AquaWorks DBO, Inc.
3252 Williams Street
Denver, Colorado 80205

(303) 477-5915
www.aquaworksdbo.com
info@aquaworksdbo.com

Mr. Bret Icenogle, P.E.
Water Quality Control Division
4300 Cherry Creek Drive South
Denver, CO 80246-1530

January 16, 2020

RE: Arabian Acres Construction Application Submittal
PWSID#CO-0160075

Dear Mr. Icenogle,

The Arabian Acres Metropolitan District, located in unincorporated Teller County, Colorado, is submitting the attached Construction Application for improvements to its potable water treatment system to the Colorado Department of Public Health and Environment. The proposed improvements consist of installing two new groundwater wells, removing and replacing the two existing control (treatment) buildings, replacing the existing 38,000 gallon water storage tank with a new 100,000 gallon water storage tank, removing and replacing portions of the distribution system, and other miscellaneous improvements.

The proposed improvements will significantly improve the condition of the district. The system will be able to produce more water with the new well sources and additional pumping capabilities. Less water will be lost in the distribution system by replacing the leak prone water lines. The district is concurrently applying for an SRF loan for this project. It has been awarded a $1,000,000 DOLA EIAF Grant.

Attached for your review is an electronic copy of the application materials. A hard copy can be provided if required. Please feel free to contact me at (303) 477-5915 with any questions.

Sincerely,
AQUAWORKS DBO, INC.

Adam Sommers, P.E.

cc. Kevin Walker, District Manager
Erick Worker, CDPHE GLU Project Manager

# Treatment and Distribution Improvements

## Construction Application Engineering Report


**Arabian Acres Metropolitan District**
**c/o Walker Schooler District Managers**
**614 N. Tejon Street**
**Colorado Springs, CO 80903**

**Unincorporated Teller County, Colorado**
**PWSID#CO-0160075**

**January 2020**

**AquaWorks DBO, Inc.**
**3252 Williams Street**
**Denver, CO 80205**
**(303) 477-5915**

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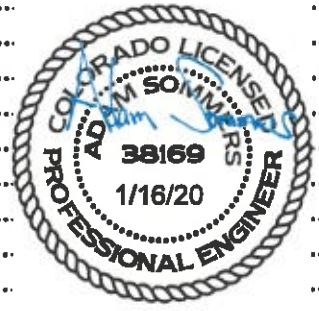


## FIGURES



## TABLES



## ABBREVIATIONS

(Not all may be included in this engineering report)

| | |
|---|---|
| AWDBO | AquaWorks DBO, Inc. |
| AWWA | American Water Works Association |
| BDL | below detection level |
| CDPHE | Colorado Department of Public Health and Environment |
| cf | cubic feet |
| CPDWR | Colorado Primary Drinking Water Regulations |
| cy | cubic yards |
| ft | feet |
| g | grams |
| gpd | gallons per day |
| gpm | gallons per minute |
| gpy | gallons per year |
| Hp | horsepower |
| LS | lump sum |
| MCL | maximum contaminate level |
| MG | million gallons |
| MGD | million gallons per day |
| mg/L | milligrams per liter |
| min | minutes |
| N/A | not applicable |
| NaOCl | sodium hypochlorite |
| NS | not sampled |
| NSF 61 | National Sanitary Foundation Standard 61 |
| O&M | operation and maintenance |
| PER | Preliminary Engineering Report |
| ppm | parts per million |
| RTU | remote telemetry unit |
| SMCL | secondary maximum contaminate level |
| TDS | total dissolved solids |
| TSS | total suspended solids |
| VFD | variable-frequency drive |
| WTP | water treatment plant |
| WWTP | wastewater treatment plant |
| WQCD | Water Quality Control Division |

# EXECUTIVE SUMMARY

The Arabian Acres Metropolitan District (District) provides potable water service to the Arabian Acres subdivision and Trout Haven Estates Filings 1, 3, 4, and portions of Filing 2. The District currently serves 150 taps with a population of approximately 405 people.

The District has faced considerable challenges over the past few years. These challenges include providing reliable service with the approximately 40 year old and poorly maintained distribution system that leaks considerably. Additionally, the District is in unsatisfactory financial condition due to the high cost to purchase water hauled from offsite to make up for the water loss. The intent of this Construction Application is to permit the following items:

This document recommends implementation of the following improvements:

- Item #1: Replace the two existing control (treatment) buildings.
- Item #2: Remove the existing 38,200 gallon water storage tank and replace it with a 100,000-gallon tank.
- Item #3: Redrill Well #3 and drill new Well #10
- Item #4: New SCADA System
- Item #5: Remove and replace portions of the existing distribution system

The improvements will allow the District to provide reliable, long-term potable water service to its users. Until the District can lower water loss to an industry acceptable level, it will continue to spend a considerable percentage of its revenue hauling water and responding to leaks and line breaks.

