City of Dover

Draft
Water Facilities Plan

October 21, 2016

Prepared By:
T-O ENGINEERS
West 280 Prairie Avenue
Coeur d'Alene, ID 83815
Office: (208) 762-3644

Table of Contents

Appendices

1. Introduction

1.1. Purpose and Need

The purpose of this report is to review and evaluate the City of Dover's Public drinking water system (PWS #ID1090193) and develop alternatives to resolve any problems and meet the long-term needs of the community. The primary focus of this report is to develop a long-term plan that ensures compliance with Idaho Department of Environmental Quality (IDEQ) Rules, preserve the health of the public, and result in an overall benefit to the community. This plan is meant to update and supplement the City of Dover Water System Facility Plan prepared by Tate Engineering Inc., dated February 2014.

1.2. Plan of Study

This facilities plan identifies alternatives to address deficiencies found with the existing water supply, treatment and distribution system and provides guidance for future projects to accommodate growth. It has been prepared utilizing the IDEQ Facility Plan Outline and Checklist and covers the following items which are broken down in the table of contents:

- Existing Conditions
- Existing Water System
- Future Conditions
- Development and Screening of Alternatives
- Selected Plan Description and Implementation

This facilities plan will also investigate the feasibility of Dover selling water to the Syringa Heights Water District (SHWD), which currently purchases its water from the City of Sandpoint. SHWD is currently conducting their own Facilities Planning Process, with the help of James A. Sewell and Associates (JAS). This report will refer to the SHWD Draft Water Facilities Plan (JAS 2016) for all information related to the SHWD.

1.3. Background

The City of Dover was incorporated in 1988 to facilitate improvements to the water system that served the unincorporated community of Dover. The City of Dover's water system now serves approximately 265 equivalent residential units (ERUs), including

129 ERUs within its original boundaries (Non-Dover Bay) and 136 ERUs within the Dover Bay Development. SHWD currently serves 185 ERUs.

The water source for the City of Dover is the Pend Oreille River. The majority of the City's current water infrastructure was constructed in 1991, including a raw water intake, slow sand filtration system (two filter bays), and water storage reservoir. In 1998 the water system was expanded to serve the 25-lot Cedar Ridge development, which is considered part of the Non-Dover Bay area. This expansion included two (2) water booster stations and a 43,000 gallon reservoir. In 2007 two (2) additional filter bays, doubling the treatment capacity, were added to the slow sand filtration system. In 2009 the City's reservoir was expanded to 354,000 gallons with the addition of baffling. These upgrades were triggered by the Dover Bay Development, a 600 unit planned unit development within the City of Dover. Sanitary restrictions for the lots in the Dover Bay Development were implemented to minimize the effects of rapid development on existing customers. Sanitary restrictions on the water system were partially lifted in May 2013, when IDEQ agreed that the treatment capacity of the existing system could serve up to 95 ERUs in Non-Dover Bay plus up to 482 ERUs in the Dover Bay Development. The 2014 Water System Facility plan recommended a new water intake, expansion of the slow sand filtration facility, increased water storage, new transmission piping and standby power to serve an estimated build-out of 1100 ERUs.

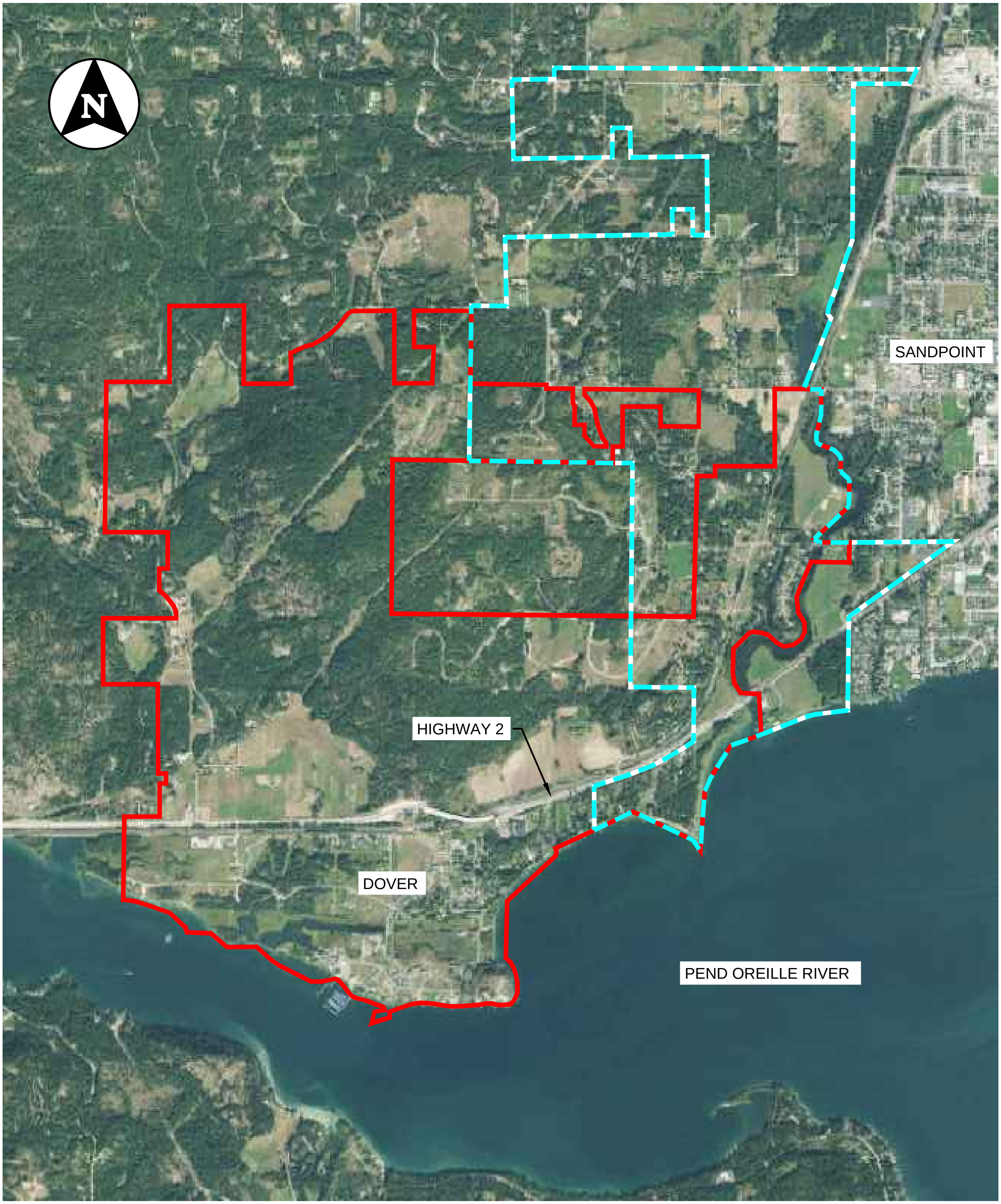
In 2015, the City applied for a FY16 Drinking Water Planning Grant to update the Water System Facility Plan that was completed in 2014.

2. Existing Conditions

2.1. Planning and Project Area Boundaries

The planning and project area includes the Dover city limits, which encompass an area of approximately four (4) square miles. The City of Dover is located approximately 3 miles west of Sandpoint along the Pend Oreille River, near the outlet of Lake Pend Oreille, in Bonner County, Idaho. The project and planning area also includes the Syringa Heights Water District (SHWD) boundary, portions of which overlap the Dover City limits. See **Figure 2-1** for a map showing the project and planning area boundaries.

FIGURE 2-1: PROJECT AND PLANNING AREA MAP



SCALE: N.T.S.

LEGEND:

EXISTING SYRINGA HEIGHTS WATER DISTRICT BOUNDARY

DOVER CITY LIMITS

T-O ENGINEERS
280 W. PRAIRIE AVENUE
COEUR d'ALENE, IDAHO 83815-7710
PHONE: (208) 762-3644 FAX: (208) 762-3708

E-FILE: 150200/ACAD/SHEETS/EXHIB DATE: FEB 2016 JOB: 150200

2.2. Existing Environmental Conditions

2.2.1. ***Physiography, Topography, Geology, and Soils***

The project and planning area sits along the north shore of the Pend Oreille River along State Highway 200. The City is located within parts of Sections 19, 20, 21, 28, 29, 30, 31 and 32, Township 57 North, Range 2 West. The SHWD is located in parts of Sections 16, 17, 20, 21, 28 and 29, Township 57 North, Range 2 West (JAS 2016).

The majority of the City and SHWD, between SH-2 and the river is relatively flat. North of SH-2 there is more mountainous topography, especially in the Cedar Ridge and Syringa Heights areas. Elevations within the planning area range from 2060 feet at the Pend Oreille River shoreline to 2515 feet at the upper end of Cedar Ridge.

The Natural Resource Conservation Service (NRCS) Web Soil Survey maps and soil descriptions indicate that the majority of the planning area consists of Pend Oreille Silt Loam (approximately 50%) and Mission Silt Loam (approximately 30%). The Pend Oreille soils dominate the more upland areas north of SH-2 and were formed in glacial till from granitic and metamorphic rock. The Mission soils dominate the lowland areas along the river and were formed in glacial lake laid sediment derived from volcanic ash and loess. The mountainous areas include Pend Oreille and Treble Rock Outcrop associations.

2.2.2. ***Surface and Ground Water Hydrology***

The City of Dover sits on the shores of the Pend Oreille River, which also serves as the source of the City's water. The river in this area is controlled by the Albeni Falls Dam, located approximately 23 miles downstream. River elevation is controlled by the dam and ranges between a winter low of 2051 feet and a normal full pool of 2062.5 feet. There are currently draft Total Maximum Daily Loads (TMDLs) in the Idaho portion of the river for both Temperature and Total Dissolved Gas (TDG). The Washington State Department of Ecology lists the Pend Oreille River on its 1998 list of impaired water bodies (303(d) List) for Temperature and TDG.

Syringa Creek runs through SHWD and discharges to the Pend Oreille River on the east edge of the City of Dover. Hornby Creek runs along the west edge of the City of Dover, also discharging to the Pend Oreille River.

The City of Dover has an NPDES permit (ID-002769-3) for discharge of treated effluent from their wastewater treatment facility to the Pend Oreille River. The outfall is located approximately two miles downstream of the City's drinking water system raw water intake.

*2.2.3. **Fauna, Flora, and Natural Communities***

A USFWS IPAC Trust Resource Report has been generated for the planning area. This report lists Bull Trout (threatened) as the only threatened or endangered species in the planning area. There are no critical habitats or refuges listed in the planning area. A total of 13 migratory birds of conservation concern are listed including the Bald Eagle, Black Swift, and Cassin's Finch among others.

*2.2.4. **Housing, Industrial and Commercial Development***

Historically, housing growth in the City was limited and sporadic. With the Dover Bay development, housing growth has been more rapid, with the development nearly tripling the size of the original City. Commercial development in Dover is limited, with 31 water connections classified as commercial. About half of these are condominium associations. There is one industrial water user in the City; Thorne Research a manufacturer of vitamins and supplements, which employs approximately 120 people.

*2.2.5. **Utility Use***

The City of Dover is the water and sewer provider for the majority of the planning area. The Syringa Heights area is on City of Dover sewer but is provided water by the SHWD, which currently buys its water from the City of Sandpoint. Power and gas in the project planning area are supplied by Avista and telephone service is provided by Frontier Communications.

*2.2.6. **Floodplains/Wetlands***

According to the U.S, Fish and Wildlife Service (USFWS) National Wetlands Inventory, wetlands that exist within the City and SHWD boundaries include freshwater emergent, freshwater forested shrub, freshwater pond and open water. A wetland delineation plan has been created for the City of Dover and approved by the U.S. Army Corps of Engineers (USACE). This plan, prepared by James A. Sewell and Associates will be used in conjunction with any proposed improvements.

*2.2.7. **Wild/Scenic Rivers***

Congress established the National Wild and Scenic Rivers System in 1968, as a method and standard through which rivers in the United States may be identified and protected [Wild and Scenic Rivers Act (16 USC 1271-1287)]. According to the National Wild and Scenic Rivers website none of the designated rivers are near the project planning area. The nearest river designated as Wild and Scenic is the St. Joe River, located south of Coeur d'Alene (NWSRA 2015).

The Idaho Department of Lands regulates activities that encroach on the shores of Lake Pend Oreille (http://www.idl.idaho.gov/lakes-rivers/lake-protection/) through the Idaho Lake Protection Act. Any encroachment below Ordinary High Water Mark (OHWM) will require an encroachment permit from the Idaho Department of Lands which is obtained through a US Corps of Engineers Joint Application 404 Permit, as well as Idaho Department of Water Resources approvals.

*2.2.8. **Public Health and Water Quality Considerations***

Protection of the Pend Oreille River, as the source water for the City of Dover, will be considered during construction of any proposed improvements. Protection of existing water mains and other water infrastructure from contamination during construction will also be considered. Construction practices including flushing, disinfection and bacteriological testing of new water mains and facilities will be implemented.

*2.2.9. **Proximity to Sole Source Aquifer***

A sole source aquifer (SSA), as defined by EPA, is the principal or sole source of groundwater for the area which overlays the designated aquifer and supplies at least 50 percent of the drinking water consumed in a specified area. These designated areas (SSAs) may also have no alternative source of drinking water available for groundwater withdrawals. The SSA designation is authorized by section 1424(e) of the Safe Drinking Water Act of 1974 (Public Law 93-523, 42 U.S.C. 300 et seq.). The EPA has designated 14 SSAs in Region 10, a region which includes the states of Alaska, Idaho, Oregon, and Washington. The Spokane Valley/Rathdrum Prairie SSA northern boundary is located approximately 12 miles south of the Dover project planning area and therefore is not located in close proximity to the project site.

*2.2.10. **Land Use and Development***

There are five (5) zoning districts within the City of Dover. These include mostly Agricultural and Rural north of the SH-2 corridor, with the exception of the Syringa Heights area which is zoned Suburban. All of the area south of SH-2 is zoned Residential, except for a Commercial corridor 220' either side of SH-2, from the west edge of Dover Tracts east to the 29/30 Section line.

*2.2.11. **Precipitation, Temperature and Prevailing Winds***

Weather data from the Sandpoint Experiment Station, located about 3 miles northeast of Dover lists average annual precipitation at 32.0 inches and average annual snowfall at 70.3 inches. The lowest average minimum temperature of 20.2 degrees F occurs in January and the highest average maximum temperature of 82.1 degrees F occurs in July. Prevailing winds are most often out of the southwest with a typical range of 0-13 mph.

2.3. Existing Water System

2.3.1. ***Water Source***

The source of water for the City of Dover is the Pend Oreille River. The City's raw water intake is located approximately 1900 feet from the shoreline at a depth of approximately 56 feet at summer pool level. The intake consists of a stainless steel well screen connected to approximately 1560 feet of 6-inch HDPE pipeline. The pipeline is connected to two 8-inch PVC pump sleeves each with a 5 HP submersible intake pump. The pumps are approximately 293 feet from the pump control vault, which is located on the shoreline above the high water mark. The pumps have approximately 12 feet of submergence at summer pool elevation (2061') and can operate at their full rated capacity of 185 gallons per minute (gpm) each. The pumps only have 2.5 feet of submergence at low lake level (2051.5') during the winter, limiting capacity to approximately 100 gpm each.

The City installed flow meters inside the pump control vault for each pump during March and April of 2015. Pressure gauges were also installed on each pump discharge line. The City replaced Pump #2 in April 2015 when the existing pump impeller was found to be damaged.

IDEQ's Sanitary Survey report dated October 3, 2012 mentioned that raw water pump replacement has been an ongoing problem and may be attributed to pump cavitation during periods of low lake levels. This apparent problem was remedied in the past by throttling the gate valve in the pump vault down to about 60 gpm in the winter. T-O completed an analysis of the intake system during April of 2015. This analysis concluded that there is adequate Net Positive Suction Head (NPSH) available at the pump at the low lake level even at full pumping capacity, so cavitation should not be occurring. However, vortexing (drawing air into the pump) at low lake levels may be occurring. The pumps should have approximately 4 feet of submergence to avoid vortexing at their full rated capacity. With 2.5 feet of submergence available at low lake levels, the pumps must be throttled to about 100 gpm to avoid vortexing.

On June 30, 2016 the State of Idaho Division of Building Safety (DBS) issued a technical memorandum entitled The Permanent Installation of Directly Connected Submersible Well Pumps in Bodies of Water. The DBS has enacted new policy requirements applicable to submersible well pumps installed in open water bodies due to concerns with the hazards associated with utilizing these pumps in a method not intended by the pump manufacturers. This policy is considered interim until a negotiated rulemaking process can be completed. The interim policy includes numerous provisions related to electrical equipment and transformers; location of service equipment; electrical connections; wiring methods; submersible equipment power connections; and ground-fault circuit-interrupter (GFCI) protection. A copy of the policy can be found in **Appendix A**. Whether these types of installations will even be allowed long term is yet to be determined as the State of Idaho goes through the rulemaking process.

2.3.2. ***Water Treatment Facility***

Water treatment consists of slow sand filtration followed by chlorination. The slow sand filter consists of four (4) filter bays. The two (2) original filter bays, at 672 SF each, were constructed in 1992 and re-sanded in 2007. Two (2) new filter bays, at 697 SF each, were constructed in 2007. Filter flow rate is manually controlled by butterfly valves on the effluent side of each filter, which discharge to two (2) clear wells. In accordance with IDEQ's Rules for Public Drinking Water Systems, the maximum filtration rate cannot exceed 0.1 gpm/sf for each individual bed. Thus the design capacity of the existing system with one (1) filter off line is 204 gpm or 293,760 gallons per day (gpd).

Following filtration, water is transported from each clear well to the storage reservoir using two (2) 15 HP pumps, rated at approximately 200 gpm each. A spare 7.5 HP pump is also available as a backup. Sodium hypochlorite solution injection occurs at each pump discharge using two (2) Pulsatron flow-regulated metering pumps. Chlorine contact time is provided through 8,000 feet of 8-inch dedicated feed line to the reservoir, with additional contact time in the baffled, flow-through 354,000 gallon reservoir.

