier 1 Protection *Concentration (mg/L)*	Tier 1 Protection *Annual Load (lbs/ year)*	Tier 2 Protection *Concentration (mg/L)*	Tier 2 Protection *Annual Load (lbs/ year)*
BOD_5	220	36,864	30	3,653	5	609
NH_3-N	20	3,349	10	1,218	3	365

The proposed Tier 2 limits are quite stringent, and typical wastewater treatment technologies may not be able to meet them consistently and reliably. A membrane bioreactor system is designed to meet very stringent effluent limits, but the associated capital and operating costs are approximately 50 percent higher than the more standard treatment technologies of activated sludge or recirculating filters. However, the McDowell County PSD can apply for an AASEJ that, if approved, would allow for Tier 1 requirements instead of Tier 2. The PSD should explore a Tier 1 justification through the AASEJ process if a surface water discharge is needed for the wastewater system. Per the language in WVDEP Legislative Rule §60-5-5.6.a.I, the Tier 1 limits would be in effect unless the permit is expanded or a new permit is requested. This document includes a phasing option for construction of a wastewater system in Northfork and Keystone to take advantage of as much grant funding as possible. If the phasing option is selected, the McDowell County PSD will want to be strategic in permitting the facilities in the beginning so that the project's second phase is not considered an "expansion" of the permit.

Figure 5 shows the Keystone and Northfork service areas, Highway 52, and Elkhorn Creek. One of the greatest challenges to providing wastewater service in Keystone and Northfork is finding a suitable site for a wastewater treatment plant. It will be difficult to find sites that have enough flat land to meet the needs of a wastewater treatment plant and buffer requirements. The availability of suitable sites will determine how the system is designed and constructed. Options for wastewater infrastructure that provide flexibility to meet Keystone's and Northfork's needs and limitations include the following:

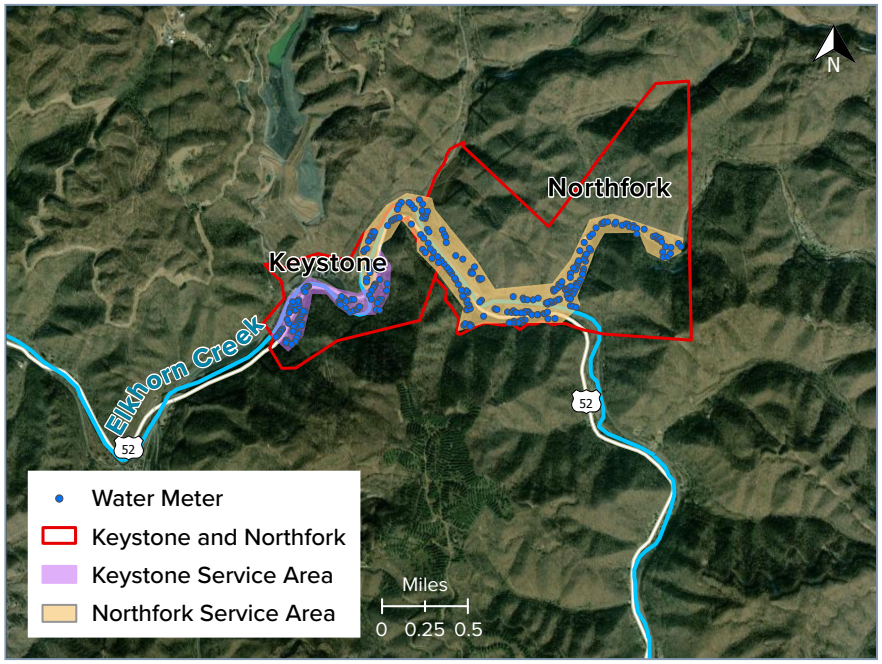


Figure 5. The Keystone and Northfork service areas.

- The communities could use a gravity sewer system to convey flow from homes to a "community septic tank" in the valley and pump the effluent from the septic tank to a treatment plant above the floodplain. The community septic tank will act as the primary clarifier and may allow for a smaller treatment plant. Locating the plant near Highway 52 may make it more accessible to large equipment, leading to easier system maintenance.
- The treatment facility could be a recirculating filter system or small sequencing batch reactor (SBR). The treatment plant can use the same technology that the McDowell County PSD is currently using or installing at other sites, to allow for greater ease of operations and ability to keep parts in inventory. The PSD will want to strongly consider using the AASEJ permitting process for Tier 1 treatment standards for a surface water discharge.