The construction budget for this project is $2,500,000. The district will be seeking multiple funding sources, including a loan for $1,500,000 from the State Revolving Fund program. It has been awarded a $1,000,000 EIAF grant. The district does not propose increasing user rates with this project. It does propose reclassifying current monthly supplemental fees to debt service.

# ENGINEERING REPORT COMPONENTS

## 1. PROJECT PURPOSES

The Arabian Acres is experiencing operational challenges with respect to raw water production, line losses, failing existing infrastructure, controlling equipment, freezing water lines, and raw water pumping capabilities. The District is committed to addressing these shortcomings with the existing system and in 2019 installed new water meters at each individual home as the first phase of the improvements.

The second phase of the improvements, distribution and treatment improvements, is being proposed with this project. The items proposed in this application are intended to remedy the continued challenges with the system.

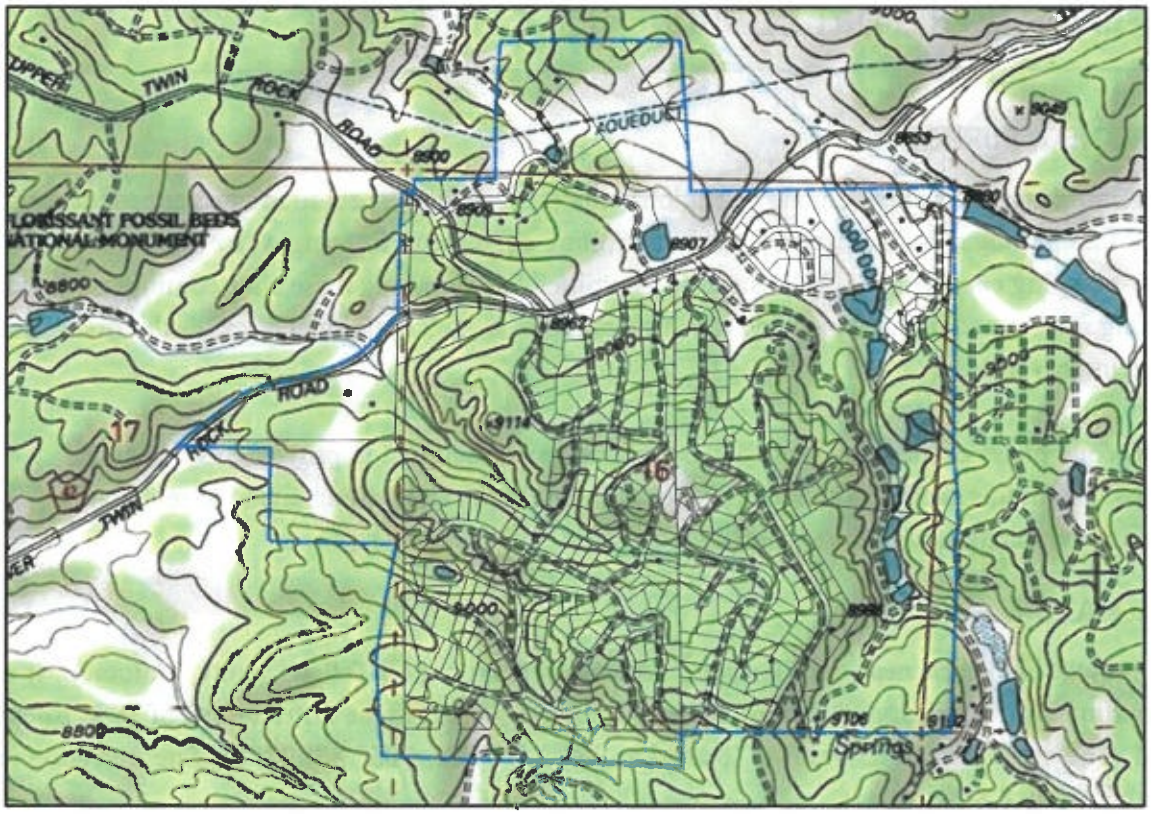
## 2. LOCATION

The project is located near the Florissant area of unincorporated Teller County, Colorado. It is approximately 3.5 miles southwest of Divide, Colorado. Access to the district is off of Twin Rocks Road. The center of the District is located at 38° 55′ 04″N, 105° 13′ 37″W. Site elevation is approximately 8,800 feet.

### 2.1. Area Map

A three-mile radius map is included in the Appendix. The following is the USGS topo map for the service area:

Figure 1: USGS Topo




## 2.2. Climate & Geography

The climate in the area is typical for the mountainous areas of Colorado. The prolonged duration of extreme cold temperatures experienced during the winter months requires special consideration when designing infrastructure, including adequate bury depths for underground pipes to prevent freezing. Elevations in the District area vary from approximately 8,800 to 9,200 feet ASL. There is a series of hydraulically connected lakes located on the east side of the District. The District's service area does not contain any mapped FEMA 100-year floodplains.

