

## 7.0 PROPOSED PROJECT

### 7.1 Preliminary Project Design

Chapters 5 and 6 provided a detailed analysis of all feasible alternatives and the selection of the preferred alternative. The following subsections are presented to provide a more detailed discussion of the preferred alternatives. The preferred improvements for the water system at this time include:

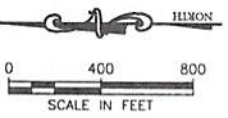
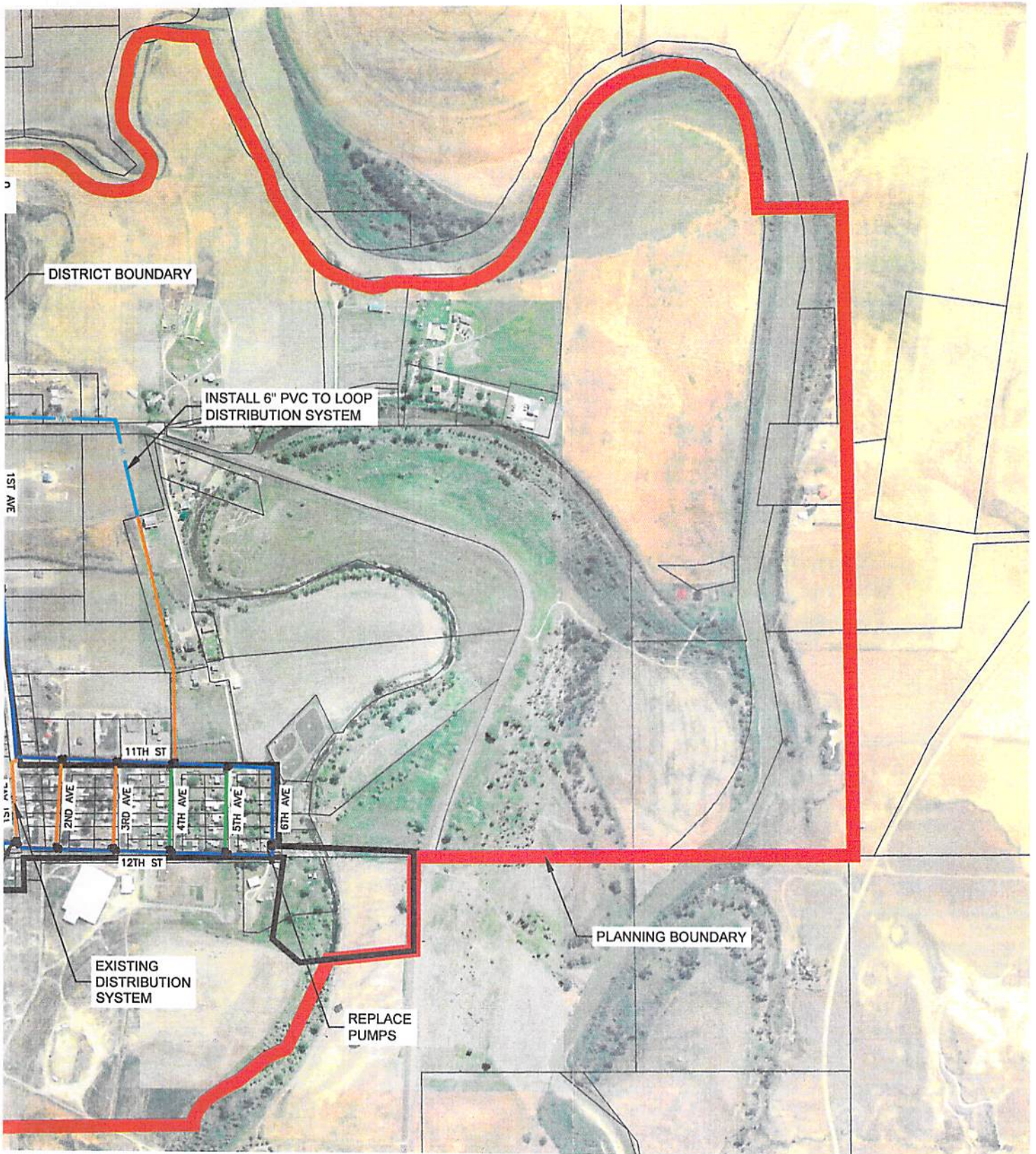
- Alternative S-1: Replace Existing Well and Chemical Feed Pumps
- Alternative ST-1: On-Grade Bolted Steel Storage Tank
- Alternative D-1: Replace Valves and Fire Hydrants
- Alternative D-2: Distribution System Looping