The choice of system type will depend on the McDowell PSD's approach to permitting a new wastewater treatment plant through WVDEP. There are three common methods for managing discharge from a wastewater treatment plant:

1. Surface water discharge, where the effluent is discharged into a receiving water such as Elkhorn Creek. This is the most common method.
2. Subsurface discharge, such as a drainfield with septic tanks (for small systems) or an underground injection well (for large systems).
3. Land application or reclamation of effluent for beneficial reuse (e.g., irrigation).

The project team did a preliminary evaluation of these discharge methods. Aerial imagery shows an apparent mine reclamation site with reforestation or tree farming on the top of a mountain south of Northfork and Keystone. Initial analysis indicates that the difference in elevation from the valley floor to the top of the mountain would require a booster pump to pump the effluent from a wastewater treatment system up to the top of the mountain. The expected capital and operating cost to maintain this system is high.

There is very limited land around Keystone and Northfork that is suitable for a drainfield. One site in Keystone that is currently a park may be usable but is quite small and would only support discharge from a small number of homes; therefore, it is not considered a viable alternative. An underground injection well would be difficult to site and construct in the Northfork and Keystone area due to past mining activities creating pathways for effluent into potable water sources.

Because Keystone and Northfork are such compact communities, any wastewater system should also be designed to minimize odors from lift stations and treatment facilities. This was a key issue for the elected officials in Keystone and Northfork. Community septic tanks and recirculating filters have been used effectively in dense neighborhoods in Winona, West Virginia. While there can be odors while the community septic tank is periodically pumped out, odors have generally not been an issue with that system. PSD will be installing a similar system in Iaeger. Figure 6 shows a community septic tank with homes close by, and Figure 7 shows the treatment system in Winona.

The following section outlines alternatives presented to McDowell County, including estimated capital and operating costs and the pros and cons for each alternative. Treatment systems in Option 2 and Option 3 are sized to handle at least 40,000 gallons of influent per day from more than 200 wastewater connections. Expectations of future population changes should be considered when designing and choosing an alternative and determining the size of the plant(s). These options are not necessarily exhaustive, and McDowell County is not required to select any of these alternatives for its wastewater needs.

Figure 6. Community septic tank close to homes in Winona, West Virginia.

Figure 7. Recirculating treatment system in Winona, West Virginia.

Option 1: No Action

This option explores the outcome of taking no action on wastewater treatment issues in Keystone and Northfork.

Expected capital cost range: $0.

Expected annual operating costs: $0.

Pros:

- No cost. Without some source of rate assistance, most households in this area would not be able to afford a monthly bill.

Cons:

- Does not address the issue of straight pipes, which are prohibited by state law. If this issue is not resolved, residents could face fines or condemnation of their homes.
- Does not support economic revitalization.
- Does not resolve consent decree in Keystone.

Option 2: Gravity Sewer With 40,000 to 60,000 Gallons Per Day (gpd) Wastewater Treatment Plant in Northfork

This option examines the use of a gravity sewer with five lift stations: four grinder lift stations and one larger lift station that will pump wastewater up to the plant. Treatment technology could be a recirculating filter with community septic tank(s) or a small SBR system. Other activated sludge systems could be used based on technologies that the McDowell PSD is familiar with operating. The number and sizing of lift stations is estimated and will need to be confirmed with a topographic survey.

O&M costs include periodic maintenance of the gravity sewer (cleaning) and lift stations. O&M costs for the wastewater treatment facilities include one full-time staff member and electrical and chemical costs. Capital costs include one pumper truck and one jetter for the sewer system.

Expected capital cost range: $15.4 million to $22 million.

Expected annual operating costs: $140,000.

Pros:

- One plant is easier to maintain.
- Requires less land acquisition than two plants.
- Project can be completed all at once if funding is available; otherwise, system can be phased.

Cons:

- It will be more difficult to site a larger plant.
- Does not allow for growth or additional connections in the future.
- Requires a Tier 1 permit with additional requirements, such as a full-time operator.

Option 3: Gravity Sewer With Two Smaller Plants That Can Be Phased—(a) Northfork, 35,000 gpd; (b) Keystone, 25,000 gpd

This option examines the use of a gravity sewer with five grinder lift stations. Treatment technology could be a recirculating filter with community septic tank(s) or a small SBR system. Other activated sludge systems could be used based on technologies that McDowell PSD is familiar with operating. Both plants can be permitted as one system so that there is one permit with two outfalls. The number and sizing of lift stations is estimated and will need to be confirmed with a topographic survey.

