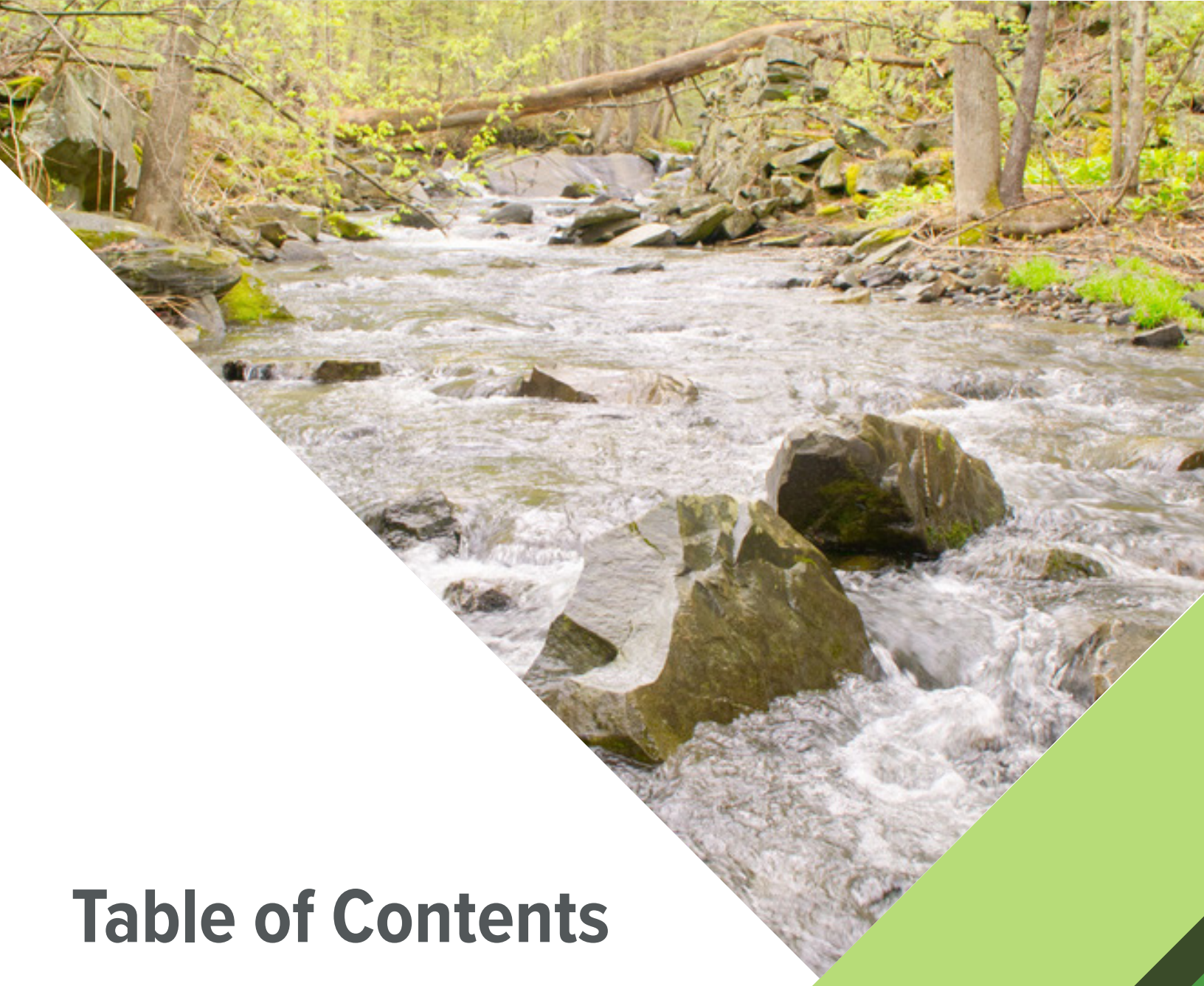
EPA COMMUNITY CHANGE GRANTS PROGRAM

Apple Springs Water Works Sanitary District Clean Energy and Water Project

SUBMITTED BY
Apple Springs Water Works Sanitary District and
Clean Water Legacy

November 2024



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Application Title
Apple Springs Water Works Sanitary District Clean Energy and Water Project

Lead Applicant
Apple Springs Water Works Sanitary District

Statutory Partner to the Lead Applicant
Clean Water Legacy

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Eligibility
Apple Springs Water Works Sanitary District, the Lead Applicant is a Unit of Local Government (Special District), and Clean Water Legacy, the Statutory Partner is a community-based organization

Climate Action Strategy
(2) Mobility and Transportation Options for Preventing Air Pollution and Improving Public Health and Climate Resilience, (4) Microgrid Installation for Community Energy Resilience, (5) Community Resilience Hubs, (8) Workforce Development Programs for Occupations that Reduce GHG Emissions and Air Pollutants

Pollution Reduction Strategy
(1) Indoor Air Quality and Community Health Improvements, (3) Clean Water Infrastructure to Reduce Pollution Exposure and Increase Overall System Resilience

Grant Award Period and Completion
December 1, 2024 – November 30, 2027

Amount of EPA Funding Requested
$20 million

Target Investment Area
N/A

Disadvantaged Community to Benefit from the Projects
Project activities will take place in Boulder Canyon, a Census-Designated place located in Lawrence County, South Dakota. The project focuses on its most underserved communities. According to the EPA IRA Disadvantaged Communities map, the entire Boulder Canyon area is identified as disadvantaged. According to the EPA EJScreen Community Report, 34% of the project area population is identified as low income, exceeding the State and U.S. average of 30%. In terms of equity, the often-overlooked elderly population will greatly benefit from this project, especially since 31% of the residents are over the age of 64. This number is significantly higher than that of the State or the U.S, as 18% of the residents in South Dakota and the U.S. are over the age of 64.

Other Sources of Funding
No other funding opportunities have been pursued at this point and no other grant funding has been awarded to the project.

Resubmission Status
This is a resubmission following the initial submission on July 30, 2024. The EPA debrief meeting took place on November 4, 2024.

Part 1. Community-Investments for Change

1.1 Community Overview

Community Description

The project area is the Boulder Canyon Census-Designated place located in Lawrence County, South Dakota. This is a Track 1 application, and the community is identified as disadvantaged according to the EPA IRA disadvantaged communities' map. A contiguous Project Area Map with outlined boundaries is included in **Attachment D** (Project Area Map).

Overview of Existing Assets

Figure 1 in **Attachment C** shows the current water, sewer and electricity assets in the canyon. The lime green highlighted area is the current community sewer service area.

Well: A 1,500 ft deep, 7" diameter municipal drinking water well drilled to the Madison Aquifer. A collocated booster station provides water to an upper pressure zone for future expansion.

Ground Storage Tank: A 357,000 Gallon tank, 30.5 feet tall.

Wastewater Treatment Plant: Rated for 16,700 gallon per day (winter) and 27,500 gallons per day (summer), equivalent to 88 year-round homes and 147 summer-home population.

Rushmore/Butte Electric Power Substation: Maximum 0.77 MW peak recorded for Canyon.

Within the project area, a compact and concentrated area at the base of the Canyon near the old community clubhouse and adjacent to the Valhalla Addition is where most project activities will focus. The residents in the focus area are the most affected by potential polluted groundwater and the base of the Canyon is the most cost-effective and efficient location for a new wastewater treatment plant.

The golf course at the lower elevation of the Canyon engages in soil management and maintenance of greenspaces abutting the Black Hills National Forest, a 1.25-million-acre Ponderosa Pine Forest managed by the U.S. Forest Service. These management practices are crucial to the protection of the forest reserve from devastating wildfires. The greenspace enhances environmental safety and community well-being. Communities looking to improve fire protection consider incorporating landscape features that buffer the effects of a fire between developed and undeveloped lands. For limiting fire spread, the Boulder Canyon Golf Course functions similar to hardscaped land uses, and irrigation and vegetation management has been effective in creating desired buffering qualities. Within the golf course area are the golf course club house and fire pit, which provide a location for community gatherings and fireside townhall meetings, respectively.

The existing well serves about a third of the total Canyon population of 561 residents. The remaining 300-400 people are served by shallower, low-productivity residential wells that tap water from aquifers prone to drought and surface contamination.

Existing Technology Deficiencies

Although the current technology (rotating biological contactors, found in Figure 2 in **Attachment C**) is working adequately now and meeting permit limits, there are a number of deficiencies that plague the system and justify its replacement. These deficiencies are:

- The collection system currently feeds a series of eight underground storage tanks. The tops of the tanks are connected to the treatment plant, therefore monthly pumping and hauling of solids remains necessary to manage solids and prevent system overload.
- The photo of the inside of the plant shows that the solids content requires constant flushing of the final clarifier (unit with the top open), and gases in the building have to be emitted to the neighborhood to prevent building up.
- The system requires high-energy input to run all the motors (each RBC has a motor), pumps and heating system.

