

WATER PERMIT NO. 1969-1

Name of Applicant: **Terry Trojan Well No. 2**

Address: **PO Box 515, Lead SD 57754** Phone: **605 722-7560**

Amount of Water Claimed: **0.22 cfs (46 AF)** Total Acres: **NA**

Source of Water Supply: **groundwater (one well)**

Water to be used for: **rural water system** County: **Lawrence**

Type of Waste Disposal System:

Location: **approximately 3 miles west of Lead**

PRIORITY Date Received: **7-14-17** Application/License Fee: **\$ 700**

Corrected Application Received: **7-24-17** Period of Annual Use: **January 1 – December 31**

Remarks: **approximately 3 miles west of Lead**

Diversion Point: **SW 1/4 NE 1/4 Sec 2-T4N-R2E**

Land to be Irrigated:

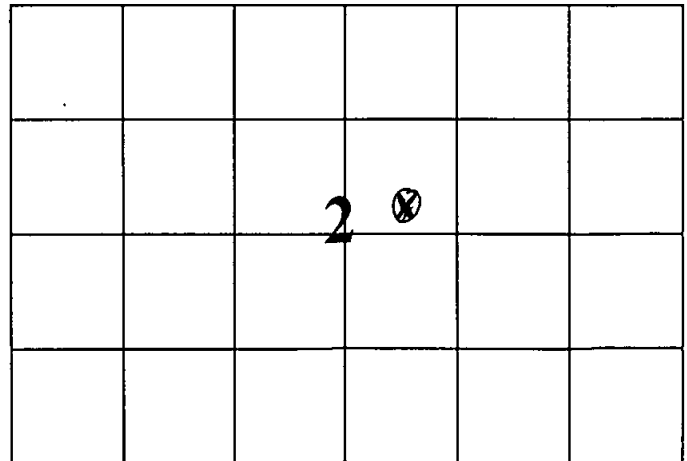
Depth of Well: **850 feet deep**

Well Driller:

Remarks:

Type of Map: **aerial**

Prepared by:



Reviewed and the Number Assigned on: **7-24-17**

By: **Karen Schlaak**

Notice of Hearing - date to intervene: _____

**SOUTH DAKOTA
WATER PERMIT NO. 1969-1**

Date of first receipt of application July 14, 2017.

Date of return to applicant for corrections, amendments or changes July 17, 2017.

Date of receipt of corrected application July 24, 2017.

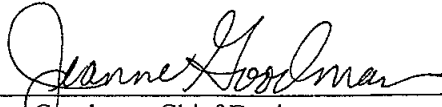
The Chief Engineer, on behalf of the Water Management Board, issues Water Permit No. 1969-1 to Terry Trojan Well No. 2, c/o Linda Derosier, PO Box 515, Lead SD 57754 authorizing the construction of the water use system and the placing of water to beneficial use subject to the following limitations, conditions and qualifications:

1. Water Permit No. 1969-1 appropriates 46 acre-feet of water annually at a maximum diversion rate of 0.22 cubic feet of water per second from one well to be completed into the Deadwood Aquifer (approximately 850 feet deep) located in the SW 1/4 NE 1/4 Section 2-T4N-R2E for a water distribution system serving the Terry Trojan Water District located approximately three miles west of Lead SD.
2. The water appropriated shall be used for the purpose of a water distribution system and may not exceed the amount of water needed for beneficial use.
3. The water is to be used during the following described annual period: January 1 – December 31.
4. The date of approval of Permit No. 1969-1 is October 23, 2017.
5. The date from which applicant may claim right is July 14, 2017.
6. One-fifth of the construction is to be completed on or before April 23, 2020.
7. All construction is to be completed on or before October 23, 2022.
8. Water is to be put to beneficial use on or before October 23, 2026.
9. Water rights obtained in compliance with the laws of the State of South Dakota may not be unlawfully impaired by this appropriation.

QUALIFICATIONS

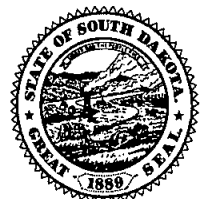
1. The well approved under this Permit will be located near domestic wells and other wells which may obtain water from the same aquifer. The well owner under this Permit shall control his withdrawals so there is not a reduction of needed water supplies in adequate domestic wells or in adequate wells having prior water rights.
2. The well authorized by Permit No. 1969-1 shall be constructed by a licensed well driller and construction of the well and installation of the pump shall comply with Water Management Board Well Construction Rules, Chapter 74:02:04 with the well casing pressure grouted (bottom to top) pursuant to Section 74:02:04:28.
3. The Permit holder shall report to the Chief Engineer annually the amount of water withdrawn from the Deadwood aquifer.
4. Water Permit No. 1969-1 authorizes a total annual diversion of 46.0 acre feet of water.

WATER MANAGEMENT BOARD

By: 
Jeanne Goodman, Chief Engineer
Water Rights Program
Department of Environment and Natural Resources

JAN 09 2018

date



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JUL 14 2017
WATER RIGHTS
PROGRAM

Mail to: DENR - Water Rights 523 E Capitol Ave Pierre, SD 57501-3182 ph. (605) 773-3352	No. <u>1969-1</u> (office use only) Hydrologic Unit <u>10/20203</u>
	Basin <u>Belle Fourche River</u>
	Newspaper <u>Black Hills Pioneer, Spearfish</u>

Application For Permit To Appropriate Water Within The State Of South Dakota

Check use(s) of water:

☐ Municipal	☐ Water Distribution System	☐ Recreational	☐ Institutional
☒ Rural Water System	☐ Commercial	☐ Fish & Wildlife	☐ Geothermal
☐ Domestic (over 18 gpm)	☐ Industrial	☐ Other _____	

Type of Application: (check one)

☒ New ☐ Vested Right (Use predates Mar 2, 1955) ☐ Future Use Reservation
☐ Place to Beneficial Use Water Reserved by Future Use Permit No. _____
☐ Amendment/Correction to Permit No. _____

Description of amendment/correction: (i.e. change diversion point(s), add diversion point(s), change use, etc.)

Add diversion point _____

1. Name to Appear on Water Permit Terry Trojan Well No. 2

Mailing Address PO Box 515 (Address) Lead _____ SD 57754 (City) (State) (Zip Code)
 Phone (605) 722-7560 Mobile _____ Email _____

2. Amount of water claimed 0.22 *CFS or 100 **GPM and 46 ***AF or 15 Million Gallons
 Flow rate and volume are both required. (*Cubic Feet per Second) (**Gallons per Minute) (***Acre Feet - storage capacity of dam/dugout or annual use)

3. Source of water supply Deadwood Aquifer

4. Location of point of diversion SW1/4 NE1/4, Section 2, T4N, R2E County Lawrence

(example - 3 wells in SW1/4 NE1/4 section 12-T104N-R53W)

If not a public water supply (e.g. municipal), will water be used outside of the area described above? ☐ Yes ☐ No

If "Yes," where will water be used? _____

(example - NW1/4 section 12-T104N-R53W)

5. County or counties where water will be used Lawrence

6. Annual period during which water is to be used All Year Jan 1 - Dec 31

7. Give a description of the project. When available include any preliminary engineering report or other reports or information that will help explain the project. (Attach sheet if more space is needed)

See preliminary engineering report

I, Derosier
Spide Derosier, TTWD Executive Director, the applicant, certify under
 Name of Person Title (if applicable)

penalty of perjury that I have read this application, examined the attached map, and that the matters stated are true. I further certify, if acting on behalf of an entity or individual other than myself, that I am authorized to submit this application.

Supplemental Information

(type or print)

1. Well Information (check one or both as applicable) ☒ Drilling new well(s) ☐ Using existing well(s)

a) If new wells, how many 1 Have test holes been drilled ☐ Yes ☒ No Drilled by _____
(if yes, please provide copies of logs)

b) If existing wells, how many _____ Provide copy of log(s), if available. Drilled by _____

For either Existing or Proposed Wells:

c) Well Depth (required) *850' Depth to Top of Water Bearing Material *600' Depth to Water from Surface *650'

d) Distance to nearest domestic well on applicant's property N/A Property owned by others 2,500'

2. Wastewater Disposal System Information

a) Type of System (i.e. septic tank, drain field) _____

b) System Capacity (gallons) _____ Year Constructed _____

c) Connected to the City of _____ Sanitary System

3. Dugout Information

a) Surface Dimensions n/a Depth _____

b) Depth to water (ground surface to water level) _____

4. Water Storage Dams

If the proposed water use system contains one or more storage dams, please furnish the information requested below for each dam. The locations of the dams need to be shown on the map submitted with the application.

a) If a private engineering firm or government agency was involved in the design of this dam, please give their name and address:

b) Freeboard _____

c) Crest Width _____

Crest Length _____

d) Height _____

e) Primary Outlet Capacity _____

If pipe, diameter _____

f) Secondary Spillway Capacity _____

Spillway Width _____

g) X & Y Slope (e.g. 3 to 1 is a typical slope)

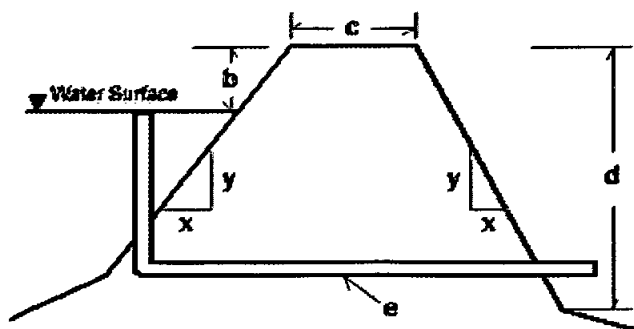
Upstream _____

Downstream _____

h) Surface Area of Impoundment _____

i) Storage _____ Acre Feet

j) Drainage Area Above Dam _____ Acres



Water System Facility Plan for Terry Trojan Water District

RECEIVED

JUL 14 2017

**WATER RIGHTS
PROGRAM**

Prepared For

**Terry Trojan Water
District**

PRELIMINARY ENGINEERING REPORT

**Water System
Rehabilitation
Terry Trojan Water
District**

September 28, 2016

AE2S Project #: P12430-2016-000

Water System Facility Plan

Terry Trojan Water

State Revolving Fund

Project No. P12430-2016-000

September 28, 2016

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of South Dakota.

Theodore F. Schultz

Name

Date: September 28, 2016

Reg. No. 7113

Prepared by:



1560 Concourse Drive
Rapid City, South Dakota
57703

Phone: 605-341-7800
Fax: 605-341-7864

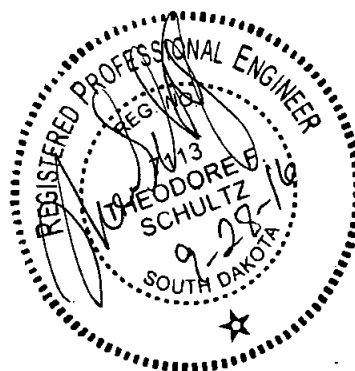


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- B Detailed Cost Estimate Breakdown
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1. Introduction and Background

The Terry Trojan Water District (TTWD) owns and operates a public water supply system serving the Terry subdivision. Ed Striebel with Clearwater Consulting & Water Management currently operates and maintains the system. The system has numerous components that were constructed over a number of years, but was substantially complete in the 1990's.