## 2.3. Local and Regional Government Coordination

This project does not call for any new treatment facilities or increases to capacities of existing facilities. As such, consultation with local and regional governmental agencies such as Teller County or Pikes Peak Area Council of Governments will not be required for this project.

# 3. SERVICE AREA

The Arabian Acres Metro District currently services most of Arabian Acres (229 lots) and some

of Trout Haven Estates (169 lots). Not all lots are developed and have a tap from the District. This includes 150 taps over a service area of approximately 0.85 square miles. It is anticipated that the boundaries of the current service area will remain unchanged for the next 20 years. Growth within the service area over that time is anticipated to be minimal (development of a few additional homes per year is expected to continue). The District has seen stagnant growth over the past few years. The full development of the total 398 lots is not probable because many estates are located on more than one lot.

Consumers in the District are predominantly single-family residences. Due to limited availability of water, the potential for water service outages, and the high cost for the District to haul water, the residents have become very efficient water users.

The water quality is generally good, and the District has not had any recent water quality compliance issues with the CDPHE, with the exception of one corrosion control sample which was due a broken chemical feed pump.

**Figure 2: District Service Area**

## 3.1 FACILITIES LAYOUT AND DESCRIPTION

Key elements of the existing distribution system include two drinking water treatment plants (Control Buildings A and B), a 38,200 gallon water storage/disinfection tank, nine wells, and distribution lines. Air relief valves, isolation valves, and blow off hydrants are also part of the distribution system.

### 3.1. Growth Potential

The District currently has 150 active taps. Applying a standard rate of 2.7 people per tap yields

405 people within the District. This appears to be a realistic estimate based upon general observations by the District's operator.

The total number of buildable lots within the District is 389 (229 for Arabian Acres Subdivision and 169 for Trout Haven Estates). Build out of the full 389 lots is not realistic because many of the homes are on more than one lot. The District anticipates that there could be about 196 homes in Arabian Acres and 108 for Trout Haven Estates, combining for a total of 304 homes.

**Table 1: Population Growth Estimate**

| | Taps: | Persons Per Tap: | Estimated Population: |
|---|---|---|---|
| Current | 150 | 2.7 | 405 persons |
| Potential Build-Out | 304 | 2.7 | 820 persons |

While the ultimate build out of the District could be as large as 304 taps, reaching that size within the 20-year planning period is unlikely. There has been stagnant growth within the District for the past few years and there is no indication of upcoming projects that would add significant growth. It is probable that a small number of homes would be added to the system each year.

## 4. EXISTING POTABLE WATER TREATMENT SYSTEM

The existing system consist of the following:

### 4.1. WELLS

There are currently nine wells installed in the District. Water from the wells is treated in two locations. Control Building A treats Wells 1, 2, 6, 7, and 8. Control Building B treats Wells 3, 4, 5R, and 9. Control Building A feeds a 38,200 gallon disinfection/water storage tank with a 2 inch line. Control Building B discharges to a 12-inch PVC pipe loop which is approximately 90 feet long prior to the distribution system entry point.

**Table 2: Well Summary**

| Well # | Well Depth (Feet) | Control Building | Initial Rating (GPM) | Approx. Current Yield (GPM) |
|---|---|---|---|---|
| 1 (Permit# 044597-F) | 120 | A | 3 | Control Building A Approximate Current Yield of 13.5 GPM (19,400 GPD) |
| 2 (Permit# 74381-F) | 300 | A | 2 | |
| 6 (Permit# 053350-F) | 300 | A | 4 | |
| 7 (Permit # 054114-F) | 400 | A | 1.5 | |
| 8 (Permit# 055182-F) | 380 | A | 3 | |
| 3 (Permit# 051210-F) | 20 | B | 5 | Control Building B Approximate Current Yield of 12.2 GPM (17,500 GPD) |
| 4 (Permit# 051408-F) | 200 | B | 1.5 | |
| 5R (Permit# 68439-F) | 600 | B | 0.75 | |
| 9 (Permit #77155-F) | 600 | B | 5 | |

Water production rates of the existing wells have decreased over the years, at times making it difficult for the system to provide enough water to the residents. The problem results from the wells needing to produce extra water to make up for the distribution losses or occasional peak flow demands from the commercial taps. Current well production capacity based on current yields from Control Buildings A and B is about 25 GPM or 36,000 GPD. If the current production rate continues and water losses are minimized, there would be an adequate volume for the District's estimated demand of 19,700 GPD.

With the exception of drilling new groundwater wells and installing booster pumps, none of the recommended alternatives of this document increase water consumption or production capabilities (production rates will go down based on water savings). JDS Hydro concluded that drilling new wells is consistent with the District's water rights plan and that up to 17 wells can be developed within the District.