The current ownership plans to relocate the assets to a community with lagoons, which will allow solids to settle before treatment and will allow for improvements to be made to the new location's building to prevent odor build up and excessive heating costs in the winter.

Community Challenges

The challenges and needs facing the community from pollution pivot on drinking water vulnerability to an aged population due to non-compliant septic systems and shallow

wells. According to the Climate Economic Justice Mapping Tool (CEJST), Boulder Canyon is in the 97th percentile for wastewater discharge. With over half of the population in the Canyon over 65 years old, elderly individuals are more vulnerable to the effects of polluted drinking water due to age-related factors such as a weakened immune system, chronic pre-existing conditions and reduced hydration tolerance.

With most of the non-compliant septic systems built before the implementation of the Clean Water Act of 1972, many residents are unaware of the environmental pollution threatening their drinking water supply. There is a public perception that well water is naturally filtered and safe to drink, and that was mostly true before anthropogenic activities began to modify the local environment. The proximity of the Homestake Gold Mine to the Canyon is one of the reasons the EPA has prioritized this project area as an IRA disadvantaged community. Despite the EPA designation of the nearby Whitewood Creek as a superfund site in 1983, the local population is still unaware of the risk of ingesting just a single drop of contaminated water, which can lead to severe health issues like chronic diarrhea and kidney failure.

The community is also subject to a high risk of wildfires. According to CEJST, Boulder Canyon is in the 92nd percentile for projected wildfire risk. The region's high winds and low humidity can cause power lines to spark against vegetation, leading to fires that spread rapidly. With all electricity supplying the Canyon coming from a common-use high voltage transmission line that crosses the forest reserve, the project area is at risk of wildfires when the grid is stressed during peak times. With the average house using up to 2.3 kW of instant power, this can cause as much as 0.77 MW of power draw during peak demand.

Electricity consumption accounts for almost 80% of the community's water and sewer treatment and distribution costs. With the median household income of the residents below the average household income of Americans aged 65 and older, and with that income typically fixed, the rising cost of monthly water and sewer bills is impactful and needs to be stable and sustainable. The costs to address the issues of pollution and wildfire risk require financial assistance and is the driving force behind the community's application to the EPA.

And with climate change, extreme heat waves and human activities on the rise, the risks to the community will only become more daunting to tackle. As recently as September, 2024, wildfires caused evacuation warnings to residents near the southern edge of the Black Hills National Forest near Rapid City and only 25 miles away from Mount Rushmore National Monument. Fire burned 160 acres of forest in 96 degree F temperatures and 45 mph winds. If such orders come to the 561 residents of Boulder Canyon, it will undoubtedly come in the summer heat and high winds, when the canyon is the most populated with tourists and locals. The displacement of over 500 people from the area will put a strain on the limited housing and accommodations in the summertime in the Black Hills. Elderly people will be the most impacted. For seniors who live on a fixed income, evacuation may not always be feasible for their budget. Evacuating has many associated – and hidden – costs. Transportation, food and housing can add up quickly. Shelters may be intimidating.

A survey conducted by PBS in 2020 with 2,256 older adults across the U.S. found that about 1 in 4 (24%) indicated it would be difficult to afford to stay somewhere else for a week if necessary. And with so many wildfires happening so frequently, costs related to multiple evacuations can quickly add up.

Community Vision

The project area is defined by the U.S. Census to be a "Census-Designated Place, CDP". Within this CDP, a need arose in the early 2000's for the County to create a Waterworks Sanitary District to manage the public drinking water and sanitary system that was constructed to serve a portion of the CDP with the long-term vision to serve the entire CDP one day. With an elected Board of Trustees and the ability to levy taxes, the Board of the Apple Springs Waterworks Sanitary District, is in effect, a nascent hamlet or village of just under 200 people. In addition to water and sewer, a separate Board of Trustees manages the road network in that portion of the Canyon via a Road District.

The need to create the District arose from the enforcement of the Clean Water Act by the County, to put into compliance those residents who wished to build homes on their property which was less than 1 acre. In the project area, this need was acutely necessary as many lots were within 50 feet to 75 feet of a well and could not safely operate a decentralized septic system. The District therefore built and operates a public sanitary system and wastewater treatment plant. The immediate impact was that from 2007 – 2022, the number of homes tripled in that portion of the Canyon,

which was very impactful in a region of the country suffering from an acute housing shortage.

Despite the successes of the County in creating the District and its maturation over the last 15 years, the areas of the Canyon not included in the initial district boundaries have been neglected. Of the approximately 1,400 acres of inhabited area in the CDP, less than 500 acres is served by the District's safe drinking water and public sanitary sewer. Over 20 drinking water wells less than 130 feet deep and over 150 people living on land less than 1 acre remain outside of the district boundaries in need of safe drinking water and sanitation.

The short-term benefits of the EPA grant will be to provide all 150 people currently living on less than 1 acre access to public sanitation. The immediate benefit of decommissioning these non-compliant septic fields will be the protection of shallow wells, which are being significantly contaminated by nitrates. The overabundance of nitrates is a known cause of gastric cancer in the elderly and triggers methemoglobinemia in babies, affecting both old and young in the community. The boundaries of the District would be enlarged to include these residents, providing them with a way to participate fully in the decision-making process of how their community grows.

The Apple Springs District would have a power generation meter tied to the 1MW solar array, which would be recorded by Butte Electric and will show up as a credit to the energy bill. Since power is a major source of costs to users, the reduced power bill reflects in the District users' water bill (wells and booster station pumping) and sewer bill (energy costs of the wastewater treatment plant and pump station). The use of battery back up for peak demand power generation will have a maximum impact on the district's electricity bill, with the practical effect of net-zero metering in a state with no such requirement.

The long-term goals that would result from the award of the EPA grant to Boulder Canyon would be the inclusion of all residents with failing wells into the Apple Springs Waterworks District, thereby providing them with safe, clean drinking water from a new municipal water well. Without the award of the EPA Grant, the cost to implement both the short- and long-term strategies for residents outside of Apple Springs would be prohibitive, which is why nothing has been done to help them so far.

The formation of the sanitary district by Lawrence County allows the development, the size of a small town, the ability to obtain funds through property taxes and special use taxes to pay for sewer infrastructure operating and maintenance costs. With 50 % of the county being U.S. Forest Service Land and much of the private land owned by large mining companies, there is not much left for private owners, which makes the real estate values stay higher than most other counties in South Dakota. In addition, the district has no debt and therefore the only costs are mainly operational expenses and planned capital expenses will be offset by new users, currently at 10-15% growth annually.

The size of Boulder Canyon is similar to nearby towns. Lead, SD (population 3,124) has 1,320 acres, Deadwood (pop. 1,270) has 2,451 acres of land. Boulder Canyon, with only 561 population currently, has 1,400 acres of development land, right in the same range and posed for rapid growth. Thus, the sanitary district will be able to leverage not only an increasing tax base, but an increasing user population who will be spreading the cost of the assets built under the grant over a larger payer base.

1.2 Selected Strategies

Strategy Overview

Pollution Reduction Strategy #1: Community Health Improvements.

The project intends to upgrade the wastewater treatment technology in conjunction with climate strategies to reduce the production and emission of methane and other GHG emissions. The implementation plan involves a 1-year design period, within which all permits will be acquired within 6 months' time or less, and a 2-year construction period.

Pollution Reduction Strategy #3: Clean Water Infrastructure to reduce pollution exposure and increase overall system resilience.

The project will perform over two dozen septic-to-sewer conversions to connect non-compliant homes to the community sewer system. The installation of water reuse technology at the wastewater treatment plant allows for the water system to decrease both energy and water use inefficiencies through reuse of treated wastewater for firestop land irrigation.

This strategy has a public outreach and education campaign component on safe drinking water and wastewater that has

already been started by the Board of the Sanitary District and will be directed during the grant period by the non-profit project partner, Clean Water Legacy. Activities will be coordinated with the EPA Environmental Finance Centers to minimize duplication of effort.

The climate action strategies being implemented in this project are:

Climate Action Strategy #2: Increasing mobility and transportation options for the prevention of air pollution and improving public health and climate resilience.
The project proposes to construct a new transportation hub in the project area connecting the Apple Springs sidewalks and trails system (part of the Apple Springs Road District) to the bustling towns of Deadwood and Sturgis at Highway 14A to promote reduced vehicle miles traveled between residences, workplaces, commercial and community centers, medical facilities and schools. The implementation plan involves public engagement and the development of agreements with local transportation and DOT in the first year of the grant followed by construction of the new transportation hub in conjunction with other infrastructure work in the road right-of-way in years 2 and 3.