TTWD is located in Lawrence County, South Dakota near the base of Terry Peak, approximately three miles west of Lead, SD. Terry Peak is the second highest peak in South Dakota with elevation ranging from 6,000 feet to a summit at 7,100 feet having a mountainous terrain. The area water system provides water to residential and commercial properties near the Terry Peak Ski Resort. A system map is shown in Figure 1-1.

In 2005, TTWD and Schreir Engineering completed "Terry Trojan Water District Distribution, Storage & Transmission System Planning Study", which provided TTWD with a comprehensive overview of water system. A decade later, TTWD is experiencing substantial water loss through leaks within their system storage and distribution network and does not have a redundant water supply.

1.1 Purpose and Scope

AE2S was contacted to consult identify both a near-term as well as a long-term strategy for the TTWD water utilities. The existing system and conditions have been evaluated and options presented to the Board. Short and long-term improvement options and strategy have been identified. The monthly user costs and funding options have been presented to TTWD for consideration.

1.2 System Funding

System funding is presented as a Drinking Water State Revolving Fund Loan through the South Dakota Department of Environment and Natural Resources (SDDENR). The loans are currently 3.0% interest at a 20-year term.

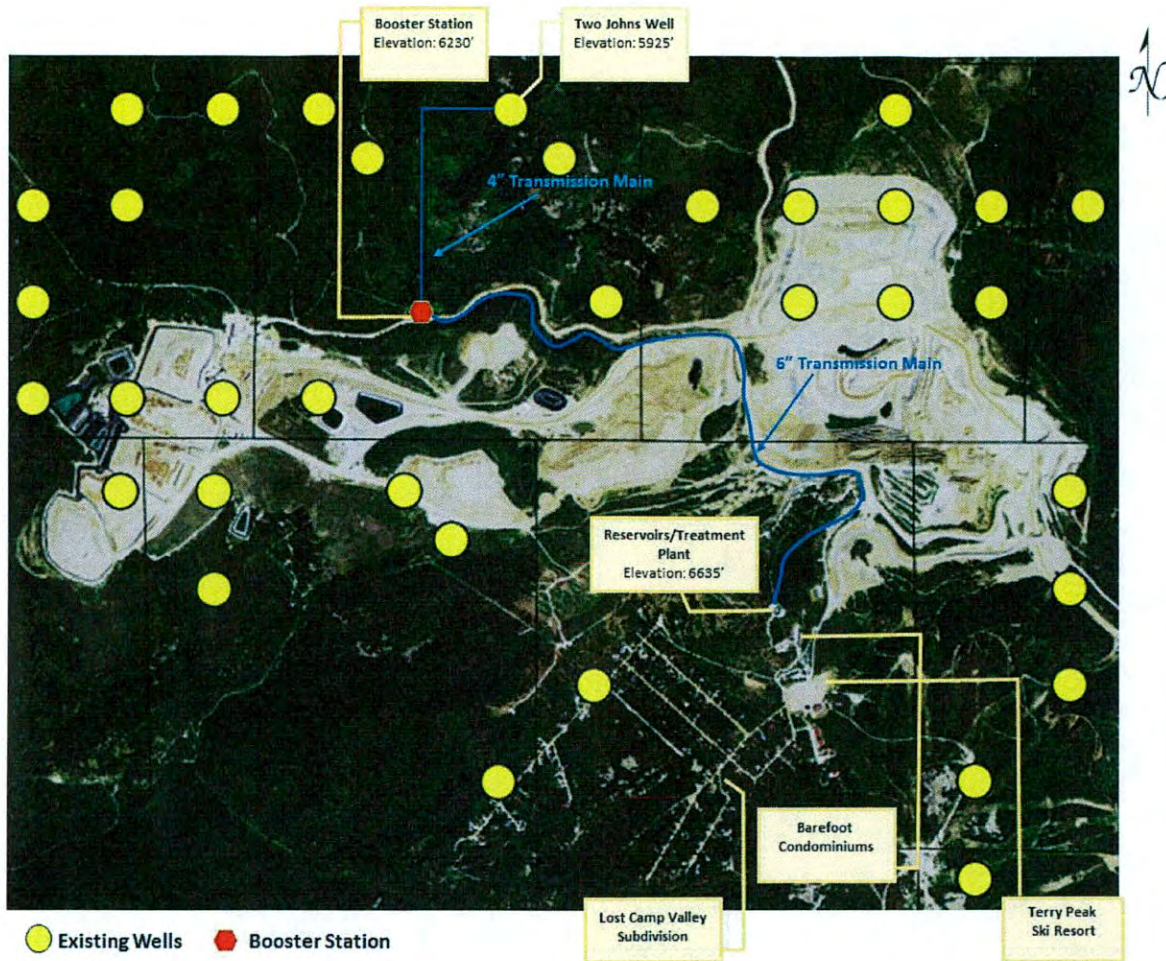
1.3 Adopting the Facility Plan Process

Facility planning provides policymakers and the public with a detailed report on infrastructure needs and the recommended steps to meet those needs. Facility planning can establish priorities for the construction of necessary improvements within the context of a long-term plan to ensure compatibility and prudent management. Lastly, a facility plan can be used as a tool to pursue and as the basis to support capital improvement funding.

TTWD recognizes that prudent management of annual operation and maintenance budgets, optimizing short-term capital improvement expenditures, and maximizing the benefits of long-term capital improvements require a consistent direction for the utility, which can be attained through planning.

As the TTWD adopts and cycles through the planning process, some uncertainties and changes are to be expected. The impacts of these changes can be best managed through a continued proactive planning approach. Responding to future challenges will be most appropriately accomplished through a dynamic planning process that enables the District to maintain a clear vision and consistent direction for the TTWD water supply and treatment system.

Figure 1-1 TTWD Vicinity Map



2. Existing System and Condition Assessment

The water supply system consists of one well, booster pumping station, two storage reservoirs, and approximately 14,000 feet of transmission mains. The TTWD currently has 200 service connections. The system serves the Terry Peak Ski Resort and occupancy of homes is variable throughout the year due to the fact many of the homes are seasonal or short-term rentals. A vicinity map included as Figure 1-1 in this study identifies the area and current Terry Trojan Water System.

2.1 Water Supply

Two Johns Well

Drinking water is supplied from a single well drilled into an abandoned mine decline known as the Two Johns Decline. The well is aptly named the Two Johns Well. Groundwater accumulates in the voids created by the decline and provides an underground aquifer source. Taylor Drilling drilled the well into the decline in 1988.

A well casing was drilled from the surface into the decline and a pump set within the well. A level indicator in the Terry Trojan Reservoir controls the operation of the Two Johns Pump. The Two Johns Decline and well pump are located on property owned by Coeur Mining/Wharf Resources specifically in the Northwest ¼ Northeast ¼ of Section 34, Township 5 North, Range 4 East.

Water is conveyed from the wellhead to a booster station through approximately 4,700 feet of 4-in diameter PVC pipe. The pipe material has not confirmed, but has been a general acceptance based on the best available information.

The well has worked well, but there is not a redundant water source and the controls and SCADA equipment has become outdated. The well is currently pumping at 80-85 gpm and requires arsenic removal treatment.

Table 2-1 TTWD Two Johns Well Data

Two Johns Well Data	Value
Well Casing Diameter (in.)	6
Pump Make and Model	Grundfos 855 30-26
Motor Horse Power	30 hp
Rated Capacity	50 gpm at 1300' TDH
Pump setting Depth (below well head)	360'
Approximate Well Elevation	5924'
Construction Date	1988

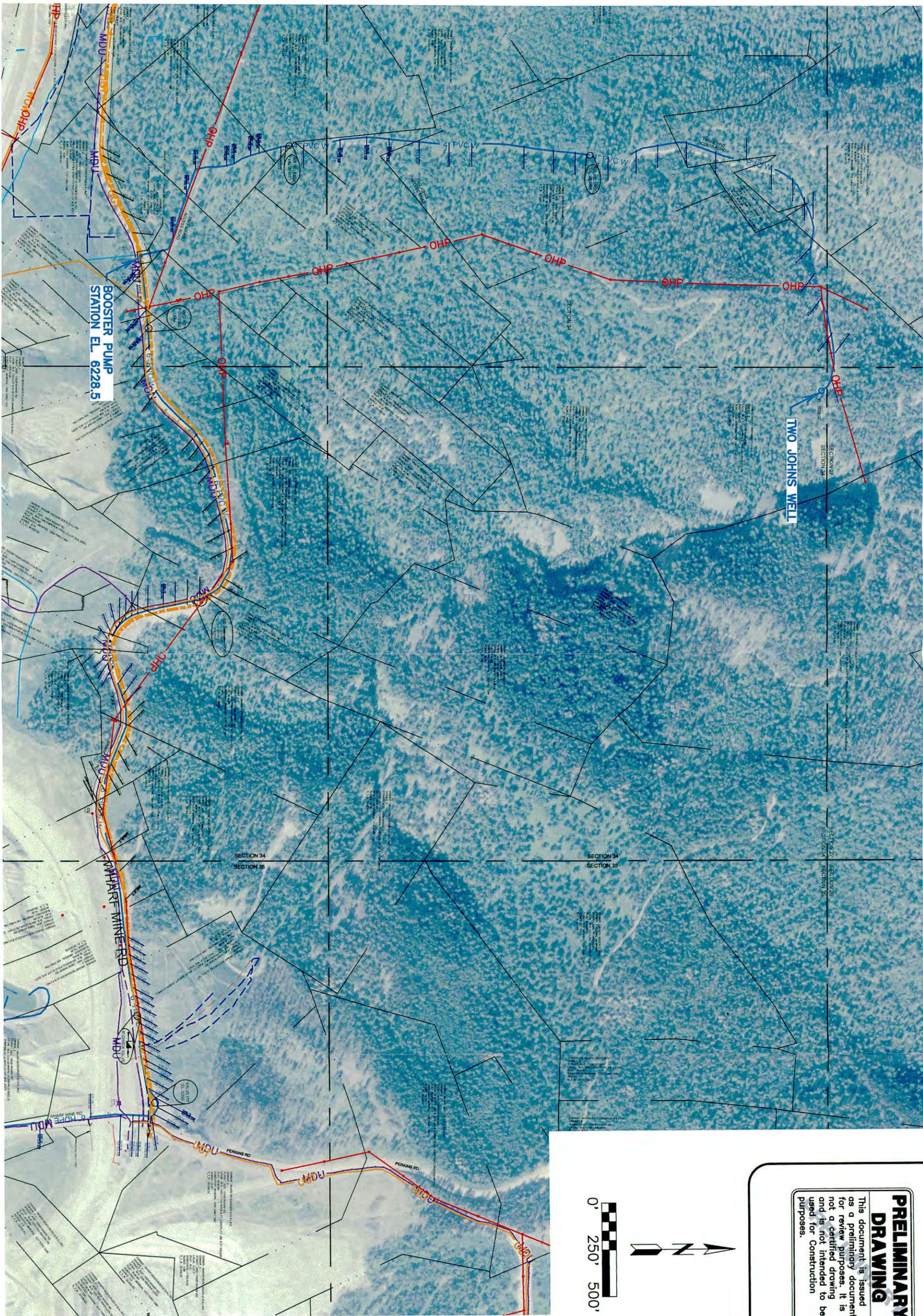
Data obtained from Schreier's 2005 TTWD Distribution, Storage and Transmission System Planning Study.