O&M costs include periodic maintenance of the gravity sewer (cleaning) and lift stations. O&M costs for the wastewater treatment facilities include staffing, electrical, and chemical costs. Capital costs include one pumper truck and one jetter for the sewer system.

Expected capital cost range: (a) $8.5 million to $12 million; (b) $6.7 million to $9.7 million.

Expected annual operating costs: (a) $97,000; (b) $65,000.

Pros:

- Can be phased to optimize grant funding through the CWSRF program.
- Smaller plants may be easier to fit onto available lots while meeting buffer requirements.
- Can include capacity for additional connections in the future.

Cons:

- Higher non-personnel costs to operate plants.
- Additional property acquisition is needed.

Financing Options

The financing options evaluated include:

- **CWSRF principal forgiveness loan.** Up to 100 percent principal forgiveness loans through the CWSRF from WVDEP. This requires approval from the West Virginia Infrastructure and Jobs Development Council (WVIJDC).
- **USDA-RD loan/grant.** Rural Development loan/grant that includes a 25 percent loan for a 40-year term at an assumed interest rate of 2.5 percent with 221 customers.
- **30-year bond.** Bond from the McDowell County PSD to construct the system on its own, with a 4 percent interest rate for 221 customers.

Table 2 shows the estimated monthly rate for O&M for each option, and the monthly rate impact of each financing alternative. These estimates assume 221 customers for each system. The McDowell PSD will need to work with the funding agencies throughout the project development process to determine the level of grants and loans available. Funding availability can change based on several factors, including the amount of funding available, the project ranking process, and the number and type of other applications received.

Table 2. Potential Monthly Bills for Keystone and Northfork

Option	Name	Estimated Capital Cost Range	Estimated O&M Monthly Bill per Customer	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)*	Monthly Bill Addition for Financing Options of Capital Costs *(30-Year Bond)*
2	**Gravity sewer, one plant in Northfork**	$15.4 million–$22 million	$55	$0	$59	$342
3(a) 3(b)	**Gravity sewer, two smaller plants in Keystone and Northfork that can be phased**	$15.2 million–$21.7 million	$60	$0	$58	$333

[a] Full principal forgiveness is possible but not guaranteed. Funding availability is dependent on several factors. McDowell County will need to engage with WVDEP and USDA along the way to determine grant funding availability.

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 McDowell County, including USDA-RD and the CWSRF administered by WVDEP.

Overview of the CWSRF Program Administered by WVDEP

- The West Virginia CWSRF is a low-interest loan program intended to finance public infrastructure improvements.
- Eligibility is based on WVDEP's affordability criteria, which include population trends, unemployment rate, median household income (MHI), poverty rates, and whether the project serves unserved areas and failing systems. Based on these criteria, Keystone and Northfork are eligible for 100 percent principal forgiveness up to $2 million.
- Conventional loans with a repayment period of 20 years are available with an interest rate and annual administrative fee not exceeding 3 percent for certain communities. Loans with repayment periods from 21 to 40 years are available for disadvantaged communities where affordability is an issue. Principal forgiveness loans are available to communities that qualify.
- CWSRF also provides additional subsidization for green infrastructure projects. Allowable categories include projects related to energy efficiency, water efficiency, stormwater/green infrastructure, and emerging contaminants, as well as environmentally innovative projects such as decentralized sewer systems. The level of debt forgiveness available for each type of green project is outlined in the West Virginia CWSRF Fiscal Year 2024 Intended Use Plan.[5]
- Communities approved by the WVIJDC can submit CWSRF applications.

Overview of USDA's Rural Development Water and Environmental Programs: Water and Waste Disposal Loans and Grants

- Through Rural Utilities Service Water and Environmental Programs, rural communities 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. There are opportunities for grants combined with loans for communities that qualify.
- Eligibility for funding is based on the community's MHI and population. The community being served by the improvements must have a population of fewer than 10,000 people.
- 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.
- For communities receiving loans, the loan term can be up to 40 years based on the expected life of the system.
- USDA-RD accepts applications year-round on a rolling basis through RD Apply.[6]
- More information is available on the USDA website.[7]

5 West Virginia Department of Environmental Protection. (2023). FY2024 *Intended Use Plan*. https://dep.wv.gov/WWE/Programs/SRF/Documents/Fiscal%20Year%202024%20Clean%20Water%20Intended%20Use%20Plan.pdf

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

7 https://www.rd.usda.gov/programs-services/water-environmental-programs

Other Funding Opportunities

USDA Disaster Grant

- Helps eligible communities pay expenses related to damages to rural water systems from events (presidentially declared disasters) that occurred between January 1, 2022, and December 31, 2022. McDowell County is a qualified county.
- Total project costs are covered up to 100 percent based on determined eligibility.
- More information is available on the USDA website.[8]