Climate Action Strategy #4: Micro-grid installation for community energy resilience.
The project intends to construct a 1MW solar energy generation and storage system in the project area and connect a transmission line to the local energy cooperative substation. The storage systems will be controlled remotely to manage operations and increase peak demand reliability by releasing energy at peak consumption times by the power company. Strategy implementation involves an initial engineering study conducted by the power company that will take 9 months, followed by a bid and construction phase of 2 years and a three-month commissioning phase.

Climate Action Strategy #5: Community resilience hubs.
The most acute climate risk factor facing the community is wildfire and the plan is to mitigate the risk to the community's water infrastructure to be ready to support relevant emergency response organizations, such as the National Forest Service and local fire departments, to provide the required water for firefighting. The community fire pit and golf course clubhouse can serve as community rallying points that can provide water, food and basic services to those affected by wildfire. The clubhouse acts as a hub to remain operable during an emergency and provides communications and backup power through agreements between the Apple Springs Waterworks District and the Boulder Canyon Golf Club. Implementation of the plan will involve public engagement in conjunction with pollution reduction strategies in year 1 followed by the upgrade to the community hubs to provide the necessary services during an emergency such as additional public restrooms, outdoor and indoor public seating, and picnic areas and water filling station.

Tying back into the impact of displacement on local residents, the need for a community center to organize the community to prepare for disaster events is especially critical for seniors. It is well documented that social isolation among older adults, who live alone, makes them especially at risk in the event of an evacuation. That's why evacuation planning guidelines recommend checking in on neighbors to see if they need help. Programs, run by local governments or community groups, must exist in the area to help seniors evacuate.

Coordinating efforts with the forestry service and local indigenous tribes, who are playing a more critical role in forestry management, requires a centralized hub for information on the local area and resources available. That information includes:

- Community Ordinances related to water use and waste management
- Road district guidelines for road maintenance and trailhead interaction
- Stormwater management and BMP information developed by the district

Without a conventional town hall or office, visitors to the area are left to guess what rules are in place and what services are available. This is especially true when coordinating with tribal partners, who are coming from tribal lands miles away in the Cheyenne River or Badlands regions and need a community information center.

Climate Action Strategy #8: Workforce development programs for occupations that reduce GHG Emissions.
To promote reduced energy consumption for local community utilities and implement technology that reduces carbon emissions (methane reduction), the project proposes creating a water and wastewater operator State-certified training program and career center on site at the

community's water and wastewater treatment facilities and micro-grid renewable energy site. This initiative is a multi-sectoral 3-year partnership with the South Dakota School of Mines and Technology, which is a project partner and grant sub-awardee. New workforce skills are needed in the region to implement low-energy intensity wastewater treatment and carbon-negative technology.

The lack of a skilled technical workforce can be addressed by introducing college students to careers in water and wastewater treatment to help replenish an aging workforce population and incentivize new talent to the region. In addition, the existing workforce who are reluctant to change can be introduced to new and emerging greenhouse gas and air emissions-reducing technologies. All activities will be organized in coordination with the design and construction phases of the project's climate action and pollution reduction strategies by way of a pilot-scale installation in year 1 and full-scale installation in years 2+3. At least three SDSMT doctoral thesis students will work on the project and publish research in notable scientific journals before the completion of the grant period.

The Workforce Development program specifically includes participation in the National Rural Water Association Apprenticeship program, administered by South Dakota Association of Rural Water Systems (SDARWA). CWL's role in the program will be to induce participation and bring awareness to local area residents through informational meetings both in Boulder Canyon and at the Oglala Lakota College, where tribal participants can learn more about the apprenticeship program.

Project Integration

The project came about initially through the desire to streamline water resource management by reusing the treated wastewater for irrigation in lieu of irrigating from the drinking water system. This desire was enhanced by the need for additional water capacity for more users. Since the main irrigation pipe network connects to the lowest and most easterly irrigation pond, the treated wastewater needs to be relocated. Given the natural topography, it was determined that it would be more cost effective to relocate the treatment plant versus installing a pump station and running all sewer by gravity flow. In addition, the old existing Boulder Canyon Clubhouse was found to be unsuitable for use due to a troublesome septic system, and a desire to be in a more central location by golf club management. Thus, two parcels, each of approximately 3 acres, were created and the intended uses for each parcel swapped. **See Figure 1.2.1 in Attachment C.**

One key element in the successful implementation of the project is a fully integrated construction phase, which minimizes disturbances and maximizes impact by focusing on a 1-mile-long project area right of way (ROW) along the north side of Highway 14A. In this dense right-of-way, the main sanitary sewer trunk line will run from west to east, connecting the Boulder Park and Boulder Canyon subdivisions, Bauer Avenue and Valhalla addition to the new wastewater treatment plant. In addition, a dedicated electrical transmission line will run between the 4-acre solar array adjacent to the new treatment plant to the Wildberger substation. The new transportation mobility hub will also be in this same right-of-way (ROW) at the site of the future Boulder Canyon Community Center.

Additional benefits of a dense construction area are reduced environmental impact, minimal permit acquisition time, a single project area restoration phase serving all project activities and simplified traffic management.

Complementary Projects

The project proposes to connect all septic fields located on less than 1 acre to the public sewer system wherever there is a contamination risk to an existing well. Data from the County Tax Records and the State Department of Environment and Natural Resources (DENR) have identified 8 non-compliant septic fields constructed on less than 0.5 acre and 17 septic fields within less than 75 feet of a well for a total of 25 non-compliant septic fields that requiring immediate hookup to the sewer system. An additional 75 inhabited homes will be passed by the construction of a sewer trunk main to the treatment plant. As per state law, when any of these properties have failing septic, they must hook into the sewer system. Thus, there is a potential to add an additional 100 residences to the existing sewer collection system, which currently serves 75 homes, thereby over doubling the treatment capacity requirement. Although the Sanitary District has stated the hook up of septic systems being passed by the sewer trunk main will be 100% voluntary, initial public engagement at the June 21, 2024, Firepit Town Hall has established that many people would prefer to connect to the sewer system to add value to their properties and avoid a large potential cost of a new septic field, (which costs between $15,000-$20,000,

depending on location and soil type). Thus, the requirement to double the treatment capacity from 25,000 gpd to 50,000 gpd has become complementary to the new hookup of septic fields.

Additional Complementary tasks include:

- The use of carbon-neutral wastewater treatment technology in the new treatment plant, to eliminate odors and potentially earn carbon credit offsets.
- The use of low-energy consumption equipment in the treatment plant design so all power needs can come from the solar array during "blue sky" conditions.
- The relocation of the treatment plant to the old Clubhouse site and the construction of a new Community / Golf Clubhouse Hub at the old treatment plant site (land swap), making a more central location for community gatherings and workforce training events.
- The construction of a Mobility Transportation Hub at the new Community Hub, to connect to the Sturgis Bus (DaBus) and Prairie Hill Transit for increased public transport access to the largest city and County capital, respectively.
- The construction of a 4-acre solar array behind the new treatment plant site on undevelopable land that is out-of-sight, facing the southern sky and able to generate up to 1 MW of power and store it in Energy Storage Systems, and release it into a dedicated transmission line to the Canyon substation during peak demand times.
- The dedicated transmission line being in the same ROW as the new sewer trunk main, Community Hub and Mobility Transportation Hub, thereby reducing both the time and cost of construction.

An overview map of the expanded District boundaries is provided in **Figure 1.2.2 in Attachment C.**

Benefit Cost to the Disadvantaged Community

In any valuable project, the benefit and cost should be weighed to assess the project's value to the disadvantaged community as well as the consequences and costs of doing nothing at all. As the cost of the project is estimated at $20M, let's look at the benefit/s to the community based on the challenges they face.

Risk of Wildfire – Damage to Real Estate

A 2023 congressional report stated that climate change-fueled wildfires are costing the US Economy between $394 – 893 billion annually. The Black Hills region of South Dakota is especially prone to wildfires due to its low rainfall and dry, hot summers. For example, on March 30, 2021, Firefighters battled a massive wildfire that caused the evacuation of more than 400 homes and closed Mount Rushmore National Memorial. When it was all said and done, it burned more than 3.5 square miles. Wildfires are hard to put out in the Black Hills especially because of the steep and rugged terrain and high winds. It took 60 firefighters almost a week to put out the 2021 Mt. Rushmore Fire in winds as high as 81 mph. The cost to the disadvantaged community of wildfire can range from temporary displacement up to total property loss.