2.2 Booster Pump Station

The Terry Trojan booster station pump was constructed in 2004 by Wharf Resources and is located on a mining access road at elevation 6,230 feet. The station was built to address the

difference in static head elevation from the Two Johns well pump and the Terry Trojan Reservoir. A pressure sensor and flow meter work together to control the operation of the booster pump. The control for the booster pump is independent of the level indicator controlling the Two Johns Well pump (Schreier 2005, Terry Trojan Water District Distribution, Storage & Transmission System Planning Study).

As indicated by the TTWD, the capacity of the pump in the booster station is 65-75 gpm. The age of the pump and associated equipment is from 2004 and being maintained regularly by Wharf Resources but has outdated controls and SCADA. Refer to Figure 2-1 for the location of the Two Johns Well and Booster Station.



**PRELIMINARY
DRAWING**

This document is issued as a preliminary document for review purposes. It is not a certified drawing and is not intended to be used for construction purposes.



0' 250' 500'

**TERRY VALLEY - TROJAN
FACILITY PLAN**
LAWRENCE COUNTY, SOUTH DAKOTA

FIGURE 2-1



SYM	DATE	DESCRIPTION	APPR

CLIENT PROJECT NO.	DRAWING TYPE FIGURE
DATE JULY 2016	PREPARED BY EJ
PROJECT NUMBER 12430-2016-000	CHECKED / APPROVED TSI 11TS
SHEET 1 OF 4	DATE JULY 2016
DRAWINGS 2-1	PROJECT NUMBER 12430-2016-000

Table 2-2 TTWD Booster Station Pump Data

TTWD Booster Station Pump Data	Value	Comments
Pump Inlet and Discharge (in.)	2.5 and 2	8.87" impellor
Pump Make and Model	C1020 AMBF	Sterling fluid system
Motor Horse Power	30 hp	3 phase, 230/460 volt 3510 RPM
Approximate Station Elevation	6220 ft	
Approximate Static Discharge Head	426.4 ft 185 psi	Tank overflow at 6646.4 ft
Construction Date	2004	

Data obtained from Schreier's 2005 TTWD Distribution, Storage & Transmission System Planning Study.

Water is conveyed from the booster station to the Water Treatment Plant through approximately 10,300 feet of 6-in diameter PVC and HDPE pipe. The pipe material has not confirmed, but has been a general acceptance based on the best available information.

2.3 Water Treatment Facility

The booster pump supplies water to the TTWD water treatment facility located on a small peak above the Barefoot Condominiums, near the storage reservoir tanks. The facility houses a SolmeteX Pre-Engineered System (PES) series ion exchange resin based arsenic removal system. The unit removes arsenic from raw water. The process receives arsenic laden feed water, which is then pumped through two media tanks that are plumbed in a lead/lag series configuration. The tanks are loaded with ArsenXnp adsorption media. The ArsenXnp is an NSF/ANSI 61 certified adsorption consisting of hydrous iron oxide nanoparticles impregnated into a polymer bead specifically developed for the removal of arsenic from drinking water. The small size of the hydrous iron oxide particles and the high porosity of the polymer substrate ensure that the reaction kinetics associated with arsenic uptake is rapid and arsenic removal capacity is high. The water path is in the down flow direction to minimize channeling and maximize contact time.

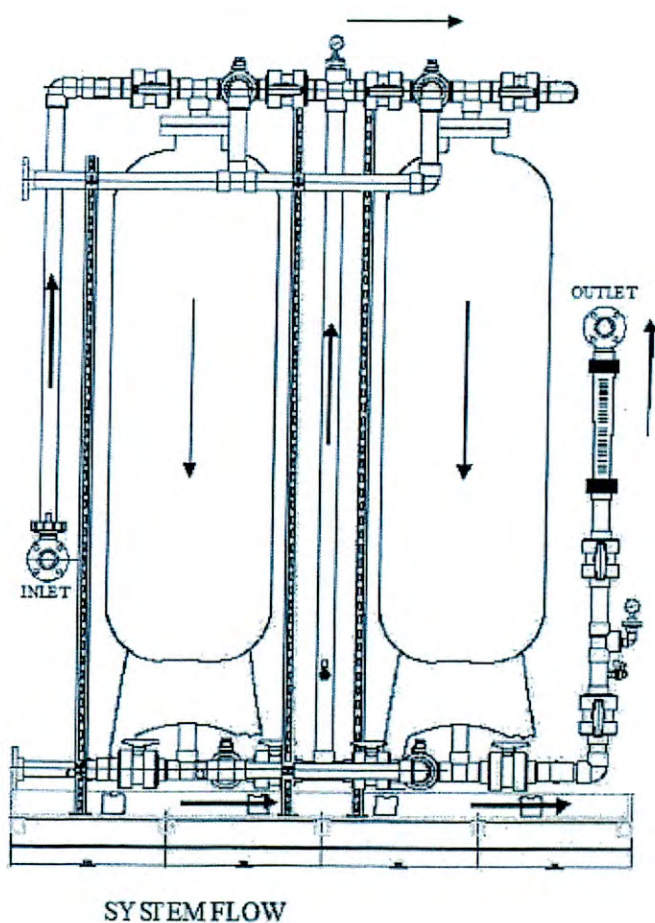
The facility was constructed in 2010 and continues to operate satisfactorily meeting arsenic removal requirements. Media is changed periodically and is replaced by WaterTree on a contract basis.

Table 2-3 SolmeteX Arsenic Removal System Data

TTWD SolmeteX Arsenic Removal System	Value
Model	NPX-PES-42
Serial Number	PES-42-0002
Resin	56 ft ³
Garnet	16 ft ³
Maximum Flow	75-85 gpm
Maximum Capacity	100,000 gpd
Maximum Inlet Pressure	150 PSI
Maximum Operating Temperature	120°F (49°C)
Minimum Operating Temperature	33°F (1°)
Dimensions	140" L x 68" W x 114" H
Weight (dry)	2000 lbs.

Data obtained from NPX-PES-42 Arsenic Removal Systems O&M manual.

Figure 2-2 SolmeteX PES System Schematic



2.4 Water Storage

The TTWD currently has two storage reservoir tanks near the Water Treatment Facility, one concrete tank and one bolted steel tank. The concrete tank is a cast-in-place reinforced concrete rectangular storage tank that measures approximately 54' x 30' x 12' in depth (approximately 140,000 gallons of storage).

Concrete tanks of this type generally have a life expectancy of 50-75 years if properly constructed and designed. There are no known design drawings of the tank. The reinforcement and construction methods executed in 1994 are not known. The reasons for existing cracking could be due to construction methods, reinforcement and joint design issues, inadequate control joint spacing, settlement, or other unknown issues. Inadequate horizontal reinforcing steel and control joints are the primary result of vertical shrinkage cracks in a cast-in-place wall.

The tank was inspected by Midco Diving in May 2013. During the inspection, Midco noted a number of deficiencies and from the inside of the tank, attempted to repair the tank with food grade epoxy. Food grade epoxy applied under water has a limited life span and is not a permanent repair.

The tank appears to show an existing coating. In many areas, the white coating is non-existent and small holes and cracks have formed in the vertical wall section. There are a number of areas where spalls, honeycombing, and bug holes appear in the wall surface.

As a test, food dye was injected from the inside of the tank with water almost instantly flowing through the wall to exterior cracks where flowing colored water was observed. There are numerous vertical cracks in the concrete around the entire tank perimeter. The spacing of the cracks is variable, but estimated at 4' for purposes of this evaluation which results in 30-50 vertical cracks in the walls. The wall and ceiling do not appear to have major cracks or issues, from the video, but the floor connection to the wall should be evaluated further. The existing tank is partially buried around the outside perimeter and the flowing water can be seen on the concrete exterior wall. The amount of leaking in the buried portion is unknown as soil covers the lower six to eight feet of the twelve-foot-high tank.

Table 2-4 TTWD Concrete Reservoir Facility Data

Reservoir Facility	Comment/Value
Construction Material	Reinforced Concrete
Tank Dimensions	56' x 32'
Wall Thickness	12" (assumed)
Inside Dimensions	54' by 30'
Floor Elevation	6635'
Overflow Elevation	6646.4'
Maximum Operating Range	11.5'
Recommended Operating Range	7.5'
Approximate Capacity	140,000 gallons

Data obtained from Schreier's 2005 TTWD Distribution, Storage & Transmission System Planning Study.

The bolted steel tank has a water storage volume of approximately 150,000 gallons and was manufactured by Boss Tanks. The tank does not have a concrete ring wall foundation and is

assumed to have been constructed on a granular base, but does not have any known issues at this time. The tank is approximately 32 feet in diameter and 24 feet high. The tank was constructed in 2008 with a base elevation of 6624 feet.

Both tanks have the same hydraulic grade line and overflow elevations of about 6648-feet above mean sea level on state plane datum. This allows either tank to be removed for maintenance without affecting the operation of the other tank. The base of the concrete tank is approximately 12' higher than the bolted steel tank which affects operating storage. The storage tank locations are shown in Figure 2-3.

2.5 Distribution System

The distribution system comprises a total approximate length of 14,000 feet. The main distribution system serves the Lost Camp Valley subdivision below Terry Peak but does not run through a few commercial properties. The distribution mains consist of 2, 3, 4 and 6-inch PVC pipe.