West Virginia Infrastructure and Jobs Development Council (WVIJDC)

- WVIJDC accepts applications by the 10th of each month and conducts a 60-day review of initial applications, with a binding commitment issued upon readiness to proceed.
- A community is grant-eligible if the wastewater rate is greater than 1.5 percent of area MHI.
- The loan has a 3 percent fixed interest rate for 20 years.
- More information is available on the WVIJDC website.[9]

Appalachian Regional Commission

- McDowell County is designated as a distressed county in Fiscal Year 2024. The maximum Appalachian Regional Commission share for projects funded in McDowell County is 80 percent.
- More information is available on the Appalachian Regional Commission website.[10]

Community Development Block Grant

- These grants may fund all activities.
- The application maximum is $2 million overall, with a separate design loan with a maximum of $250,000.
- More information is available on the U.S. Department of Housing and Urban Development website.[11]

WVDEP Abandoned Mine Lands Economic Revitalization

- These grants are specifically for design and construction.
- The community must have exhausted all other sewer funding options and show economic development.
- For a successful application, the recommended grant amount is $4 million or less.
- More information is available on WVDEP's website.[12]

U.S. Congressional Direct Spending Request: CWSRF State and Tribal Assistance Grant

- Applications are typically solicited in the spring for fall Senate Appropriations Committee review.
- There is typically a 20 percent to 25 percent non-federal match requirement.
- For a successful application, the recommended grant amount is $1 million or less.
- More information is available from Congressional Research Service.[13]

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8 https://www.rd.usda.gov/programs-services/water-environmental-programs/calendar-year-2022-disaster-water-grants-program/wv

9 http://www.wvinfrastructure.com/index.php

10 https://www.arc.gov/grants-and-opportunities/

11 https://www.hud.gov/program_offices/comm_planning/cdbg

12 https://dep.wv.gov/dlr/aml/Pages/AML-Pilot-Program.aspx

13 Congressional Research Service. (2023). *U.S. Environmental Protection Agency (EPA) Water Infrastructure Programs and FY2023 Appropriations*. https://crsreports.congress.gov/product/pdf/IF/IF12309

Area Foundations, Private Investments, and Other Programs

- Construction grants are available for various amounts and at different times of the year.
- Area foundations that serve McDowell County include the Beckley Area Foundation[14] and Community Foundation for the Virginias, Inc.[15]
- CoBank[16] is a private investment firm for rural public utilities.

Benefits of Investing in Adequate Wastewater Infrastructure

Public and Community Health Improvement

Wastewater investment improves the environmental and public health of communities. Straight piping of raw sewage into local waterways can greatly harm natural ecosystems and limit their capacity to support wildlife. Figure 8 shows a "catch and release" sign on Elkhorn Creek in Northfork that was installed due to the impact of poor water quality on fish in the stream. Sewage can also contaminate drinking water. Residents can become ill when they interact with contaminated water sources and can ingest harmful bacteria by consuming fish or wildlife from polluted waters. Residents in the surrounding area depend on water from roadside springs that are often affected by groundwater interactions with contaminated surface waters and have tested positive for fecal indicator bacteria.

Figure 8. Straight pipes from homes and "catch and release" fishing sign on Elkhorn Creek.

Because Keystone and Northfork residents rely on wastewater collection pipes installed in the early 20th century that go directly into Elkhorn Creek, they may not experience direct contact with raw sewage in their homes through backups; however, they could experience contact with raw sewage through local waterways. This contact can cause health complications and spread disease. Additionally, roots can infiltrate dilapidated pipes and sewer infrastructure, exacerbating the risk of sewer leaks and blockages and further jeopardizing public health. The residents of Keystone and Northfork have inherited an unsustainable and unreliable water and wastewater system that was left by the coal mining companies, and they do not have adequate resources to resolve these issues on their own.

14 https://www.bafwv.org/

15 https://cfvinc.org/

16 https://www.cobank.com/

Economic Impact of Wastewater Infrastructure Investment

Although the primary purpose of any wastewater system improvements is to address the sanitation conditions in Keystone and Northfork, 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.[17] Town leaders in Keystone and Northfork will want to consider school apprenticeship programs and other local workforce development programs, including construction-related skills, to create local employment opportunities for residents once construction-related activities begin.

Figure 9. The Hatfield-McCoy ATV Trail is a major economic investment in McDowell County.