Groundwater Pollution – Contamination of Shallow Wells

The migration of pathogens, nitrates and pharmaceuticals into the drinking water systems follows the geologic formations that underlie the Canyon. Contamination has been known to enter the Spearfish Red Shale, Minnekahta Limestone, Opeche Shale Sandstone, and Minnelusa formations (from surface down to 250 feet) due to a high rate of water migration combined with numerous cavities and caverns, such as the Jewel and Wind Caves. Boulder Canyon is dotted with individual wells distributed over the entire project area. **Figure 1.2.3 illustrates this in Attachment C.** The cost to drill a well into the deeper Madison Aquifer, which is not as prone to contamination, in 2024, is no less than $200/ft. x 1000 ft. = $200,000, excluding the cost of pumps and connecting utilities and infrastructure. No less than six Madison wells would be needed to replace contaminated shallow wells, with no guarantee of water production volume prior to drilling. This is purely based on the geography of the canyon and population density.

Low-Connectivity/Mobility Cost – Interconnection with Deadwood and Sturgis

Affordable transportation options are a challenge in the Black Hills, especially for the elderly (65 years old and older) who are less prone to driving vehicles. The community in Boulder Canyon has two Hospitals within 15 minutes with no regular bus service.

Monument Health Lead-Deadwood Hospital is open 24 hours a day, 7 days a week and provides Emergency Medicine, Heart and Vascular Care, Physical Therapy, Medical Imaging and Laboratory Services. Monument Health Sturgis Hospital is also open 24/7 and provides all the services of Lead-Deadwood as well as Hospice Care, Speech Therapy and Nutrition Services.

The Sturgis Bus (DaBus) operates seasonally in the summer, with daily buses in the month of August between Sturgis and Deadwood. With Boulder Canyon being a half-way along that route, DaBus has provided a letter of support for the construction of the Bus stop and will be including the project as a stop in the August Rally schedule in 2025 if the project is funded by the EPA. Prairie Hills Transit (PHT) is a non-profit corporation dedicated to providing public transportation for persons of all ages, including those who may require specialized transportation. PHT offers a service with direct pick-up and specific-destination delivery on clean, comfortable, handicap-accessible buses complete with seat belts and a calmer atmosphere.

Social benefits of increased public transportation include reduced vehicle miles traveled, reduced air pollution, and low and zero-emission transportation options both short-term and long-term to the community.

Thus, resilience against wildfire, reliability of drinking water resources and interconnectivity with medical and support services will be positive benefits to the community. Increased climate resilience, reduced pollution and a greater capacity to address environmental and climate justice challenges are also project benefits. These goals have been the response to community and stakeholder inputs and have been designed to transform the potential for this disadvantaged community that has been disproportionately impacted by climate change, legacy pollution and historical disinvestments.

Climate Action Strategies

Climate Impact and Climate Action Strategy #2: Mobility and Transportation

Driving personal cars is one of the leading contributors to the increase of greenhouse gases in the atmosphere. In the U.S., the transportation sector contributes 28 percent of all greenhouse gas emissions. The innovative website mapmyemissions.com allows a user to determine how much C02 a trip will generate. Using this website, if a resident of Boulder Canyon were to drive a medium-sized car from their home to the doctors at the Lead-Deadwood Monument Health campus, the trip would generate a whopping 3.5 pounds of carbon dioxide equivalent. The website also estimates the social cost of those emissions; over the course of a year, the 15-minute drive to the doctor would cause $62 in damages to climate change, such as changes in crop productivity and loss of life and property from floods and more intense storm events. Comparing that to the same trip using public transportation. From the U.S. Department of Transportation 2010 report, if just one driver per household switched to public transportation for daily commutes of 15 miles each way, this would save 6,940 lbs. of carbon dioxide per household per year – an 8.1% reduction in the annual carbon footprint of a typical American household.

Connecting non-motorized sidewalks and trails to existing public transportation between Sturgis and Deadwood is possible through the construction of a new, centrally located bus stop, shared with the Sturgis School District Buses (during the school year), DaBus, and Prairie Hills Transit.

Climate Impact and Climate Action Strategy #4: Microgrid Infrastructure

Boulder Canyon is supplied with Electricity by Butte Electric Cooperative, which in turn buys power wholesale from Rushmore Electric Power Cooperative. Rushmore Electric in turn buys the bulk of its power from Basin Electric Power Cooperative, which operates:

- Four (4) Coal-fired power plants
- Seven (7) Natural gas power plants
- Two (2) Oil-fired power plants
- Eight (8) Recovery Energy stations
- Eight (8) Hydroelectric power dams
- Twenty (20) Wind farms
- One (1), 114 MW Solar Array. Wild Springs just outside Rapid City, SD.

The power cooperatives have a diverse energy supply, an “all-of-the-above” energy strategy and wish to see the Boulder Canyon project succeed, thereby filling a noticeable gap in the power generation map **(Figure 1.2.6 in Attachment C)** in the northern Black Hills with a small 1 MW solar array strategically located in a wild-fire prone region of the Black Hills National forest.

The microgrid will ensure reliability, specifically serving critical facilities such as the wastewater treatment plant, which is 100% behind the meter, during power outages.

During normal local energy consumption times, specifically

"blue sky" conditions, the microgrid will store energy in energy storage systems, which will send power to the grid to meet peak energy consumption demands. As a part of the project, Butte Electric Cooperative will conduct an engineering study to design the interconnection to ensure seamless power supply and increased grid reliability,

The microgrid infrastructure is part of a long-term strategy to reduce wildfire risk to the Black Hills region. As laid out in the Community Vision section, wildfire has the potential to displace large amounts of people, rendering them in need of shelter, food and water during firefighting operations. The common use transmission line bringing power through the Black Hills national forest and supplying all of Boulder Canyon is a potential source of wildfire during peak demand and high wind times. By creating a 1MW solar array with ESS in the canyon itself, the risk of fire is greatly reduced or eliminated. The peak demand, as recorded by Rushmore Electric Cooperative, has not exceeded 0.77MW, thus the sizing of the system is appropriate and has a modest margin of growth built in.

Climate Impact and Climate Action Strategy #8: Workforce Development for Occupations that Reduce GHG Emissions and Air Pollutants

In many instances, appropriate, environmentally conscientious technology does not get implemented in South Dakota because of a lack of workforce training, knowledge of operations and lack of a youthful workforce to take the initiative. In wastewater treatment, the Lagoon remains the go-to technology, with methane and hydrogen sulfide-emitting facultative lagoons being the most common. Lagoons are a large source of methane emissions, odors, respiratory diseases, vectors, other emissions like Ammonia and H2S. Deteriorated bottom liners are a major source of ground pollution. To empower the local workforce, the project plans to implement a workforce training program that will bolster:

- Technical skills and experience – Increase knowledge of new and emerging greenhouse gas and air emissions-reduction technologies. We are taking an "all of the above" approach to technology that either prevents GHG emissions (such solar, wind and micro-hydro) and reduces emissions and air pollutants, such as algal biofilm wastewater treatment technologies. This may be done by hosting tours of the facilities and collaborating with the South Dakota School of Mines and Technology to integrate hands-on experience with their college-level coursework.
- Knowledge of emerging trends to reduce peak power demand (versus the generation of power) using Energy Storage Systems and grid- integrated systems. This will be achieved by hosting classes from the Solar Energy International (www.solarenergy.org/trainingschedule/) online workshop and combining it with real-life applications.
- Establishing relationships of trust within the community using Clean Water Legacy and South Dakota School of Mines and Technology partnerships. This is relevant to the history of the community and community dynamics in the Black Hills, which has been impacted by mining and other exploitative enterprises. Public Engagement will focus on how to develop meaningful and long-lasting relationships in the community that will support local recruitment and participation.

Long-term, high-quality, family-sustaining jobs in the solar industry are relevant to South Dakota (and the upper Great Plains region) where there is an abundance of sun throughout the year due to the lack of rain, i.e. a cold desert and steppe region. Wind power is also a great opportunity in South Dakota due to high winds in the prairies, however the technology for small-scale wind has many challenges due to mechanical failure and will require further research and development while Solar meet the challenges reliably and safely.

Our program is a possible candidate for the American Climate Corp (ACC) program, as an operator (with occasional helper) needs to spend at least 500 hours running a treatment facility. Maintenance of the solar array, treatment plants, wells and pump stations and associated ESS will increase this need, the cost of which will be mitigated by incorporating paid interns, primarily recruited from the School or Mines and Western Dakota Technical Institute.