Figure 7-1 presents the location of proposed improvements. Actual design criteria and applicable regulations were discussed in detail in Chapter 5. The proposed alternative will be designed and constructed to meet all design criteria, including Circular DEQ-1. Plans and specifications will need to be reviewed and approved by the Montana Department of Environmental Quality prior to bidding and construction.

#### 7.1.1 Water Supply

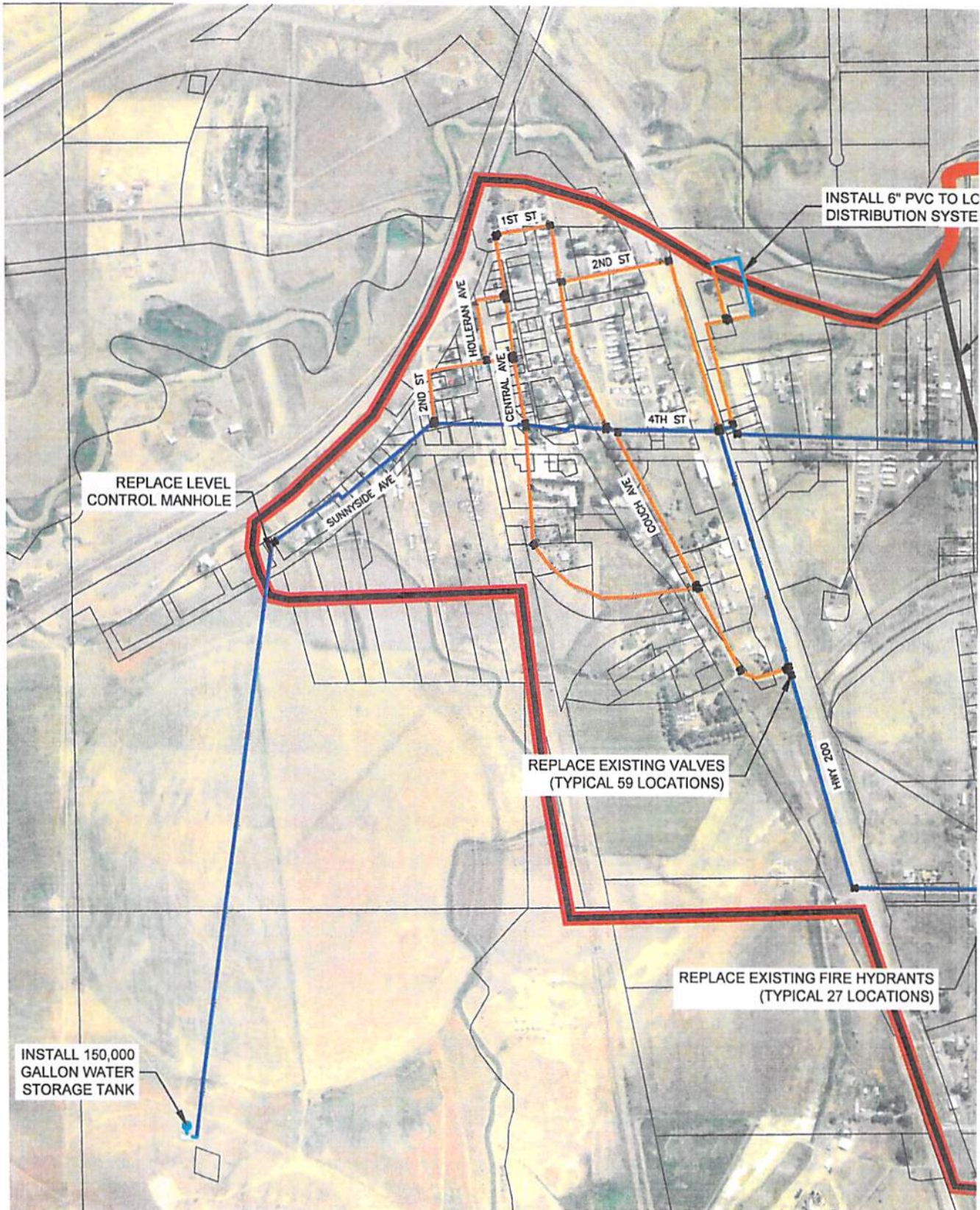
The proposed project includes replacement of the existing well pumps and chemical feed pumps, as well as installation of a new flow meter in the District's existing pumphouse. The well pumps will be sized to meet design year maximum day demands, at a minimum, estimated to be 253 gpm. The capacity existing pumps, based on information in the Source Water Delineation and Assessment Report (Appendix N), is 275 gpm and 325 gpm.