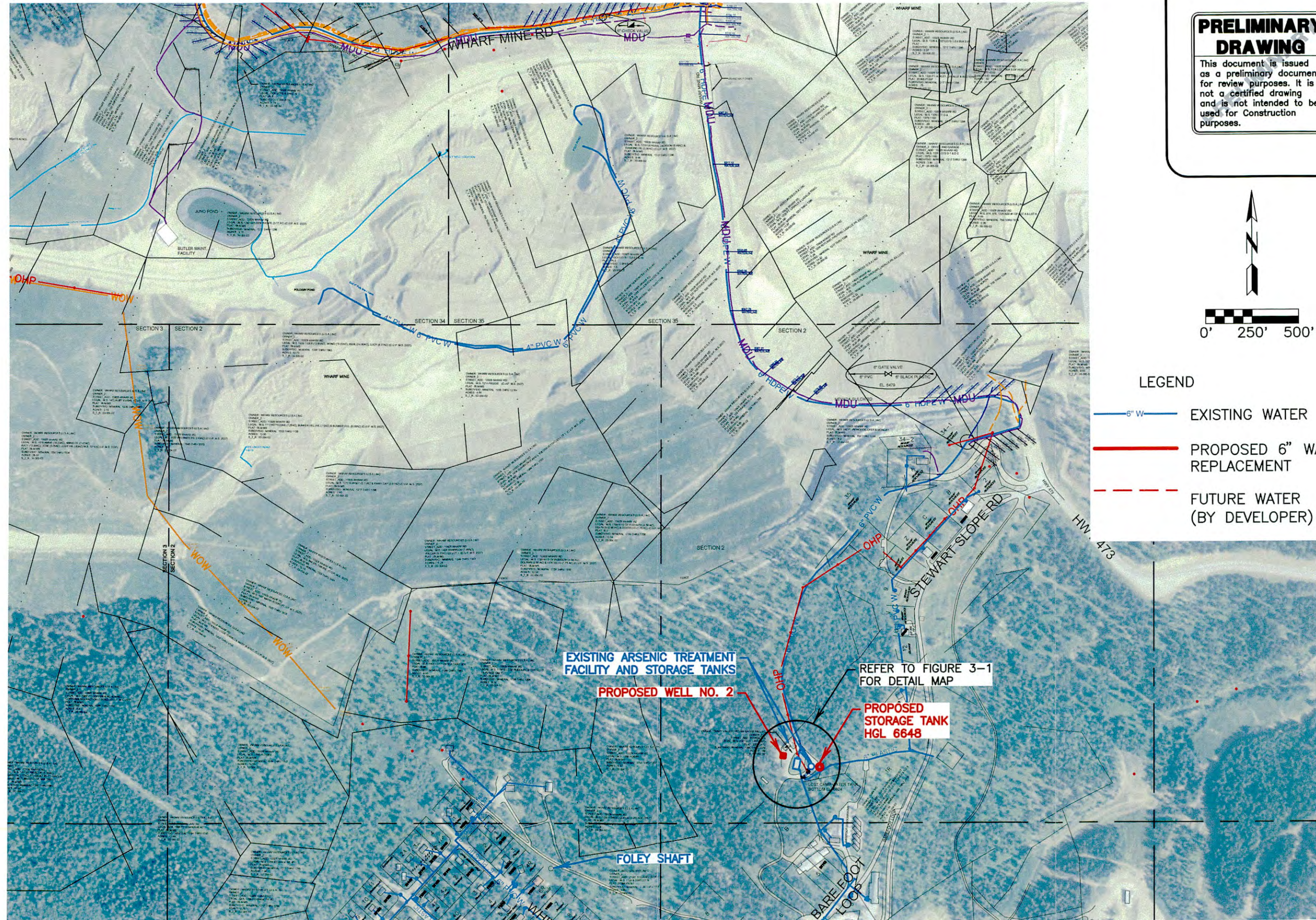
TTWD water records from 2007 to 2015 indicate an average water loss of 55% from the amount of water treated, to the amount of water sold. Some losses are expected within a water system due to minor leaks and variability within flow meters, but water loss should be within the 10-20% range.

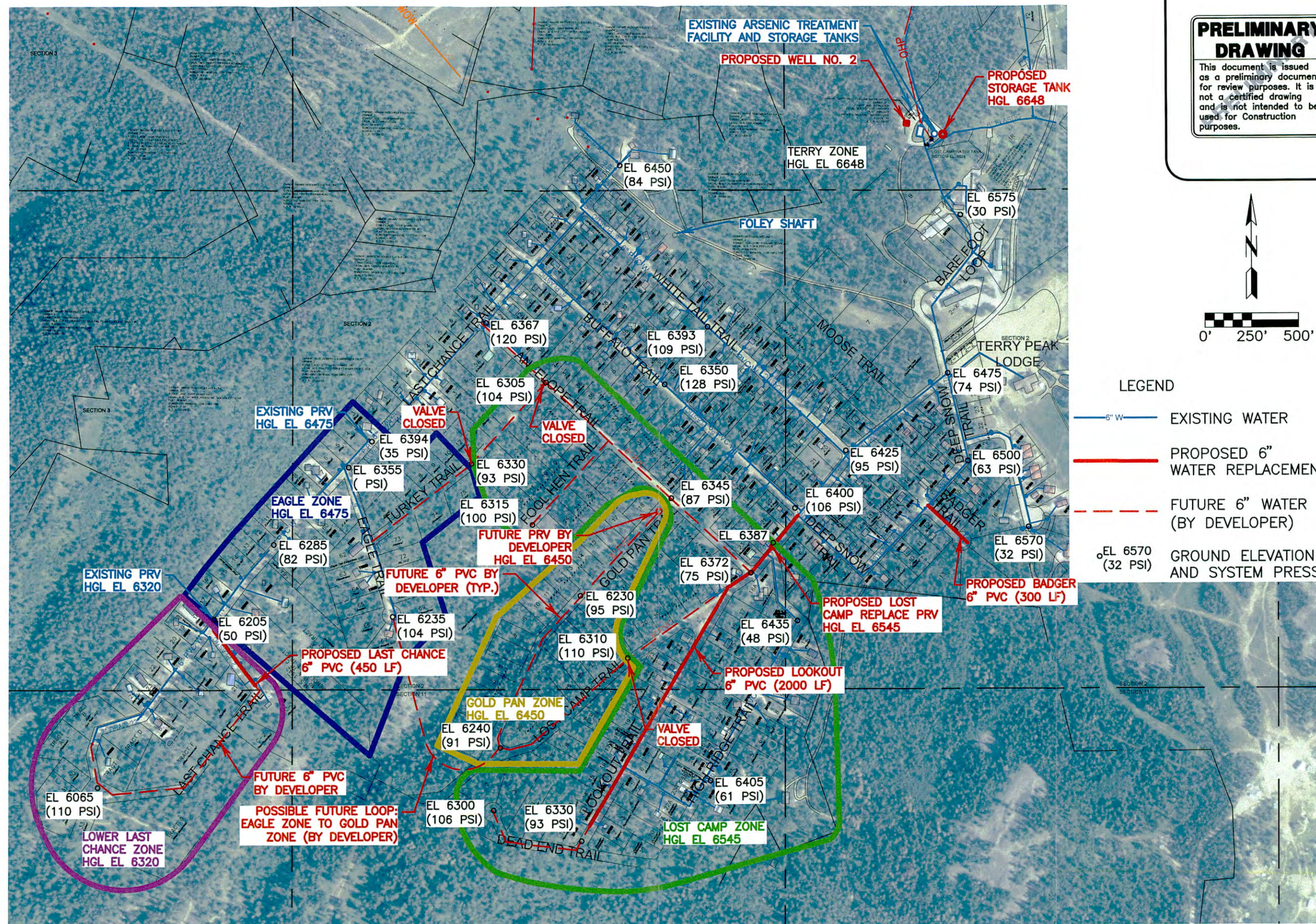
The pipe material and size in some locations are estimates, due to the lack of utility system maps. Existing mains 2, 3, and 4-inch diameter mains have been found to be low pressure rated PVC pipe class 160 or 200, is brittle and prone to breaks and leaks.

Distribution systems should be designed to minimize the number of dead ends within the system. Dead ends lead to decreased system reliability and increased headloss within the pipe network. The system is currently laid out to maximize the number of direct users, without looping.

Ten State Standards recommends water mains that are to provide fire protection shall be a minimum of 6-inches in diameter. Additionally, water mains that are not to provide fire protection are to be a minimum of 3-inches in diameter and limited to 600 lineal feet per Ten States Standards.

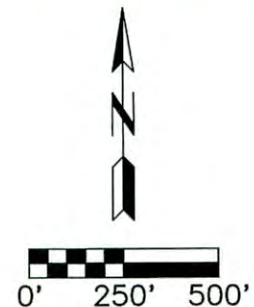
TTWD has a single pressure zone at elevation 6648. There are two existing pressure reducing valves (PRV), installed in below grade manholes. The PRVs were utilized to reduce system pressure within the residential subdivision. The pressure zones are shown in Figure 2-1. The Lost Camp PRV has become inoperable and repairs are needed for the valve to operate correctly. Additional Pressure Zones and PRVs are identified in the proposed distribution system map in Figure 2-4. It is anticipated that the Developer will construct water mains and PRV stations to provide service and pressure as shown.





**PRELIMINARY
DRAWING**

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LEGEND

- 6" W — EXISTING WATER
- PROPOSED 6" WATER REPLACEMENT
- - - FUTURE 6" WATER (BY DEVELOPER)
- EL 6570 (32 PSI) GROUND ELEVATION AND SYSTEM PRESSURE

SYM	DATE	DESCRIPTION	APPR



TERRY VALLEY - TROJAN
FACILITY PLAN
LAWRENCE COUNTY, SOUTH DAKOTA

FIGURE 2-4

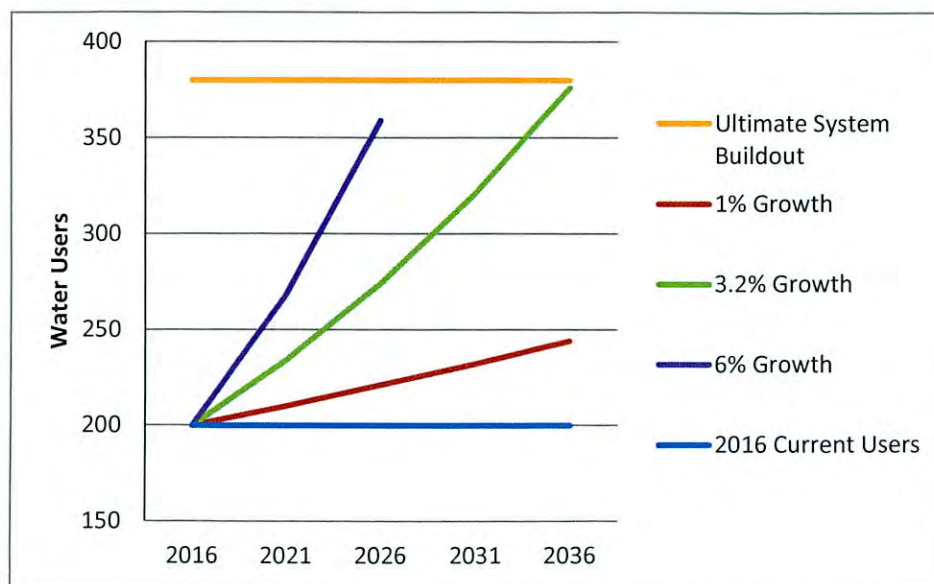
CLIENT PROJECT NO.
DRAWING TYPE FIGURE
PREPARED BY EJ
CHECKED / APPROVED TS TS
DATE JULY 2016
PROJECT NUMBER 12430-2016-000
SHEET 3 of 4
DRAWING

2-4

2.6 Water Connections and System Growth

TTWD currently serves 190 existing homes and 10 commercial users. There are approximately 180 unplatted lots within the subdivision. There is an estimated 2.5 people per dwelling unit bringing the current TTWD population to around 475. The system is anticipated to serve 380 homes with an equivalent population of 950 people at final system buildout.