Combined with increased connectivity and mobility of Transportation, the local workforce can have better access to the basic skills and on-the-job training, as well as licensure, to move into occupations in water and wastewater treatment/distribution, solar electric design and installation, microgrid system maintenance and much more. The project aims to tackle the lack of licensed operators and has a commitment to training at the Apple Springs Waterworks Sanitary District facilities. Mentorship programs to connect experienced workers to new workers, coaching to support

work-based learning and continuing education credits may all be offered. The duration of the program and its components, such as time spent in the classroom and on-the-job training, will be developed by the South Dakota School of Mines and Technology teaching staff. SDSMT will ensure the program curriculum shall be compliant to industry standards and employer demands. Apple Springs also has a commitment to ongoing support for participants, once they exit the training program, it will help connect full-time employment to support retention of skills acquired. Through SDSMT, Apple Springs may engage employers at annual job fairs and through paid summer internship programs, which will connect participants to high-quality jobs.

The estimated number of participants in the Apple Springs Workforce development program is 5-10 per year during the 3-year grant period. In concert with Clean Water Legacy, the program will build visibility and trust among residents in the project area through the public engagement planned over the three years of the EPA Grant. Wages and stipends for the participants may become available after completion of basic instruction, by way of paid internships. Thanks to the mobility hub initiative in this project, Apple Springs hopes to overcome barriers (such as transportation) to participate in the program, gaining them meaningful experience recognized by the state to allow them to sit for exams.

Pollution Reduction Strategies

Pollution Impact and Pollution Reduction Strategy #1: Community Health Improvements

In order to successfully implement micro-grid and grid-tied integration to the wastewater treatment plant, improvements must be made to replace high-energy consumption technologies with low-energy demanding equipment and energy-efficient building. Wastewater treatment is inherently difficult to maintain good air quality. Domestic sewage is rich in Ammonia and decomposes into Methane and other odorous gases. The indoor air quality of a building dictates sufficient air exchanges with fresh air to prevent a dangerous situation for treatment operators. Exhausting the air from a treatment facility to the outside thereby exposes the community to gases and odors inadvertently.

Solving these two problems of energy efficiency and air quality is a key strategy of the project and achieved through the upgrade the wastewater treatment technology in conjunction with climate strategies to reduce the production and emission of methane and other GHG emissions using algae. **Figure 1.2.7 in Attachment C** illustrates how the biological process works.

In our proposed treatment plant, algae grows on rotating wheels, using light, CO2 and nutrients to sustain and induce the growth. Through co-evolution, the algae and bacteria have developed a natural and highly intricate relationship to break down pollution, where the by-products of one group are the food for the other. Algae produce oxygen, consume carbon dioxide, and generate sugars and nutrients. Bacteria consume the oxygen and sugars and produce carbon-dioxide, which is then used by the algae, completing the cycle.

Biological Oxygen Demand (BOD) and Ammonia (NH3) are broken down when the algae biofilms become saturated with oxygen and subjected to light. This is the result of billions of years of evolutional “engineering” as nature’s way of balancing its diverse ecology and chemistry. As part of the cycle of photosynthesis, algae naturally use pollutants such as carbon, phosphorus and nitrogen as sources of nutrition to fuel their growth. Nitrogen in domestic wastewater comes from human and food waste. Phosphorus is found in many soaps, detergents and household chemicals. These harmful chemicals need a safe, low-energy and low-cost way to be broken down. As with many solutions, this is done by harnessing nature instead of fighting it. This is why the project proposes to implement an Algae-wheel technology, as illustrated in **Figure 1.2.8 in Attachment C.**

A key part of the low-cost operation of the treatment plant is the use of coarse air bubble diffusers instead of electric motors to turn the wheels, and the installation of the entire treatment plant in a greenhouse. The use of air bubblers instead of motors and shafts also reduces mechanical failures and consumes so little electricity that a single 7.5 kw Variable Frequency Drive can run a 50,000 gallon per day treatment train of blowers, and they would draw a total of 4.5kW for 23hours and around 21 kW for 1 hour. That is the equivalent power as that generated by 50 residential solar panels.

The technology has been successfully implemented in 8 states, including Colorado, Illinois, New York, Iowa and Michigan. The Village of Napes, NY installed a 50,000 GPD Algaewheel wastewater treatment plant in 2019 and now enjoys an aesthetically pleasing, low-energy treatment system which allows for future growth. The ease of operation makes the proven technology perfect for small

to mid-sized communities that have limited skilled workers. The Naples NY plant replaced 100 failing septic systems for residential and businesses and discharges to a sensitive trout-stream (Grimes Creek Raceway) under a State Pollutant Discharge Elimination System permit from the Department of Environmental Conservation. The quality of water treated by the Apple Springs upgrade will exceed its current discharge permit limits, effectively treating not only Ammonia, BOD and nitrates, but also reducing Phosphorus from 6 mg/l currently down to less than 1mg/l.

One 45' x 75' building that is currently used for golf cart storage could be retrofitted to serve part of the footprint of the treatment plant. **Photos 1.2.9 in Attachment C** show the existing building and how it could potentially look after retrofitting it with Algaewheel basins and light-translucent window panels. The use of existing infrastructure will shorten the time for permitting and duration of construction. It will also save money on the cost of materials and site preparation. The implementation plan involves a 1-year design period, within which all permits will be acquired within 6 months' time or less, and a 2-year construction period.

Pollution Impact and Pollution Reduction Strategy #3: Clean Water Infrastructure

The enlargement of the Apple Springs Sanitary district is focused primarily on reducing pollution exposure and increasing overall shallow well resilience. The preliminary study of the Boulder Canyon Census-Designated place conducted by the district found that there are a total of 25 non-compliant septic systems risking over 50 shallow wells in their proximity (within 75 feet).

We have identified nine parcels with homes on them that should be connected to a sewer system. The geographic location of those locations West of the district and south of the Highway 14A, with a cluster near the proposed treatment plant location, gives a high-impact project area. Comparing this map to the well locations, the pollution risk can be summarized as follows:

- 29 wells south of Highway 14A are at risk of contamination by seven of the nine lots that are less than 0.5 acres, with the Valhalla Addition Water Company's well the most at risk. An additional 15 lots are less than 1 acre and can require connection to the sewer system **(see Figure 1.2.12 in Attachment C).**
- 1 lot west of the district boundary (see map of wells vs. district boundaries in **Figures 1.2.10. and 1.2.11a. found in Attachment C)** is endangering the drinking water supply of the Boulder Park Subdivision. An additional 54 lots in the vicinity of the <0.5-acre lot are under 1 acre and can require connection to the sewer system as per State law. Those lots endanger an additional 8 wells west of the district.
- 1 lot southwest of the District is endangering a string of 4 wells on the same street (Gigear Road). An additional 31 lots from Gigear Road and Red Cliff Road down Story Lane and between Burchette, Berry and Greenfield Lane all are less than 1 acre. The wells in the larger area number 8 are under risk of contamination by septic fields.
- The new location of the wastewater treatment plant allows for reuse of treated wastewater for firestop land irrigation.

The strategy has a public outreach and education campaign component on safe drinking water and wastewater that has already been started by the board of the Sanitary district and will be directed during the grant period by the non-profit project partner, Clean Water Legacy. Activities will be coordinated with the EPA Environmental Finance Centers to minimize duplication of effort. The district has already begun receiving written support from residents interested in voluntarily hooking up to the sewer system after a June 21, 2024, Townhall meeting.

The implementation plan involves public engagement in the first three months of the 1-year design process, followed by two years of construction. The 109 total lots that are under 1 acre and outside of the district will be given the opportunity to voluntarily hook up to sewer, with all costs being covered by the EPA grant. The budget will allow for up to 109 hookups free of charge, and if there are connections available after the 100 lots between 0.5 – 1 acre, these have been given first choice, lots over 1 acre that are being passed by the sewer main will be given the remaining sewer taps free of charge.

1.3 Community Engagement and Collaborative Governance Plan

The Community Engagement and Collaborative Governance Plan is in **Attachment E.**

1.4. Community Strength Plan

The Community Strength Plan is in **Attachment F.**

Part 2. Program Management, Capability, and Capacity

2.1 Performance Management Plan and Outputs/ Outcomes

Strategy 2 (CA): Mobility Hub

Outcome: Vulnerable populations (Seniors, School-age children and pregnant women) have more affordable options to get to local area hospitals using the new Bus Stop on Highway 14A. Improves public access to the Black Hills National Forest, specifically for indigenous tribal organizations who are taking inventory of timber resources that they are entitled to and are making economic development plans for. The project will focus on tribal engagement into how the pathways linking to the national forest connect to the mobility hub location to serve the entire community.

Tracking Timeline: Input from Indigenous tribes into the pathways needed to access the 11,069 acres of National Forest for forest management and conservation will take three months. This will be followed by six months of design engineering. A bid phase will focus on engaging tribally-owned construction companies to take part in the construction of the pathways and bus stop. The Construction phase will last 15 months with a tribal inauguration ceremony at the end of construction.