## 4.2. TREATMENT BUILDINGS

Control Buildings A and B treat the raw water with a sodium hypochlorite solution. Soda ash is injected to prevent corrosion in the distribution system. The facilities consist of the buildings, flow measurement devices, and chemical metering pumps. The pumps are not flow paced and turn on and off based upon the active wells. Unlike Control Building A, Control Building B uses a bag filter to treat the raw water.

## 4.3. DISTRIBUTION NETWORK

The existing distribution lines consist of a patchwork of differently sized pipes and materials. The pipes range from 2 inch to 6 inch and the materials include polyethylene, copper, and PVC (SDR35 and C900). The system has approximately 37,600 linear feet of piping.

The original system was installed between 1972 and 1979. There were upgrades made between 1990-1996, 1999-2000, and 2009-2010. The as-built records of these improvements are not thorough or complete. It is suspected that the installation methods and bury depths are not adequate. This is supported by the disproportionate amount of line break and water loss. Also, many piping connections are glued rather than connected with mechanical joints to accommodate settlement. The District anticipates that most of the distribution network will need to be replaced.

The network is not adequately looped, resulting in dead endings of lines, freezing from stagnant water, and lack of proper mixing, and this requires the shutdown of an entire line segment when repairs are required upstream. The distribution system improvements will include additional line segments adding loops to the system and creating redundancy.

Pressure reducing valves are installed in the network to reduce line pressure where required and these perform as though they were correctly installed.

Automatic read flow meters are installed at each home. Most water meters are installed in a pit outside the home. Some homes have water meters installed inside the home.

## 4.4. CONDITION OF EXISTING TREATMENT WORKS

### 4.4.1. ANTIQUATED SYSTEM COMPONENTS

The existing treatment and distribution systems have experienced deferred maintenance and the identified components are in need of rehabilitation.

**Figure 3: Control Building A**


**Figure 4: Control Building B**

**Figure 5: Control Building B Interior**

### 4.4.2. WATER LOSS

The volume of water loss, the difference between the amount of water treated and the amount sold, continues to be a significant problem for the District. There are two types of leaks

contributing to the problem. There are line breaks that drain a large amount of water over a period of days, weeks, or months until the leak is found. The District spent $50,000 last year fixing leaks and hauling water. Due to the age of the system, a lack of proper bury depth, and improper installation techniques, the frequency of new leaks is increasing.

The following is a summary of water lost between 2006 and 2010:

**Table 3: Water Loss (2006-2010)**

| Year | Water Loss |
|---|---|
| 2006 | 35.76% |
| 2007 | 52.59% |
| 2008 | 52.17% |
| 2009 | 48.54% |
| 2010 | 33.79% |

The District's records for 2010 to the present are incomplete. There was a change of management in 2012 and the previous management did not keep adequate logs. The available records are not fully reliable. For example, the records of water produced versus water sold are not separate from each other. The District is not comfortable reporting the water loss after 2010 and it estimates that water loss from 2010 to the middle of 2014 is in the range of the 2006-2010 percentages.

Distribution systems of this size typically have water losses of 5-10%, even with newer piping. The District's water losses often exceed the acceptable rates, resulting in operational and financial problems. The water losses often make the District unable to meet the demand of its users.

If implemented, removing and replacing the existing water lines would alleviate the water loss problems. The new HDPE water lines will be more leak resilient. Solving the distribution system's water loss problem will help solve many of the District's financial problems.

## 4.5. SOURCES OF POTENTIAL CONTAMINATION

The water quality of the existing wells has been under the required MCLs. There is no agriculture or industrial operations that contaminate the wells. The proposed improvements do not increase the potential for contamination.

## 5. DRINKING WATER WELL IMPROVEMENTS

Key components and features of the system improvements include:

- Removing and replacing the two-existing control (treatment) buildings
- Removing the existing 38,200 gallon water storage tank and replacing it with a 100,000-gallon tank.
- Redrilling Well #3 and drilling new Well #10
- Install new SCADA system
- Removing and replacing portions of the existing distribution system

### 5.1. Removing and Replacing the Two Existing Control Buildings

The existing control buildings are in need of complete replacement. They were built as wooden shacks and do not have proper foundations, wood framing, or roofing. Further, components inside of the building have reached the end of their design life, are corroded, or both. The proposed project features demolishing the existing control buildings and replacing them with prefabricated fiberglass buildings manufactured offsite and delivered to the site complete with electrical and mechanical systems preinstalled. New treatment equipment will be installed inside of the proposed fiberglass buildings.

A hydraulic model of the existing system, including the wells, was created by AquaWorks DBO. The model shows that most of the existing well pumps are undersized. The well pumps convey water from the bottom of the wells to the top of the water storage tank. The undersized wells were designed to bring water from the bottom of the wells to ground level and don't account for the extra energy needed to bring the water from the ground level to the top of the water storage tank.