IDEQ's Sanitary Survey report, dated October 3, 2012, recommends a more accurate method of measuring filtration rates at the plant. Flow through each filter is currently estimated using the piezometers on the clear wells with a flow test methodology that includes isolating the clear well and filter bay being tested, monitoring the fill rate of the clear well, calculating the flow, then throttling the filter discharge valve to achieve the desired flow. While accurate, this method is labor intensive. Other IDEQ recommendations included security improvements at the treatment facility and raw water turbidity monitoring.

2.3.3. ***Distribution System***

2.3.3.1. Storage Reservoirs

Water from the treatment plant is pumped to a 354,000 gallon concrete storage reservoir at an elevation of approximately 2250 feet, or 180 feet above the treatment plant. The reservoir was expanded to its present size in 2009, with baffling added to the inside. A second reservoir, which serves the Cedar Ridge area, is fed from the main reservoir by booster pumps. The Cedar Ridge reservoir has a volume of 43,000 gallons at sits at an elevation of approximately 2510 feet. Currently there are manual valves in place that allow the Cedar Ridge reservoir to back feed to the City's main reservoir, providing a total available storage volume of 397,000 gallons.

IDEQ's Sanitary Survey report, dated October 3, 2012 expressed concern that there is no check valve on the supply main to the 43,000 gallon Cedar Ridge reservoir. In the event of a line break, there would be no mechanism to prevent the draining of the reservoir. Placement of a check valve would however eliminate the ability to manually back feed the main reservoir, so a new bypass back feed connection would be required.

The SHWD is served from a 1.7 million gallon reservoir owned by the City of Sandpoint. This reservoir sits at an elevation of approximately 2256 feet. Approximately 54 ERUs are served by gravity from this reservoir (lower pressure tier) and 131 ERUs (upper pressure tier) are served from a booster station, owned by SHWD (JAS 2016).

2.3.3.2. Water Mains

The main transmission line feeding the system is an 8-inch PVC pipe extending 8,000 feet from the main reservoir down to the Non-Dover Bay section of town. The majority of water mains in the Non-Dover Bay section of town are 6-inch, constructed under lower fire flow requirements than the Dover Bay section of town, which is served by 8-inch water mains. Static pressure in the City is reported to be about 78 psi (IDEQ Drinking Water Supply Report, September 2012). The 2014 Water System Facility Plan identified the 8-inch main transmission line from the reservoir as under sized to achieve fire flow requirements as set forth by the Fire District for the Dover Bay development.

Water mains in the SHWD are primarily 6-inch, 4-inch and 2 inch PVC, with the majority of these mains installed in 1968 (JAS 2016). Due to the insufficient size of their existing water mains, SHWD does not provide fire flow capacity, and there are no immediate plans for expansion to provide fire flow (JAS 2016).

2.3.3.3. Pumping Stations

The Cedar Ridge reservoir is supplied from a booster pump station located next to the City's main reservoir. The booster station is equipped with two (2) 10 HP pumps rated for 87 gpm each at 280 feet, Total Dynamic Head (TDH). The booster pumps are controlled by on-off floats in the Cedar Ridge reservoir. There is currently no method of remotely monitoring this booster station and the alarm system is not incorporated into the main auto-dialer system.

There is a second booster pump station located at the Cedar Ridge reservoir to serve the lots adjacent to and above the reservoir. This booster station has one (1) 3 HP pump on a variable frequency drive (VFD).

The SHWD booster pump station provides water from Sandpoint's reservoir to the upper tier lots. This station includes two (2) 20 HP pumps rated for 250 gpm each at 85 psi (JAS 2016).

2.3.3.4. Water Meters

The City currently has an ongoing program to replace broken and/or out dated meters. The Dover Bay Development and SHWD both have newer auto-read meters in place, but Non-Dover Bay does not.

2.3.4. ***Water Demand***

An analysis of meter data provided by the City for the years 2012 through 2015 has been completed and is included in **Appendix B**. Previous analysis relied on pumping data from the water treatment plant, which has been determined to be un-reliable, since a pump control issue was found in 2015, which was causing the treated water pumps to overfill the large reservoir, causing an overflow situation. The previous data analysis also included a period of time where the City was selling large quantities of water to the contractor working on the highway project through Dover. There was also a period of unaccounted for water loss in excess of 40% occurring between the main reservoir and Cedar Ridge reservoir, which has since been reduced to less than 10%. For these reasons, a new analysis has been completed utilizing actual meter readings from system users. Since readings are collected on a monthly basis, Maximum Day Demands (MDD) and Peak Hour Demands (PHD) have been estimated based on procedures set forth in the Washington State Department of Health (WSDOH) Water System Design Manual Sections 5.2.1 and 5.2.4. An additional 10% has been added to all demands for assumed system losses. The following **Table 2-1** summarizes water system unit demand data.

Table 2-1 - City of Dover Water System Unit Demand Summary

	Non-Dover Bay		**Dover Bay Development**		**Combined**	
Demand	**(gpd/ERU)**	**(gpm/ERU)**	**(gpd/ERU)**	**(gpm/ERU)**	**(gpd/ERU)**	**(gpm/ERU)**
Average Day	194	0.135	75	0.052	117	0.081
Maximum Day	436	0.303	165	0.115	279	0.194
Peak Hour	1341	0.931	572	0.397	718	0.498
Fire Flow	1,000 gpm		2,000 gpm			
Current Connections	129 ERUs		136 ERUs		265 ERUs	

According to the Draft Water Facilities Plan prepared by James A. Sewall and Associates (February 2016), unit demand for the Syringa Heights Water District (SHWD) is estimated as summarized in the following **Table 2-2**.

Table 2-2 - SHWD Water System Unit Demand Summary

	SHWD	
Demand	**(gpd/ERU)**	**(gpm/ERU)**
Average Day	258	0.179
Maximum Day	516	0.358
Peak Hour	1378	0.957
Fire Flow	N/A	
Current Connections	185 ERUs	

2.3.5. ***Water Quality***

Daily monitoring at the slow sand filtration plant includes turbidity, pH, temperature and chlorine residual. Turbidity levels are monitored continuously using a Hach 1720E turbidimeter. Turbidity levels are required to be maintained at or below 1.0 NTU. If levels exceed 1.0 NTU then weekly total coliform sampling is required. A review of IDEQ records shows no positive Total Coliform results and no water quality violations over the previous year.

All community drinking water systems must provide customers with an annual report of drinking water quality. A copy of the Report on Quality of Drinking Water in 2014 can be found in **Appendix C**.

2.3.6. ***Sanitary Survey***

The last sanitary survey completed by IDEQ for the City of Dover's water system was conducted during September 2012. This survey listed a number of significant deficiencies, additional requirements and recommendations as outlined in a Drinking Water Supply Report dated October 3, 2012. All of the noted significant deficiencies and additional requirements have been addressed by the City. A number of the recommendations will be considered and addressed in this Facilities Plan. Copies of the Water Supply Report and related correspondence can be found in **Appendix D**.

2.3.7. ***Hydraulic Analysis***

A hydraulic analysis was completed for the City of Dover water system by Tate Engineering as part of the 2014 Water System Facility Plan. This analysis concluded that the existing 8-inch water main from the main reservoir down to Railroad Avenue is undersized to meet the 2,000 gpm fire flow requirement for the Dover Bay development. The analysis concluded that construction of a new 12-inch main parallel to the existing 8-inch main was the best alternative, and would bring everything within the Dover Bay Development past the 2,000 gpm required flow (Tate, 2014).

2.3.8. **User Charges and Budget**

The City of Dover charges a monthly base rate of $25.21 per ERU plus an additional charge of $0.0037 for every gallon used. The current one-time connection fee for new water connections is $5,392 per ERU.

The City's FY 2015-2016 water budget projects $150,500 in total water revenues. Projected expenses for operation and maintenance are $70,746, with total projected expenses at $114,504. This excludes capitalization projects, depreciation and capital carry over. The City water fund currently has approximately $26,000 in savings; a note receivable from the Dover Urban Renewal Agency (DURA) for approximately $617,000; and approximately $227,000 in outstanding dept.

2.3.9. **Violations of Safe Drinking Water Act and Idaho Water Rules for Public Drinking Water Systems**

There have been no known violations of the Safe Drinking Water Act or Idaho Rules for Public Drinking Water Systems by the City of Dover.

2.3.10. **List and Status of Defects or Deficiencies**

Following is a list of treatment and distribution system deficiencies identified in previous sections. Problems identified with the existing system include:

- The raw water pumps at the existing intake are limited in capacity during the winter months due to low water levels in the river. Frequent pump replacement has been an ongoing problem due to possible cavitation, vortexing and/or debris getting into the pumps. Manual throttling of the pumps is currently necessary to adjust flows to meet demands and/or reduce vortexing in the winter.
- Low lake levels can expose the raw water pump discharge lines, leaving them susceptible to freezing.
- The electrical and control equipment at the raw water pump station is out dated and in need of upgrades.
- The existing raw water pumping system does not meet the new DBS Policy for Use of Submersible Well Pumps in Bodies of Water.
- An improved mechanism for monitoring flow rate and water levels in the slow sand filters is needed.
- Additional security measures are needed at the treatment facility and reservoirs.
- The water system is controlled by a series of floats and relays which have proven unreliable at times. There is also currently no method of monitoring the multiple reservoirs and pumping systems from one centralized location.

- The 8-inch main transmission line from the reservoir as under sized to achieve fire flow requirements as set forth by the Fire District for the Dover Bay Development (Water System Facility Plan, Tate Engineering, 2014).
- Back feeding from the Cedar Ridge reservoir to the main reservoir is manual, and there is no check valve in place to prevent draining of the Cedar Ridge reservoir in the event of a break in the feed pipe.
- Many of the water meters in the Non-Dover Bay section of the planning area are out dated and/or in disrepair and should be upgraded to auto-read for consistency with other parts of the planning area.
- Upgrades to supply, storage and booster pumping facilities will be required to serve the City of Dover plus SHWD.

3. Future Conditions

3.1. Projected Growth

Projected build-out for the Dover Bay Development is 556 ERUs. This is less than the 600 ERUs projected in the 2014 Water System Facility Plan, and is based on an updated projection provided by the developer. Estimated build-out of the remaining areas covered by Dover corporate City limits is 373 ERUs based on current lots and zoning. Thus projected total build-out is 929 ERUs.

The Dover Bay Development is projected to reach build-out within 20 years, which equates to a projected growth rate of 21 ERUs per year. Growth rate for Non-Dover Bay is projected based on United States Census Bureau data for Bonner County, which shows an 11% population change from 2000 to 2010. This amounts to an annual growth rate of approximately 1.04%. Therefore 20 year projected growth for Non-Dover Bay is to 159 ERUs.

Growth within the SHWD service area is projected to reach 222 ERUs within the next 20 years and 265 ERUs within the next 40 years (JAS 2016).

3.2. Forecast of Demand (20-year period)

Forecast of demand for a 20-year period considers the projected build-out of 556 ERUs for the Dover Bay Development; a projected 20-year population of 159 ERUs for Non-Dover Bay; and a projected 20-year population of 222 ERUs for SHWD. The following **Table 3-1** provides a summary of projected design flows based on this 20-year forecast.

Table 3-1 - City of Dover Projected Water Demands (20-year period)

Description	Projected ERUs	Average Day Demand (gpd)	Average Day Demand (gpm)	Maximum Day Demand (gpd)	Maximum Day Demand (gpm)	Peak Hour Demand (gpm)
Non-Dover Bay	159	30,906	21.5	69,324	48.1	148.1
Dover Bay Development	556	41,876	29.1	91,740	63.7	221.0
SUBTOTAL	**715**	**72,782**	**50.5**	**161,064**	**111.9**	**369.1**
SHWD	222	57,276	39.8	114,552	79.6	212.4
TOTAL	**937**	**130,058**	**90.3**	**275,616**	**191.4**	**581.5**

3.3. Drinking Water Facilities Needed (20-year Period)

Projected supply, treatment and distribution system capacity is estimated utilizing the water system unit demands summarized in **Tables 2-1 and 2-2** and projected total demands presented in **Table 3-1**.

Each of the two (2) existing raw water intake pumps have a summer pumping capacity of 185 gpm. To account for redundancy only the capacity of a single pump is considered, which amounts to 266,400 gpd. As shown in **Table 3**, estimated maximum day demand (MDD) for buildout of Non-Dover Bay and the Dover Bay Development is 161,064 gpd. With the addition of SHWD, estimated MDD increases to 275,616 gpd. Thus, the existing raw water intake has adequate capacity for projected 20-year flows for Dover, but would require upgrades to serve SHWD. Estimated capacity of the 6" raw water line from the intake to the treatment plant is 600 gpm or 864,000 gpd.

During the winter months, at low river levels, each of the two (2) existing raw water intake pumps have a pumping capacity of approximately 100 gpm. This provides a winter pumping capacity of 144,000 gpd with a single pump running. Since winter meter reading data is not available, MDD during the month of May is considered which amounts to an estimated winter MDD, 20-years out, of 93,578 for the City of Dover. Thus it is projected that the existing intake has adequate winter capacity for projected 20-year flows for Dover.

The existing slow sand filter treatment facility has a capacity of 293,760 gpd, with one (1) filter bay off-line. Based on the projected flows summarized in **Table 3-1**, the existing treatment facility has adequate capacity for 20-year projected flows for the City of Dover plus SHWD.

An analysis of reservoir sizing can be found in **Appendix E**. The analysis considers operational storage, equalization storage, standby storage and fire storage requirements for different scenarios. The analysis shows that the existing reservoirs have adequate capacity for the City of Dover. SHWD does not require fire storage, but the Cedar Ridge development has hydrants but no fire storage. This analysis assumes that 120,000 gallons in fire storage will be necessary at Cedar Ridge to ensure adequate water supply to SHWD during a fire situation.

To provide adequate source capacity from the main reservoir to the Cedar Ridge reservoir for supplying SHWD, upgrades to the existing booster station will be required.

The following **Table 3-2** summarizes the required and available capacities of the various water facilities under a number of scenarios from serving existing connections in Dover only through the 20-year projection for Dover and SHWD.

Table 3-2 - Drinking Water Facility Needs (20 year)

Scenario	**Required Reservoir Capacity (gal.)**	**Required Treatment Capacity (gal.)**	**Required Intake Capacity (gal.)**
Dover Existing Connections	284,430	76,684	76,684
Dover + SHWD Existing Connections	444,186	174,144	174,144
Dover 20-year	296,918	161,064	161,064
Dover + SHWD 20-year	450,241	275,616	275,616
	Available	**Available**	**Available**
Existing Available Capacity	397,000	293,760	266,400

3.4. Forecast of Demand (Build-out)

For consideration of longer term implications of serving SHWD, a forecast of build-out demand is also considered. Forecast of demand for build-out considers the projected build-out of 556 ERUs for the Dover Bay Development; a projected build-out of 373 ERUs for Non-Dover Bay; and the projected 40-year population of 265 ERUs for SHWD. The following **Table 3-3** provides a summary of projected design flows based on this build-out forecast.

Table 3-3 - City of Dover Projected Water Demands (Build-out)

Description	**Build-out ERUs**	**Average Day Demand (gpd)**	**Average Day Demand (gpm)**	**Maximum Day Demand (gpd)**	**Maximum Day Demand (gpm)**	**Peak Hour Demand (gpm)**
Non-Dover Bay	373	72,502	50.3	162,628	112.9	347.3
Dover Bay Development	556	41,876	29.1	91,740	63.7	221.0
SUBTOTAL	**929**	**114,378**	**79.4**	**254,368**	**176.6**	**568.3**
SHWD	265	68,370	47.5	136,740	95.0	253.6
TOTAL	**1194**	**182,748**	**126.9**	**391,108**	**271.6**	**821.9**

3.5. Drinking Water Facilities Needed (Build-out)

Projected supply, treatment and distribution system capacity for build-out is estimated utilizing the water system unit demands summarized in **Tables 2-1 and 2-2** and projected total demands presented in **Table 3-3**.

The following **Table 3-4** summarizes the required and available capacities of the various water facilities under a number of scenarios from serving build-out of Dover only to serving build-out for both Dover and SHWD. <u>It is important to note that projected build-out for Dover does not require expansion of the slow sand filter, but expansion is required to serve projected build-out of Dover plus SHWD.</u>

Table 3-4 - Drinking Water Facility Needs (Build-out)

Scenario	**Required Reservoir Capacity (gal.)**	**Required Treatment Capacity (gal.)**	**Required Intake Capacity (gal.)**
Dover Build-out	345,759	254,368	254,368
Dover + SHWD Build-out	508,090	391,108	391,108
	Available	**Available**	**Available**
Existing Available Capacity	397,000	293,760	266,400

3.6. Future Conditions without the Proposed Project

The City of Dover water system is in adequate working condition and provides a safe source of drinking water at acceptable pressure and demands to its customers. The system has sufficient capacity to serve projected growth within the City limits; however there are a number of deficiencies that have been identified that should be address to improve system safety, reliability and ease of operation. In order to provide service to SHWD, some expansion would be required to serve projected future growth of the combined service areas.

4. <u>Development and Screening of Alternatives</u>

4.1. Development of Alternatives

The alternatives presented below consider upgrades necessary to serve the 20-year projected growth for the City of Dover as well as upgrades necessary to serve the 20-year projection for the City of Dover plus SHWD. Costs shown in Section 4 do not include financing.