Strategy 4 (CA): Microgrid Installation for community energy resilience

Outcomes: Wildfire is a major hazard to Boulder Canyon area residents. In addition, the destruction of timber resources by wildfire impacts the economic value for indigenous tribes. Working together with Butte Electric Cooperative, a Solar Array with battery back up will eliminate a major source of wildfire by undergrounding the transmission line from the solar array battery backup to the substation, thereby preventing sparking of energized lines during drought conditions.

Tracking Timeline: The SDSMT research team will be working continuously on the efficacy of the bifacial solar panels for the duration of the grant. A preliminary findings report will be complete after 18 months, which will be presented to the public by CWL. Design of the solar installation will be conducted in the first 12 months of the project followed by 21-month construction phase and ownership transfer in Q2 of 2028 to Butte Electric Coop.

Strategy 5 (CA): Community Resilience Hub

Outcomes: Most small communities have a town hall. This project proposes to build a hub that serves as an "everyday" community center for residents of Boulder Canyon and guests from outside the community to meet, get notices, sign up for important public events, participate in regular board meetings, pay bills, and engage in planning efforts. The goal of the hub is to allow people to better support one another, share information, navigate resources, and build trust.

Tracking Timeline: The public involvement must happen in the first six months of the project, to inform the design team on the final building location and arrangement. All options for Hub location are along Highway 14A and will be designed in six months and constructed in 18 months. CWL will conduct an inauguration ceremony for the building, where next steps can be discussed.

Strategy 8 (CA): Workforce Development Programs for Occupations that Reduce GHG emissions

Outcomes: Participate in the SDARWS Apprenticeship program as a on-the-job training venue and employer. The existing treatment assets and new wastewater treatment plant will allow a local apprentice to learn the skills and knowledge to operate a small treatment plant. The apprentice will get a chance to learn from the current operator (mentor), who is already licensed and with experience in the field. Apprenticeship - South Dakota Association of Rural Water Systems. The solar array training program, sponsored by Butte Electric and put on by the district, will provide local workforce with knowledge of emerging trends to reduce peak power demand (versus the generation of power) using Energy Storage Systems and grid- integrated systems. This will be achieved by hosting classes from the Solar Energy International online workshop and combining it with real-life applications. www.solarenergy.org/trainingschedule/

Tracking Timeline: SDARWS kick-off webinar for the apprenticeship and rural water workforce for employers will be held November 21, 2024 at 2pm CT, coinciding with the application resubmittal to EPA. If funded by the EPA, SDARWS will announce in Q1 2025 that an opening for locals interested in Apple Springs plant will be available. Applicants from indigenous tribes will be welcomed and

encouraged to apply. CWL will announce the opportunity at the Oglala Lakota College for a partner apprenticeship program in Pine Ridge (run by the Oglala Sioux Tribe Water Resources Department). Both two-year apprenticeship programs would start in Q3 2026 after a year of program development with Butte Electric and SDARWS.

Strategy 1 (PR): Indoor Air Quality and Community Health Improvements

Outcomes: Increase overall community health, reduced GHG emissions, increased public and environmental health literacy. The new treatment plant uses significantly less energy to run (50% reduction) and is housed in a greenhouse which requires minimal heat in the winter. The six hundred rotating wheels with algae growing on them consume carbon dioxide and release oxygen in the process of treatment, which reduces GHG emissions by eliminating methane production through aeration and photosynthesis. The most important outcome is the improved water quality discharging into the Bear Butte Creek, which includes phosphorus removal and sludge reduction.

Tracking Timeline: Design of the treatment plant begins with preliminary process design in Q3 2025. The final design will be submitted for contractor bidding in Q2 2026 and their will be a two-year construction cycle. Construction begins with the demolition of the dilapidated clubhouse in Q4 2026 and ends with commissioning in Q1-Q2 2028. The South Dakota School of Mines and Technology will be conducting a three-year optimization study on the Algae Biofilm technology to minimize sludge production and energy consumption and optimize algae growth conditions. CWL will conduct a plant tour to the public at the end of the grant in Q2 2028.

Strategy 3 (PR): Clean Water Infrastructure to Reduce Pollution Exposure and Increase Overall System Resilience

Outcomes: Decreased levels of water contamination and pollution, increased availability of clean, safe water. The unique geology of the Black hills is both a blessing, due to the presence of accessible clean drinking water, and curse, in that the outcrop of ancient rock acts as a funnel for surface contamination to quickly reach the aquifer. This susceptibility to contamination was first noticed due to mining activities at the nearby Homestake Gold Mine. The EJScreen tool has given the community a disadvantaged status partly due to the proximity to the mine and geologic susceptibility to contamination. Eliminating septic fields seeping into the outcrop will reduce the infiltration of nitrates, sulfates and other contaminants. The SDSMT team will conduct a hydrogeologic study to quantify the speed of migration and participate in the public education meeting organized by CWL.

Tracking Timeline: The successful elimination of failing septic fields begins with a survey of the hydrogeology in the area conducted by SDSMT. The preliminary report in Q1 2026 will be presented to the residents by CWL, with a focus on residents that are farthest away from the treatment facility at the farthest reaches of the collection system. The acquisition of easements and environmental clearances in Q1 2026 will allow the collection system design to be completed in Q3 2026. That will coincide with the construction of the new pump station in the north of the community, near to the boundaries of the Black Hills National Forest, which is bisected by the Apple Springs community. All septic tanks will be decommissioned by Q1 2028.

Evaluation and Progress Measurement

The District has incorporated comprehensive program evaluation activities. The engineering firm, accounting firm, and grant management firm will be required to have extensive experience in assessing environmental and community development programs. The firms hired by the District will be required to utilize evaluation tools and methodologies, including both qualitative and quantitative measures, to track and assess the project's progress from initiation through completion. Performance indicators such as the new transportation hub usage, energy saved and stored, clean water usage, and cost effectiveness will be monitored regularly upon construction of the new facilities.

The District has already started conducting baseline assessments, so these will be followed by periodic evaluations at predetermined intervals throughout the project lifecycle. These assessments will include follow up surveys, sidewalk and facility audits, and environmental impact measurements, ensuring a thorough understanding of both immediate and long-term outcomes. The consulting firms will produce detailed reports that will be reviewed by the District and shared with stakeholders to provide transparency and accountability. These reports will not only document progress but also identify any areas requiring adjustments or improvements. These tracking and reporting measures will be used to gain insight into implementing project corrective measures to stay on track and achieve the project goals and outcomes within the required grant timeframe.

In terms of the Workforce training program, the Department of Labor established policy on the performance and assessment of the Workforce Innovation and Opportunities Act. These indicators gauge the success of the methodology and track the participant progress during and after the program. The program may use these six indicators, which are:

1. Mid-year Employment Rate - % of participants hired after exiting program.
2. End-of-year Employment Rate - % of participants hired after exiting program.
3. Median Earnings – what is the statistical earnings of participants after exiting.
4. Credential Attainment – Upon exiting the program, what % of participants enrolled in education or training programs?
5. Measurable Skills gains – What % of program participants achieved measurable skills in education or training that leads to post-secondary credentials or employment
6. Business Indicators – What % of businesses have repeatedly utilized services within the past three years?

2.2 Project Linkages to the EPA Strategic Plan

The proposed project activities support and advance EPA Strategic Plan Goal 2 (Take Decisive Action to Advance EJ and Civil Rights, Objective 2.1, (Promote EJ and Civil Rights at the Federal, Tribal, State, and Local Levels) by aligning the project activities to the three strategies listed in the Plan. The project is building capacity and climate resilience by expanding the infrastructure network, creating a transportation hub, and by implementing workforce development programs to disadvantaged populations. These activities are also being performed with climate resiliency at the forefront, specifically by reducing air pollution, enhancing extreme weather event resiliency, reducing GHG emissions, increasing overall community health, and decreasing levels of water contamination.

The project integrates equity as a focus of the project to maximize the benefits to the underserved community, especially as it relates to Tribes. Clean Water Legacy collaborates with the Oglala Sioux Tribe on water issues in the Black Hills including issues involving the northern Black Hills. This past experience and built relationships will be utilized when engaging tribes to create meaningful engagement throughout the project.

Quotation from Oglala Sioux Tribe Letter of Support:
"This project is a good custodian of the Black Hills, leading to climate action and pollution reduction. This project proposes to protect the national forest surrounding the project area from wildfire. The proposed project would also protect the water resources of the Black Hills."