Replacing the well supply pumps and chemical fee pumps will reduce the constant maintenance burden for the District and provide a more reliable water source for its users. One well pump is believed to be leaking and there is loud noise and vibration that occurs any time the pumps kick on. Completion of this alternative will remedy these issues and ensure a safe drinking water supply can continue to be distributed to the community.



**Figure 7-1**  
**Proposed Water System Improvements**  
**Project**  
 VAUGHN CASCADE COUNTY WATER AND SEWER DISTRICT  
 2018 WATER SYSTEM IMPROVEMENTS PER

F:\1-17335-Vaughn Water\CADD\_1-17335\Exhibits\PER\1-17335-Figure 7-1-Proposed Water System Improvements Project.dwg



**LEGEND:**

- EXISTING 8" PVC ———
- EXISTING 6" PVC ———
- EXISTING 3" PVC ———
- EXISTING GATE VALVE ⊠
- EXISTING FIRE HYDRANT ⊙



### 7.1.2 Treatment

The recommended project does not include treatment system improvements.

### 7.1.3 Storage

The proposed alternative includes constructing a new 150,000-gallon glass-lined bolted steel storage tank adjacent to the existing tank.

Glass-lined bolted steel tanks have a typical design life of around 40 years and do not require re-coating. The initial tank coating is applied in a controlled environment at the factory and operation and maintenance costs are minimized. The glass coating forms a hard, chemically inert layer that protects the steel surface from corrosion. Glass-lined steel tanks can be expanded if needed in the future and generally have lower life cycle costs than other types of steel tanks. In glass-lined tanks, vertical and horizontal seams have to be resealed every 20 years.

Vaughn's existing storage tank is undersized in terms of meeting existing, future, and fire flow demands. DEQ requires a minimum storage capacity equal to the average day demand plus fire flow demand. Fire demand is based on satisfying the governing fire protection agency recommendation and fire codes. A discussion with the local fire chief, Jason McAllister, indicated the fire department's ability, based on truck capacity, to provide around 3,500 gpm. However, a hydraulic water model of the existing system shows that only approximately 1,000 gpm can be provided at most locations throughout the distribution system.

Vaughn is comprised primarily of residential dwellings with some small businesses and a school. The NFPA Uniform Fire Code, adopted by the State of Montana, states that fire flow of 1,000 gpm should be provided for one and two-family dwellings not exceeding 3,600 square feet, but also states that fire flow requirements can be modified by the authority having jurisdiction "*in rural areas or small communities where the development of full fire flow requirements is impractical*".

The recommended minimum fire flow for the existing system in Vaughn is 1,000 gpm for 2-hours. This equates to 120,000 gallons. When added to the projected average day flow, the minimum tank size required for Vaughn is approximately 241,000 gallons, which is about 150,000 gallons more than the existing storage capacity. Accordingly, proposed project includes a new 150,000-gallon storage tank. As noted, the preferred type of tank is glass-lined bolted steel, which is expandable. In future phases of work, the District may consider upgrading its transmission main

and distribution system to accommodate greater fire flows, at which point they may also consider increasing storage capacity.