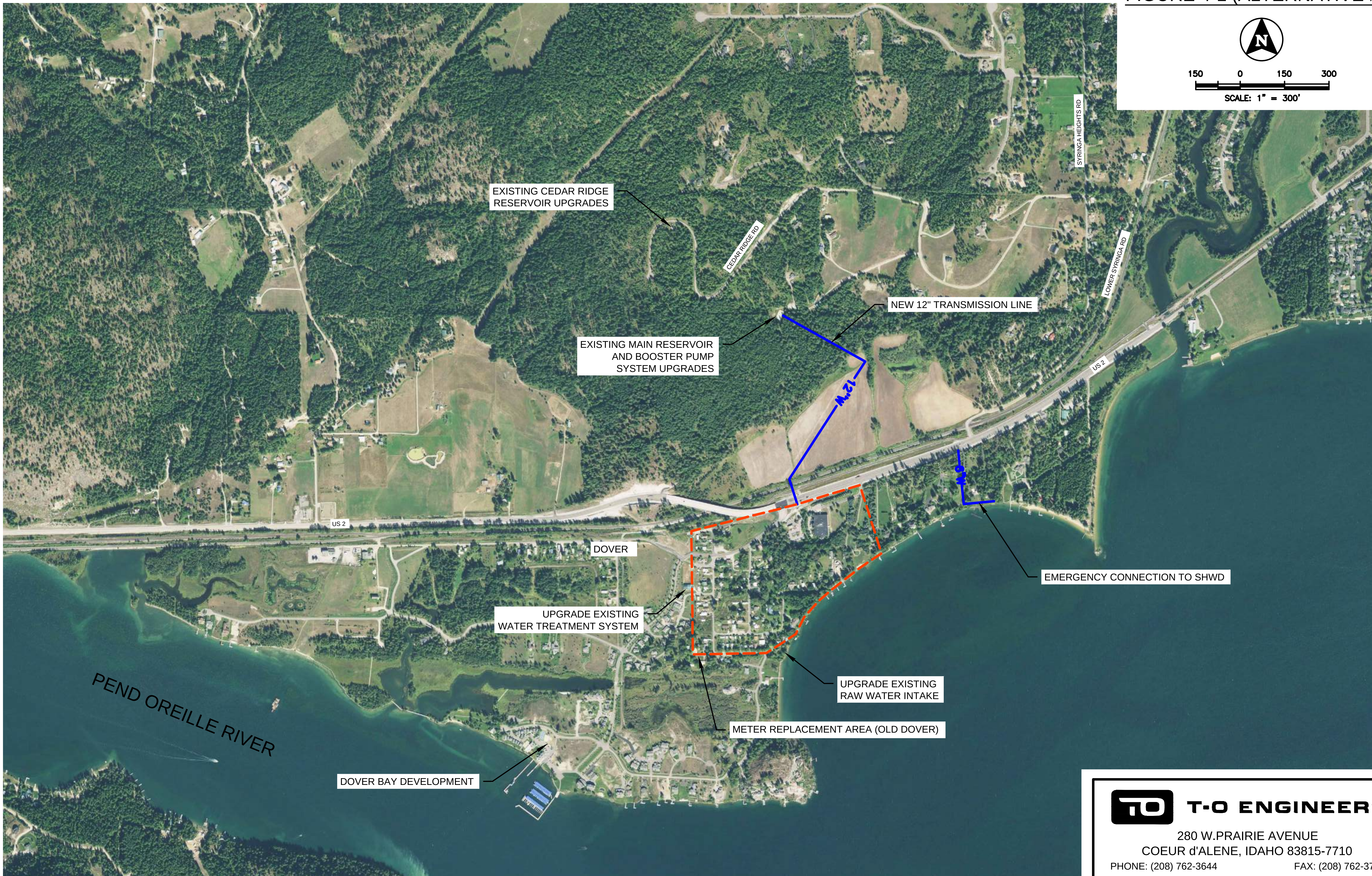
*4.1.1. **Alternative #1 – No Service to SHWD; Upgrade Existing Intake.***

This alternative involves upgrades to serve the City of Dover without service to SHWD. As discusses in Section 3.4, the existing system has sufficient capacity to serve the projected 20-year growth within the City limits, but there are a number of deficiencies that should be addressed. This alternative proposes to address these deficiencies as follows:

- Provide an integrated supervisory control and data acquisition (SCADA) system for centralized monitoring and control of all water system components including pumping, treatment and storage facilities.
- Upgrade the existing raw water intake including variable speed pumps; providing additional depth and flattening out the intake pipe; installing air/vacuum valves; updating the electrical/control equipment including meeting DBS interim policy; and SCADA integration.
- Upgrade the water treatment system including sand filter flow and water level monitoring; variable speed pumps for feeding the reservoir; improved chlorine and turbidity monitoring; increased security measures including video surveillance; and SCADA integration.
- Upgrade the water storage system including improved level monitoring and control; increased security measures including video surveillance; adding a check valve at the Cedar Ridge reservoir inlet; back feed from the Cedar Ridge reservoir to the main reservoir; and SCADA integration.
- Upgrade the existing booster pumping facilities including SCADA integration. Install new flow meters at the booster station next to the main reservoir, for remote monitoring.
- Install a new 12-inch transmission line from the main reservoir to the existing 12-inch main on Railroad Avenue.
- Install emergency backup connection with SHWD at the service area interface near the river.
- Replace all of the older water service meters in the City of Dover with new auto-read meters.

See **Figure 4-1** for an overview of this alternative. Estimated total cost for this alternative is $1,140,379. An Engineer's preliminary opinion of construction cost can be found in **Appendix F**.

FIGURE 4-1 (ALTERNATIVE #1)



T-O ENGINEERS
280 W.PRAIRIE AVENUE
COEUR d'ALENE, IDAHO 83815-7710
PHONE: (208) 762-3644 FAX: (208) 762-3708

E-FILE: 150200/ACAD/EXHB/FIG 4-1 DATE: MARCH 2016 JOB: 150200

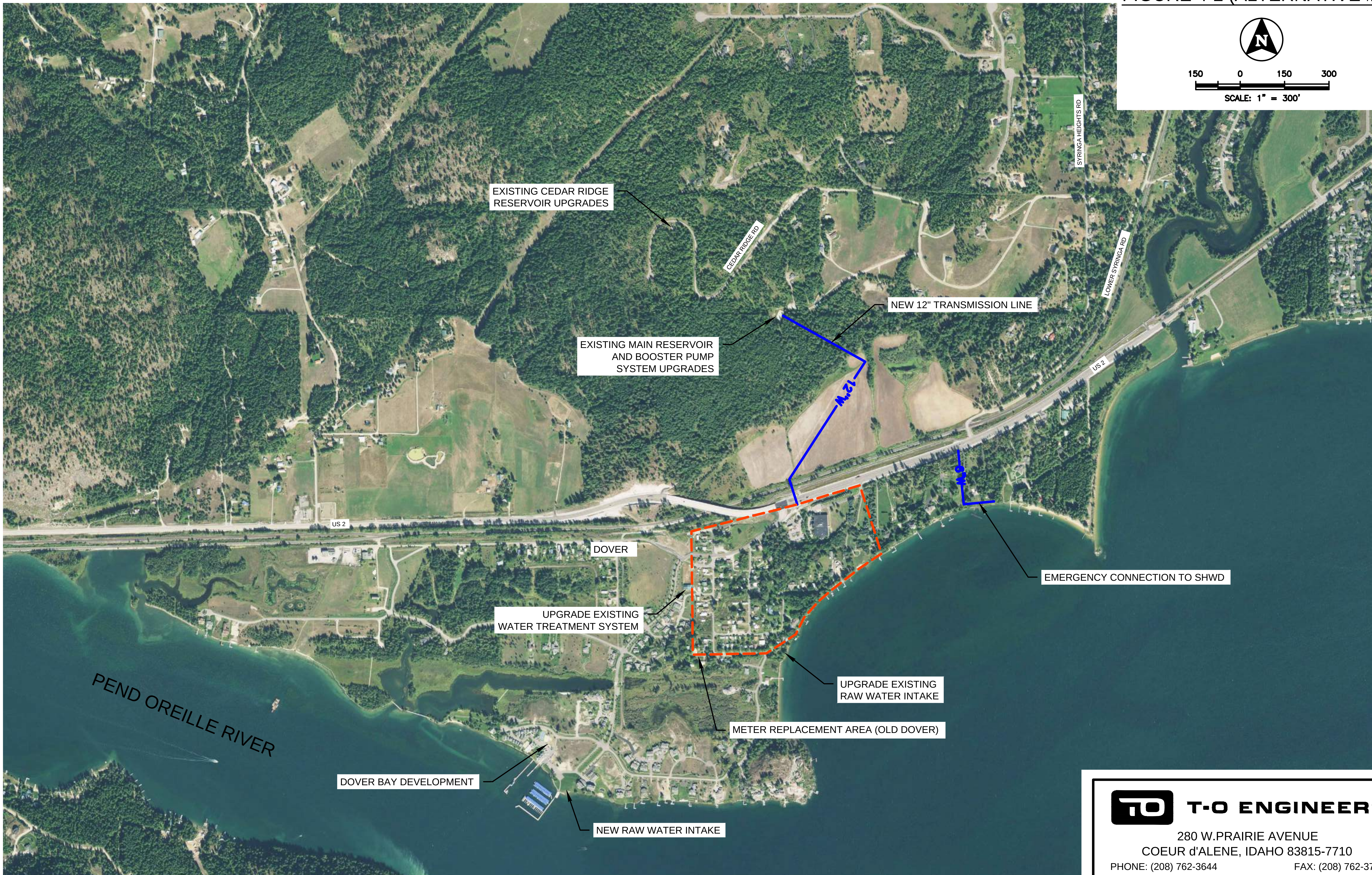
*4.1.2. **Alternative #2 – No Service to SHWD; Construct New Raw Water Intake.***

This alternative also involves upgrades to serve the projected 20-year growth in the City of Dover without service to SHWD. The primary difference with this alternative is that a new raw water intake, with a land based pumping system, would be constructed and less significant upgrades to the existing intake would occur. This alternative proposes to address the identified system deficiencies as follows:

- Provide an integrated supervisory control and data acquisition (SCADA) system for centralized monitoring and control of all water system components including pumping, treatment and storage facilities.
- Construct a new raw water intake system, with a land based pumping system, south of the existing intake.
- Keep the existing intake as a backup system, with minor upgrades including updating the electrical/control equipment; addressing DBS interim policy requirements; and SCADA integration.
- Upgrade the water treatment system including sand filter flow and water level monitoring; variable speed pumps for feeding the reservoir; improved chlorine and turbidity monitoring; increased security measures including video surveillance; and SCADA integration.
- Upgrade the water storage system including improved level monitoring and control; increased security measures including video surveillance; adding a check valve at the Cedar Ridge reservoir inlet; back feed from the Cedar Ridge reservoir to the main reservoir; and SCADA integration.
- Upgrade the existing booster pumping facilities including SCADA integration. Install new flow meters at the booster station next to the main reservoir, for remote monitoring.
- Install a new 12-inch transmission line from the main reservoir to the existing 12-inch main on Railroad Avenue.
- Install emergency backup connection with SHWD at the service area interface near the river.
- Replace all of the older water service meters in the City of Dover with new auto-read meters.

See **Figure 4-2** for an overview of this alternative. Estimated total cost for this alternative is $1,586,993. An Engineer's preliminary opinion of construction cost can be found in **Appendix F**.

FIGURE 4-2 (ALTERNATIVE #2)



T-O ENGINEERS
280 W.PRAIRIE AVENUE
COEUR d'ALENE, IDAHO 83815-7710
PHONE: (208) 762-3644 FAX: (208) 762-3708

E-FILE: 150200/ACAD/EXHB/FIG 4-1 DATE: MARCH 2016 JOB: 150200

The difference between Alternatives #1 and #2 is the construction of a new raw water intake versus simply upgrading the existing intake. Constructing a new intake has the following benefits and disadvantages:

Benefits-

- Eliminates the reduction in winter source capacity
- Eliminates the need to adjust winter pumping rates through throttling.
- Provides two (2) intakes, increasing system redundancy.
- May eliminate frequent pump replacements at the existing intake.
- Provides a land-based pumping system to alleviate DBS concerns with the use of submersible well pumps in open bodies of water.

Disadvantages-

- Higher construction cost than upgrading the existing intake.
- Two (2) intake systems to maintain instead of one (1).
- New intake not necessary for capacity without service to SHWD.

4.1.3. ***Alternative #3 – Service to SHWD***

This alternative involves upgrades and expansion necessary to serve the projected 20-year growth for the City of Dover plus SHWD, as well as address deficiencies identified with the existing system. This alternative proposes upgrades and expansion as follows:

- Provide an integrated supervisory control and data acquisition (SCADA) system for centralized monitoring and control of all water system components including pumping, treatment and storage facilities.
- Construct a new water intake system, with a land based pumping system, south of the existing intake.
- Keep the existing intake as a backup system, with minor upgrades including updating the electrical/control equipment; addressing DBS interim policy requirements; and SCADA integration.
- Upgrade the water treatment system including sand filter flow and water level monitoring; variable speed pumps for feeding the reservoir; improved chlorine and turbidity monitoring; increased security measures including video surveillance; and SCADA integration.
- Upgrade the existing booster pump station next to the City's main reservoir to provide two (2) pumps, each capable of providing 150 gpm (relocated from SHWD). Add standby power and Install new flow meters for remote monitoring.
- Connect the City of Dover water system to the SHWD system by installing approximately 880 LF of water main extending from the Cedar Ridge Development to the SHWD water main in Syringa Heights Road.

- Upgrade the water storage system including improved level monitoring and control; increased security measures including video surveillance; adding a check valve at the Cedar Ridge reservoir inlet; back feed from the Cedar Ridge reservoir to the main reservoir; and SCADA integration.
- Add 120,000 gallons of fire storage capacity for the Cedar Ridge development to ensure adequate supply to SHWD during a fire in Cedar Ridge.
- Install a new 12-inch transmission line from the main reservoir to the existing 12-inch main on Railroad Avenue.
- Replace all of the older water service meters in the City of Dover with new auto-read meters.
- Install emergency backup connection with SHWD at the service area interface near the river. This alternative proposes maintaining the SHWD connection to the Sandpoint reservoir, to provide an emergency backup connection to the City of Sandpoint for both Dover and SHWD.

See **Figure 4-3** for an overview of this alternative. Estimated total cost for this alternative is $2,111,684. An Engineer's preliminary opinion of construction cost can be found in **Appendix F**

The following are the benefits and disadvantages of the proposed upgrades needed to provide service to SHWD:

Benefits-

- Immediate increase in available revenue for operation and maintenance.
- Immediate increase in demand, easing maintenance of required minimum flows through the slow sand filters.
- Aforementioned benefits of having a new raw water intake.
- Improved fire protection for the Cedar Ridge development.

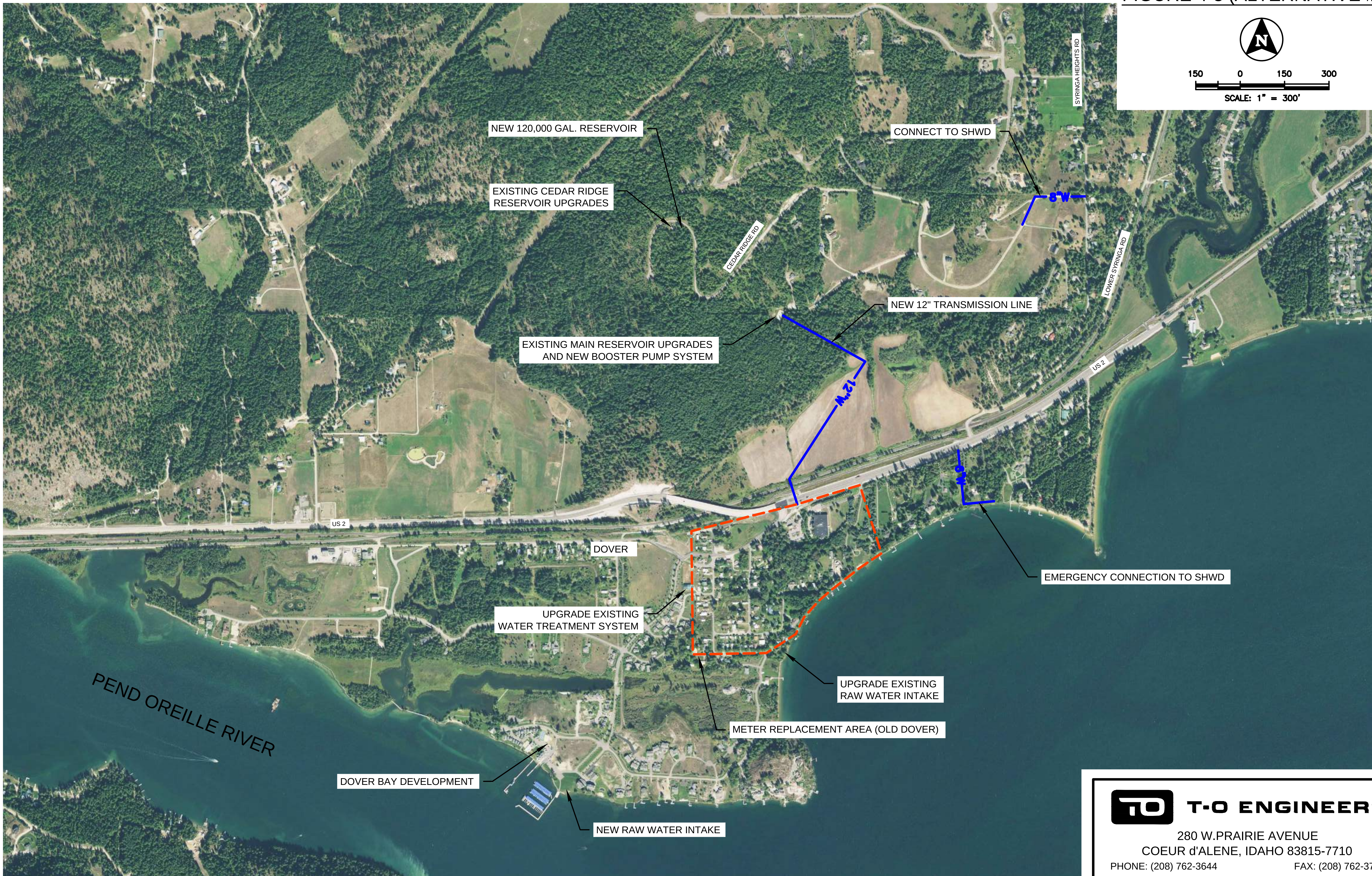
Disadvantages-

- Higher up front capital costs.
- More significant facility upgrades needed.
- May require slow sand filter facility expansion beyond the 20-year projection.
- Reduces the available reserve capacity of the existing system components.

*4.1.4. **Alternative #4 ("No Action" Alternative)***

As discussed previously upgrades to the existing water supply, treatment and collection system are necessary to improve system safety, reliability and ease of operation. With the addition of SHWD, water supply, pumping and storage components will reach capacity prior to reaching projected combined 20-year demand for the City and SHWD.

FIGURE 4-3 (ALTERNATIVE #3)



T-O ENGINEERS

280 W.PRAIRIE AVENUE
COEUR d'ALENE, IDAHO 83815-7710
PHONE: (208) 762-3644 FAX: (208) 762-3708

E-FILE: 150200/ACAD/EXHB/FIG 4-1 DATE: MARCH 2016 JOB: 150200

J:\15020003_Acad\dwg\Sheets\Exhibits\16.03.02_150200-Figure 4-3_Alternative #3.dwg , 3/3/2016 7:55:41 AM, Schrader, Kyle, DWG To PDF.pc3

4.2. Evaluation of Costs

Preliminary cost estimates have been developed for the alternatives and are provided in **Appendix F**. Estimates are based on the most current available cost data.