The District understands that projects of this magnitude engage various levels of government and is prepared to work with the EPA, the South Dakota Department of Agriculture & Natural Resources, Lawrence County, and any other agency that requires coordination and collaboration. The South Dakota Department of Transportation will also need to be involved and the District has identified the need to engage the DOT and other local transportation agencies. This project isn't just a clean water project, as it has evolved into something much greater that will need to bring professionals in sectors like infrastructure, transportation, economic development, workforce development, professors, and the public together to complete this project.

The project also supports and advances the following EPA Strategic Plan Goals:

Goal 1 - Tackle the Climate Crisis

This project reduces emissions that cause climate change and accelerates resilience and adaptation to climate change impacts by the installation of renewable energy, battery storage installation, and upgrading the wastewater facility to reduce pollution and reduce GHG emissions.

Goal 4 - Ensure Clean and Healthy Air for All Communities

The project improves air quality and reduces localized pollution and health impacts by the installation of renewable energy, battery storage installation, and upgrading the wastewater facility to reduce pollution and reduce GHG emissions and by creating a transportation hub that connects the Apple Springs sidewalk and trails system.

Goal 5 - Ensure Clean and Safe Water for All Communities

The project ensures safe water and reliable water infrastructure and protects the waterbodies within the area by upgrading the wastewater facility to reduce the production and emission of methane and other GHG emissions and by reducing pollution exposure and increasing the overall system resilience with up to 109 septic to sewer conversions and installing water reuse technology.

Goal 6 - Safeguard and Revitalize Communities

The project prepares for and respond to environmental emergencies by mitigating the risk to the community's water infrastructure to be ready to support relevant emergency response organizations, such as the National Forest Service and local fire departments. The clubhouse will act as a hub to remain operable during an emergency and provide communications and backup power through agreements between the Apple Springs District and the Boulder Canyon Golf Club.

Goal 7 - Ensure Safety of Chemicals for People and the Environment

The project promotes pollution prevention by installing water reuse technology, upgrading the treatment facility, and installing a microgrid that promotes renewable energy and creates a better environment for all.

2.3 CBO Experience and Commitment

Clean Water Legacy (CWL) is dedicated to ensuring future generations have pure surface and groundwater. The mission of CWL is, "To ensure that future generations in western South Dakota, in Lakota Treaty Territory under the Fort Laramie Treaty of 1868, receive a legacy of pure surface and groundwater. The organization strives toward this purpose through research and education."
CWL has set out to accomplish its mission with clear goals that align with the purpose of the project as well as the EPA. These goals are as follows:

- Educate and Involve: Educate and involve the public on water use, allocation, and quality.
- Provide a Forum: Provide a forum for water planning to secure a future of plentiful, clean water in South Dakota.
- Encourage Servant Leadership: Encourage servant leadership in meeting future needs among people of all ages and backgrounds.
- Combat Climate Change: Climate change is a global crisis with far-reaching consequences. Clean Water Legacy is committed to combating climate change through advocacy, education, and promoting sustainable practices.

CWL has partnered with alliances and organizations throughout the Black Hills and beyond, including the following:

- **Black Hills Clean Water Alliance (BHCWA)** - Between 2017 and 2023, CWL acted as fiscal sponsor for Black Hills Clean Water Alliance (BHCWA) in the northern Black Hills. BHCWA is a diverse collection of citizens concerned about the health, environmental, and economic impacts that mining projects and their contributions to the climate crisis are having on our communities, people, economy, and natural resources.
- **Mni Ki Wakan** – CWL works with the indigenous organization Mni Ki Wakan on broad-based water issues and participate in their annual conference in Rapid City, South Dakota.
- **Great Plains Tribal Water Alliance** - CWL participates in an alliance that involves water issues in the Black Hills and a broader region.
- **Oglala Sioux Tribe** – CWL collaborates with the Oglala Sioux Tribe on water issues in the Black Hills including issues involving the northern Black Hills.
- **NDN Collective** - NDN Collective is an Indigenous-led organization dedicated to building Indigenous power. CWL collaborates with NDN Collective on Black Hills issues, including water.
- **Spearfish Canyon Homeowners Association** – CWL communicates and cooperates with Spearfish Canyon

Homeowners Association on water issues in the northern Black Hills.

These diverse partnerships have led to connections throughout the project area and potential stakeholders who can help champion the proposed project as well. CWL's experience will lead to a successful partnership with the District and ultimately a successful project.

2.4 Programmatic and Management Capability and Resources

ASWWSD has the experience and capacity to successfully perform the proposed project activities. The District started with roughly a dozen homes but has now exploded to over 100 homes and continues to expand. The District is led by qualified individuals who have years of experience in the infrastructure sector. The District's current President, Dan Carlson, is a former plant manager who has operated $200 million treatment/chemical facilities. His years of experience managing and overseeing water/wastewater facilities demonstrates the capabilities of the District to perform the proposed activities. Dan's skills include project execution and ownership. The District's current Secretary, Chris Vinich, a successful business owner and former pipeline business owner, will serve the District in various capacities, for example in project management, accounting, leadership, and project administration.

The District does not currently have its own staff, so current infrastructure upgrades and maintenance is contracted out through procurement processes. If awarded, the District will use their current process to procure a qualified firm for engineering services, accounting services, and grant management services.

The District has current financial stability and controls in place to manage funds ethically and efficiently by managing program risk, program oversight, and demonstrating financial transparency. The District submits a yearly budget to Lawrence County – which is reviewed and approved. Once approved, the County provides the District their monthly budget for operations and maintenance, therefore implementing a process by which funds are publicly approved and utilized. The District publishes their financial statements on their website, specifically their budget, balance sheet, and income statements that allows for complete transparency of the District's financials. The District will continue to utilize their website to publicize grant information if the application is awarded.

CWL's efforts for the proposed project will be led by Lilias Jones Jarding, Ph.D., who has over 12 years of experience with grant management, grant reporting and drafting grant proposals. Her experience includes managing state and federal grants. As a consultant, Dr. Jarding also wrote grant proposals that brought nearly $12 million in federal funds into northern Colorado.

Dr. Jarding has additional experience advocating for other environmental issues throughout South Dakota and Colorado, including uranium mining and energy issues.

In addition, she has extensive academic teaching experience and currently is an associate professor at Ogalala Lakota College teaching undergraduate courses, serving on graduate student committees, and taking an active role in the College and regional communities. Her extensive and diverse background ensures CWL's ability to carry out the proposed education and engagement with the community of Boulder Canyon.

SDSMT's role will be to fulfill the following tasks associated with this project:

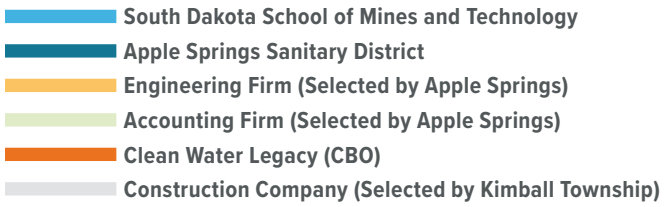
- Microgrid Integration in Apple Springs: Enhancing Rural Electric Systems and Community Resilience: Led by Dr. Zhao, PhD, Electrical Engineering.
- Implementation an Optimization of an Algaewheel Reactor System for Treatment of Wastewater at the Apple Springs Subdivision: Led by Dr. Gadhamshetty, PhD, Environmental Engineering.
- Modeling the Impact of Septic Systems on Shallow Aquifer Water Quality in the Boulder Canyon outside of Apple Springs Subdivision: Led by Dr. Li, PhD, Hydrogeology

Project abstracts from the SDSMT professors can be found in **Attachment C.** The projected milestone schedule can be found on pages 17-18.

2.5 Past Performance

As the focus of this section is on the Lead Applicant, the Apple Springs Water Works Sanitary District does not have any relevant or available past performance related to federal or non-federal grants. The District has a proven track record of supporting the current sewer Wastewater Treatment Plant (WWTP) private owner on previous projects and operational costs. Additionally, the District's board members have successfully implemented projects exceeding $200 million in the private sector for similar types of projects.

Projected Milestone Schedule



Task/Activity	EPA Strategy	2025		2026				2027				2028	
		Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Collection System & Easement Acquisition													
Legal Description and Purchase Agreement													
Easement Negotiations													
Engineering, Research, Grant Administration													
Topographic Survey													
Algae Biofilm Reactor - Optimization Study													
Collection System Design													
Environmental Clearance (FONSI)													
Enlargement of District Boundaries													
Preliminary Process Design													
ROW Permits													
Public Meeting - Hydrogeology Report													
Final Design Phase													
Advertising and Bid Phase													
Hydrogeologic Study - Sampling and Model													
Audits													
Workforce Development													
Programming w/ SDARWS and Butte Electric													
Rural Water & Electric - 2-yr. Apprenticeships													
Solar Power Generation Array													
Agreement Signed with Butte Electric Coop													
Bifacial solar array - Efficacy Study													
Power Study and Solar Array Design													
Public Meeting - Energy Efficacy Report													

Schedule continues on following page.