Remedying the situation with the undersized pumps can be achieved by installing a 5-horsepower booster pump in each of the control buildings. The booster pump will take head pressure off of the well pumps and allow them to operate on their design curve. The hydraulic model shows that the instantaneous flow rate will double from 20 GPM to 40 GPM at each location.

#### 5.1.1. Disinfection Calculations

The application proposes installing new chlorine contact loops to achieve the required disinfection. The maximum instantaneous flow will be 40 GPM at each of the two control buildings. The SCADA system will be programmed to not allow more than 40 GPM to be

pumped from the wells feeding the control buildings. Adequate contact time to meet the 4-log removal for viruses can be achieved in 120' of 10" HDPE contact piping using plug flow values. The calculations supporting this conclusion are as follows.

**Table 4: Disinfection Log Inactivation Calculations**

| | Item | Number | Unit |
|---|---|---|---|
| 1 | Peak Instantaneous Flow (at each control building) | 40 | GPM |
| 2 | Temperature | 5 | C |
| 3 | BF—Baffling Factor | 1 | |
| 4 | pH | 8 | s.u. |
| 5 | Minimum Pipe Volume | 320 | Gallons |
| 6 | TDT—Theoretical Detention Time (Volume/Flow) | 8 | Minutes |
| 7 | Actual Detention Time (TDT x BF) | 8 | Minutes |
| 8 | Chlorine Residual Concentration (minimum) | 1 | mg/L |
| 9 | Virus Log Inactivation | 4 | log |

**Table 5: Calculations Supporting a Plug Flow Baffle Factor of 1**

| Item | Number | Unit/Notes |
|---|---|---|
| HDPE DR11 (10") Pressure Rating | 200 | psi |
| Inside Pipe Diameter | 8.68 | in |
| Pipe Volume per Foot | 710 | $in^3$ |
| Pipe Volume per Foot | 3.052 | gallons |
| Pipe Loop Length | 120 | feet |
| Volume Provided | 366 | gallons |
| Length/Diameter Ratio | 165.89 | Exceeds Minimum Ratio of 160 |
| Min. Individual Segments | 28.93 | Pipe Segments of 60' Exceeds Minimum Length |

Sodium hypochlorite is used to maintain a chlorine residual in the distribution system. The amount of chlorine injected by the chlorinators into the system can be adjusted to maintain the required residual; however, the district needs to be mindful not to exceed disinfection byproduct levels.

### 5.1.2. Chlorinator Sizing Calculations

The district will install new chemical pumps of the same make and model as the existing pumps. The existing pumps are adequately sized to meet the 1 mg/L residual.

## 5.2. NEW WATER STORAGE TANK

The existing water storage tank will be replaced with a larger version. The district looked at the cost for three different sized tanks: 60,000 gallons, 80,000 gallons, and 100,000 gallons. The

incremental cost between the different tank sizes is not significant. For example, it costs 28% more for the 100,000 gallon tank than the 60,000 gallon tank; however, the capacity is 67% greater.

A final design of the tank meeting Design Criteria for Potable Water Systems is included in the design drawings.

### 5.3. WELL IMPROVEMENTS

The hydraulic model shows that adding two booster pumps will allow the well pumps to perform as designed and will double the instantaneous flow rate capacity of the wells. As such, it is not as critical to install new water sources as thought in the project's Project Need Assessment or Capital Improvement Plan.

Work at two wells is proposed with this project. Well #3 is 20' deep. It was classified on January 8, 2019, by Bryan Pickle, CDPHE's Groundwater Evaluation Specialist, as a groundwater source; however, the district is not confident it will always be classified as a groundwater well. Redrilling Well #3 deeper will improve the chances it is never reclassified as GWUDI. The district's hydrologist concluded that drilling a new well (Well #10) near Control Building A would be a cost-effective way to increase water production. The costs to connect the new well to Control Building A will be minimized, as the two are located close to each other.

A memo from the project's hydrogeologist included in the Appendix summarizes the flow testing of the existing wells and projects the amount of flow each well can produce over time.

### 5.4. NEW SCADA SYSTEM

A new cloud based SCADA system manufactured by Hightide Technologies will be installed. The SCADA system will turn the wells on and off based on the water storage tank level. The SCADA system will also turn the booster pumps on/off and report the flow rate. The SCADA system will turn wells off if either building is close to exceeding the 40 GPM used to size the disinfection piping. The three different sites will communicate via the Iridium low orbit satellite communication system. Alarms can be programmed to export to the operator's cell phone.

### 5.5. DISTRIBUTION SYSTEM IMPROVEMENTS

A design for the removal and replacement of the district's entire distribution system is included with the engineering drawings. Due to budget constraints, not all of the distribution system can be upgraded with this part of the project. The length of line replacement that can be completed will be dependent upon the unit cost in the contractor's bids.