#### **7.1.4 Pumping Stations**

Other than the pumps at the well, the existing water system does not include any pumping stations and the recommended improvements do not propose the addition of a pumping station.

#### **7.1.5 Distribution System**

The proposed distribution system improvements include the replacement of approximately 59 gate valves and 27 fire hydrants throughout the distribution system. The project will also include the installation of 1,850 lineal feet of 6" diameter PVC main to complete some system loops and eliminate dead-end mains.

### **7.2 Project Schedule**

It is anticipated that project funding will be awarded in May 2019 and available for use in July 2019, at which point design will begin. Submittals to MDEQ will be made in October 2019 and necessary approvals obtained by December 2019. The project would then advertise for bids in January 2020 and award of a construction contract could be expected in March 2020, followed by initiation of construction in May 2020. It is anticipated that substantial completion would be achieved by August 2020, with final completion and initiation of operation in September 2020. Chapter 8 includes a detailed implementation schedule.

### **7.3 Permit Requirements**

Permits from MDT, Cascade County, and possibly private landowners are anticipated for construction of the new gate valves, hydrants, and system looping. Construction permits will likely include a Stormwater Pollution Prevention Plan (SWPPP) and Dewatering, which will be the responsibility of the selected contractor.

### **7.4 Sustainability Considerations**

Replacement of aging and deteriorated water system infrastructure is a sustainable utility management practice that aids in creating a resilient utility and provides social, economic, and environmental benefits. By replacing the existing pumps for the water supply system, the District

will ensure its ability to continue providing safe drinking water to its users. Providing adequate storage facilities ensures the local fire department's ability to provide fire protection for the residents in Vaughn. Increased storage capacity will provide an economic benefit in that the ability to contain fires will result in less damage to structures. The current risks of contamination associated with a potential backflow event that could result due to the system draining during a main break because of the inability of isolating the system will be significantly reduced by the proposed improvements. And, finally, the current risks of contamination associated with dead-end mains and risks of limited fire flows due to dead-end mains will also be reduced.

#### **7.4.1 Water and Energy Efficiency**

Water and energy usage in the District's water system will not change substantially with the implementation of this project; however, the improvements may result in some conservation of energy with the use of more energy efficient pumps. The installation of new gate valves will provide the operators the tools they need to be able to isolate the system in the event of a main break that needs repaired. Effective system isolation will prevent the 91,000-gallon tank and the distribution system from draining completely, resulting in conservation of one of the State's valuable resources.

#### **7.4.2 Green Infrastructure**

Stormwater management during the project will include temporary erosion and sediment control measures including the installation and maintenance of temporary structural control measures to reduce or eliminate the erosion of soil and transport of sediment offsite as result of construction activities.

### **7.5 Total Project Cost Estimate**

Table 7-1 provides an itemized estimate of the project cost based on the stated period of construction. This estimate includes construction, legal, engineering, construction management, funding administration, interest, construction contingency, and other costs associated with the proposed project. The construction subtotal is separated out from the non-construction costs. The non-construction subtotal is included and added to the construction subtotal to establish the total project cost. An appropriate construction contingency of 10% is added as part of the non-construction subtotal.