The number of users has grown from 148 in 2005 to 200 users in 2016, a 3.2% annual increase. Growth with the area has ranged from 1% to 6% annually and is expected to continue within this range over the next 15-20 years. The graph below illustrates that the system could reach buildout in as soon as 10 years, but given the systems average growth, 20 years or longer could also be expected.



3. Description of Proposed System

3.1 Water System Improvement goals

The existing system deficiencies include: substandard distribution system pipe materials in certain areas, a single water source, numerous distribution leaks, non-functional PRV station, Two Johns Well has insufficient electrical, meter, and controls, booster station lacking controls, and the concrete storage tank with significant leakage. Some of the goals and results of the proposed project are listed below.

Project Goals:

- Continue to provide safe drinking water in conformance with state and federal standards.
- Provide redundant supply if Two Johns Well is out of service.
- Replace failing distribution system components on 2", 3", and 4" low-pressure class piping to reduce leaks and water loss.
- Improve system reliability for supply, storage, and distribution.
- Reduce customer service interruptions and remove failing system components.
- Increase system production.
- Provide pressure in the range of 35 psi to 120 psi in each sub-pressure zone.
- Improve water operation controls and efficiencies.

3.1 Recommended Improvements

3.1.1 Water Supply

Water systems are recommended to have a minimum of two sources of water in the event one source becomes inoperable. The Two Johns well is located a significant distance from the TTWD Water Treatment Plant without any redundancy. Improvements recommended for the wells:

- Construction of a new well including electrical, SCADA, and appurtenances
- Improved SCADA at the Two Johns Well
- Improved SCADA at the Booster Pump Station

3.1.2 Water Treatment

The water treatment plant is approximately 8 years into its expected service life of 30-40 years. Since its construction, TTWD has been in compliance with all drinking water standards and does not have any known water quality concerns. There are no recommended improvements at this time to the Water Treatment Plant other than routine maintenance.

3.1.3 Distribution System

Due to the high number of leaks, inadequate fire flow protection, and pressure zone deficiencies, the following improvements are recommended:

- Badger Trail 6-inch water main
- Last Chance 6-inch water main
- Lookout Trail 6-inch water main
- Lost Camp PRV Station improvements

3.2 Design Criteria

3.2.1 Criteria

Existing water system facilities were evaluated using criteria adopted by SDDENR and other regulatory and advisory sources. The following sources documents were used.

- *Recommended Standards for Water Works*, 2012 (also known as “Ten States Standards”) as adopted by SDDENR.
- *Criteria for Public Water Supplies in South Dakota*, 1979, SDDENR.
- *State Drinking Water Standards*, ARSD 74:04:12.
- *International Fire Code*, 2012
- *Standard for Fire Protection Infrastructure for Land Development in Suburban and Rural Areas*, NFPA 1141, 2008.

3.2.2 Water Quality

TTWD routinely tests for all regulated parameters of the State Water Quality Standards including: inorganic chemicals, organic chemicals, and radiological contaminants. TTWD Water Treatment facility has not had any known issues with compliance and is operating within Water Quality Standards.

3.2.3 Water Quantity

TTWD supplied data showing the water supplied and the water sold from 2009 through 2015. These numbers were used to establish current and future water demands as presented below and based on Dwelling Units (DU).

<u>EXISTING:</u>	Daily Water Production per 200 DU	Daily Projected Production for 200 DU	System Production GPM
<u>Parameter</u>			
Average Day	177	35,340	25
Peak Month	309	61,750	43
Peak Day (2 x PM)	618	123,500	86

Notes:

1. These estimates include an average of 54.6% water loss.
2. Data from Treated and Sold Water from 2009 to 2016.

<u>FUTURE:</u>	Daily Water Production for 380 DU	Daily Projected Production for 380 DU	System Production GPM
<u>Parameter</u>			
Average Day	177	67,260	47
Peak Month	309	117,420	82
Peak Day	618	234,840	163

Notes:

1. Estimates include an average of 54.6% water loss from 2009-2016 data.
2. Data from Treated and Sold Water from 2009 to 2016.
3. Reduction of water loss will provide additional safety factor.

Assume system supply needs of 1.25 safety factor x 163 gpm = 204 gpm

SUMMARY

Two Johns Well Supply	80-85	gpm
Proposed Well No. 2 (Actual Supply Unknown)	75-100	gpm
Proposed Well Supply:	155-185	gpm

Notes:

Proposed supply will provide water to approximately 325 dwelling units.

Supply should be reevaluated when occupied lots reaches 275.

Continued water loss reduction work will increase system capacity and reduce need for a third well. The production of Well No. 2 and future water consumption will dictate the need for a possible third well or water source in the future.

3.2.4 Water Storage

Water storage needs for a water system are normally based upon the following formula:

$$\text{Storage Need} = \text{ES} + (\text{larger of FR and ER})$$

Where:

ES = Equalization Storage.

Water which must be supplied to the system from storage when peak usage exceeds the supply capacity. Flow equalization needs are unique to each system, but AWWA and other advisory sources recommend providing an equalization storage volume of at least 20% of the peak use.

FR = Fire Reserves

The International Fire Code, Appendix B recommends providing a minimum fire flow capability of 1500 gpm for a duration of 2 hours for most residential and low height commercial structures. The stored volume needed to conform to this recommendation is 180,000 gallons (1500 gpm x 120 min.) Fire flow storage is not required for the District, but a recommendation to follow.

ER = Emergency Reserves

Ten States Standards recommend that emergency storage be provided for at least one day of average demand. The emergency reserves are intended to maintain service during a loss of production from principal sources due to power outage, equipment failures and other unexpected events. For small communities the fire storage is typically much larger than emergency reserves. One day of average day use at buildout condition for TTWD is approximately 67,260 gallons.

For the TTWD, the minimum recommended storage volume is calculated as follows.

TTWD Future Storage Need

$$\begin{aligned}\text{Storage Need:} & \quad \text{ES} + \text{Larger of FR or ER} \\ & (.20 \times 234,720 \text{ gpd}) + (180,000 \text{ gal.}) \text{ or } (67,260 \text{ gal.}) \\ & \quad \uparrow \text{larger} \\ & = 46,944 + 180,000 \\ & = 226,944 \text{ gallons}\end{aligned}$$

The current storage facilities have these capacities.

Existing Storage Volume

Concrete Tanks:	140,000 gal.
<u>Steel Tank:</u>	<u>150,000 gal.</u>
Total Storage:	290,000 gal.

The existing storage tanks are larger than required to meet current minimum storage criteria requirements at future sizing. Refer to Figure 3-1 for tank site layout.

OWNER : WESTERN COMMUNICATIONS
OWNER_2 : -
STREET_ADD : 21115 BAREFOOT LOOP
LEGAL : M.S. 1040 LOT A OF MAY QUEEN
PLAT : 7-30
SUBDIVISIO : MINERAL 1035 THRU 1135
ACRES : 1.2
S_T_R : 02-004-02

OWNER : WHARF RESOURCES (U.S.A.) INC
OWNER_2 : -
STREET_ADD :
LEGAL : M.S. 915 PT ASHLAND SEG. ETAL
PLAT : BLM MS
SUBDIVISIO : MINERAL 759 THRU 1034
ACRES : 27.44
S_T_R : 02-004-02

OWNER : TERRY VALLEY-TROJAN WATER PROJEC
STREET_ADD : PO BOX 515
LEGAL : M.S. 2021 LOT 1 REVISED
PLAT : 2005-3472
SUBDIVISIO : MINERAL 1995 THRU 2079
ACRES : .89
S_T_R : 02-004-02

OWNER : SHACK CONDOMINIUM
OWNER_2 : C/O HILT, TIM
STREET_ADD :
LEGAL : M.S. 1040 & 2021 OF LOT B
PLAT : 1997-1639
SUBDIVISIO : MINERAL 1035 THRU 1135
ACRES : 5.09
S_T_R : 02-004-02

OWNER : WHARF RESOURCES (U.S.A.) INC
OWNER_2 : -
STREET_ADD :
LEGAL : M.S. 2021 LOT A OF CLARENCE EX LOT 1 REV(.89)
PLAT : 7-40
SUBDIVISIO : MINERAL 1995 THRU 2079
ACRES : 2.08
S_T_R : 02-004-02

PRELIMINARY DRAWING

This document is issued
as a preliminary document
for review purposes. It is
not a certified drawing
and is not intended to be
used for construction
purposes.