## 6. WATER RIGHTS

The proposed project will not adversely affect the district's water rights. Please refer to the hydrologist's report in the Appendix summarizing how redrilling Well #3 and installing new Well #10 is consistent with the district's water rights plan.

## 7. FLOODPLAIN CONSIDERATIONS

The district has reviewed the current FEMA floodplain map for the location. The district is Zone X, area of minimal flood hazard and not in a 100-year floodplain.

**Figure 6: Floodplain Map**

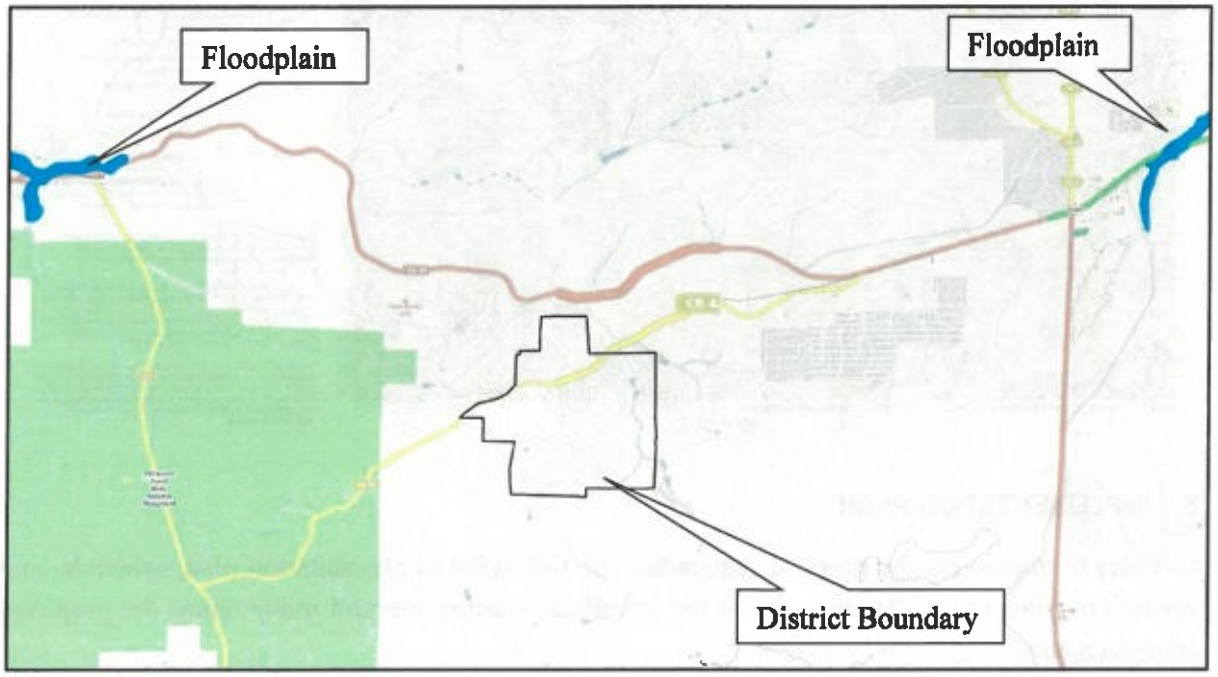
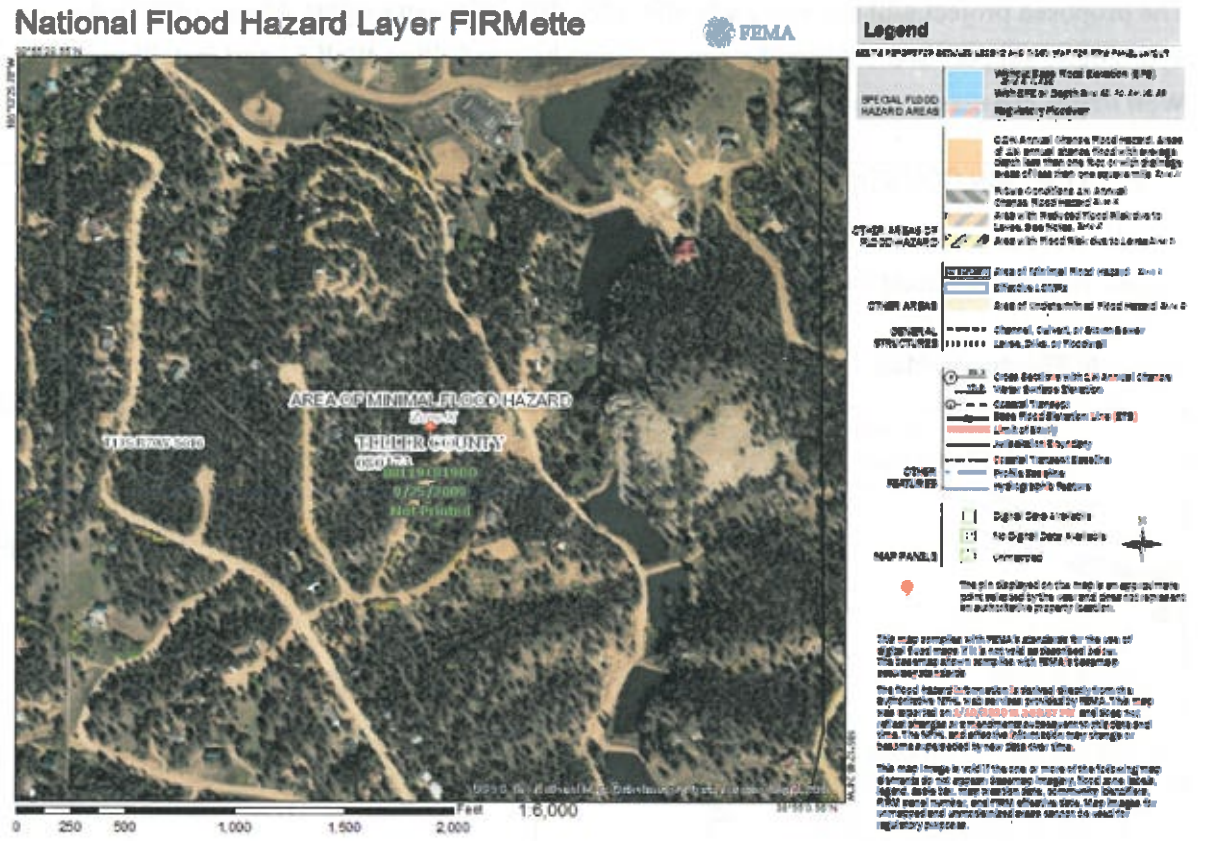