Table 7-1 – Opinion of Probable Cost – Proposed Water System Improvements

| Opinion of Probable Cost<br>PER for Vaughn Cascade County Water and Sewer District Water System Improvements<br>Proposed Water System Improvements |   |       |       |                         |                     |
|--|---|-------|-------|-------------------------|---------------------|
| #  | BID ITEM  | QTY   | UNITS | UNIT PRICE <sup>1</sup> | TOTAL               |
| 1  | Exploratory Excavation                              | 100   | HR    | \$ 250.00               | \$ 25,000           |
| 2  | 6" PVC Water Main                                   | 1,850 | LF    | \$ 50.00                | \$ 92,500           |
| 3  | 3" Gate Valve                                       | 4     | EA    | \$ 800.00               | \$ 3,200            |
| 4  | 6" Gate Valve                                       | 34    | EA    | \$ 1,600.00             | \$ 54,400           |
| 5  | 8" Gate Valve                                       | 23    | EA    | \$ 2,000.00             | \$ 46,000           |
| 6  | 6" Fire Hydrant with Auxiliary Valve                | 27    | EA    | \$ 5,000.00             | \$ 135,000          |
| 7  | 6"x3" Tee   | 2     | EA    | \$ 500.00               | \$ 1,000            |
| 8  | 6"x6" Tee   | 15    | EA    | \$ 600.00               | \$ 9,000            |
| 9  | 6"x8" Tee   | 10    | EA    | \$ 700.00               | \$ 7,000            |
| 10   | 6" 90° Bend   | 4     | EA    | \$ 600.00               | \$ 2,400            |
| 11   | 3/4" PE Water Service                               | 200   | LF    | \$ 35.00                | \$ 7,000            |
| 12   | Connect to Existing Water Main                      | 4     | EA    | \$ 1,500.00             | \$ 6,000            |
| 13   | 150,000-Gal. On-Grade Bolted Steel Glass Lined Tank | 1     | LS    | \$ 260,000.00           | \$ 260,000          |
| 14   | Tank Mixer  | 1     | LS    | \$ 10,000.00            | \$ 10,000           |
| 15   | Site Work and Excavation                            | 1     | LS    | \$ 30,000.00            | \$ 30,000           |
| 16   | Site Piping   | 1     | LS    | \$ 10,000.00            | \$ 10,000           |
| 17   | Level Transmitting Manhole                          | 1     | LS    | \$ 10,000.00            | \$ 10,000           |
| 18   | Telemetry System                                    | 1     | LS    | \$ 40,000.00            | \$ 40,000           |
| 19   | Tank Site Fittings & Valves                         | 1     | LS    | \$ 7,000.00             | \$ 7,000            |
| 20   | Fencing   | 400   | LF    | \$ 25.00                | \$ 10,000           |
| 21   | Tank Site Electrical                                | 1     | LS    | \$ 10,000.00            | \$ 10,000           |
| 22   | Vertical Turbine Pump                               | 2     | EA    | \$ 20,000.00            | \$ 40,000           |
| 23   | Chemical Feed Pumps                                 | 1     | LS    | \$ 15,000.00            | \$ 15,000           |
| 24   | Flow Meter  | 1     | EA    | \$ 6,000.00             | \$ 6,000            |
| 25   | Pumphouse Electrical                                | 1     | LS    | \$ 10,000.00            | \$ 10,000           |
| 26   | Type "A" Surface Restoration                        | 600   | SY    | \$ 45.00                | \$ 27,000           |
| 27   | Type "B" Surface Restoration                        | 600   | SY    | \$ 10.00                | \$ 6,000            |
| 28   | Type "C" Surface Restoration                        | 2,000 | LF    | \$ 8.00                 | \$ 16,000           |
| <b>Direct Construction Subtotal</b>  |   |       |       |                         | <b>\$ 896,000</b>   |
|  | Mobilization  |       | 10.0% |                         | \$ 90,000           |
|  | Traffic Control                                     |       |       |                         | \$ 13,000           |
|  | Contingency   |       | 10%   |                         | \$ 90,000           |
| <b>Construction Subtotal</b>   |   |       |       |                         | <b>\$ 1,089,000</b> |
|  | 2020 Construction Cost <sup>2</sup>                 |       | 3.10% |                         | \$ 1,158,000        |
|  | Right-of-Way & Permits                              |       |       |                         | \$ 5,000            |
|  | Land Acquisition                                    | 0.5   | Acre  | \$ 25,000.00            | \$ 12,500           |
|  | Geotechnical Investigation                          |       |       |                         | \$ 10,000           |
|  | Engineering   |       | 20%   |                         | \$ 218,000          |
|  | Legal & Administrative                              |       | 5%    |                         | \$ 54,000           |
| <b>TOTAL</b>   |   |       |       |                         | <b>\$ 1,457,500</b> |

<sup>1</sup> Estimated unit costs are based upon estimates from suppliers and bid tabs for similar projects throughout Montana.