While local tourist attractions such as trout fishing and the Hatfield-McCoy Trail System, shown in Figure 9, could expand, they are limited due to the fact that supplementary businesses need dependable wastewater infrastructure in order to open and operate. A 2018 survey from the 2021 *McDowell County Comprehensive Plan* indicated that 94 percent of McDowell County residents felt lodging and dining options were inadequate, and 96 percent said there were not enough retail shopping options in McDowell County.[18] Health risks associated with unsanitary wastewater conditions lead to fewer people interacting with the environment for fear of contracting and spreading disease, reducing the economic benefits of natural attractions. Support for tourism and outdoor recreational opportunities through improved wastewater infrastructure will strengthen the local economy and increase the long-term viability of the community.

While the environmental and public health consequences of continued inaction are severe, the historic nature of the funding opportunity provided by the Bipartisan Infrastructure Law means that now is the best time to invest in wastewater infrastructure. Improved wastewater infrastructure in Keystone and Northfork will encourage economic growth and investment, support commercial and recreational activities, and ensure that future generations can thrive in these communities.

17 U.S. Water Alliance. (2023). *The Economic Benefits of Investing in Water Infrastructure*. 7. https://uswateralliance.org/wp-content/uploads/2023/09/Economic-Impact-of-Investing-in-Water-Infrastructure_VOW_FINAL_pages_0.pdf

18 McDowell County Commission. (2021). *McDowell County Comprehensive Plan*. 93. https://mcdowellcountycommission.com/wp-content/uploads/2021/04/mcdowellcocompplan-1.pdf

Sustaining the Investment Through Operations and Maintenance

Potential Approaches for O&M

The McDowell County PSD is developing the capacity to operate and maintain wastewater systems in its service area. There are no other organizations in the area to address O&M needs. For efficient operations, the McDowell County PSD may want to consider the following:

- Using technology to support remote monitoring and control of the wastewater system. The telemetry system capacity may be limited based on availability of communication systems such as cellular, broadband, and/or radio. Automating operations through telemetry systems in Keystone and Northfork could be included in the project costs.
- Using treatment plant technology like that of other plants the McDowell PSD operates so that operators are familiar with technology and can maintain parts in inventory.

Paying for O&M and the Affordability Challenge

Across the United States, utilities use sewer bills to pay for management, operations, maintenance, and loan repayments for wastewater systems. The McDowell County PSD 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. However, using MHI as an indicator can make it challenging to understand the community's affordability needs, as low-income residents struggle more with paying utility bills than higher-income residents do. This analysis incorporates both household income quintile upper limits from the U.S. Census Bureau and MHI into the affordability analysis to better reflect the impact for low-income residents. Even with assistance from federal and state funding programs, all options will have a high financial impact on the lowest-income residents of Keystone and Northfork.

Table 3 gives an overview of the impact on Keystone and Northfork households based on quintile or 20 percent increment income levels from the U.S. Census Bureau. The lower the percentage of income spent on sewer rates, the more affordable the system is to the customer. Because affordability is focused on lower-income households, the highest income level was not included in this analysis. The analysis uses the current wastewater rate of $57.22 a month for the McDowell County PSD's Coalwood Project. The expected cost to operate and maintain the alternatives in Keystone and Northfork without administrative costs for ongoing support such as customer service or any potential debt service is $55 to $60 per month. Therefore, the current rate of $57.22 should be a representative cost for ongoing O&M of the selected alternative(s) in Keystone and Northfork. The Public Service Commission will set rates for the project.

Table 3. Percent of Household Income Spent on Sewer Rates in Keystone and Northfork, West Virginia, Considering O&M Costs[a]

Income Bracket	First Income Upper Limits	Second Income Upper Limits	Third Income Upper Limits	Fourth Income Upper Limits	MHI	Poverty Threshold (Poverty Rate)[b]
Percent of Households in Income Bracket	**0%–20%**	**20%–40%**	**40%–60%**	**60%–80%**		
Keystone Annual Household Income	$9,714	$16,063	$20,188	$32,900	$17,344	$30,000 (19%)
% of income based on current wastewater rate of $57.22 (Keystone)	7%	4.2%	3.4%	2%	3.9%	2.2%
Northfork Annual Household Income	$11,500	$26,000	$34,265	$66,125	$32,604	$30,000 (43%)
% of income based on current wastewater rate of $57.22 (Northfork)	6%	2.6%	2%	1%	2.1%	2.2%

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

a Household income quintile upper limits, median household income, and poverty rate sourced from U.S. Census Bureau, *American Community Survey: 5-Year Data (2017–2021)*, Tables B19080, S1701, S1901.

b Poverty thresholds listed for Keystone and Northfork are based on U.S. Federal Poverty Guidelines for a family/household of four and are independent of American Community Survey calculations for poverty rates.