Projected Milestone Schedule (continued)

Task/Activity	EPA Strategy	2025		2026				2027				2028	
		Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
New Wastewater Treatment Facility													
Mobilization, Access Road and Earthwork													
Underground Utilities and Pipework													
Holding Tank Relocation													
Demolition of Clubhouse													
Pilot PFAS Thermal Destruction													
Greenhouse Construction													
Algaewheel Equipment Installation													
Commissioning Phase													
Permit Update with DANR													
Public Meeting - Solar Report													
Public Meeting - Plant Tour to Public													
Substantial Completion - Construction													
New Collection System Construction													
ROW Permitting and Const. Permits Req'd													
21,000 LF of Collection main													
New Pump Station Construction													
Solar Array Construction													
Site Prep and Access Roads													
Solar Panel Construction													
Transmission Line Construction & Tie-In													
Transmission Main installation													
ESS Installation and Commissioning													
Mobility Hub													
Design of Bus Stop and path links ot NF													
Engagement with Tribal Nations - Input													
RFQ to tribally-owned Construction Firms													
Contractor Selection - Bus Stop - Pathways													
Construction Phase - Mobility hub													
Tribal Ceremony - Black Hills Mobility Hub													
Community Resilience Hub													
Resident input on Hub location/services/goals													
Design of Resilience Hub Building													
Contractor Selection - Community Hub Bldg.													
Construction of Resilience Hub Building													
Inauguration of Community Hub Building													
Final Closeouts on Construction													
Audits on Substantially Completed Projects													

2.5 Past Performance (continued)

The Lead Applicant will lean heavily on Clean Water Legacy and the School of Mines professors as both partners have vast experience with grants. Dr. Gadhamshetty, Dr. Zhao, and Dr. Li have received and administered over $30 million of grant funding over the last decade. Examples projects include:

- CAREER: Corrosion Resistance of Nano-meter Graphene Coatings in Aggressive Microbial Environment
- Collaborative Research: RII Track-2 FEC: AQUACLIME: Advancing Quality and Climate-Resilient Water Management with Community Partnerships and Enhanced Sensor Network
- A pilot-scale, portable water treatment train for remediation of PFAS contaminants
- ERI: Data-Driven Analysis and Dynamic Modeling of Residential Power Demand Behavior: Using Long-Term Real-World Data from Rural Electric Systems
- Data-Driven Forecasting for the Next-Generation Power Grids using Real-World Big Data
- RII Track-4: Inverse Methods of Hydraulic Fracturing for Enhanced Geothermal Systems in a Deep Mine

Part 3. Readiness to Perform, Feasibility, and Sustainability

3.1 Feasibility

Apple Springs has worked with a consulting firm to develop the project need, scope, timeline, and budget to ensure the project activities can be successfully and effectively performed within the three-year grant period. The grant narrative, specifically each climate action and pollution reduction strategy explain the performance of each project activity and provides detailed information regarding the timeline of all activities. The cost breakdown and budget description supplements the narrative to identify each strategy's cost that can be evaluated collectively or individually.

The District is well equipped with knowledgeable individuals who are experienced in performing project-related activities. The performance management plan will be utilized to track and measure the project during the three-year grant period and beyond the grant timeframe, and the District has project partners in place like Clean Water Legacy and the School of Mines to assist with project management, administration, and ultimately perform the project activities in an efficient and effective manner. Regular progress evaluations, financial audits, and stakeholder involvement will allow the District to identify potential risks early and implement corrective actions promptly. A dedicated grant manager and accounting manager establishes our capacity to manage and mitigate risks effectively.

3.2 Sustainability

The District is committed to ensuring that the benefits and outcomes of the proposed projects are sustained well beyond the three-year grant period. While we are currently requesting 100% of the project costs for this initial period, our strategy for sustainability includes leveraging additional funding and resources from diverse sources to expand the project's impact after the grant term ends. In terms of maintenance, upon purchasing the infrastructure assets, the District will be in full control of operations and maintenance of the treatment system. The District currently supports the facility, but it does so under the umbrella of H2O Clear Solutions LLC, the current owner of the infrastructure assets. The facility will operate similar to other publicly owned facilities in that the District will bill facility users by usage. This will be the main source of revenue as the sustainability and maintenance of implementation measures will be the responsibility of the District. The implementation measures on private property shall become the responsibility of the owner, like the decision to connect to the system. By fostering strong relationships with current grant partners and continuously seeking new funding opportunities, the District is confident in the ability to sustain and enhance the benefits of the projects for years to come.

The project will be meticulously managed to prevent overspending, with a primary focus on constructing the Wastewater Treatment Plant (WWTP), sewer mains for noncompliant lot owners, solar power installations, and a transportation hub. The expansion of sewer mains in the undeveloped Apple Springs District will be contingent upon available funds, determining the timing and extent of these enhancements. Should funds be depleted, the current developer will be responsible for financing the sewer mains expansion. A possible option is that the District could secure funding through bonds and impose an annual assessment on district taxpayers, in collaboration with the Lawrence County Auditing Department, in accordance with South Dakota statutes.

3.3 Program Budget Description

A project budget can be found in **Attachment A.** The proposed project budget summary can be found on page 20.

The budget was developed using the following unit prices and quantities from referenced sources as follows:

Category 1 - Wastewater Treatment Plant

- Demolition of the 3,200 SF, two story Clubhouse was budgeted at approximately $8 per square foot = $50,000. This is just above the median cost from sources such as angi.com and fixr.com. Additional trucking costs equal to $50,000 brings the total budget to $0.1M.
- The treatment plant cost includes new equalization tanks (50,000 gallons), a lift station, 7,200 SF Greenhouse, treatment basins, blowers, RBC's, a Direct-Air-Flotation clarifier, Ultrafiltration and UV disinfection equipment, SCADA and all controls. Estimates for Equipment are $3M with $2.1M in labor costs to prepare site and construct were provided by Algaewheel.

Category 2 - Sanitary Sewer Lift Station, Force Main, and Sewer Lines

- The Apple Springs Sanitary District does not yet own the assets of the collection system. A Letter of Understanding (LOU) has been drafted and approved by ASSD and the property management company who owns the assets, H20 Clear Solutions LLC for a purchase price set at $2.6M. A copy of the LOU is provided as supporting documentation for the grant application.
- 21,000 linear feet of mostly 8-inch PVC sewer main and 10/12-inch sewer trunkline is estimated to cost (Labor and Materials) $142/LF based on a median price of $50-$250 per linear foot quoted by online sources such as angi.com. This includes manholes at approximately 350 LF average spacing, excavation to an average depth of 5.5 feet, importation of pipe bedding material and compaction of new fill above pipe. Moderate dewatering of the trench is inclusive. Minimal rock blasting or removal is anticipated in this project as pipe is being laid below the frostline in the road ROW.
- The sewer lift station is a 6' diameter structure with two pumps and a control panel. The cost of the structure and equipment is approximately $150,000 and the force main discharge line is approximately $50,000 (350 LF). The Labor cost is expected to cost $300,000 to excavate, dewater, construct and install equipment. The price is based on recent bid tabulations in the Rapid City, SD area.
- Septic tank decommissioning cost is about $5,000 on average. With the potential of up to 100 homes requesting connection to the sewer system, the estimate is $0.5M. Included in this price is the cost of the new service line, which will average an additional $5,000 (most homes are about 50 feet set back from the road and the price of $100/LF covers a 4-inch service line). Thus, this line item is estimated at $1M.

Category 3 - Solar Array

- The 1MW solar array cost is based on a marketwatch.com guide that quotes the National Renewable Energy Laboratory (NREL) price of $1.06 – 3.16 per watt. Thus, taking the average of those costs amounts to $1.5 per watt or $1.5M.
- The Power, Delivery, Intelligence Initiative estimates the cost of the underground 69 kV line to be $1.5M per mile. Thus, 6000 LF will equal $1.7M. The cost of a SCADA system with integration can cost as much as $100,000. Thus, this line-item cost is $1.8M
- The sitework for the 4-acre site is estimated at $50,000/acre. This includes clearing and grubbing at $1,500 per acre, construction staking, excavation, import and compaction of subgrade material and a 3,000 LF of perimeter fence ($8/LF).

Category 4 - Mobility Transportation Hub

- The mobility connection bus stop cost includes the installation of the shelter ($100,000) and building connecting sidewalks and amenities such as a bike rack and signage. Prices are sourced from bluelinemedia.com. and do not include advertising ads. The remaining costs are provided in the supporting documentation section.