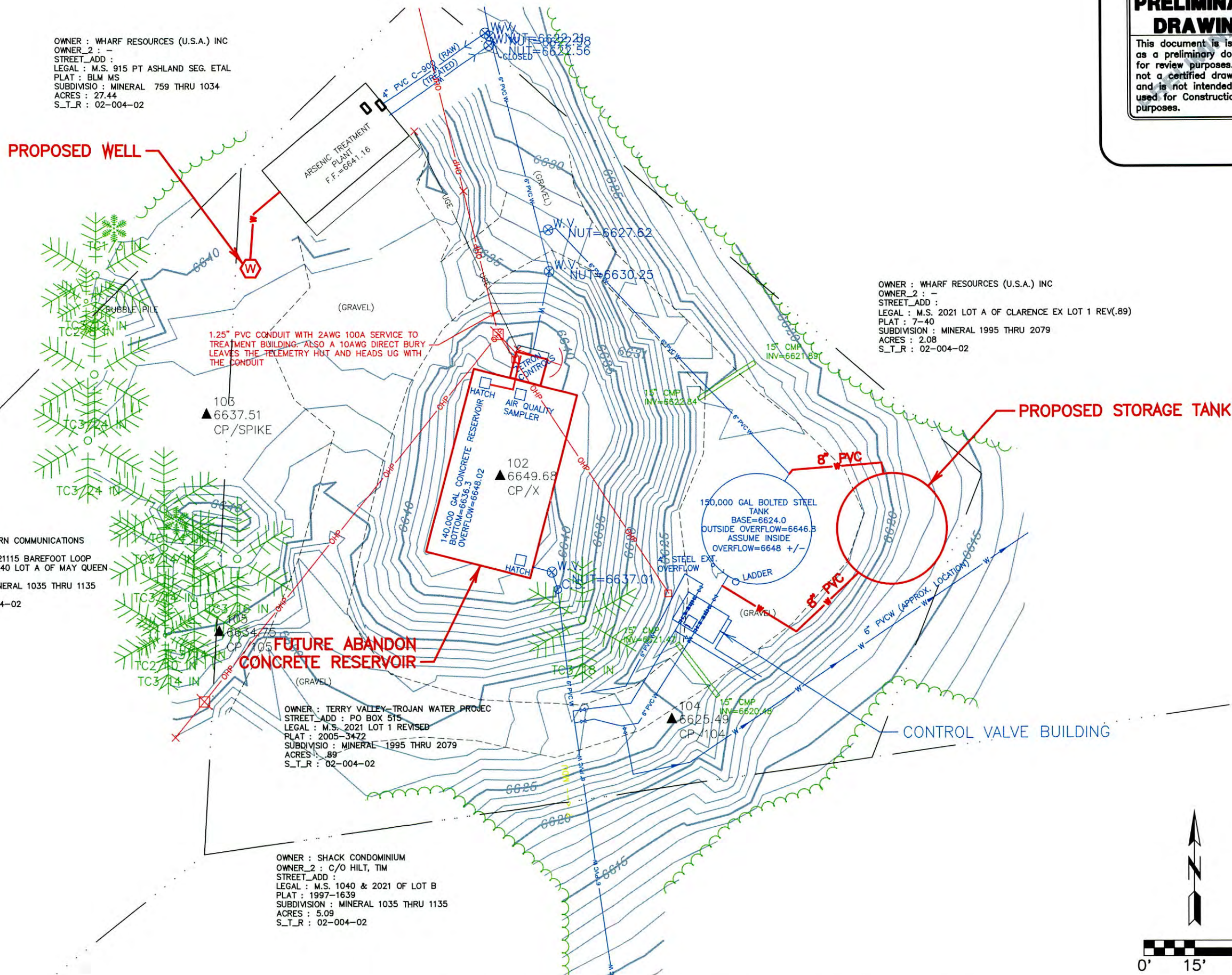
SYM	DATE	DESCRIPTION	APPR



TERRY VALLEY - TROJAN
FACILITY PLAN
LAWRENCE COUNTY, SOUTH DAKOTA

FIGURE 3-1

CLIENT PROJECT NO.
DRAWING TYPE FIGURE
PREPARED BY EJ
CHECKED / APPROVED TS TS
DATE JULY 2016
PROJECT NUMBER 12430-2016-000
SHEET 4 of 4
DRAWING 3-1



4. Evaluation of Alternatives

4.1 Water Supply

The Two Johns well has enough capacity for the current and short-term demands of the TTWD. However, a single source of water is not preferred and a second source needs to be identified and established. There are two main options, the Foley Shaft is similar to the Two Johns well in that it is an abandoned mine shaft, the second option is to drill a new well near the existing Water Treatment Plant.

4.1.1 Foley Shaft

The Foley Shaft is an old mine that consists of a large square hole in the upper section and necks down to a small open shaft approximately three feet in size. The water level is fairly close to the surface, approximately 100 feet. The upper section is covered with a large piece of steel but is not watertight. The cover will allow debris, insects, water, and other items to enter the shaft, which is not sanitary.

The bottom of the shaft consists of a large cavern with significant storage of water. The water likely comes from rock fissures and other connections to other abandoned mine shafts. Alexander Drilling completed a successful pump test on the Foley Shaft in 2013. The water level drawdown was minimal and the water quality parameters met drinking water standards. The turbidity was not tested.

Converting the Foley Shaft to be a part of a public water system would require the shaft and upper room sealed. This work would include installing a 7-inch or larger steel casing pipe vertically in the shaft and backfilling the shaft above the water level with concrete and grout. The large room could be backfilled with a granular material. There would be significant costs in filling this hole to seal in a sanitary condition. A pitless adapter unit would be installed on the casing pipe at the ground surface, and a well pump, motor, and casing pipe installed to pull water from the lower section of the casing.

One concern for a well of this type is the possibility the water is under the influence of surface water. This could be through surface connections within mineshafts or fissures. If the water has low turbidity and does not visually appear to have surface water influence, the water may be adequate for drinking water. Turbidity tests could be completed upon development. If the water is dirty and will not clean up, the water may require testing for microparticulates, which may include: insect parts, leaves, dirt, debris, etc.

The SDDENR Drinking Water Program completes particulate tests on wells, which typically take a several days of fieldwork with results available in a few months. If a well is deemed to be under the influence of surface water, the EPA regulations for turbidity are put into effect. This would require a filtration plant. These plants can be made up of prepackaged skids and require three chemical feeds, hot water, backwashing, discharge, etc. Filtration plants require discharge water and disposal, increased operations and maintenance are also consideration.

The Foley Shaft is located 2,000 feet from the existing water treatment and storage site. The distance between would require 6-inch transmission line to convey water from the well to the site. Additionally, the Foley Shaft would require significant improvements to the site for construction of the new well casing, well house, and electrical improvements.

Estimated work required:

- Construct new well and seal upper area:\$125,000
- Construct transmission line to Water Treatment and Storage site:\$160,000
- Construct new Well House:\$150,000

Total for Foley Well =\$460,000

4.1.2 New Well Evaluation

The second option is to consider drilling and developing a new well near the treatment plant site. Available data from nearby wells indicate a proposed depth of 700-800 feet. The water may not require arsenic treatment which would reduce operating costs for the system. The water still may have the possibility of being under the influence of surface water, but the risks would be reduced by drilling a new hole. The cost to drill a new well would be less than developing the Foley Shaft, but also may have some additional risk as quantity available water is unknown.

- Construct new well:\$150,000
- Controls and Electrical in Water Treatment Plant:\$34,000

Total for Well No. 2 =\$184,000

4.1.3 Well Conclusion and Recommendation

The recommendation for Water Supply is to proceed with the design and construction of a new well near the existing Water Treatment Plant. This is due to the lower construction costs and lower chance of the wellbeing under the direct influence of surface water. The new well location, at the same site as the existing water treatment would allow electrical controls to be housed in the treatment plant.

4.2 Water Storage

The current TTWD water storage capacity is sufficient for future buildout of the system, however, the reliability of the concrete tank is a concern for the district. The following alternatives were evaluated and analyzed in greater detail below.

1. Do Nothing
2. Shut Down Concrete Tank
3. Epoxy Injection into Exterior Cracks
4. Interior Spray Coating
5. Bladder Liner System
6. Construction of a new Steel Tank

4.2.1 Do Nothing or Shut Down Concrete Tank

Continue using the tank with ongoing leaks. Direct cost to the district is the expense of treating water that will be lost and not sold. Water will continue to leak and worsen over

time. Inflow of water is also possible at low tank levels which can contaminate the potable water.

Similar to the Do Nothing alternative is to discontinue use of the tank and only use steel tank. Cost is minimal to shut down use of the tank. Loss of storage capacity is downside to this option. If system leaks are resolved the use of this tank is considerably less important as shown in the following calculations. The steel tank itself provides 5 days of average-day water usage and over 1 day of usage on a peak day.

4.2.2 Inject Epoxy into Exterior Cracks

Excavate around the tank down to the base elevation. Wash the tank exterior, drill holes, inject epoxy with an injection port drill at a 45° angle at approximate depth of ½ the structure thickness, insert injection port and inject material with use of a pressure zerk gun.

Port spacing would be based upon field conditions and would vary from 6 to ____ inches and may average 12-inch spacing. One product that has been locally used is Prime-Flex 900. The material is NSF 61 approved and safe for use in potable water systems. Other materials such as Mountain Grout, etc. may be considered.

The vertical crack spacing is estimated at 4 feet and there may be 30-50 vertical cracks that could require injection repair. Injecting from the exterior of the tank, while it holds water, is the ability to visibly view leaks coming through the wall. Similar work could be completed from the interior of the tank, but leak stoppage could not be visibly viewed.

Estimated work required:

- Perimeter excavation:\$3,000 to \$5,000,
- Epoxy injection material: 500 holes x ¼ gallon/hole = 125 gallons x \$100/gal.
=\$12,500 to \$15,000.
- Labor for injection: 2 workers for 12 days =\$10,000

Total for Injection Epoxy from Exterior =\$25,000 to \$30,000

4.2.3 Interior Spray Coating

This is not a standalone option, but could be done in conjunction to injecting epoxy into exterior cracks.

Drain the tank, dry, sand blast, repair large voids, and spray on an epoxy system liner on the tank interior. This method could be used in addition to epoxy injection, but not recommend as a alone. The surface repairs of the tank interior may not stop the water from flowing through the cracks in the walls. The cracks may repair if the tank is moving. The coating may help if the cracks are only due to shrinkage, but it may not stop them from coming through the same crack location.

Estimated work required:

- Interior Spray Lining Cost Estimate:\$50,000
- Cost of Injection Epoxy from Exterior:\$25,000 to \$30,000

Total for Interior Spray Coating and Injection Epoxy from Exterior = \$30,000 to \$35,000

4.2.4 Bladder Liner System

This prefabricated system includes the installation of a rubber butyl membrane liner, designed and constructed to the dimensions of the existing tank interior. The bladder is connected to the inlet and outlet pipes and installed with stainless steel brackets along the top of the tank perimeter.

This type of repair requires a specialty Contractor and custom order for the material. There is not enough local Black Hills data to determine the success rate for bladder installation. Primary issues may be small cuts or nicks that happen during installation or during future inspections. The connection points to the outlet pipe is often the primary source of leaks if something would occur.

The cost of a bladder installation is about \$40,000 to \$50,000.

4.2.5 Construction of a New Steel Storage Tank

Construction of a new tank would require excavation, possible demolition of the existing concrete tank, piping connections, etc. The tank would be similar to the existing Boss Tank already owned by the District. To meet future system storage requirements, an 80,000-gallon tank could be constructed, but to provide system redundancy during routine maintenance and maintain a similar level of service as the existing tank, a 125,000-gallon tank would be recommended.

Estimated work required:

- 125,000+ Gallon Bolted Steel Storage Tank:\$150,000
- Concrete ring foundation:\$25,000
- Site grading:\$7,500
- Piping:\$5,000
- Contingency/Fees:\$25,000

Total Cost for a new Steel Storage Tank =\$200,000 to \$215,000

4.2.6 Conclusion and Recommendation

These five alternatives each have different risks, variable costs, benefits, and disadvantages. The exact condition of the concrete tank is not fully known. The tank could be in better or worse condition upon investigation of the interior and exterior of the tank.

Concrete Tank Alternative Evaluation

Alternative	Capital Cost	Estimated Increase in Service Life	Cost per Year of Increased Service Life	Risk Factor
Do Nothing	\$ 0	0	\$ 0	Medium
Epoxy Injection	\$ 30,000	10	\$ 3,000	Low
Coating and Injection	\$ 80,000	20	\$ 4,000	Low
Bladder Liner	\$ 50,000	20	\$ 2,500	Medium
New Tank	\$ 215,000	50	\$ 4,300	Low

The recommendation for Water Storage is to proceed with the design and construction of a new steel tank. This is due to the long service life and dependability of the tank.

4.3 Water Distribution

The distribution system problems include: substandard distribution system pipe materials in certain areas, numerous distribution leaks, and inefficient looping within the system.