**Figure 7: FEMA 100-year Floodplain Map**




## 8. IMPLEMENTATION PLAN

In order to implement the proposed upgrades, the following implementation plan, schedule, and operations plan establishes milestones for installing, starting up, and maintaining the proposed improvements.

The district will commence construction after it has all applicable permits, weather permitting. The proposed permitting, engineering, and construction activities include:

- Completing permitting and obtaining CDPHE Construction Application approval
- Applying for $1,500,000 State Revolving Fund loan

## 9. PROJECT SCHEDULE

Construction of the improvements is anticipated to begin in the summer of 2020. The date of construction is dependent upon a number of factors, not all of which are under the control of the district.

The following milestones highlight the anticipated schedule. The final schedule is dependent upon a number of factors, such as approval time and weather:

- January 2020 — Submit Construction Approval Application
- February 2020 — Submit SRF Loan Application
- March-April 2020 — Bid Project
- May 2020 — Close SRF Loan & Sign Agreement with Contractor
- June 2020 — Begin Treatment & Distribution Improvements
- November 2020 — Complete Treatment Improvements
- November 2021 — Complete Distribution Improvements.

## 10. ENGINEER'S OPINION OF PROBABLE COSTS

The construction budget for this project is $2,500,000. The current availability and contractor pricing is extremely volatile due to a large number of projects and limited number of qualified water/wastewater contractors.

AquaWorks has prepared the following engineer's opinion of probable costs:

**Figure 8: Engineer's Opinion of Probable Costs**

| | | | | | |
|---|---|---|---|---|---|
| **Water Storage Tank Improvements** | | | | **Cost:** | **$ 299,720** |
| Water Storage Tank Addition. 100,000 gallons. Includes Site Work & Foundation. | 1 | Each | $ 205,000 | $ | 204,000 |
| Additional Tank Level Control | 1 | Each | $ 32,000 | $ | 32,000 |
| *Contractor Overhead & Profit* | *12%* | | | $ | *28,320* |
| *Bidding, SRF Administration, & Construction Engineering Consulting* | *5%* | | | $ | *11,800* |
| *Contingency* | *10%* | | | $ | *23,600* |
| **Drinking Water Treatment Improvements** | | | | **Cost:** | **$ 375,920** |
| Drilling New Well Near Control Building A | 1 | Each | $ 30,000 | $ | 30,000 |
| Redrill Well #3 | 1 | Each | $ 30,000 | $ | 30,000 |
| Well/Treatment Building Improvements (Control Buildings A & B) | 2 | Each | $ 100,000 | $ | 200,000 |
| Install Chlorine Contact Piping | 240 | Feet | $ 150 | $ | 36,000 |
| *Contractor Overhead & Profit* | *12%* | | | $ | *35,520* |
| *Bidding, SRF Administration, & Construction Engineering Consulting* | *5%* | | | $ | *14,800* |
| *Contingency* | *10%* | | | $ | *29,600* |
| **Existing Distribution System Improvements (Replacement for System Except C900 for Trout Haven)** | | | | **Cost:** | **$ 4,322,624** |
| Replace Existing Water Lines with 4" HDPE (maintain bury depth)[1] | 30,000 | Feet | $ 100 | $ | 3,000,000 |
| • Allowance for Gate Valves, Hydrants, and Air Relief Valves / Pressure Relief (10% of Line Work | 10% | | | $ | 300,000 |
| Restore Gerka Ln to Lower Gerka Ln Loop | 720 | Feet | $ 100 | $ | 72,000 |
| • Allowance for Gate Valves, Hydrants, and Air Relief Valves (10% of Line Work) | 10% | | | $ | 7,200 |
| *Contractor Overhead & Profit* | *12%* | | | $ | *405,504* |
| *Bidding, SRF Administration, & Construction Engineering Consulting* | | | | $ | *200,000* |
| *Contingency* | *10%* | | | $ | *337,920* |
| *Cost Per Foot of Water Line (includes cost per foot + 10% for valves + O&P + Construction Engineering +Contingency)* | | | | $ | 141 |
| | | | **Grand Total:** | **$** | **4,998,264** |