*4.2.1. **Capital Costs***

Capital cost is the one time "setup" or initial cost to construct the proposed facility improvements, and excludes operation and maintenance. The estimated capital cost of each alternative including engineering, administration and an added contingency amount is summarized in the following **Table 4-1**.

Table 4-1 Capital Cost of Alternatives

Alternative 1	**Cost**
Construction	$844,725
Engineering/Admin.	$168,945
Contingency	$126,709
Total	**$1,140,379**
Alternative 2	**Cost**
Construction	$1,175,550
Engineering/Admin.	$235,110
Contingency	$176,333
Total	**$1,586,993**
Alternative 3	**Cost**
Construction	$1,564,210
Engineering/Admin.	$312,842
Contingency	$234,632
Total	**$2,111,684**
*Note: The costs provided above do not include financing costs.	

*4.2.2. **Operation and Maintenance Costs***

Operation and Maintenance costs (O&M) were developed based on the existing O&M costs plus the added costs for each alternative projected to the 20-year demand. O&M costs are the total of the individual costs associated with each component of the proposed alternatives and are summarized in the following **Table 4-2**. Additional O&M costs for Alternative 3 would be offset by additional revenue collected from SHWD.

Table 4-2 Operation and Maintenance Cost Summary

O&M Expense Description	Alternative 1	Alternative 2	Alternative 3
Admin./Accounting	$12,500	$12,500	$16,500
Legal Services	$5,000	$5,000	$7,500
Engineering Services	$10,000	$10,000	$10,000
Maintenance, Repairs and Supplies	$10,000	$12,500	$18,000
Licensed Operator and Consulting	$36,000	$38,000	$42,000
Testing	$2,000	$2,000	$2,000
Utilities	$15,000	$15,000	$25,000
Security Monitoring Services	$2,400	$3,200	$3,200
Capital Reserves	$50,000	$55,000	$65,000
Totals	**$142,900**	**$153,200**	**$189,200**

*4.2.3. **Present Worth Analysis***

A present worth analysis was performed on the three (3) alternatives. Present worth is used to compare dissimilar alternatives and should not be confused with capital cost. This assumes an interest/discounting rate of 3% which can be compared to an inflation rate in this application. The present worth for each alternative includes the capital cost plus the O&M costs over a 20-year period. No salvage or return values were assumed for this analysis. The results are summarized in **Table 4-3**.

Table 4-3 Present Worth Analysis

Alternatives	Capital Cost	O&M	Present Worth (20-yr)
Alternative 1	**$1,140,379**	**$142,900**	**$3,266,370**
Alternative 2	**$1,586,993**	**$153,200**	**$3,866,222**
Alternative 3	**$2,111,684**	**$189,200**	**$4,926,502**

4.3. Reliability of Alternatives

All three of the Alternatives rely on continued use of the slow sand filtration system, which is a proven treatment technology that is relatively simple, reliable and inexpensive to operate. It is a process that the City and City's operators are familiar with and has served the City well for over 25 years. Alternatives #2 and #3 provide a more reliable raw water intake system at a new location, as well as the redundancy provided with two intake systems. All three alternatives improve system reliability with centralized SCADA monitoring and more automated control of all water system components. The emergency connection with SHWD, proposed with all three alternatives, provides added reliability in the event of a source contamination or upset in the Dover treatment facility.

4.4. Regionalization

Alternative #3 considers regionalization through supplying water to SHWD, which lies adjacent to and partially within the Dover City limits. Due to the 40+ year age of SHWD's distribution piping it is recommended that the City only supply water to SHWD, and not take ownership and operation of SHWD's infrastructure. Based on preliminary discussions with SHWD, this arrangement appears to be their preference.

4.5. Un-serviced Areas in and around the Community

The majority of the City limits, north of SH-2, are not currently served by the City's water system. This area consists mostly of larger parcels, with agricultural or rural zoning and very low density. Developed parcels in this area are served by individual domestic wells. Due to the low density, it is not cost effective to extend water infrastructure to serve these areas, however, re-zoning and future planned developments could make expansion of water service to these areas feasible. It is anticipated that expansion of water service into these areas will be paid for by new development.

4.6. City Council Input

The Draft Facilities Plan was presented to the Dover City council during their meeting on April 14, 2016. Follow-up meetings were held with SHWD for preliminary discussion of supplying them with water. At a subsequent City Council meeting on October 13, 2016 the Council directed T-O Engineers to proceed with Alternative 3 as the selected alternative.

5. Selected Plan Description and Implementation Arrangements

5.1. Justification and Description of Selected Plan

Following review of the alternatives and discussion with SHWD, the City Council directed T-O engineers to complete and submit the Draft facilities plan to IDEQ, with Alternative 3 as the selected alternative. Negotiations with SHWD are still ongoing, but the Council has elected to move forward with planning for Alternative 3. This selected alternative provides the necessary upgrades to serve the City of Dover and to allow for supply of water to SHWD. Providing service to SHWD is advantageous to the City because it will spread operating costs over a larger customer base and it allows the City to utilize more of the treated water necessary to keep minimum flows through the slow sand filters.

5.2. Preliminary Design of Selected Plan

As discussed in Section 4, the selected alternative involves upgrades and expansion necessary to serve the projected 20-year growth for the City of Dover plus SHWD, as well as address deficiencies identified within the existing system. An integrated supervisory control and data acquisition (SCADA) system for centralized monitoring and control of all water system components including pumping, treatment and storage facilities is included with this alternative, along with specific upgrades as follows.

*5.2.1. **Water Source and Treatment Facilities***

Due to the limitations of the existing intake, the selected alternative proposes construction of a new raw water intake system. The new intake is anticipated to be at or near the location shown on the construction plans approved by DEQ in January 2013. A land based system including wet well and submersible pumps located on the shoreline is proposed, with a piped connection to the river. This will provide easier access to the pumps for maintenance and repair, and eliminate the uncertainty related to the use of submersible pumps in open bodies of water. The existing intake will be kept in place as a backup system, with minor upgrades including updating the electrical/control equipment; addressing DBS interim policy requirements; and SCADA integration.

Proposed upgrades to the water treatment system include sand filter flow and water level monitoring; variable speed pumps for feeding the reservoir; improved chlorine and turbidity monitoring; increased security measures including video surveillance; and SCADA integration.

*5.2.2. **Water Storage and Distribution Facilities***

Service to SHWD will require upgrades to the City of Dover's main booster pump station located next to the City's large reservoir. This booster station feeds the Cedar Ridge reservoir, which will supply SHWD. Two (2) booster pumps, each capable of providing 150 gpm, will be relocated from SHWD's existing booster station. SHWD will no longer need their booster station, since Dover has the capability to feed all of SHWD by gravity. The addition of standby power and the installation of new flow meters for remote monitoring will also be included in the upgrades at the City's main booster station.

Connection to the SHWD system will require approximately 880 LF of water main extending from the Cedar Ridge Development to the SHWD water main in Syringa

Heights Road. An additional 120,000 gallons of storage capacity at the Cedar Ridge development is also proposed to ensure adequate fire storage supply is available to Cedar Ridge above and beyond the operational, standby and equalization storage needed to serve SHWD. This additional fire storage capacity will be available to all of the City of Dover.

Proposed upgrades to Dover's existing reservoirs include improved level monitoring and control; increased security measures including video surveillance; adding a check valve at the Cedar Ridge reservoir inlet; back feed from the Cedar Ridge reservoir to the main reservoir; and SCADA integration. Improved level monitoring and control should eliminate water loss that has occurred previously due to overfilling of the reservoirs.

Additional proposed upgrades to the distribution system include the installation of a new 12-inch transmission line from the main reservoir to the existing 12-inch main in Railroad Avenue to improve fire flow capacity at the Dover Bay development; replacement of all of the older water service meters in the City of Dover with new auto-read meters; and the installation of an emergency backup connection with SHWD at the service area interface near the river. This alternative proposes maintaining the SHWD connection to the Sandpoint reservoir, to provide an emergency backup connection to the City of Sandpoint for both Dover and SHWD, and will need to be negotiated with SHWD and the City of Sandpoint.

*5.2.4. **Construction Phasing***

Prioritized construction of improvements over two (2) or more phases is proposed to spread out the costs and break the project into more manageable portions. The highest priority improvements should be completed during Phase I including the IDEQ sanitary survey recommendations, immediate requirements to serve SHWD, and improved monitoring and control. Recommend Phasing is broken down as follows:

Phase I Construction – Estimated Cost $708,000

- SCADA System
- Upgrade Existing Raw Water Intake
- Water Treatment System Control and Monitoring Upgrades
- Upgrade Existing Water Storage Level Control and Piping
- Upgraded Main Reservoir Booster Pump Station
- Pipe Connection to SHWD

Phase II and Beyond – Estimated Cost $1,404,000

- New Raw Water Intake
- New Water Storage Reservoir (Cedar Ridge)

- New 12” Transmission Line from Main Reservoir
- Emergency Backup Connection to SHWD
- Water Meter Replacements

5.3. Implementation

5.3.1. ***Inter-municipal Service Agreements***

The City of Dover will need to enter into an agreement with SHWD for supplying them with water. Based on preliminary discussions with SHWD, this agreement will include the sale of water to SHWD based on a negotiated usage rate per 1,000 gallons. The usage rate will be calculated based on SHWD paying an equal share of the supply, treatment, and storage costs. SHWD would continue to own, operate and maintain their distribution system, and would be billed as a single customer. SHWD will decommission their booster station and provide the pumps to Dover, and SHWD will install the necessary pressure reducing stations within their distribution system.

5.3.2. ***Financing Arrangements***

Financing for the proposed improvements will be through the Dover Urban Renewal Agency (DURA).

5.3.3. ***Operation and Maintenance Requirements***

O&M costs for Alternative #3 are summarized in Section 4.2.2. The estimated total annual O&M cost is $189,200. Operation requirements will be similar to those for the existing system, but efficiency should improve with the implementation of SCADA and other proposed monitoring and control system upgrades. Current Water System Classifications and Operator Licensing requirements are not anticipated to change with the proposed improvements.

5.3.4. ***Project Schedule***

- Submit Draft Facilities Plan to IDEQ — October, 2016
- IDEQ Comments on Draft Report — November, 2016
- Submit Final Facilities Plan to IDEQ — December, 2016
- IDEQ Final Facilities Plan Approval — January, 2017
- Phase I Project Design and Review — February, 2016 – May, 2017
- Advertisement for Phase I Bids — June, 2017
- Begin Phase I Construction — July, 2017

APPENDIX A

DBS Memo
Use of Submersible Well Pumps in Bodies of Water

Issue: Use of Submersible Well Pumps in Bodies of Water

Background:

The 2016 Idaho Legislature enacted House Bill 634, and the Governor signed that bill on Tuesday, April 5, which changes the regulatory backdrop for the installation of submersible well pumps in lakes and other bodies of water in Idaho.

Policy:

Pending the results of the rulemaking process mandated in House Bill 643 the following interim provisions shall apply to the installations of submersible well pumps employed in lakes, rivers, ponds, and streams in Idaho, and shall supplement the requirements traditionally imposed on such installations:

Submersible well pumps may continue to be installed and utilized in the lakes, rivers, streams and ponds of Idaho subject to the following restrictions:

1. All provisions of article 682 shall apply to bodies of water where swimming and marine activities do not take place.
2. In bodies of water where swimming or marine activities take place all provisions of 682 excluding 682.10 relating to the specific use of pumps shall apply.
3. Submersible well pumps located in Idaho's swimming and marine areas shall be considered directly connected.
4. In bodies of water where swimming or marine activities take place submersible well pumps shall be installed or repaired in accordance with, *The Permanent Installation of Directly Connected Submersible Well Pumps in Bodies of Water*, policy submitted to the Idaho Electrical board by a collaborative effort, dated 6/30/2016.

Date: 6/30/2016

Issue: The Permanent Installation of Directly Connected Submersible Well Pumps in Bodies of Water.

Background:

The 2016 Idaho Legislature enacted House Bill 643, and the Governor signed that bill on Tuesday, April 5, which changes the regulatory backdrop for the installation of submersible well pumps in lakes and other bodies of water in Idaho. A collaborative effort, between the Division of Building Safety, the Idaho Electrical Board, pump manufacturers, installers, end users, Department of Lands and other interested parties, began on April 15, 2016. This collaborative is tasked with providing rules for the safe installation of submersible well pumps within the State of Idaho.

Policy:

It has been the duty of the submersible pump collaborative, to identify and propose standardized practices with the regard to new installations, and repair and replacement of existing installations, of submersible well pumps employed in lakes, rivers, ponds, and streams in Idaho, and shall supplement, or improve upon, the requirements imposed by authority having jurisdiction (AHJ), and/or the requirements of adopted National Electrical Code (NEC), NFPA 70.

This policy, as proposed by the collaborative, amends NEC Article 682, for both new installations, and for repair and replacement installations. Existing submersible well pump installations located in bodies of water, shall not be repaired without applying for an electrical permit. Permitted repairs shall comply with all of the requirements of NEC Article 682 and any Idaho State adopted amendments.

This policy is proposed as follows:

NEC Article 682 as Amended for New Installations/Repair and Replacement

682 Part I. General. *All aspects still apply.*

682 Part II. Installation

682.10 Electrical Equipment and Transformers. Electrical equipment and transformers, including their enclosures, shall be specifically approved for the intended location. No portion of an enclosure for electrical equipment not identified for operation while submerged shall be located below the electrical datum plane.

Add New: Exception. All submersible well pumps used in bodies of water, must be labeled and listed in compliance with any one of the following - UL778, UL1004, UL2111 or other AHJ approved standard, until the use of submersible well pump motors are listed and *approved for use in bodies of water at a future date.*

682.11 Location of Service Equipment. On land, the service equipment for floating structures and submersible electrical equipment shall be located no closer than 1.5 m (5ft) horizontally from the shoreline and live parts shall be elevated a minimum of 300 mm (12 in.) above the electrical datum plane. Service equipment shall disconnect when the water level reaches the height of the established electrical datum plane.

Add New: Exception. This rule shall not apply to service equipment that is located on or at the dwelling unit and is not susceptible to flooding.

682.12 Electrical Connections. All electrical connections not intended for operation while submerged shall be located at least 300 mm (12 in.) above the deck of a floating or fixed structure, but not below the electrical datum plane.

682.13 Wiring Methods and Installation. Liquidtight flexible metal conduit or liquidtight flexible nonmetallic conduit with approved fittings shall be permitted for feeders and where flexible connections are required for services. Extra-hard usage portable power cable listed for both wet locations and sunlight resistance shall be permitted for a feeder or a branch circuit where flexibility is required. Other wiring methods suitable for the location shall be permitted to be installed where flexibility is not required. Temporary wiring in accordance with 590.4 shall be permitted.

Add New: Exception No 1. Wiring methods such as HDPE schedule 80 electrical conduit or its equivalent or greater, and clearly marked at a minimum "Caution Electrical" to indicate that it contains electrical conductors shall be approved. It shall be buried whenever practical, and in accordance with other regulatory agency policies. The use of gray HDPE water pipe rated at 250 PSI (eg. SIDR-7 or DR-9) is suitable for use as a chase only when the following conditions are met:

A. When internal conductors are jacketed submersible pump cable.
B. When used in continuous lengths, directly buried, or secured on a shoreline above and below the water line.
C. When submersible pump wiring terminations in the body of water according to 682.13 Exception No. 2 are met.

Add New: Exception No 2. Any listed and approved splices required to be made at the submersible well pump itself, outside of a recognized submersed pump sleeve or housing, when wires are too large to be housed inside said sleeve, shall be covered with a non-metallic, impact resistant material, no less than .25 inches thick, such as heavy duty heat shrink or other equivalent method approved by the AHJ. (Eg. install a heat shrink over the sleeve or housing that the submersible well pump is installed in, and then recover (apply heat) the heat shrink over both the HDPE and the water line). At least 6" shall be over the sleeve and at least 12" over the HDPE and *water line.*

Add New: Exception No. 3. Pipe, conduit, PVC well casing, or other electrically unlisted tubing may be used as a chase (not as a raceway) to protect conductors or cables from physical damage. Conductors or cables within a chase shall be rated for the location.

682.14 Submersible or Floating Equipment Power Connections. Submersible or floating equipment shall be cord – and plug-connected, using extra-hard usage cord, as designated in Table 400.4, and listed with a "W" suffix. The plug and receptacle combination shall be arranged to be suitable for the location while in use. Disconnecting means shall be provided to isolate each submersible or floating electrical equipment from its supply connection(s) without requiring the plug to be removed from the receptacle.

Existing Exception No. 1: Equipment listed for direct connection and equipment anchored in place and incapable of routine movement cause by water current or wind shall be permitted to be connected using wiring methods covered in 682.13.

Add New: Exception No. 2. Submersible well pumps shall be considered directly connected and shall be anchored in place. Ballast is an acceptable form of anchoring.

A. Type and Marking. The disconnecting means shall consist of a circuit breaker, a switch, or both, or a molded case switch, and shall be specifically marked to designate which receptacle or other outlet it controls.

Add New: Exception No. 1. Motor controller circuits (remotely located stop pushbutton, disconnect, relay, switch) in a non-metallic enclosure shall be accepted as a required disconnecting means when a controller location is not practical, or where terrain or other obstacle(s) prevent installation of actual operating motor controller in this location, and shall be placed no closer than five feet from but within sight of the shoreline, and marked at a minimum "Emergency Pump Stop", or "Emergency Stop" with other obvious indication on the visible side of the enclosure, that it is for a pump. It shall be elevated not less than 12" above the datum plane.

Add New: Exception No. 2. An equipotential plane is not required for disconnecting means with non-metallic enclosures.

B. Location. The disconnecting means shall be readily accessible on land, located not more than 750 mm (30 in.) from the receptacle it controls, and shall be located in the supply circuit ahead of the receptacle. The disconnecting means shall be located within sight of but not closer than 1.5 m (5 ft) from the shoreline and shall be elevated not less than 300 mm (12 in.) above the datum plane.