<sup>2</sup> The ENR 20-year average Construction Cost Index is +3.1%, so capital costs are projected to an anticipated construction date in 2020 using a yearly 3.1% inflation rate.

## 7.6 Annual Operating Budget

Table 7-2 provides a summary of the District's operating expenses for 2017. The District's budget is based on previous years expenses.

**Table 7-2 - Operating Expenses**

| Operating Expenses        |                    |
|---------------------------|--------------------|
| Water Expenses            | Amount             |
| Water Payroll             | \$47,460.12        |
| Operating Expenses        | \$17,568.27        |
| Operating Supplies        | \$6,598.29         |
| Property Taxes & Licenses | \$102.50           |
| Utilities                 | \$9,403.52         |
| Professional Services     | \$453.00           |
| Insurance & Bonds         | \$2,118.50         |
| Interest Expense - Water  | \$5,982.30         |
| <b>Total Expenses</b>     | <b>\$89,686.50</b> |

### 7.6.1 Income

Income and expenditures for the water system, including operations and maintenance, are included in the water account under the District's accounting system. Currently, the District charges a base rate of \$36.13 per month for residential usage and \$47.22 per month for commercial usage. Collection of rates and charges accounts for almost all the District's revenue, although they do make some income on bulk water sale, investment earnings, and miscellaneous fees. Revenues for the past three years are tabulated in Table 7-3, below.

**Table 7-3 - Existing Water System Revenues**

| Existing Water System Revenues |               |               |               |
|--------------------------------|---------------|---------------|---------------|
| Description                    | 07/15 - 06/16 | 07/16 - 06/17 | 07/17 - 06/18 |
| Water Revenues                 | \$94,649.93   | \$99,786.92   | \$94,555.58   |



### 7.6.2 Annual O&M Costs

Table 7-4 provides the estimated O&M costs associated with the proposed project. The total annual O&M related to the project is a result of the new storage tank and is estimated to be \$5,300. The water system expenses averaged over a three-year span from 2015 to 2018 were approximately \$84,000. It should be noted that the average is slightly higher when considering over \$36,000 in professional expenses that were expended in 2015 for the water system. This is not typical and therefore a portion of this expense is disregarded. The total annual expenses for operation and maintenance of the water system after implementation of the project are expected to be approximately \$89,300.

**Table 7-4 - Opinion of Probable Annual Operation and Maintenance Costs - Alternative ST-1 On-Grade Bolted Steel Storage Tank**

| Opinion of Probable Annual Operation & Maintenance Costs<br>PER For Vaughn Cascade County Water And Sewer District Water System Improvements<br>Alternative St-1 - On-Grade Bolted Steel Storage Tank |                             |     |       |             |                    |
|---|-----------------------------|-----|-------|-------------|--------------------|
| #   | ITEM                        | QTY | UNITS | UNIT PRICE  | TOTAL              |
| 1   | Salaries/Benefits           | 100 | HR    | \$ 20.00    | \$ 2,000           |
| 2   | Administration              | 10  | HR    | \$ 20.00    | \$ 200             |
| 3   | Office Expenses/Training    | 1   | LS    | \$ 250.00   | \$ 250             |
| 4   | Tank Cleaning and Sealant   | 1   | LS    | \$ 2,000.00 | \$ 2,000           |
| 5   | Replace Cathodic Protection | 1   | LS    | \$ 300.00   | \$ 300             |
| 6   | Reserve                     | 1   | LS    | \$ 500.00   | \$ 500             |
| <b>TOTAL</b>  |                             |     |       |             | <b>\$ 5,300.00</b> |

### 7.6.3 Debt Repayments

The District currently pays \$1,614/month (\$19,368/year) for a loan on its water system. The total annual debt service for the proposed project is \$17,330.

### 7.6.4 Reserves

#### *Debt Service Reserve*

SRF requires a bond reserve in the amount of ½ year's payment. For the proposed project the SRF Bond reserve is estimated to be \$7,100.

*Short-Lived Asset Reserve*

Short-lived assets are included as part of the O&M costs. Therefore, there are no additional reserve requirements to be included as part of the project costs.