4.3.1 Do Nothing

Requires annual unknown maintenance costs to repair leaks. This is the current mode of operation and issues are ongoing. The cost of repairing leaks is dependent on time to find the leak and the cause of the leak. Each leak situation is unique and can range from \$2,000 to \$20,000 depending on the extent of the replacement needed. This leads to additional issues including:

- Water outages and reduced efficiencies since repairs emergencies and large areas of the system are out of service until problem is found.
- Water loss of 50% or more is not resolved.
- Avoids or delays large capital expenditures.
- System is at the point of its design life where improvements could be made to make it more efficient.
- This option is not preferred by the District and is a reactionary method to minimizing issues. Often unplanned repairs cost much more than planned repairs that can be bid and constructed to lessen impact to customers.

4.3.2 Distribution Lines and Valves Upgrades

It is recommended that the district replace small diameter substandard pipe material with 6" PVC mains along Badger Trail and Last Chance Trail. New distribution lines are also needed from the new well to the Water Treatment Plant and from the Water Treatment Plant to the water storage reservoirs. The Lost Camp Trail PRV should also be replaced to allow better efficiency within the system. Where possible dead end lines should be eliminated in the system and the piping system looped.

5. Environmental Resources Inventory

5.1 Cultural Resources

A Level III Cultural Resources Inventory will be completed prior to final Facility Plan Submittal in October 2016.

5.2 Reviewing Agency Comments

Project review and comments will be requested from the following agencies.

- US Army Corps of Engineers
- USDA Natural Resource Conservation Service
- US Fish and Wildlife Service
- South Dakota Department of Game, Fish and Parks
- South Dakota Office of Emergency Management

Copies of letters soliciting comments and the responses received have not been completed as of the date of this facility plan.

5.3 Design and Construction Costs

The recommended improvements have been separated into short term and long term improvements and are presented below in July 2016 Construction Dollars:

Major Work Item	Construction Estimate	Contingency	Engineering	Project Total
New Well, Mechanical & Electrical	\$180,900	\$18,090	\$31,658	\$230,648
Two Johns Electrical and Controls	\$10,000	\$1,000	\$1,750	\$12,750
Booster Station Controls	\$5,000	\$500	\$875	\$6,375
Badger Trail 6" Water Main	\$37,451	\$3,745	\$6,554	\$47,750
Last Chance Trail/Last Chance 6" Water Main	\$137,320	\$13,732	\$24,031	\$175,084
Lost Camp PRV Station Improvements	\$12,500	\$1,250	\$2,188	\$15,938
Lookout Trail 6" Water Main	\$249,674	\$24,967	\$43,693	\$318,334
Short Term Subtotal	\$632,845	\$63,285	\$110,748	\$806,877
Water Storage Tank, 150,000 Gallons	\$220,000	\$22,000	\$38,500	\$280,500
Long Term Subtotal	\$220,000	\$22,000	\$38,500	\$280,500
Totals	\$852,845	\$85,285	\$149,248	\$1,087,377

5.4 Operation and Maintenance Costs

The Operation and Maintenance costs will be minimal to the district, the current water demand does not required both wells to run simultaneously, and the electrical and controls upgrades are replacing existing dated equipment.

There is potential for a decrease in Operation and Maintenance costs if the new well is of higher quality than the Two Johns well. The new well could become the primary source of TTWD, and may require less or no treatment, and less pumping to get utilize the existing water storage.

5.5 Impact on User Rates

Short Term and Long Term Terry Trojan Water District Possible SRF Loan Repayment Costs

		20 Year Monthly System	20 Year Monthly
		Possible Loan Amount	Loan Payment
		Customer Cost/Month	
Long Term Phase	\$ 200,000	\$ 1,220	\$ 6.10
	\$ 280,500	\$ 1,711	\$ 8.56
	\$ 500,000	\$ 3,050	\$ 15.25
Short Term Phase	\$ 750,000	\$ 4,575	\$ 22.88
	\$ 806,877	\$ 4,922	\$ 24.61
	\$ 1,000,000	\$ 6,101	\$ 30.50
Total Project	\$ 1,087,377	\$ 6,634	\$ 33.17

Estimated payments include 110% debt service coverage for 200 customers.

SDDENR - Drinking Water State Revolving Fund Loan Program (SRF)

Loan 3.0% over 20 year term (Possible 10% Grant Not Included)

6. Implementation Schedule

Following is a tentative schedule for project implementation. The schedule assumes that project funding applications to DENR and this Water System Facilities Plan in October 2016.

Implementation Schedule

<u>Task</u>	<u>Complete By</u>
State Water Plan Application.....	August 1, 2016
Finalize Facility Plan	October 1, 2016
Public Hearing for SRF	December 2016
Board of Natural Resources Funding Action	January 2017
Engineering Design and Reviews	February 2017
Bidding and Construction (7 months).....	May 2017 – October 2017

Appendix A

Water Usage and Production Records



Terry Trojan Water District Monthly Water Report

	Treated	Sold	% Sold	% Loss
Jan-09	1,452,922	471,900	32.48%	-67.52%
Feb-09	1,269,108	311,900	24.58%	-75.42%
Mar-09	1,401,020	342,800	24.47%	-75.53%
Apr-09	1,134,617	214,000	18.86%	-81.14%
May-09	1,204,600	212,000	17.60%	-82.40%
Jun-09	1,536,178	261,000	16.99%	-83.01%
Jul-09	1,848,825	311,500	16.85%	-83.15%
Aug-09	1,616,133	286,000	17.70%	-82.30%
Sep-09	983,750	492,000	50.01%	-49.99%
Oct-09	701,553	492,000	70.13%	-29.87%
Nov-09	923,672	512,000	55.43%	-44.57%
Dec-09	1,451,052	612,000	42.18%	-57.82%
2009 Total	15,323,430.00	4,319,100.00	29.11%	-70.89%
Jan-10	1,567,766	429,400	27.39%	-72.61%
Feb-10	1,097,280	511,400	46.61%	-53.39%
Mar-10	1,298,292	399,800	30.79%	-69.21%
Apr-10	791,719	344,400	43.50%	-56.50%
May-10	864,317	282,700	32.71%	-67.29%
Jun-10	887,654	315,100	35.50%	-64.50%
Jul-10	1,143,714	329,400	28.80%	-71.20%
Aug-10	701,600	401,600	57.24%	-42.76%
Sep-10	694,891	356,200	51.26%	-48.74%
Oct-10	759,264	301,300	39.68%	-60.32%
Nov-10	684,327	254,500	37.19%	-62.81%
Dec-10	854,387	412,700	48.30%	-51.70%
2010 Total	11,345,211.00	4,338,500.00	38.24%	-61.76%
Jan-11	976,961	584,300	59.81%	-40.19%
Feb-11	904,361	538,600	59.56%	-40.44%
Mar-11	854,387	549,700	64.34%	-35.66%
Apr-11	1,135,854	419,800	36.96%	-63.04%
May-11	894,514	216,300	24.18%	-75.82%
Jun-11	1,158,793	577,800	49.86%	-50.14%
Jul-11	1,290,351	621,800	48.19%	-51.81%
Aug-11	1,095,723	735,050	67.08%	-32.92%
Sep-11	894,357	432,200	48.33%	-51.67%
Oct-11	647,696	386,260	59.64%	-40.36%
Nov-11	379,693	285,620	75.22%	-24.78%
Dec-11	1,137,518	629,620	55.35%	-44.65%
2011 Total	11,270,208.00	5,977,050.00	52.57%	-47.43%
Jan-12	634,544	454,180	71.58%	-28.42%
Feb-12	734,857	540,410	73.54%	-26.46%
Mar-12	757,264	504,510	66.62%	-33.38%
Apr-12	598,716	192,410	32.14%	-67.86%
May-12	684,561	312,770	45.69%	-54.31%
Jun-12	945,816	596,070	63.02%	-36.98%
Jul-12	1,278,459	802,260	62.75%	-37.25%
Aug-12	1,262,200	887,200	70.29%	-29.71%
Sep-12	941,367	586,900	62.35%	-37.65%
Oct-12	944,928	395,610	41.89%	-58.11%
Nov-12	889,982	361,030	40.57%	-59.43%
Dec-12	970,810	597,810	61.58%	-38.42%
2012 Total	10,643,504.00	6,231,360.00	58.55%	-41.45%

Jan-13	1,363,917	457,530	33.55%	-66.45%
Feb-13	867,550	456,940	52.67%	-47.33%
Mar-13	961,920	523,360	54.41%	-45.59%
Apr-13	537,751	173,410	32.25%	-67.75%
May-13	791,547	283,300	35.79%	-64.21%
Jun-13	1,451,993	628,320	43.27%	-56.73%
Jul-13	1,485,055	1,001,770	67.46%	-32.54%
Aug-13	1,327,623	808,070	60.87%	-39.13%
Sep-13	2,395,686	364,450	15.21%	-84.79%
Oct-13	1,280,798	300,220	23.44%	-76.56%
Nov-13	1,984,419	208,260	10.49%	-89.51%
Dec-13	1,497,827	523,390	34.94%	-65.06%
2013 Total	15,946,086.00	5,729,020.00	35.93%	-64.07%
Jan-14	1,614,270	501,130	31.04%	-68.96%
Feb-14	1,314,400	501,130	38.13%	-61.87%
Mar-14	1,605,026	498,490	31.06%	-68.94%
Apr-14	1,259,784	224,800	17.84%	-82.16%
May-14	1,436,229	239,230	16.66%	-83.34%
Jun-14	1,815,301	733,000	40.38%	-59.62%
Jul-14	1,684,089	1,073,500	63.74%	-36.26%
Aug-14	1,061,361	708,100	66.72%	-33.28%
Sep-14	752,372	438,900	58.34%	-41.66%
Oct-14	599,103	269,800	45.03%	-54.97%
Nov-14	744,699	366,200	49.17%	-50.83%
Dec-14	1,070,607	677,800	63.31%	-36.69%
2014 Total	14,957,241.00	6,232,080.00	41.67%	-58.33%
Jan-15	971,987	590,130	60.71%	-39.29%
Feb-15	815,020	454,490	55.76%	-44.24%
Mar-15	899,034	424,730	47.24%	-52.76%
Apr-15	731,796	210,030	28.70%	-71.30%
May-15	892,100	362,840	40.67%	-59.33%
Jun-15	937,478	716,740	76.45%	-23.55%
Jul-15	1,293,611	935,530	72.32%	-27.68%
Aug-15	1,076,788	935,530	86.88%	-13.12%
Sep-15	545,082	391,280	71.78%	-28.22%
Oct-15	658,120	328,400	49.90%	-50.10%
Nov-15	465,368	349,800	75.17%	-24.83%
Dec-15	998,800	655,160	65.59%	-34.41%
2015 Total	10,285,184.00	6,354,660.00	61.78%	-38.22%
Jan-16	614,710	523,330	85.13%	-14.87%