Add New: Exception. Motor controller circuits (remotely located stop pushbutton, disconnect, relay, switch) in a non-metallic enclosure shall be accepted as a required *disconnecting means when it installation is not practical, or where terrain or other obstacle(s) prevent installation of actual operating motor controller in this location, and shall be placed no closer than five feet from but within sight of the shoreline, and marked at a minimum "Emergency Pump Stop", or "Emergency Stop" with other obvious indication on the visible side of the enclosure, that it is for a pump. It shall be elevated not less than 12" above the datum plane.*

682.15 Ground-Fault Circuit-Interrupter (GFCI) Protection. Fifteen (15) and twenty (20) ampere single-phase, 125 volt through 250 volt receptacles installed outdoors and in or on floating buildings or structures within the electrical datum plane area that are used for storage, maintenance, or repair where portable electric hand tools, electrical diagnostic equipment, or portable lighting equipment are to be used shall be provided with GFCI protection. The GFCI protection device shall be located not less than 300 mm (12 in.) above the established electrical datum plane.

Add New: Exception No. 1. For submersible pumps located in bodies of water, and are rated 60 amperes maximum, 250 volts maximum, shall have GFCI or Ground Fault Equipment Protection designed to trip at a maximum of 30 milliamps or less, protected by means selected by a licensed installer, meeting listing or labeling requirements, and inspected by the AHJ prior to submersion in bodies of water.

Add New: Exception No. 2. For installations or repair and replacement of submersible pumps located in bodies of water, that are rated over 60 amperes, and rated at any voltage, shall be evaluated by a qualified designer (Experienced Licensed Contractor), or involve Engineering or be engineered, for each specific application, with the utmost goal of public safety. Whenever possible, GFCI or Ground Fault Equipment Protection designed to trip at a maximum of 30 milliamps or less, meeting listing or labeling requirements, shall be installed, then inspected by the AHJ prior to submersion in bodies of water.

682 Part III.

682.30 Grounding. *All aspects still apply.*

682.31 Equipment Grounding Conductors.

A. Type. Equipment grounding conductors shall be insulated copper conductors sized in accordance with 250.122 but not smaller than 12 AWG.

B. *All aspects still apply.*
C. *All aspects still apply.*
D. *All aspects still apply*

682.33Bonding of Non-Current-Carrying Metal Parts. *All aspects still apply.*

682.33 Equipotential Planes and Bonding of Equipotential Planes. An equipotential

plane shall be installed where required in this section to mitigate step and touch voltages at electrical equipment.

A. Areas Requiring Equipotential Planes. Equipotential planes shall be installed adjacent to all outdoor service equipment or disconnecting means that control equipment in or on water, that have a metallic enclosure and controls accessible to personnel, and that are likely to become energized. The equipotential plane shall encompass the area around the equipment and shall extend out not less than 900 mm (36 in.) in all directions from which a person would be able to stand and come in contact with the equipment.

Add New: Exception. Submersible pump control panels and remote control circuit panels used to disconnect submersible pumps, and that are enclosed in non-metallic enclosures, do not require equipotential planes.

B. Areas Not Requiring Equipotential Planes. Equipotential planes shall not be required for the controlled equipment supplied by the service equipment or disconnecting means.

Add New: Exception. All circuits rated 60 amperes maximum and 110-250 volts, any phase, shall contain ground fault protection, in accordance with 682.15, for the motor leads that are located in a body of water, at a minimum.

C. Bonding. Equipotential planes shall be bonded to the electrical grounding system. The bonding conductor shall be solid copper, insulated, covered or bare, and not smaller than 8 AWG. Connections shall be made by exothermic welding or by listed pressure connectors or clamps that are labeled as being suitable for the purpose and are of stainless steel, brass, copper, or copper alloy.

Other articles and sections of the adopted National Electric Code not specifically addressed by House Bill 643 may apply.

This submersible pump collaborative acknowledges and accepts the reality of the hazards associated with electrical equipment in water. During the organizing and discussion of the collaborative concerns, it remains evident that all parties want to ensure the safe installation of submersible well pumps.

Thomas Bangle, MBA
Chairman
Idaho Submersible Pump Collaborative
Sandpoint Pump & Power
(208)263-0536
t.bangle@yahoo.com

APPENDIX B

Meter Data and Demand Calculations

CITY OF DOVER WATER SYSTEM
METER DATA SUMMARY

Year		OLD DOVER WATER DATA			DOVER BAY DEVELOPMENT DATA			COMBINED DATA					
		Residental	Commercial	All	Residential	Commercial	All						
		Total City of Old Dover Metered Usage	Total City of Old Dover Metered Usage	Total Metered Usage	Total Dover Bay Development Metered Usage	Total Dover Bay Development Metered Usage	Total Dover Bay Development Metered Usage	CALCULATED ERU's OD and DBD Combined	City Charge ERUs	Water Source Production	Monthly Balance		
	Nov-April	1,427,980	619,780	2,047,760	629,810	521,880	1,151,690	3,199,450		4,167,000	967,550	*10 Months of records.	1.302411352
	May	427,550	102,470	530,020	107,890	126,450	234,340	764,360		1,068,000	303,640	*10 Months of records.	1.39724737
	June	617,520	139,220	756,740	134,502	179,280	313,782	1,070,522		1,567,000	496,478		1.46377188
	July	949,226	213,560	1,162,786	249,094	225,747	474,841	1,637,627		1,983,000	345,373		1.210898452
	August	775,553	403,730	1,179,283	246,314	279,787	526,101	1,705,384		1,842,000	136,616		1.080108644
	September	518,178	215,060	733,238	257,877	160,890	418,767	1,152,005		1,091,000	-61,005		0.947044501
	October	341,456	184,760	526,216	117,724	102,344	220,068	746,284		961,000	214,716		1.287713525
2015	ERU's	87	38	125	62	96	158	**282**	287	282			
	Max Month	949,226	403,730	1,179,283	257,877	279,787	526,101	1,705,384	1,694,390	1,726,000			
	Max Month Average Day (gpd/eru)	351.96	344.44	304.79	134.17	94.50	107.75	194.86	190.78	197.22			
	Max Day (gpd/ERU)	**457.54**	**447.77**	**435.85**	**174.42**	**122.85**	**154.08**	**278.65**	**248.01**	**256.38**			
	Monthly Average	421,455	156,548	578,004	145,268	133,032	278,299						
	Yearly Total (12 months)	5,057,463	1,878,580	6,936,043	1,743,211	1,596,378	3,339,589	10,275,632		12,679,000	2,403,368	1.233890042	
	Average Day Total	13,818	5,133	18,951	4,763	4,362	9,125	28,075					
	Avg. Day (gpd/ERU)	**158.83**	**135.75**	**167.02**	**76.82**	**45.67**	**63.73**	**109.39**					

Year		OLD DOVER WATER DATA			DOVER BAY DEVELOPMENT DATA			COMBINED DATA					
		Residental	Commercial	All	Residential	Commercial	All						
		Total City of Old Dover Metered Usage	Total City of Old Dover Metered Usage	Total Metered Usage	Total Dover Bay Development Metered Usage	Total Dover Bay Development Metered Usage	Total Dover Bay Development Metered Usage	CALCULATED ERU's OD and DBD Combined	City Charge ERUs	Water Source Production	Monthly Balance		
	May	326,240	165,260	491,500	142,640	165,960	308,600	800,100		152,000		*10 Months of records.	0.189976253
	June	412,200	158,660	570,860	107,958	213,660	321,618	892,478		1,078,000	185,522		1.207872911
	July	608,560	193,090	801,650	194,602	254,940	449,542	1,251,192		1,356,800	105,608		1.084405911
	August	686,230	439,170	1,125,400	271,220	297,770	568,990	1,694,390		1,726,000	31,610		1.018655681
	September	405,570	220,860	626,430	146,910	148,410	295,320	921,750		962,000	40,250		1.043666938
	October	259,970	165,380	425,350	93,960	71,120	165,080	590,430		778,000	187,570		1.317683722
2014	ERU's	87	48	135	56	103	159	**294**	287	287			
	Max Month	686,230	439,170	1,125,400	271,220	297,770	568,990	1,694,390	1,694,390	1,726,000			
	Max Month Average Day (gpd/eru)	254.44	292.28	267.98	156.23	93.41	115.56	185.72	190.78	194.34			
	Max Day (gpd/ERU)	**330.77**	**379.96**	**383.21**	**203.10**	**121.44**	**165.25**	**265.58**	**248.01**	**252.64**			
	Monthly Average	449,795	223,737	673,532	159,548	191,977	351,525						
	Yearly Total (Only 6 months)	2,698,770	1,342,420	4,041,190	957,290	1,151,860	2,109,150	5,350,240		5,900,800	550,560	1.102903795	
	Average Day Total	14,510	7,217	21,727	5,147	6,193	11,340	28,765					
	Avg. Day (gpd/ERU)	**166.78**	**148.90**	**176.42**	**91.91**	**60.22**	**78.53**	**107.51**					

CITY OF DOVER WATER SYSTEM
METER DATA SUMMARY

Year		OLD DOVER WATER DATA – Residential: Total City of Old Dover Metered Usage	OLD DOVER WATER DATA – Commercial: Total City of Old Dover Meterd Usage	OLD DOVER WATER DATA – All: Total Metered Usage	DOVER BAY DEVELOPMENT DATA – Residential: Total Dover Bay Development Metered Usage	DOVER BAY DEVELOPMENT DATA – Commercial: Total Dover Bay Development Metered Usage	DOVER BAY DEVELOPMENT DATA – All: Total Metered Usage	COMBINED DATA: CALCULATED ERU's OD and DBD Combined	City Charge ERUs	Water Source Production	Monthly Balance
2013	Nov - April	1,585,439	205,580	1,791,019	479,560	553,530	1,033,090	2,824,109			
	May	369,150	163,250	532,400	93,878	118,800	212,678	745,078			
	June	493,390	176,930	670,320	96,788	191,040	287,828	958,148			
	July	736,431	186,820	923,251	158,870	215,179	374,049	1,297,300			
	August	741,099	199,189	940,288	234,290	297,760	532,050	1,472,338			
	September	588,430	220,080	808,510	142,570	234,880	377,450	1,185,960			
	October	304,000	158,550	462,550	87,520	91,790	179,310	641,860			
	ERU's (See Note for DBD Residential)	85	39	124	53	104	157	281	280		
	Max Month	741,099	220,080	940,288	234,290	297,760	532,050	1,472,338	1,472,338		
	Max Month Average Day (gpd/eru)	281.25	186.03	243.76	142.60	93	110	169	170		
	Max Day (gpd/ERU)	**365.63**	**241.84**	**348.58**	**185.38**	**120**	**156.61**	**241.57**	**221**		
	Monthly Average	401,495	172,675	574,170	107,790	152,715	260,505				
	Yearly Total (12 months)	4,817,938	2,072,099	6,890,037	1,293,475	1,832,579	3,126,054	9,473,791			
	Average Day Total	13,200	5,677	18,877	3,544	5,021	8,565	25,956			
	Avg. Day (gpd/ERU)	**155.29**	**143.96**	**166.87**	**66.86**	**48.41**	**60.12**	**101.55**			

Year		OLD DOVER WATER DATA – Residential: Total City of Old Dover Metered Usage	OLD DOVER WATER DATA – Commercial: Total City of Old Dover Meterd Usage	OLD DOVER WATER DATA – All: Total Metered Usage	DOVER BAY DEVELOPMENT DATA – Residential: Total Dover Bay Development Metered Usage	DOVER BAY DEVELOPMENT DATA – Commercial: Total Dover Bay Development Metered Usage	DOVER BAY DEVELOPMENT DATA – All: Total Metered Usage	COMBINED DATA: CALCULATED ERU's OD and DBD Combined	City Charge ERUs	Water Source Production	Monthly Balance
2012	May	355,650	164,150	519,800	77,477	505,040	582,517	1,102,317			
	June	403,910	125,550	529,460	130,628	140,560	271,188	800,648			
	July	503,190	161,220	664,410	175,719	236,540	412,259	1,076,669			
	August	807,450	210,310	1,017,760	196,800	294,080	490,880	1,508,640			
	September	707,390	204,970	912,360	109,560	180,570	290,130	1,202,490			
	October	422,021	131,220	553,241	70,889	93,070	163,959	717,200			
	ERU's (See Note for DBD Residential)	82	25	107	47	100	147	**254**	273		
	Max Month	807,450	210,310	1,017,760	196,800	505,040	582,517	1,600,277	1,600,277		
	Max Month Average Day (gpd/eru)	317.64	276.75	305.89	135.07	162.79	128	203	189		
	Max Day (gpd/ERU)	**412.94**	**359.78**	**437.42**	**175.59**	**211.63**	**182.70**	**290.16**	**246**		
	Monthly Average	533,268	266,237	799,505	126,846	278,643	405,489				
	Yearly Total (Only 6 months)	3,199,610	1,597,420	4,797,030	761,073	1,671,860	2,432,933	6,407,964			
	Average Day Total	17,389	8,682	26,071	4,136	9,086	13,222	34,826			
	Avg. Day (gpd/ERU)	**212.06**	**342.73**	**267.19**	**88.01**	**90.79**	**98.89**	**150.58**			

Notes:
1. 2012 and 2013 Parkside Bungalows meter data was comprimised so 2014 data was used for all three years.
2. Average Day Demand includes an additional 10% for assumed system loses.
3. Maximum Day Demands estimated based on Washington State Department of Health (WSDOH) Water System Design Manual Section 5.2.1 MDD to MMAD peaking factor of 1.3 plus an additional 10% for system losses.

APPENDIX C

Drinking Water Quality Report

DOVER, THE CITY OF
PWS #ID1090193
Report on Quality of Drinking Water in 2014

The federal Safe Drinking Water Act requires that all community drinking water systems must provide customers an annual report of the quality of their drinking water. This report is a summary of the quality of the City of Dover's water for calendar year 2014. Included are details about where the water comes from, what it contains, and how it compares to EPA and Idaho standards. All City of Dover drinking water facilities are operated under the direction of the City Council. Bob Hansen of Water Systems Management, Inc. operates our drinking water system. For further information about your water system (PWS #ID1090193), call Bob Hansen at (208) 265-4270 or Email: wsmibob@aol.com.

The City Council meets regularly at 6:00 pm on the 2nd & 4th Thursday of each month. Official Agendas are posted at City Hall, 699 Lakeshore Ave., Dover, Idaho 83825, prior to the meeting. Copies are available or if you have any questions please call Jacquie Albright at (208)265-8339. Please feel free to participate in these meetings.

Your water is a Surface Water Source that comes from Pend Oreille River, and is then filtered through a slow sand filter and is then disinfected at our water treatment plant prior to distribution.

Last year, we conducted tests for 2,4-D, Arsenic (1005), Bacteria, Disinfection By-Products, Inorganic Chemical (IOC)–Sodium and Nitrate. We had detects of some contaminants, which are listed in the tables on page four and five.

Definitions and abbreviations used are listed below:

-Action Level: The concentration of a contaminant, which if exceeded, triggers treatment, or other requirements which a water system must follow.

-Initial Distribution System Evaluation (IDSE): IDSE is an important part of the Stage 2 Disinfection By-Products Rule (DBPR). The IDSE is a one-time study conducted by some water systems, providing disinfection or chlorination, to identify distribution system locations with concentrations of trihalomethanes (THMs) and haloacetic acids (HAAs). Water systems will use results from the IDSE, in conjunction with their Stage 1 DBPR compliance monitoring data, to select monitoring locations for Stage 2 DBPR. Not all water systems were required to perform an IDSE.

-Maximum Contamination Level (MCL): The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

-Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

-Maximum Residual Disinfectant Level (MRDL): The highest level of disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

-Maximum Residual Disinfectant Level Goal (MRDLG): The Level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLG's do not reflect the benefits of the use of disinfectants to control microbial contamination.

-n/a: not applicable.

-nd: not detectable at testing limit.

-ppb: parts per billion or micrograms per liter.

-ppm: parts per million or milligrams per liter.

-pCi/l: Pico curies per liter (a measure of radiation).

-Treatment Technique: A required process intended to reduce the level of a contaminant in drinking water.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immune-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/Centers for Disease Control and Prevention (CDC) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline 1-800-426-4791 or http://www.epa.gov/safewater/hotline/.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline 1-800-426-4791 or http://www.epa.gov/safewater/hotline/.

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

In order to ensure that tap water is safe to drink, EPA prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. Food and Drug Administration (FDA) regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

Contaminants that may be present in source water before we treat it include:

Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.

Inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial, or domestic wastewater discharges, oil and gas production, mining, or farming.

Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.

Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.

Radioactive contaminants, which can be naturally-occurring or be the result of oil and gas production and mining activities.

Lead Informational Statement (Health effects and ways to reduce exposure) If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. BeeLine Water Association, Inc. is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components.

When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your drinking water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline 1-800-426-4791 or http://www.epa.gov/safewater/hotline/.

Water Quality Monitoring has been conducted on a regular basis in compliance with all Federal, State, and Local monitoring requirements.

The Department of Environmental Quality (DEQ) continues to maintain a waiver program for Inorganic Chemical (IOC), Volatile Organic (VOC), and Synthetic Organic (SOC) compounds monitoring. These waivers help to reduce some of the financial burden placed on public water suppliers by testing which would normally be required by the Safe Drinking Water Act. The DEQ has performed numerous risk analyses to determine the potential for various chemical contaminants to be present in Idaho. The DEQ office has determined that few of these chemicals pose a risk of being present in drinking water sources in the northern region of the state and that waivers would be appropriate.

The State of Idaho Department of Environmental Quality has completed the **Source Water Assessment Report** for the City of Dover Water. The Water System received a moderate susceptibility score for potential contamination. A **Drinking Water Protection Plan** is available on the City of Dover's website; http://www.doveridaho.org. For additional information or a copy of the Source Water Assessment Report, please feel free to contact, Bob Hansen at (208) 265-4270 or Email: wsmibob@aol.com.

DRINKING WATER NOTICE

Monitoring requirements not met for The City of Dover

We violated a drinking water standard. Even though this was not an emergency, as our customers, you have a right to know what happened and what we are doing to correct this situation.

We are required to monitor your drinking water for specific contaminants on a regular basis. Results of regular monitoring are an indicator of whether or not our drinking water meets health standards. During the month of February, 2015 we did not monitor for Coliform Bacteria and therefore cannot be sure of the quality of our drinking water during that time.