| **AquaWorks Recommends the Following Improvements for a $2,500,000 Project Budget** | | |
|---|---|---|
| Water Storage Tank Improvements | $ | 299,720 |
| Drinking Water Well Improvements | $ | 375,920 |
| Subtotal: | $ | 675,640 |
| Budget for Distribution System Improvements (Total Project Budget - Subtotal) | $ | 1,824,360 |
| Work on Distribution System will be bid as "Unit Price" per foot of water line. Work completed dependent upon Unit Price from contractor. | | |
| At $141 per foot (including water line, valves, O&P, Construction Engineering, Contingency) feet completed: | | 12,939 |
| At $130 per foot (including water line, valves, O&P, Construction Engineering, Contingency) feet completed: | | 14,034 |
| At $120 per foot (including water line, valves, O&P, Construction Engineering, Contingency) feet completed: | | 15,203 |
| At $100 per foot (including water line, valves, O&P, Construction Engineering, Contingency) feet completed: | | 18,244 |
| At $90 per foot (including water line, valves, O&P, Construction Engineering, Contingency) feet completed: | | 20,271 |

Completing all the work identified by AquaWorks in the capital improvement plant is estimated to cost $5,000,000, twice the proposed project budget. As such, the district has prioritized components of improvements. The district will complete the water storage tank replacement, new SCADA system, drill the two wells, replace the control buildings, and replace segments of the distribution system identified by the board of directors as having the highest priority. The linear feet of water line the district can remove and replace will not be known until contractors' bids are received. The water line will be bid on a unit cost basis (price per linear foot). The district anticipates about $1,824,360 of the construction budget will be available for distribution replacement. Several scenarios for the amount of line work to be completed are included in the opinion of cost based on possible contractor pricing. 12,939 feet out of a total 30,000 feet of line can be replaced if the bid price is $141 per linear foot.

### 10.1. Financing of Improvements

The district has already been awarded a $10,000 Planning and Design Grant, a $300,000 Design and Engineering Grant, and a $1,000,000 DOLA EIAF Grant. The $1,310,000 in grants will be matched with the $1,500,000 SRF loan for a total project budget including design fees of $2,810,000. The SRF loan application is being submitted concurrent with the Construction Application.

## 11. OPERATING CONSIDERATIONS

There are no incremental additions proposed with this project that will affect the operations of the system. In fact, the amount of operations time required will likely go down. The treatment process is very basic because it is a groundwater system with no additional treatment for contaminants. The same two chemicals will be used for disinfection and corrosion control. The operator will spend less time locating and repairing broken and leaking lines. The replacement SCADA system will improve the controls of the different wells. The additional water generated by the improved system will result in less operator involvement to make the minimum amount of water needed for the residents.

## 12. RESIDUALS HANDLING PLAN

Not applicable. The project will not generate residuals.

## 13. STAFFING AND OPERATOR CERTIFICATION

The system is classified as a community water system and must be operated in accordance with CDPHE policies. The water system's Operator-in-Responsible Charge is a contract operator, Lynn Willow, and maintains an "S" certification (#20621) and "C" (#26174). His certifications meet the requirements for this project.

# REFERENCES


Colorado Department of Public Health and Environment, Water Quality Control Division (May 1, 2015). *Colorado Primary Drinking Water Regulations, Regulation No. 11.*

Colorado Department of Public Health and Environment, Water Quality Control Division (September 1, 2013). *Design Criteria for Potable Water Systems.*

Colorado Department of Public Health and Environment, Water Quality Control Division. *New Water System Capacity Planning Manual.*

United States Environmental Protection Agency (2017). *Safe Drinking Water Information System (SDWIS).* Retrieved January 10, 2020 from https://enviro.epa.gov/enviro/sdw_report_v3.first_table?pws_id=CO0160075&state=CO&source=Ground%20water&population=325&sys_num=0