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 West Virginia will continue this program. In McDowell County, other local programs can assist with monthly bills and may be helpful to residents in Keystone and Northfork.

The McDowell County PSD, like other local governments and utilities, can build local affordability programs by charging different rates on commercial accounts, new customers, or other customer bases. 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 service. However, this solution might not work for the McDowell County PSD if new customers or commercial accounts are not added to the system.

Key Takeaways on Affordability

All wastewater treatment options have a high financial impact on most residents in Keystone and Northfork. **Rate assistance programs may be necessary for some households in Keystone and Northfork.**

Loan repayments will cause any option to have a high financial impact on residents of Northfork and Keystone. The McDowell County PSD will need to work with the funding agencies to **maximize the amount of grants** for constructing the system.

The McDowell County PSD will need multiple approaches to address the financial burden of water utilities for low-income residents, beyond just the programs discussed above. For example, McDowell County could consider non-rate revenue opportunities such as leasing space on water towers to cellular providers for antennas.

Partners and Roles

The path to clean water is not an easy one. McDowell County has options to choose from when it comes to new wastewater systems. Many partners in this pilot program will continue to support McDowell County along this journey (Figure 10), 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 3.** Lead agency (with USDA) providing jointly leveraged technical assistance resources in this pilot program.
- **West Virginia Region 1 Planning and Development Council (PDC).** Partner providing support to move through the funding programs.
- **West Virginia Department of Environmental Protection (WVDEP).** Funding partner and environmental permitting authority.
- **West Virginia Department of Health and Human Resources (WVDHHR).** Permitting authority for onsite and community systems.
- **McDowell County Public Service District (PSD).** Community point of contact.
- **West Virginia Rural Community Assistance Program (WVRCAP).** Partner providing technical assistance.
- **E.L. Robinson.** Local engineering firm supporting the McDowell County PSD.

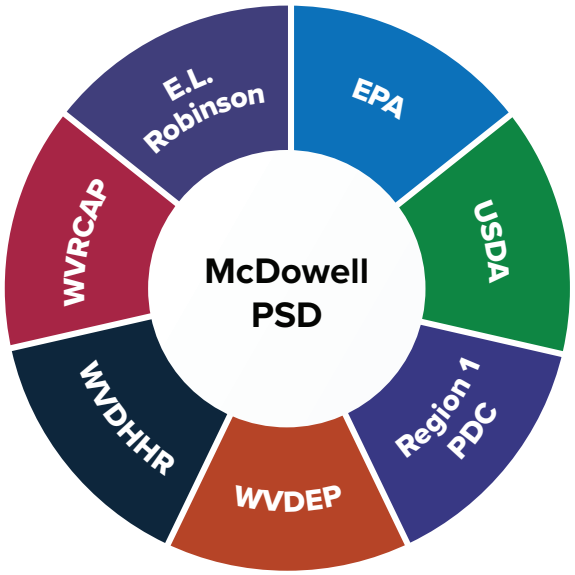

Figure 10. Partners to the McDowell County PSD.

Technical Assistance and Support for the McDowell County PSD 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 (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 the McDowell County PSD understand the funding available through the SRF and USDA-RD programs, as well as deadlines and application requirements. **EPA WaterTA and USDA-RD TA can also assist with preparing and submitting funding applications.** These providers can offer advice as communities consider infrastructure options, financing, and rate structures. Their connections with EPA and USDA-RD can help communities successfully complete projects and programs. Other technical assistance support for McDowell County can include:

- **Developing a wastewater rate program to build a local "affordability assistance" and asset management program.** If the West Virginia Public Service Commission were to allow different approaches to rate setting, the McDowell County PSD 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.** The McDowell County PSD will need operations staff for a new system. The West Virginia Rural Community Assistance Program providers offer staff training programs. Future technical assistance needs for staff training will include but are not limited to safety and regulations, daily logs and monthly operational sampling and reporting, and standard operating procedures for O&M.
- **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. Technical assistance providers can help with engagement and education for 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.[19]

Road Map for Implementation

The McDowell County PSD is considering how to address wastewater treatment needs in Keystone and Northfork (Figure 11), but this is just the beginning of the process. Developing wastewater infrastructure takes time. Creating a holistic program to address septic system needs could take 2 or more years. These issues are not easy to resolve, but the effort is worthwhile for the future of the community. Now is the best time in decades to act, as the Bipartisan Infrastructure Law funds add a boost to water infrastructure across the United States. Over the next year, the Keystone and Northfork communities will need to consider options and determine the best path for their future.