What This Means

There is nothing you need to do at this time. The table below lists the contaminant we did not properly test for, how often we are supposed to sample (frequency) and how many samples we are supposed to take, how many samples we took, when samples should have been taken, and the date on which follow-up samples were (or will be) taken.

Contaminant	Required sampling frequency	Number of samples taken	When sample should have been taken	When samples will be taken
Coliform	Monthly	0	2/1 – 2/28/2015	Each Month

Steps We Are Taking

We have since taken the required samples, as described in the last column of the table above. The samples showed we are meeting drinking water standards. For more information, please contact Bob Hansen of Water Systems Management, Inc. at (208) 265-4270.

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

State Water System ID#: ID1090193. Date distributed: June 30, 2015.

CITY OF DOVER
PWS #ID1090193
WATER QUALITY DATA FOR 2014

Microbiological Contaminants

	Highest # Positive In a Month	MCL	MCLG	Violation (Y/N)	Possible Source of Contamination
Total Coliform	0	>1	0	N	Naturally present in the environment

* Unless otherwise noted, the data presented in this water quality table is from testing done between January 1 – December 31, 2014.

Disinfection By Products

Contaminant	MCL	MCLG	Our System Range Average	Range	Sample Year	Violation Y/N	Typical Source of Contamination
Total Trihalomethanes	80	N/A	14.7	N/A	2014	N	By product of drinking water disinfection
Haloacetic Acids (HAA5)	60	N/A	11.3	N/A	2014	N	By product of drinking water disinfection

Maximum Residual Disinfectant Level

Contaminant	Violation (Y/N)	MCL	MCLG	Highest Level Detected:	Running Annual Average	Sample Date	Typical Source of Contamination
Chlorine	N	MRDL = 4	MRDLG = 4	1.4	0.75	Monthly	Water Additive used to control microbes

CITY OF DOVER
PWS #ID1090193
WATER QUALITY DATA FOR 2014

Lead/Copper

Contaminant	Date(s) Collected	90th Percentile	Action Level	MCLG	#of sites above Action Level	Violation Y/N	Possible Source of Contamination
Lead (ppb)	2011 6 samples	3	15	0	0	N	Corrosion of household plumbing systems: Erosion of natural deposits.
Copper (ppm)	2011 6 samples	0.166	1.3	1.3	0	N	Corrosion of household plumbing systems: Erosion of natural deposits.

* Unless otherwise noted, the data presented in this water quality table is from testing done between January 1 – December 31, 2014.

Turbidity

Turbidity/Units	MCL/TT	MCLG	Level Found	Range	Sample Date	Violation Y/N	Typical Source
Turbidity (NTU)	TT = 5.0 NTU	0	0.98	N/A	06/16/14	N	Soil runoff
	TT = % of samples <1.0 NTU		100	N/A	Daily	N	Soil runoff
Turbidity is a measure of the cloudiness of the water. We monitor it because it is a good indicator of water quality.							

APPENDIX D

DEQ Drinking Water Supply Report

STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

2110 Ironwood Parkway, Coeur d'Alene, ID 83814 (208) 769-1422

C. L. "Butch" Otter, Governor
Curt A. Fransen, Director

October 3, 2012

Hal Overland, Designated Operator in Charge
City of Dover
PO Box 115
Dover, ID 83825

Survey: ID1090193, City of Dover, Survey Report

Dear Hal:

Thank you for taking time out of your busy schedule to spend a full day inspecting the City of Dover's water system with Jim Williamson and myself. I sincerely appreciate your time and your expertise. It was obvious throughout the inspection that not only do you take the responsibility of providing safe drinking water to the District's users seriously; you also take great pride in maintaining the infrastructure of the water system itself.

I am pleased to report that the system is currently operating in substantial compliance with the Idaho Rules for Public Drinking Water Systems.

Enclosed please find the survey narrative report which describes the findings of the inspection. The significant deficiencies listed below were identified during the course of the survey and must be addressed. A plan of correction that outlines the timelines in which these deficiencies will be addressed must be submitted to DEQ within 120 days of receipt of this letter.

Significant Deficiencies

1. An accurate mechanism to measure filtration rate must be provided.
2. The unprotected cross connection between the disinfected (finished) and filtered water lines is a significant deficiency and must be adequately addressed. Options to address this issue were discussed at the time of the survey. Alternatively, the operator may wish to consult with the Design Engineer to determine if sand filter upflow may be accomplished through unchlorinated water in the clear wells.
3. The overflow on the 2000 gallon clear well must be screened with 24 mesh.
4. A control valve located on the discharge to the reservoir (approved DEQ record drawings 2007) has been valved off from the system due to operational failure. The valve appears to have originally been installed as a mechanism to relieve excessive pressure between the clear well and reservoir. A functioning operational mechanism to relieve pressure must be provided at this location.
5. Hillside sloughing adjacent to the reservoir has attributed to the reservoir overflow screen being pried off and partially buried. The overflow screen must be repaired to prevent contamination of the finished water supply.
6. As referenced in correspondence dated February 10, 2009 and detailed in the storage section of this report, certification of the adequacy of the overflow size must be provided to the Department for review and approval.
7. Hillside sloughing appears to be compromising the water main which feeds the 45,000 gallon reservoir. Additional information which adequately addresses this concern and ensures the integrity of this main is preserved must be provided as detailed in the storage section of this report.
8. The outlets of the two air vacuum relief valves located on the Dover Bay Development distribution

system must be screened with 24-mesh and elevated above water level in the vault to prevent contamination of the distribution main.

Additional Requirements

1. Filters must be allowed to discharge to waste for a minimum of 48 hours prior to being brought on line for potable use.
2. The diffuser discharging to the supernatant basin on the furthest east filter bay should be slightly rotated to prevent the minimal amount of scouring of the bed surface.
3. Until which time peak day demand calculations and width length ratio information is provided to DEQ Engineering for review and approval, a contact time credit of 90 minutes [20879 gallons (pipeline volume)/230 gpm (booster pump rate from clear well)] must be please be utilized for contact time calculation purposes on the system's disinfection monthly operating report form.
4. A total coliform sampling which outlines five rotating sampling locations representing the entire distribution was not found in Department files. Please submit a copy of the current total coliform sampling plan to the Department for our records.

Recommendations

1. Raw water flow meters are recommended to be installed in the raw water pump control vault.
2. The alarm system for the functioning booster pump should be incorporated into the autodialer system to allow the operator adequate time to correct system issues prior to depressurization occurring.
3. The operator reports that a check valve is not provided on discharge to the 45,000 gallon reservoir. In the event of a water line break, the operator will have no mechanism in place to prevent draining of the 45,000 gallon reservoir into the rural residential area. The Department strongly recommends a remedy is provided to address this concern to prevent future possible property damage.
4. The pressure reducing valves installed on the Dover Bay Development portion of the distribution system should be maintained to ensure continued proper operation.
5. Limited security currently is provided at the treatment plant, baffled reservoir, and 45,000 gallon reservoir. It is recommended that the City research the possibility of fencing the vicinity of these sites to provide an increased measure of security.
6. It is recommended but not required that raw water turbidity levels be analyzed on a routine basis (weekly or bi-weekly) in order to establish a baseline water quality trend should the Pend Oreille River source become impacted in the future.
7. Development of an Operation and Maintenance Manual for the system is strongly recommended.
8. It is recommended that all valves be exercised at a minimum of an annual basis.

Please contact me at 208-666-4624 if you have questions or concerns regarding the findings of this report.

Sincerely,

Suzanne Scheidt
Drinking Water Program Supervisor

Enclosure
File: ID1090193 City of Dover

Drinking Water Supply Report
Idaho Department of Environmental Quality

System: City of Dover **County:** Bonner **PWS #:** ID1090193
Date of Survey: September 5, 2012
System Representatives Present at Survey: Hal Overland, Designated Operator in Charge
Surveyed by: Suzanne Scheidt and Jim Williamson
Available Sources: Pend Oreille River
Water System Type: Community
Population: 405 **Service Connections:** 162

History

The City of Dover was incorporated in 1989 to facilitate upgrades on the community's water and wastewater systems. The slow sand filtration treatment water system consisting of two slow sand filter bays was constructed in 1991 in order to comply with Surface Water Treatment Rules. In 2007, two additional slow sand filtration bays were constructed to meet future water needs. The baffled reservoir was expanded in 2009.

Location

Dover is situated along the Pend Oreille River at the outlet of Lake Pend Oreille, and is located approximately 3 miles west of Sandpoint on Route 200. The water treatment plant is located off South 4th Street on McKinley. From Route 200, turn left on South 4th street, and then turn right on McKinley Avenue. The plant is located at the end of McKinley on the right.

Source

The source of water for the system is the Pend Oreille River. The raw water intake is located approximately 1900 lineal feet from the shoreline at a 60-degree angle from the control vault. The depth is approximately 1995 feet above mean sea level, or approximately 56 feet deep at maximum lake level. The intake consists of a 5-foot vertical Johnson stainless well screen connected to 1560 linear feet of 6-inch HDPE pipeline. The 6-inch line discharges to two 8-inch PVC pump casings 320 feet from a pump control vault located on shore above the high water line. Two 5-horsepower intake pumps with a design flow of 21 gpm each are installed within the 8-inch PVC pump casings. These intake pumps transport water, via 3-inch HDPE pipe to the control vault where the pipes manifold to a common 6-inch PVC pipe and discharges to each of the four slow sand filter supernatant basins. The City of Dover has an easement for the raw water line to the plant.

The intake pumps run alternately and are controlled by float switches in the slow sand filter supernatant basins with secondary flow cut-off switches provided as a failsafe mechanism in the control vault (i.e. floats call for water, pump turns on; if flow switch does not sense water flow, it will turn off the pump and switch to the other). When an intake pump shuts down, the water from the control vault to the intake pump drains back to the river to prevent the possibility of freezing in the lines. The transmission line from the control vault to the treatment plant is 6-inch class 160 PVC.

The raw water pump replacement had been an ongoing problem; this may have been attributed to pump cavitation during periods of low lake levels. The operator has worked with pump representatives and believes

1 Replacement of Dover Intake Pump, Rob Tate correspondence 07-24-09

this issue may have been remedied by increasing back pressure at the point of discharge to the slow sand filter supernatant basins.

The operator has observed increased levels of silt in raw water during periods of low lake levels. In order to prevent accumulation in the intake piping, the operator is able to utilize valves in the pump control vault to reverse flow through each of the intake lines to scour sediment accumulations in the pipeline.

Pump control vault

discharge to manifold

Raw water flow meters are recommended to be installed in the raw water pump control vault.

Treatment

Water treatment is completed by slow sand filtration, chlorine injection, with contact time provided by the designated transmission main between the sand filter and baffled reservoir. Additional contact time will be credited from the baffled reservoir after peak day demand calculations are provided by the Design Engineer for Department review and approval. Limited security currently is provided at the treatment plant; it is recommended that the City research the possibility of fencing the vicinity of the treatment building to provide an increased measure of security.

Filtration

Water is filtered through a four-bed effluent controlled slow sand filter. Filter flow rate is controlled by butterfly valves on the effluent side of each filter. Filter design approved by the Department included the use of calibrated piezometers to determine flow rate. During the inspection of the system it was determined that the piezometers utilized on the original sand filter beds were last calibrated in 2004, and piezometers on the newer filter beds had never been calibrated. The lack of a mechanism to measure filtration rate is a significant deficiency which must be remedied. An accurate mechanism to measure filtration rate must be provided.

Original filter bays

2007 filter bays

Original filter bays

The original filter bays each have dimensions of 36 feet in length by 18 feet in width according to Department record drawings[2] for a total surface area of 648 ft^2. Maximum flow rates through each filter must not exceed 64 gallons per minute. An optimized flow rate designed to minimize the frequency of scraping intervals is 48 gallons per minute. Winter flow rates (temperatures below 5 Centigrade) should not exceed 32 gallons per minute.


Original filter bays

Record drawings indicate the total filter bay depth of 10 feet. The lower foot consists of washed rock, overlain by 4 feet of sand. Information on the piping configuration of the under drain was not located. Drawings indicate a keyway consisting of a continuous groove in the concrete walls was constructed as an indicator of when sand depth had reached a minimum of 24 inches.

The original sand filters were re-sanded in 2007 to the original design depth of 48 inches with sand obtained from the Garnet Mine in Fernwood, Idaho. Documentation indicates new sand was incorporated into the sand bed utilizing the optimal trenching and throw-over process. For reference, maximum sand level depth is directly below the supernatant drain; sand depth is currently estimated at approximately 44 inches.

Between the period of 1997 and 2003, water system operator Ron Barrett participated in a study funded by DEQ which looked at the raw water quality vs. filtered un-chlorinated water as measured by bacteria levels. Results of this study are part of the system records and are kept on file if needed for future reference.

2007 Filter Bays

The two filter bays constructed in 2007 each have dimensions of 37 feet in length by 19 feet in width according to Department approved record drawings[3] for a total surface area of 703 ft^2. Maximum flow rates through each filter must not exceed 70 gallons per minute. An optimized flow rate designed to minimize the frequency of scraping intervals is 53 gallons per minute per filter. Winter flow rates (temperatures below 5 Centigrade) should not exceed 35 gallons per minute per filter. As previously noted, currently filtration rates are not being monitored, which is a significant deficiency. An accurate method for determining filtration rates is required. Concerns for filtration rate monitoring were addressed in the construction approval of the slow sand filtration expansion by Alan Miller, June 17, 2005.

---

2 Approved Gaffney PE, 3-20-92, Q-32

3 Approved Gaffney PE, 8-11-2008, Q-32

2007 filter bays

Maximum sand depth design calls for 44 inches of filter sand. Sand is underlain by 4 inches of coarse sand, underlain by 12 inches of pea gravel which also provides for under drain bedding. The filter under drain consists of four sticks of 4-inch PVC spaced 3-feet-9-inches apart. Record drawings indicate that maximum sand depth is 2 inches below the pipe penetration for the supernatant fill line. Record drawings indicate a keyway consisting of a continuous groove in the concrete walls was constructed as an indicator of when sand depth had reached a minimum of 24 inches. Record drawings indicate the total filter bay depth of 10 feet.

The diffuser located furthest east should be slightly rotated to prevent the minimal amount of scouring of the bed surface which was identified at the time of the survey.

Rotate filter diffuser

Slow Sand Filtration Operation

The scraping frequency of the filter bays is dependent on raw water quality, which will vary with seasonality, demand and lake levels. The operator, Mr. Overland reports a possible increased flow rate from the more recently constructed beds resulting in an increased level of silt sedimentation deposits in the schmutzdecke. The operator reports scraping the filter bays in the spring and summer of 2012. In order to scrape the schmutzdecke, water is drawn down to a level below the sand and the beds are scraped. After the removal of the top ¼- to ½-inch layer of schmutzdecke is completed through scraping, the bed is filled with filtered and disinfected water from the designated pipeline between the clear well and the baffled reservoir. The unprotected cross connection between the disinfected and filtered water lines is a significant deficiency and must be adequately addressed. Methods to accomplish this were discussed with the operator while on site. Once water levels have risen sufficiently above the sand, inflow to the filter from the raw water line is opened. Filters must be allowed to discharge to waste for a minimum of 48 hours prior to being brought on line for potable use.

There was no evidence of scouring from the influent raw water lines discharging to the supernatant basins with the exception of a minimal amount of scouring occurring at the eastern most filter as previously noted.

Supernatant equalization valves are provided between the filter bays. The beds are also equipped with overflow and supernatant drains.

Effluent butterfly valves on the filter effluent discharge to the clear wells regulate filtration rates.




Filter influent/overflow *filter effluent and cross connection to potable* *clear well*

After filtration, water from the original filter beds enters into the 2000 gallon clear well located in the original control room of the treatment plant. Water from the newer filters enters into the 3100 gallon clear well located in the control room building addition. The point of entry discharges above the overflow to prevent dewatering of the filters in the event of excessive system demand. The overflow on the 2000 gallon clear well must be screened with 24 mesh. Water is transported from each clear well to the storage reservoir via two alternating Berkley 15-horsepower booster pumps controlled by float switches in the reservoir. The booster pumps are protected by low flow cut off (float) devices installed in the clear wells. Flow rate from the active Berkley booster was recorded at 230 gpm at the time of the survey. Sensus 4-inch instantaneous and totalizing flow meters are installed on the discharge line from each clear well, which then discharge to the designated 8-inch PVC main, which ultimately discharges/lifts water to the baffled reservoir.

Screen clear well

A control valve located on the discharge to the reservoir (approved DEQ record drawings 2007) has been valved off from the system due to operational failure. The valve appears to have originally been installed as a mechanism to relieve excessive pressure between the clear well and reservoir. A functioning operational mechanism to relieve pressure must be provided at this location.

Slow Sand Filtration Operation and Maintenance

Slow sand filtration maintenance requires a physical removal of the schmutzdecke (dirt blanket) when head loss becomes apparent through a decrease in flow rates. Removal may be achieved through raking (harrowing) or scraping of the schmutzdecke. Scraping is preferred by DEQ as it must be conducted on a less frequent basis and does not present the risk of driving the schmutzdecke deeper into the filter bed.

The frequency of scraping is dependent on several factors including raw water turbidities and rate of flow through the filter bed. Low raw water turbidity combined with a low rate of flow and the highest possible water level above the filter bed generally will provide for the lowest frequency of scraping of the filter bed. As previously stated, maximum flow through each filter bed constructed in 1991 must not exceed 64 gpm per bed, with each filter operating at an optimized flow rate of 48 gpm and an optimized winter flow rate of 32 gpm per filter bed. Flow rate through each filter bed constructed in 2007 must not exceed 70 gpm, with each filter operating at an optimized flow rate of 52 gpm and a winter flow rate (when water temperatures fall below 5 degrees Centigrade) of 35 gpm.

Both filter beds are equipped with a supernatant drain that may be used to rapidly drain the bed from above the sand layer. The drain should be used prior to scraping of the schmutzdecke, or if the filter bed were to plug off.

In order to scrape the schmutzdecke layer, the water level must be lowered to below the sand surface. This level should be low enough to allow for the operator to walk on top of the sand with minimal disturbance. In order to maintain good microbial activity in the upper layer of sand, the water level should not be lower than necessary (approximately 8 inches below sand surface) to stand on/gain access to the filter.

After the schmutzdecke has been scraped off, the filter must be slowly filled from the bottom under drain in order to remove air bubbles that may have become trapped in the filter. According to Mr. Overland, current piping configuration allows for this to be completed with filtered and disinfected water back-fed from the 8-inch main to the baffled reservoir

As previously stated, an unprotected cross connection exists between the finished water supply and the filtered effluent from the slow sand filter. In lieu of installation of adequate backflow protection, the operator may also wish to explore with the Design Engineer the possibility of re-plumbing up-flow piping to originate from the clear wells.

Once water levels above sand are sufficient to prevent scouring of the sand bed, the operator resumes operational discharge of raw water above the sand filter bed.

Following scraping the filter bed must be allowed to flow to waste in order to ensure the filter has an opportunity to biologically recover; at a minimum, 48 hours is necessary. Mr. Overland also monitors filtered turbidity levels during the filter to waste cycle to ensure filtered turbidity levels return to normal operating levels prior to being utilized for potable use.[4] The filter beds will be discharged to waste for a minimum of 48 hours in order to ensure the filter reaches biological maturity prior to bringing each filter bed on line to supply for potable use.

4 Slow Sand Filtration, ASCE 1991, p. 136, 152

Slow Sand Filtration Plant Daily Monitoring and Recording

Surface water supplies introduce a risk of microbial contamination through bacteria, protozoa, and viruses. In order to ensure these contaminants have effectively been removed through filtration and disinfection, the operator must analyze and record monitoring parameters on a daily basis. Daily monitoring parameters include: filtration rates, peak hourly flow, finished turbidity, pH, temperature, and chlorine residual levels.

It is recommended but not required that raw water turbidity levels be analyzed on a routine basis (weekly or bi-weekly) in order to establish a baseline water quality trend should the Pend Oreille River source become impacted in the future. A raw water tap is available in the filter control room for this purpose.

Daily finished turbidity levels are drawn from a manifolded line representing both clear wells, and analyzed using a Hach 1720E turbidimeter calibrated quarterly according to manufacturer's directions. As part of the calibration step, the operator ensures discharge from the unit is between 0.5 and 1.0 liter per minute. Continuous finished turbidity readings are provided on a chart recorder.

In the event filtered water exceeds 1.0 NTU, the operator must collect weekly coliform samples from the first service connection in distribution. Total coliform results must be absent in order to avoid a treatment technique violation requiring public notification to users. Filtered water levels exceeding 5.0 NTU indicate a significant lapse in treatment and consequently a significant public health threat. DEQ must be contacted immediately should turbidities exceed 5.0 NTU; and all water users must receive health advisory notification within 24 hours.

Water temperature, free chlorine residual (Hach continuous CL17) and pH are also analyzed off the finished water line to the baffled reservoir. The Department must be contacted within 24 hours if in the event free chlorine residuals entering the distribution system drop below 0.2 mg/L.

Instrumentation is well maintained and calibrated according to manufacturer's specifications. The City of Dover Water Department has an excellent history of submitting monitoring data on a timely basis. Surface water treatment monthly operating reports are consistently submitted prior to the tenth of the month.

No Operation and Maintenance Manual was located for the treatment facility in DEQ's records; development of an Operation and Maintenance Manual is strongly recommended.

Disinfection

At each clear well discharge point a .125% sodium hypochlorite solution is injected via two Pulsatron (flooded suction) flow-regulated hypochlorinators rated to pump against a maximum pressure of 80 psi with a maximum pumping volume of 30 gallons per day. At the time of the inspection the pressure gage on the discharge from the clear well measured 70 psi. Chlorine levels are continually analyzed through a Hach CL17 continuous analyzer. If chlorine levels decrease below 0.7 mg/L or increase above 2.0 mg/L the operator is notified via an autodialer alarm system.

After chlorine addition, the water is pumped to the 354,000 gallon baffled reservoir via 8-inch transmission main.

Storage, Pumping and Contact Time

Water is pumped from a plant elevation of 2070 feet through 8000 feet of dedicated 8-inch PVC line, to a baffled, flow-through 354,000 gallon concrete storage reservoir at an elevation of 2250 feet (180 ft head). Original storage consisted of a 75,000 gallon reservoir with an additional 278,000 gallons of additional storage added to the existing reservoir in 2009. Construction of the additional reservoir storage (engineering services were provided by James A. Sewell and Associates, LLC) was initiated without DEQ plan and specification approval. In gathering information for the survey, calculations completed by the design engineer detailing peak day demand and length:width ratio of the baffled reservoir were not located. In order to utilize the baffled reservoir for disinfection and contact time purposes, this information must be provided to DEQ for engineering review and approval. Until such time this is provided, a contact time credit of 90 minutes [20879 gallons (pipeline volume)/230 gpm (booster pump rate from clear well)] must be please be utilized for contact time calculation purposes on the system's disinfection monthly operating report form.

354,000 gallon reservoir

reservoir interior

As per correspondence from the Department dated February 10, 2009, RE: Water Storage Reservoir, City of Dover Water System, item 6 Tank Modifications: "Foundation drainage, soil bearing capacity for the imposed loadings, and stabilization of the slopes created by the site excavation are additional city concerns that need to be addressed to city satisfaction and reflected as appropriate on the record drawings." As noted at the time of the survey, sloughing of the hillside has begun to occur with sedimentation accumulation building on the corner of the reservoir. Of additional concern is that sloughing is occurring in the immediate vicinity of the location of the water main feeding the Cedar Ridge 45,000 gallon reservoir. The operator reports there is no check valve on the main to prevent complete drainage of the 45,000 gallon reservoir in the event of main failure. As part of the survey, additional information must be provided which adequately addresses this concern and ensures the integrity of this main is preserved.


Hillside sloughing on to reservoir lid

Hillside sloughing on the opposite side of the reservoir has been attributed to the reservoir overflow screen being pried off and partially buried. This is a significant deficiency that the operator plans to fix in the immediate future. The reservoir was found to be adequately vented with 24 mesh screen; the interior of the reservoir was found to be clean. The interior hatches were sealed and found to be water tight.

The sizing of the reservoir overflow appears to remain unaddressed. Department correspondence dated February 10, 2009 item 4 stated, "The engineer needs to reconsider the capacity of the 6-inch overflow and certify adequacy of the overflow for the ultimate rate of water supply." No record certifying the adequacy of the overflow was found in Department records.

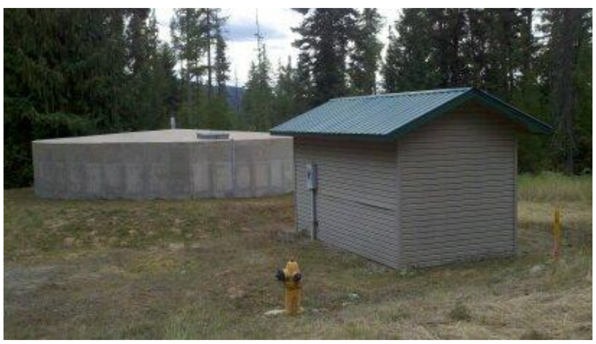
Distribution

The main distribution system is gravity fed through an additional 8000 feet of 8-inch PVC line, with a reported static pressure of 78 psi.

In 1998 expansion of the water system to serve an additional 25 lots (3.5- to 5-acre) serving the Cedar Ridge development was constructed. This project required a booster pump station which pumps to an upper 45,000 gallon above ground concrete reservoir located at an elevation of 2510 feet (270 ft head). This booster station is equipped with two 10 hp 87 gpm pumps (at 280 feet, TDH) operating off floats in the upper reservoir. The pumps are equipped with an automatic flow cut off. Two-inch Badger flow meters are installed on the discharge lines from the boosters; a sample tap is provided. The pump room is equipped with a floor drain and adequate heat and ventilation. An alarm light is provided outside the pump building but is not connected to telemetry. It is recommended the alarm system be incorporated into existing telemetry to allow the operator adequate time to correct system issues prior to depressurization occurring. The operator reports that a check valve is not provided on discharge to the 45,000 gallon reservoir. In the event of a water line break, the operator will have no mechanism in place to prevent draining of the 45,000 gallon reservoir into the surrounding rural residential area. The Department strongly recommends a remedy is provided to address this concern to prevent future possible property damage.


Cedar Ridge Booster Station

The 45,000 gallon upper reservoir is vented, and access lids are of an overlapping type. The reservoir vent screen was found to need minor repair; the reservoir overflow was found to be adequately screened. A booster station is located at the upper reservoir to serve the lots located adjacent to and above the upper tank. The upper booster is equipped with one 3 hp variable frequency drive (VFD) pump. The booster pump house building was not inspected at the time of the survey; inspection will be required prior to the booster station serving connections. Currently there are no users on this portion of the system; however, the operator does report flushing the water line serving this system as required by DEQ.



Cedar Ridge reservoir & booster station (not inspected)

Cedar Ridge vent (minor repair needed)

The distribution system is primarily looped with line sizes ranging from 4- to 8-inch PVC. Fire hydrants are located throughout the distribution system. The system meets West Side Fire District fire flow requirements and all hydrants were rebuilt in 2003. All dead end mains on the system are equipped with adequate flushing hydrants; the operator flushes dead ends at a minimum of twice per year as required.

A total coliform sampling plan which outlines five rotating sampling locations representing the entire distribution was not found in Department files. Please submit a copy of the current total coliform sampling plan to the Department for our records.

The City has not accepted the distribution system serving the Dover Bay Development. The operator reports there are two air vacuum relief valves on this portion of the distribution system. The outlet of the valves must be screened with 24-mesh and elevated above water level in the vault to prevent contamination of the distribution main. The pressure reducing valve(s) installed on this portion of the distribution system should be maintained to ensure continued proper operation.

The City has implemented a robust, premise-isolation based cross connection control program as required in order to ensure the potable supply is protected from contamination through backflow and meets the four elements required by the Idaho Rules for Public Drinking Water Systems. The City's ordinance provides the system with the authority to inspect all premises for cross connections, requires suitable backflow protection is provided where necessary, requires annual testing of all assemblies annually by a licensed tester and provides the City the authority to disconnect service to connections where required adequate backflow protection is not provided.

The Dover Bay Development portion of the distribution system receives its irrigation supply from a secondary system drawn from the Pend Oreille River. Components of the secondary irrigation system are below grade and there is no discharge to any frost free hydrants. In order to prevent contamination of the potable main through a potential cross connection, reduced pressure principle (RP) assemblies are required and provided on all main service lines as well as the marina and stores. RP's must be tested annually by a licensed backflow tester; copies of the test reports must be provided to the water system for review. Failed assemblies must be addressed in accordance with the City's cross connection control program. Replacement parts must be approved by the manufacturer.

Three underground sprinkler systems on the original Dover distribution system are adequately protected by backflow prevention assemblies.

In the event distribution pressures drop below 20 psi in the future, it will be necessary for the system to provide notification to users and adequately flush and/or disinfect the system as needed. The operator is already aware of this requirement.

Administration

The City currently uses a four member Mayor-Council form of government. The current Mayor is Randy Curless. Water rates are $38.50 for the first 7,000 gallons, with an additional charge of $5.00 per additional 1,000 gallons.

Operator Certification

The City employs one direct responsible charge operator. Hal Overland is certified at the Water Treatment Class 2 level (DWT2-16228) and Distribution Class 1 level (DWD1-14727). Mr. Jeff Jordine is the acting back-up operator. Mr. Overland is highly knowledgeable regarding water system operation and was found to be very conscientious in ensuring water users receive adequately treated water.

Monitoring

Monitoring requirements from the entry point to distribution:

The water system is required to collect a nitrate and sodium sample annually. Nitrite sampling is required once per nine years. The water system has qualified, based on a combination of an excellent monitoring history and low risk of contamination, for monitoring reductions and waivers for arsenic, inorganic, synthetic organic and volatile organic contaminants. Inorganic sampling is reduced to once per nine years. Synthetic and volatile organic sampling requirements have been waived. Radiological sampling for alpha and uranium sampling is reduced to once per nine years; radium 226/228 is reduced to once per six years. The system's current monitoring requirements may be accessed at: http://www.deq.idaho.gov/water-quality/drinking-water/pws-switchboard.aspx

Distribution monitoring requirements:

The system is required to collect one routine total coliform sample per month. The free chlorine residual is analyzed and recorded on the coliform sample form at the time the coliform sample is collected as required. As previously mentioned, please submit a current copy of the system's coliform sampling plan for the Department's records. The plan should designate five rotating sampling locations representing the entire distribution system.

One disinfection by product sample analyzed for total trihalomethane and haloacetic acid group 5 must be collected from the point of longest retention time in the distribution system annually between the months of July 1 and September 30.
Five lead and copper samples must be collected from the same locations in the distribution system once per three years. Samples should be drawn from a cold water tap following a period in which water has stood motionless in service plumbing for at least six hours.

Long Term 2 Enhanced Surface Water Treatment Rule monitoring:

The Association has met the raw water E.coli requirements of the Long Term 2 Enhanced Surface Water Treatment Rule. This rule required bi-monthly raw water monitoring for E.coli beginning in October 2008 for one year. Results indicated that the source is not susceptible to significant fecal contamination; therefore, no additional treatment was required Average E.coli quantitray results were 0.2 colonies/100 ml.

Conclusion

On behalf of the Department, I would like to express my sincere appreciation to Hal Overland for his dedication and conscientious efforts to ensure the community of Dover is provided with a safe and adequate supply of drinking water. I would also like to express my appreciation to the City of Dover for supporting Mr. Overland by providing him the tools necessary to successfully operate the water system currently and into the future.

Please find summarized below significant deficiencies, additional requirements and recommendations noted at the time of the field inspection. Within 30 days of receipt of this report, please contact me to discuss options for correction of issues identified below. Within 120 days of receipt of this report, please submit a written timeline in which the City intends to address these issues.

Significant Deficiencies

1. An accurate mechanism to measure filtration rate must be provided.
2. The unprotected cross connection between the disinfected (finished) and filtered water lines is a significant deficiency and must be adequately addressed. Options to address this issue were discussed at the time of the survey. Alternatively, the operator may wish to consult with the Design Engineer to determine if sand filter upflow may be accomplished through unchlorinated water in the clear wells.
3. The overflow on the 2000 gallon clear well must be screened with 24 mesh.
4. A control valve located on the discharge to the reservoir (approved DEQ record drawings 2007) has been valved off from the system due to operational failure. The valve appears to have originally been installed as a mechanism to relieve excessive pressure between the clear well and reservoir. A functioning operational mechanism to relieve pressure must be provided at this location.
5. Hillside sloughing adjacent to the reservoir has attributed to the reservoir overflow screen being pried off and partially buried. The overflow screen must be repaired to prevent contamination of the finished water supply.
6. As referenced in correspondence dated February 10, 2009 and detailed in the storage section of this report, certification of the adequacy of the overflow size must be provided to the Department for review and approval.
7. Hillside sloughing appears to be compromising the water main which feeds the 45,000 gallon reservoir. Additional information which adequately addresses this concern and ensures the integrity of this main is preserved must be provided as detailed in the storage section of this report.
8. The outlets of the two air vacuum relief valves located on the Dover Bay Development distribution system must be screened with 24-mesh and elevated above water level in the vault to prevent contamination of the distribution main.

Additional Requirements

1. Filters must be allowed to discharge to waste for a minimum of 48 hours prior to being brought on line for potable use.
2. The diffuser discharging to the supernatant basin on the furthest east filter bay should be slightly rotated to prevent the minimal amount of scouring of the bed surface.
3. Until which time peak day demand calculations and width length ratio information is provided to DEQ Engineering for review and approval, a contact time credit of 90 minutes [20879 gallons (pipeline volume)/230 gpm (booster pump rate from clear well)] must be please be utilized for contact time calculation purposes on the system's disinfection monthly operating report form.
4. A total coliform sampling which outlines five rotating sampling locations representing the entire distribution was not found in Department files. Please submit a copy of the current total coliform sampling plan to the Department for our records.

Recommendations

1. Raw water flow meters are recommended to be installed in the raw water pump control vault.
2. The alarm system for the functioning booster pump should be incorporated into the autodialer system to allow the operator adequate time to correct system issues prior to depressurization occurring.
3. The operator reports that a check valve is not provided on discharge to the 45,000 gallon reservoir. In the event of a water line break, the operator will have no mechanism in place to prevent draining of the 45,000 gallon reservoir into the rural residential area. The Department strongly recommends a remedy is provided to address this concern to prevent future possible property damage.

4. The pressure reducing valves installed on the Dover Bay Development portion of the distribution system should be maintained to ensure continued proper operation.
5. Limited security currently is provided at the treatment plant, baffled reservoir, and 45,000 gallon reservoir. It is recommended that the City research the possibility of fencing the vicinity of these sites to provide an increased measure of security.
6. It is recommended but not required that raw water turbidity levels be analyzed on a routine basis (weekly or bi-weekly) in order to establish a baseline water quality trend should the Pend Oreille River source become impacted in the future.
7. Development of an Operation and Maintenance Manual for the system is strongly recommended.
8. It is recommended that all valves be exercised at a minimum of an annual basis.