Figure 11. Northfork, West Virginia.

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

Immediate Next Steps Ongoing Through 2024

The McDowell County PSD has already applied for and received $75,000 in funding through a USDA SEARCH grant to develop a PER and Environmental Information Document (EID) to support a funding application for design and construction. The McDowell PSD can provide wastewater service to Northfork and Keystone through the following steps:

- Use SEARCH grant funds through 2024.
  - Refine alternatives:
    - Identify property needs for treatment plant(s), lift stations, and sewer systems.
    - Determine whether one or two plants are needed based on phasing alternatives and property needs.
    - Address permitting needs for discharge (e.g., AASEJ).
    - Establish a phasing approach, if applicable.
  - Develop PER with selected alternatives.
  - Develop EIDs to address funding needs.
- Select alternative for Northfork and Keystone.
- Apply for CWSRF and WVIJDC design and construction funding.
  - Submit application by the end of February 2025 to meet the Intended Use Plan deadline.
  - Complete the facilities plan, including:
    - PER.
    - EID.
    - "Finding of No Significant Impact" for the selected alternative.
    - Agreement with septage receiving facility for any septage hauling needs.

Activities After Alternative Selection

Once the McDowell County PSD decides on a wastewater option through the SEARCH Grant project, the PSD will have to design the system, acquire property, and get the necessary permits. Figure 12 shows two paths that McDowell County can follow based on the alternative selected.

Potential Timeline for No Action Alternative (Option 1)

If the alternatives analysis concludes that there are no affordable solutions for sewer service to the area, the Keystone Consent Decree may need to be renegotiated to implement a "No Action" alternative.

Potential Timeline for Gravity Sewer with One Plant in Northfork (Option 2)

If McDowell County selects the option for a gravity sewer with one plant in Northfork, the process would include:

1. Receiving design and construction funding for the selected alternative.
2. Designing and permitting the selected alternative and phase, if applicable (18 months to 2 years).
3. Acquiring land for infrastructure (12 to 18 months, concurrent with design/permitting).
4. Constructing the system (18 to 24 months).
5. Establishing service to homes (3 to 5 years).

Potential Timeline for Gravity Sewer with Plants in Keystone and Northfork (Option 3)

If McDowell County selects the option for a gravity sewer with two plants, one in Keystone and one in Northfork, the process would include:

1. Receiving design and construction funding for first phase of improvements.
2. Designing and permitting the first phase of the selected alternative (18 months to 2 years). If permitting a treatment system with a surface water discharge through the NPDES system, the McDowell County PSD should consider permitting both plants at once so that a future phase is not considered an expansion of the first permit.
3. Acquiring land for first-phase infrastructure (12 to 18 months, concurrent with design/permitting).
4. Applying for design and construction funding for second-phase improvements (2025).
5. Constructing the first phase (18 to 24 months).
6. Establishing service to homes for the first phase (3 to 5 years).
7. Designing and permitting the second phase of the selected alternative (18 months to 2 years).
8. Acquiring land for second-phase infrastructure (12 to 18 months, concurrent with design work).
9. Constructing the second phase (18 to 24 months).
10. Establishing service to homes for the second phase (5 to 7 years).

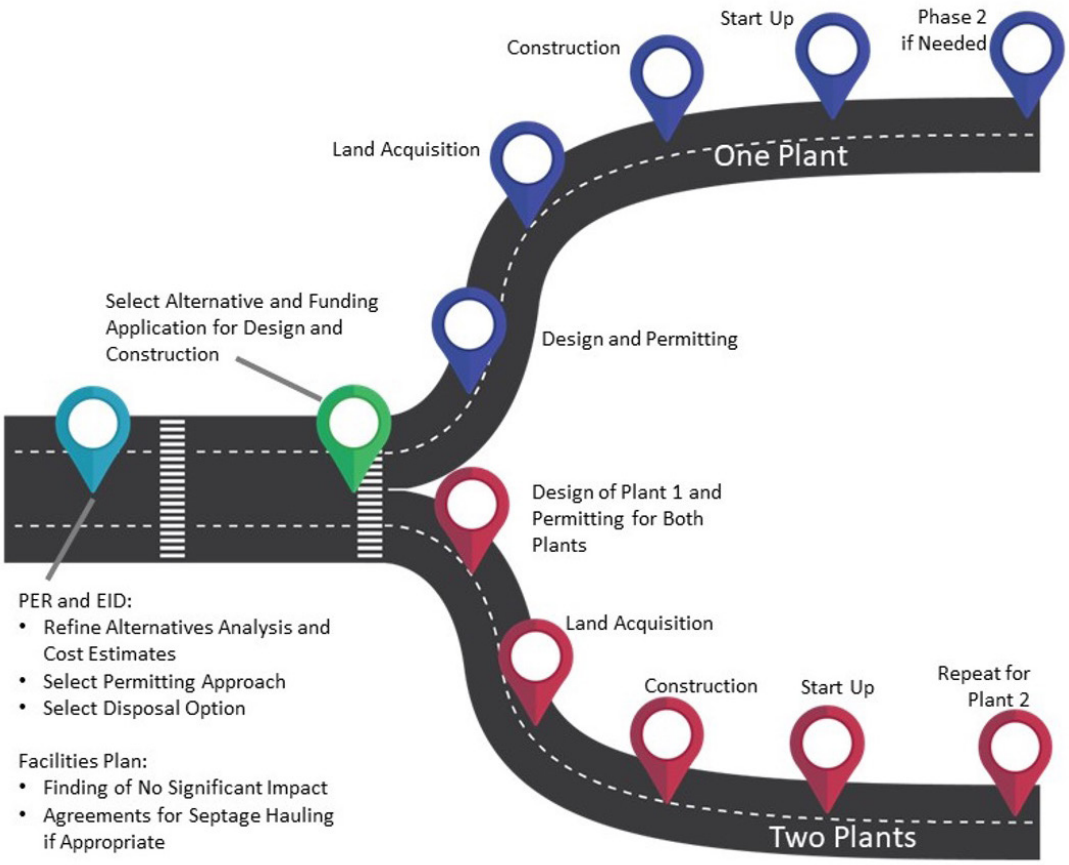

Figure 12. Road map for wastewater infrastructure investments.

Concluding Thoughts

As the McDowell County PSD moves forward with an in-depth analysis of its options for wastewater service, EPA and USDA-RD staff and technical assistance providers are ready to support the community with funding opportunities through the Bipartisan Infrastructure Law. This is a historic time for water infrastructure funding for small, rural communities such as Keystone and Northfork, West Virginia. New funding can help the Keystone and Northfork communities address their current and persistent health challenges, protect their beautiful natural resources, and build a prosperous future.

Definitions

100-year floodplain. An area with a 1 percent chance of being flooded in any given year.

BOD_5 and NH_3-N. Abbreviations for water quality parameters (5-day biological oxygen demand and ammonia as nitrogen) used to measure pollution.

Central wastewater treatment facility. A wastewater treatment system that serves two or more buildings and is permitted through WVDEP. Certified operating staff and monitoring is required for these systems.

Effluent. Treated wastewater that is released into the environment.

Gravity sewer system. A system that includes a sewer lateral connected to the house and sewer lines that flow by gravity to pump station(s) that pump the flow to a treatment plant.

Onsite/septic system. A traditional system includes a settling (septic) tank and drainfield. Advanced or engineered systems can include aeration systems, chemical dosing, and a sand filtration system for the drainfield.

Septic tank effluent gravity (STEG) system. A sewer system that relies on gravity to transport effluent from the septic tank to a treatment facility.

Septic tank effluent pump (STEP) sewer system (low-pressure sewer system). A sewer system with a septic tank and pump at the customer's building. Effluent from the septic tank is pumped into a low-pressure sewer system to a treatment facility. Septic tanks need to be pumped out periodically. This is usually the responsibility of the utility.

Sequencing batch reactor (SBR). A wastewater treatment process that relies on microorganisms to break down organic matter, producing a sludge that is separated from the treated wastewater.

Subsurface discharge. The release of treated wastewater through a drainfield or other means, such that it does not enter a surface water system.

Surface water discharge. The release of treated wastewater into a body of water, such as a river.

Tier 1. NPDES permitting standard that maintains and protects existing uses of a waterbody and the water quality conditions necessary to support such uses. A waterbody that is listed as impaired on the state's 303(d) list is considered a Tier 1 water as it pertains to the specific pollutant listed.

Tier 2. NPDES permitting standard that maintains and protects "high quality" waters—waterbodies where the level of water quality exceeds levels necessary to support recreation and wildlife and the propagation and maintenance of fish and other aquatic life. Tier 2 is the default assignment for a waterbody not listed as impaired on the state's 303(d) list.

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.