Suzanne Scheidt ____________________ October 3, 2012

Suzanne Scheidt, Drinking Water Program Supervisor Date

APPENDIX E

Reservoir Sizing Analysis

City of Dover
Reservoir Sizing Analysis
4-4-2016

Main Reservoir Storage =	354,000	gal.		
Cedar Ridge Reservoir Storage =	43,000	gal.		
TOTAL =	**397,000**	**gal.**		
Main Reservoir OS =	19,657	gal.		
Cedar Ridge Reservoir OS =	13,000	gal.		
TOTAL =	**32,657**	**gal.**		
SSF Source Capacity =	204	gpm =	293,760	gpd
Dover Fire Flow =	2000	gpm =		
Existing Booster Source Capacity =	85	gpm =	122,400	gpd (for Existing Dover + SHWD Scenario)
Upgraded Booster Source Capcity =	150	gpm =	216,000	gpd (for Build-out Dover + SHWD Scenario)
Old Dover ADD =	194	gpd/ERU		
Dover Bay Development ADD =	75	gpd/ERU		
SHWD ADD =	258	gpd/ERU		
Old Dover MDD =	436	gpd/ERU		
Dover Bay Development MDD =	165	gpd/ERU		
SHWD MDD =	516	gpd/ERU		

OS = Operational Storage
ES = Equalization Storage
SS = Standby Storage
FS = Fire Storage
ADD = Average Day Demand
MDD = Maximum Day Demand
QS = Source Capacity

Existing Connections	**ERUs**	**ADD**	**MDD**	**QS/MDD**	**Factor**	**ES**	**OS**	**SS**	**FS**	**TOTAL**
Old Dover	129	25,074	56,244							
Dover Bay Development	136	10,243	22,440							
Combined	265	35,318	78,684	3.73	0	0	32,657	11,773	240,000	**284,430**

Existing Conn. Dover + SHWD	**ERUs**	**ADD**	**MDD**	**QS/MDD**	**Factor**	**ES**	**OS**	**SS**	**FS**	**TOTAL**
Cedar Ridge	12	2,333	5,232							
SHWD	185	47,730	95,460							
Combined	197	50,063	100,692	1.22	2.4	10,069	13,000	16,688	120,000	**159,757**

Note: SHWD Fed from Cedar Ridge Reservoir. Existing booster pumps from main reservoir at 85 gpm, each pump. **444,186**

20-year Dover Only	**ERUs**	**ADD**	**MDD**	**QS/MDD**	**Factor**	**ES**	**OS**	**SS**	**FS**	**TOTAL**
Old Dover	159	30,906	69,324							
Dover Bay Development	556	41,876	91,740							
Combined	715	72,782	161,064	1.82	0	0	32,657	24,261	240,000	**296,918**

20-year Dover + SHWD	**ERUs**	**ADD**	**MDD**	**QS/MDD**	**Factor**	**ES**	**OS**	**SS**	**FS**	**TOTAL**
Cedar Ridge	19	3,693	8,284							
SHWD	222	57,276	114,552							
Combined	241	60,969	122,836	1.76	0	0	13,000	20,323	120,000	**153,323**

Note: SHWD Fed from Cedar Ridge Reservoir. Upgrade booster pumps from main reservoir to 150 gpm, each pump. **450,241**

Build-out Dover Only	**ERUs**	**ADD**	**MDD**	**QS/MDD**	**Factor**	**ES**	**OS**	**SS**	**FS**	**TOTAL**
Old Dover	373	72,502	162,628							
Dover Bay Development	556	41,876	91,740							
Combined	929	114,378	254,368	1.15	3.3	34,976	32,657	38,126	240,000	**345,759**

Build-out Dover + SHWD	**ERUs**	**ADD**	**MDD**	**QS/MDD**	**Factor**	**ES**	**OS**	**SS**	**FS**	**TOTAL**
Cedar Ridge	25	4,859	10,900							
SHWD	265	68,370	136,740							
Combined	290	73,229	147,640	1.46	0.8	4,921	13,000	24,410	120,000	**162,331**

Note: SHWD Fed from Cedar Ridge Reservoir. Upgrade booster pumps from main reservoir to 150 gpm, each pump. **508,090**

APPENDIX F

Preliminary Cost Estimates

CITY OF DOVER
ALTERNATIVE #1 - NO SERVICE TO SHWD; UPGRADE EXISTING INTAKE
Engineer's Opinion of Probably Construction Cost
April 5, 2016

Item Description	Quantity	Units	Unit Price	Amount
Mobilization (5%)	1	$42,236.25		**$42,200.00**
SCADA System				
SCADA Panels	4	EA.	$20,000.00	$80,000.00
Programming	1	LS	$75,000.00	$75,000.00
			Subtotal	**$155,000.00**
Upgrade Existing Raw Water Intake				
VFD for Raw Water Pumps	2	EA.	$3,000.00	$6,000.00
Bury and Flatten Existing Intake Pipe	250	LF	$15.00	$3,750.00
Air/Vacuum Valves	2	EA.	$800.00	$1,600.00
Electrical/Control Upgrades	1	LS	$50,000.00	$50,000.00
Warning Signage and Buoys	1	LS	$5,000.00	$5,000.00
Erosion Control Measures	1	LS	$3,000.00	$3,000.00
			Subtotal	**$69,350.00**
Water Treatment System Upgrades				
6" Flow Meter	2	EA.	$5,000.00	$10,000.00
6" Gate Valve	4	EA.	$1,000.00	$4,000.00
Misc. Pipe and Fittings	1	LS	$3,000.00	$3,000.00
Submersible Levelogger	4	EA.	$1,500.00	$6,000.00
Raw Water Turbidimeter System	1	LS	$4,500.00	$4,500.00
Video Surveillance System	1	EA.	$1,500.00	$1,500.00
VFD Pump Control System w/ PLC Upgrades	1	LS	$50,000.00	$50,000.00
			Subtotal	**$79,000.00**
Upgraded Water Storage System				
Submersible Levelogger	2	EA.	$1,500.00	$3,000.00
Telemetry System	1	LS	$5,000.00	$5,000.00
Video Surveillance System	2	EA.	$1,500.00	$3,000.00
6" Check Valve w/ Valve Vault	1	EA.	$5,000.00	$5,000.00
6" Gate Valve	2	EA.	$1,000.00	$2,000.00
Bypass Pipe and Fittings	1	LS	$4,000.00	$4,000.00
			Subtotal	**$22,000.00**
Upgraded Main Reservoir Booster Pumping Facility				
New Pump Control Panel and PLC	1	LS	$25,000.00	$25,000.00
2" Flow Meter	2	EA.	$1,500.00	$3,000.00
			Subtotal	**$28,000.00**
New Transmission Line				
12" C900 PVC Pipe w/ Fittings	2400	LF	$40.00	$96,000.00
Trenching and Backfill	2400	LF	$10.00	$24,000.00
Imported Pipe Bedding	2400	LF	$4.50	$10,800.00
12" Gate Valve	4	EA.	$2,000.00	$8,000.00
24" Steel Casing	340	LF	$100.00	$34,000.00
Pipe Boring and Jacking	340	LF	$400.00	$136,000.00
Erosion Control Measures	1	LS	$5,000.00	$5,000.00
			Subtotal	**$313,800.00**
Emergency Backup Connection to SHWD (Near River)				
6" C900 PVC Pipe w/ Fittings	650	LF	$15.00	$9,750.00
Trenching and Backfill	650	LF	$10.00	$6,500.00
Imported Pipe Bedding	650	LF	$4.50	$2,925.00
6" Gate Valve	2	EA.	$1,000.00	$2,000.00
Clear and Grub Pipe Corridor	800	SY	$4.00	$3,200.00
Erosion Control Measures	1	LS	$2,000.00	$2,000.00
			Subtotal	**$26,375.00**
Water Meter Replacements				
Meter Only Replacements	65	EA.	$400.00	$26,000.00
Meter, Assembly and Box Replacements	65	EA.	$1,200.00	$78,000.00
Misc. Erosion Control and Surface Repairs	1	LS	$5,000.00	$5,000.00
			Subtotal	**$109,000.00**
Subtotal Construction Costs				**$844,725.00**
Contingency (15%)				$126,708.75
Engineering/Admin. (20%)				$168,945.00
Total Cost				**$1,140,378.75**

CITY OF DOVER
ALTERNATIVE #2 - NO SERVICE TO SHWD; REPLACE EXISTING INTAKE
Engineer's Opinion of Probably Construction Cost
April 5, 2016

Item Description	Quantity	Units	Unit Price	Amount
Mobilization (5%)	1	$58,777.50		**$58,800.00**
SCADA System				
SCADA Panels	5	EA.	$20,000.00	$100,000.00
Programming	1	LS	$75,000.00	$75,000.00
			Subtotal	**$175,000.00**
New Raw Water Intake				
12" HDPE Intake Pipe	870	LF	$45.00	$39,150.00
6" Pump Discharge Pipeline	30	LF	$20.00	$600.00
1 1/2" Backwash Line	870	LF	$4.00	$3,480.00
Trenching and Backfill	310	LF	$20.00	$6,200.00
Imported Pipe Bedding	310	LF	$4.50	$1,395.00
Intake Screen	1	LS	$18,000.00	$18,000.00
HDPE Pipe Anchors	60	EA.	$200.00	$12,000.00
Erosion Control Measures	1	LS	$10,000.00	$10,000.00
Concrete Wet Well (27' Deep)	1	EA.	$45,000.00	$45,000.00
Raw Water Pumping System	1	EA.	$25,000.00	$25,000.00
6" Gate Valve	5	EA.	$1,000.00	$5,000.00
Misc. Cast Iron Fittings	15	EA.	$450.00	$6,750.00
Metering Vault	1	LS	$18,000.00	$18,000.00
Existing Vault Piping Modifications	1	LS	$19,000.00	$19,000.00
Metering Vault Piping	1	LS	$28,000.00	$28,000.00
Electrical/Control	1	LS	$70,000.00	$70,000.00
			Subtotal	**$307,575.00**
Upgrade Existing Raw Water Intake				
VFD for Raw Water Pumps	2	EA.	$3,000.00	$6,000.00
Electrical/Control Upgrades	1	LS	$50,000.00	$50,000.00
			Subtotal	**$56,000.00**
Water Treatment System Upgrades				
6" Flow Meter	2	EA.	$5,000.00	$10,000.00
6" Gate Valve	4	EA.	$1,000.00	$4,000.00
Misc. Pipe and Fittings	1	LS	$3,000.00	$3,000.00
Submersible Levelogger	4	EA.	$1,500.00	$6,000.00
Raw Water Turbidimeter System	1	LS	$4,500.00	$4,500.00
Video Surveillance System	1	EA.	$1,500.00	$1,500.00
VFD Pump Control System w/ PLC Upgrades	1	LS	$50,000.00	$50,000.00
			Subtotal	**$79,000.00**
Upgraded Water Storage System				
Submersible Levelogger	2	EA.	$1,500.00	$3,000.00
Telemetry System	1	LS	$5,000.00	$5,000.00
Video Surveillance System	2	EA.	$1,500.00	$3,000.00
6" Check Valve w/ Valve Vault	1	EA.	$5,000.00	$5,000.00
6" Gate Valve	2	EA.	$1,000.00	$2,000.00
Bypass Pipe and Fittings	1	LS	$4,000.00	$4,000.00
			Subtotal	**$22,000.00**
Upgraded Main Reservoir Booster Pumping Facility				
New Pump Control Panel and PLC	1	LS	$25,000.00	$25,000.00
2" Flow Meter	2	EA.	$1,500.00	$3,000.00
			Subtotal	**$28,000.00**
New Transmission Line				
12" C900 PVC Pipe w/ Fittings	2400	LF	$40.00	$96,000.00
Trenching and Backfill	2400	LF	$10.00	$24,000.00
Imported Pipe Bedding	2400	LF	$4.50	$10,800.00
12" Gate Valve	4	EA.	$2,000.00	$8,000.00
24" Steel Casing	340	LF	$100.00	$34,000.00
Pipe Boring and Jacking	340	LF	$400.00	$136,000.00
Erosion Control Measures	1	LS	$5,000.00	$5,000.00
			Subtotal	**$313,800.00**
Emergency Backup Connection to SHWD (Near River)				
6" C900 PVC Pipe w/ Fittings	650	LF	$15.00	$9,750.00
Trenching and Backfill	650	LF	$10.00	$6,500.00
Imported Pipe Bedding	650	LF	$4.50	$2,925.00
6" Gate Valve	2	EA.	$1,000.00	$2,000.00
Clear and Grub Pipe Corridor	800	SY	$4.00	$3,200.00
Erosion Control Measures	1	LS	$2,000.00	$2,000.00
			Subtotal	**$26,375.00**
Water Meter Replacements				
Meter Only Replacements	65	EA.	$400.00	$26,000.00
Meter, Assembly and Box Replacements	65	EA.	$1,200.00	$78,000.00
Misc. Erosion Control and Surface Repairs	1	LS	$5,000.00	$5,000.00
			Subtotal	**$109,000.00**
Subtotal Construction Costs				**$1,175,550.00**
Contingency (15%)				$176,332.50
Engineering/Admin. (20%)				$235,110.00
Total Cost				**$1,586,992.50**

CITY OF DOVER
ALTERNATIVE #3 - SERVICE TO SHWD
Engineer's Opinion of Probably Construction Cost
October 20, 2016

Item Description	Quantity	Units	Unit Price	Amount
Mobilization (5%)	1	$78,210.50		**$78,200.00**
SCADA System				
SCADA Panels	5	EA.	$20,000.00	$100,000.00
Programming	1	LS	$75,000.00	$75,000.00
			Subtotal	**$175,000.00**
New Raw Water Intake				
12" HDPE Intake Pipe	870	LF	$45.00	$39,150.00
6" Pump Discharge Pipeline	30	LF	$20.00	$600.00
1 1/2" Backwash Line	870	LF	$4.00	$3,480.00
Trenching and Backfill	310	LF	$20.00	$6,200.00
Imported Pipe Bedding	310	LF	$4.50	$1,395.00
Intake Screen	1	LS	$18,000.00	$18,000.00
HDPE Pipe Anchors	60	EA.	$200.00	$12,000.00
Erosion Control Measures	1	LS	$10,000.00	$10,000.00
Concrete Wet Well (27' Deep)	1	EA.	$45,000.00	$45,000.00
Raw Water Pumping System	1	EA.	$25,000.00	$25,000.00
6" Gate Valve	5	EA.	$1,000.00	$5,000.00
Misc. Cast Iron Fittings	15	EA.	$450.00	$6,750.00
Metering Vault	1	LS	$18,000.00	$18,000.00
Existing Vault Piping Modifications	1	LS	$19,000.00	$19,000.00
Metering Vault Piping	1	LS	$28,000.00	$28,000.00
Electrical/Control	1	LS	$70,000.00	$70,000.00
			Subtotal	**$307,575.00**
Upgrade Existing Raw Water Intake				
VFD for Raw Water Pumps	2	EA.	$3,000.00	$6,000.00
Electrical/Control Upgrades	1	LS	$50,000.00	$50,000.00
			Subtotal	**$56,000.00**
Water Treatment System Upgrades				
6" Flow Meter	2	EA.	$5,000.00	$10,000.00
6" Gate Valve	4	EA.	$1,000.00	$4,000.00
Misc. Pipe and Fittings	1	LS	$3,000.00	$3,000.00
Submersible Levelogger	4	EA.	$1,500.00	$6,000.00
Raw Water Turbidimeter System	1	LS	$4,500.00	$4,500.00
Video Surveillance System	1	EA.	$1,500.00	$1,500.00
VFD Pump Control System w/ PLC Upgrades	1	LS	$50,000.00	$50,000.00
			Subtotal	**$79,000.00**
Upgraded Water Storage System				
Submersible Levelogger	2	EA.	$1,500.00	$3,000.00
Telemetry System	1	LS	$5,000.00	$5,000.00
6" Check Valve w/ Valve Vault	1	EA.	$5,000.00	$5,000.00
6" Gate Valve	2	EA.	$1,000.00	$2,000.00
Bypass Pipe and Fittings	1	LS	$4,000.00	$4,000.00
			Subtotal	**$19,000.00**
New Water Storage Reservoir (Cedar Ridge)				
Construct 120,000 gallon Water Storage Reservoir	1	LS	$180,000.00	$180,000.00
Reservoir Site Work	1	LS	$15,000.00	$15,000.00
Reservoir Exterior Piping	1	LS	$30,000.00	$30,000.00
Submersible Levelogger	1	EA.	$1,500.00	$1,500.00
Video Surveillance System	1	EA.	$1,500.00	$1,500.00
Erosion Control Measures	1	LS	$3,000.00	$3,000.00
			Subtotal	**$231,000.00**
Upgraded Main Reservoir Booster Pumping Facility				
Relocate and Install SHWD Pumps/Panels	1	LS	$10,000.00	$10,000.00
New Booster Pump Building	150	SF	$180.00	$27,000.00
Building Site Work	1	LS	$5,000.00	$5,000.00
New Mechanical Piping and Valves	1	LS	$20,000.00	$20,000.00
4" Flow Meter	2	EA.	$3,000.00	$6,000.00
Misc. Electrical/Control	1	LS	$10,000.00	$10,000.00
Video Surveillance System	1	EA.	$1,500.00	$1,500.00
Standby Generator	1	LS	$45,000.00	$45,000.00
Erosion Control Measures	1	LS	$2,000.00	$2,000.00
			Subtotal	**$126,500.00**
Pipe Connection to SHWD (Near Cedar Ridge)				
8" C900 PVC Pipe w/ Fittings	880	LF	$25.00	$22,000.00
Trenching and Backfill	880	LF	$10.00	$8,800.00
Imported Pipe Bedding	880	LF	$4.50	$3,960.00
8" Gate Valve	2	EA.	$1,500.00	$3,000.00
Erosion Control Measures	1	LS	$5,000.00	$5,000.00
			Subtotal	**$42,760.00**

CITY OF DOVER
ALTERNATIVE #3 - SERVICE TO SHWD
Engineer's Opinion of Probably Construction Cost
October 20, 2016

Item Description	Quantity	Units	Unit Price	Amount
New Transmission Line				
12" C900 PVC Pipe w/ Fittings	2400	LF	$40.00	$96,000.00
Trenching and Backfill	2400	LF	$10.00	$24,000.00
Imported Pipe Bedding	2400	LF	$4.50	$10,800.00
12" Gate Valve	4	EA.	$2,000.00	$8,000.00
24" Steel Casing	340	LF	$100.00	$34,000.00
Pipe Boring and Jacking	340	LF	$400.00	$136,000.00
Erosion Control Measures	1	LS	$5,000.00	$5,000.00
			Subtotal	**$313,800.00**
Emergency Backup Connection to SHWD (Near River)				
6" C900 PVC Pipe w/ Fittings	650	LF	$15.00	$9,750.00
Trenching and Backfill	650	LF	$10.00	$6,500.00
Imported Pipe Bedding	650	LF	$4.50	$2,925.00
6" Gate Valve	2	EA.	$1,000.00	$2,000.00
Clear and Grub Pipe Corridor	800	SY	$4.00	$3,200.00
Erosion Control Measures	1	LS	$2,000.00	$2,000.00
			Subtotal	**$26,375.00**
Water Meter Replacements				
Meter Only Replacements	65	EA.	$400.00	$26,000.00
Meter, Assembly and Box Replacements	65	EA.	$1,200.00	$78,000.00
Misc. Erosion Control and Surface Repairs	1	LS	$5,000.00	$5,000.00
			Subtotal	**$109,000.00**
Subtotal Construction Costs				**$1,564,210.00**
Contingency (15%)				$234,631.50
Engineering/Admin. (20%)				$312,842.00
Total Cost				**$2,111,683.50**