Peak Month 1,073,500 63.74% gal/month

Terry Trojan Water District Monthly Water Report Summary

Treated vs Sold Water by Gallons – Sold/Treated = Sold% - 100%

	Treated	Sold	% Sold	% Loss
2009 Total	15,523,430	4,519,100	29.11%	-70.89%
2010 Total	11,345,211	4,338,500	38.24%	-61.76%
2011 Total	11,370,208	5,977,050	52.57%	-47.43%
2012 Total	10,643,504	6,231,360	58.55%	-41.45%
2013 Total	15,946,086	5,729,020	35.93%	-64.07%
2014 Total	14,957,241	6,232,080	41.67%	-58.33%
2015 Total	10,285,184	6,354,660	61.78%	-38.22%
Averages	12,867,266	5,625,967	45.41%	-54.59%
Averages	8,936	3,904.2		gpm

Peak Month: 1,848,000 Gallons Per Month
1,283/30 = 43 Gallons Per Minute

Appendix B

Detailed Cost Estimate Breakdowns



B-1 Terry Trojan Water District Short-Term and Long-Term Projects

Major Work Item	Construction Estimate	Contingency	Engineering	Project Total
New Well, Mechanical & Electrical	\$180,900	\$18,090	\$31,658	\$230,648
Two Johns Electrical and Controls	\$10,000	\$1,000	\$1,750	\$12,750
Booster Station Controls	\$5,000	\$500	\$875	\$6,375
Badger Trail 6" Water Main	\$37,451	\$3,745	\$6,554	\$47,750
Last Chance Trail/Last Chance 6" Water Main	\$137,320	\$13,732	\$24,031	\$175,084
Lost Camp PRV Station Improvements	\$12,500	\$1,250	\$2,188	\$15,938
Short Term Subtotal	\$383,171	\$38,317	\$67,055	\$488,544
Lookout Trail 6" Water Main	\$249,674	\$24,967	\$43,693	\$318,334
Water Storage Tank, 150,000 Gallons	\$220,000	\$22,000	\$38,500	\$280,500
Long Term Subtotal	\$469,674	\$46,967	\$82,192.87	\$598,834
Totals	\$852,845	\$85,285	\$149,248	\$1,087,377

B-2 Water Main Cost Estimate

Item No.	Item Description	Estimated Quantity	Units	Estimated Quantity	Engineers Estimate	
					Unit Price	Total
Bid Tabulation Results						
Schedule A: Water Main and Water Service Line Replacement						
1	Mobilization	LS	LS	1	\$ 15,000.00	\$ 15,000.00
2	Traffic Control	LS	LS	1	\$ 2,500.00	\$ 2,500.00
3	Incidental Work	LS	LS	1	\$ 5,000.00	\$ 5,000.00
4	6" PVC Water Main with Bedding	LF	LF	3400	\$ 38.00	\$ 129,200.00
5	6" Gate Valve w/Box	EA	EA	13	\$ 1,600.00	\$ 20,800.00
7	6" Coupling	EA	EA	8	\$ 500.00	\$ 4,000.00
9	6" 90 Degree Bend	EA	EA	6	\$ 700.00	\$ 4,200.00
10	6" 45 Degree Bend	EA	EA	4	\$ 700.00	\$ 2,800.00
13	6" x 6" Tee	EA	EA	5	\$ 800.00	\$ 4,000.00
14	3/4" Water Service Line	LF	LF	1030	\$ 32.00	\$ 32,960.00
15	6" x 3/4" Tapping Saddle and Corp Stop	EA	EA	31	\$ 330.00	\$ 10,230.00
19	3/4" Curb Stop and Box	EA	EA	31	\$ 255.00	\$ 7,905.00
21	Meter Pit	EA	EA	31	\$ 1,600.00	\$ 49,600.00
26	Fire Hydrant	EA	EA	7	\$ 5,800.00	\$ 40,600.00
27	6" Water Main Connection	EA	EA	4	\$ 425.00	\$ 1,700.00
31	12" CMP	LF	LF	340	\$ 33.00	\$ 11,220.00
32	12" CMP Flared End Section	EA	EA	20	\$ 506.00	\$ 10,120.00
33	Rock Excavation	LF	LF	700	\$ 25.00	\$ 17,500.00
34	Gravel Surfacing (6")	LF	LF	1000	\$ 20.00	\$ 20,000.00
38	Remove and Reset Street Sign	EA	EA	6	\$ 130.00	\$ 780.00
39	Remove and Reset Split Rail Fence	LF	LF	200	\$ 18.00	\$ 3,600.00
42	Remove and Dispose Tree/Bush, 2" - 6" Ø	EA	EA	8	\$ 210.00	\$ 1,680.00
43	Remove and Dispose Tree, 8" - 18" Ø	EA	EA	10	\$ 325.00	\$ 3,250.00
45	Erosion Control Wattle	LF	LF	1400	\$ 6.00	\$ 8,400.00
46	Seed, Fertilize, & Mulch Along New 4" Water Main	SY	SY	8500	\$ 1.50	\$ 12,750.00
47	Seed, Fertilize, & Mulch At Water Service	EA	EA	31	\$ 150.00	\$ 4,650.00
Total						\$ 424,445
Badger Trail		300 LF		\$ 37,451		
Last Chance Trail/Last Chance		1100 LF		\$ 137,320		
Lookout Trail		2000 LF		\$ 249,674		
Total Water Main and Services Replacement		3400 LF		\$ 424,445		

B-3 Well No. 2 Cost Estimate

Item	Quantity	Unit Cost	Total
Well and Pump System			
Contractor Mobilization	1 LS	\$ 1,500	\$ 1,500
13-1/2" Bore Hole	20 LF	\$ 60	\$ 1,200
9-7/8" Bore Hole	60 LF	\$ 40	\$ 2,400
10-3/4" Casing	20 LF	\$ 40	\$ 800
8-3/8" Casing	60 LF	\$ 35	\$ 2,100
7-1/4" Open Bore Hole	740 LF	\$ 32	\$ 23,700
Grout Upper Casing	40 LF	\$ 20	\$ 800
Well Development / Yield Testing	1 LS	\$ 1,500	\$ 1,500
Water Quality Testing	1 LS	\$ 600	\$ 600
Pitless Adapter	1 LS	\$ 4,000	\$ 4,000
Well Pump and Motor (20 HP)	1 LS	\$ 13,500	\$ 13,500
3" Column Pipe	600 LF	\$ 22	\$ 13,200
3" Check Valves	4 Ea.	\$ 500	\$ 2,000
Submersible Cable	725 LF	\$ 7	\$ 5,100
Well Disinfection	1 LS	\$ 800	\$ 800
Site Clean-up / Restoration	1 LS	\$ 1,500	\$ 1,500
Well and Pump System Subtotal			\$74,700
Mechanical and Electrical in Treatment Building			
Contractor Mobilization	1 LS	\$ 10,000	\$10,000
3" PVC Pipe (Underground) and Fittings	60 LF	\$ 40	\$ 2,400
Connect to Pitless Units	1 Ea.	\$ 300	\$ 300
3" PVC Pipe & Fittings (building)	1 LS	\$ 17,000	\$17,000
4" Gate Valve & Box	1 Ea.	\$ 1,200	\$ 1,200
8" x 4" Tee	1 Ea.	\$ 800	\$ 800
3" PVC Gate Valves	5 Ea.	\$ 500	\$ 2,500
3" PVC Check Valves	2 Ea.	\$ 1,500	\$ 3,000
2" PVC Pressure Relief Valves	2 Ea.	\$ 1,000	\$ 2,000
3" Water Meter / Instrumentation	1 Ea.	\$ 3,000	\$ 3,000
Pipe Support Systems/Mods	1 LS	\$ 1,500	\$ 1,500
Gauges / Taps / Piping Accessories	1 LS	\$ 2,500	\$ 2,500
Chemical Feed Pump & Accessories	1 Ea.	\$ 3,500	\$ 3,500
Furnishings	1 LS	\$ 2,000	\$ 2,000
Electrical Service to Building & Well	1 LS	\$ 7,500	\$ 7,500
Well No. 2 Electrical / Control	1 LS	\$ 30,000	\$30,000
Control System Integration	1 LS	\$ 7,000	\$ 7,000
Retrofit Treatment Building	1 LS	\$ 5,000	\$ 5,000
Site Cleanup and Restoration	1 LS	\$ 5,000	\$ 5,000
Mechanical and Electrical in Treatment Building Subtotal			\$106,200
Total of Well and M/E			\$180,900

Note: Does not include contingency or engineering.

Appendix C

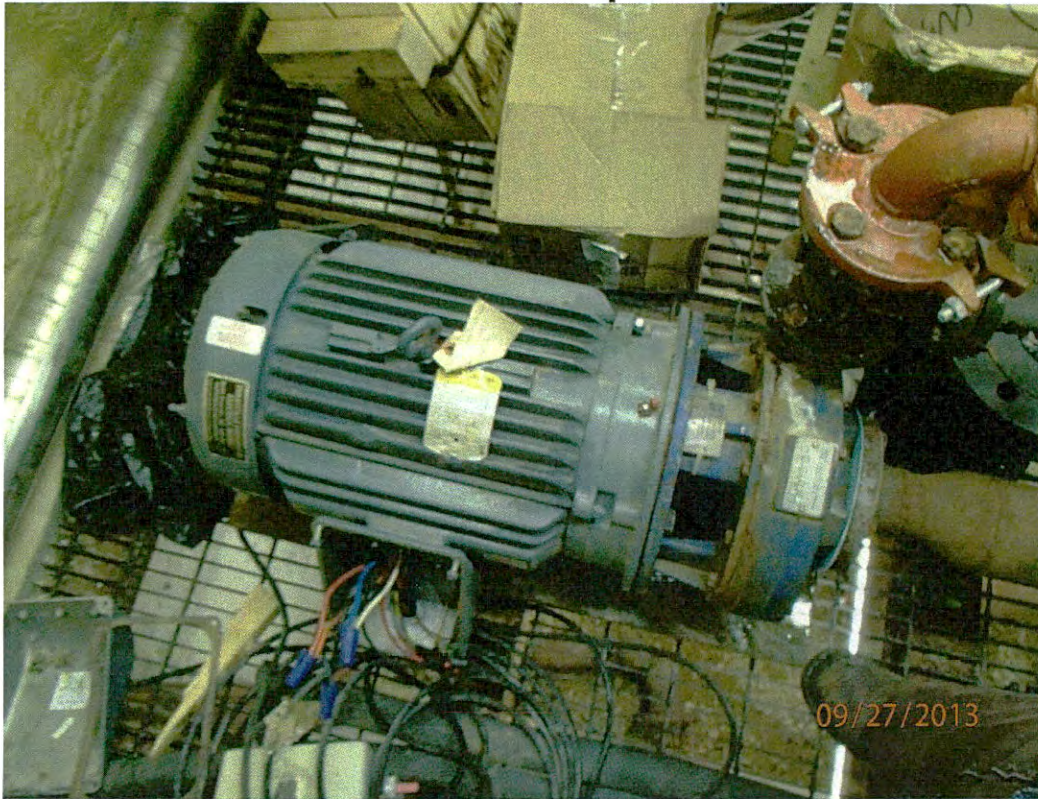
Photos of Existing Facilities



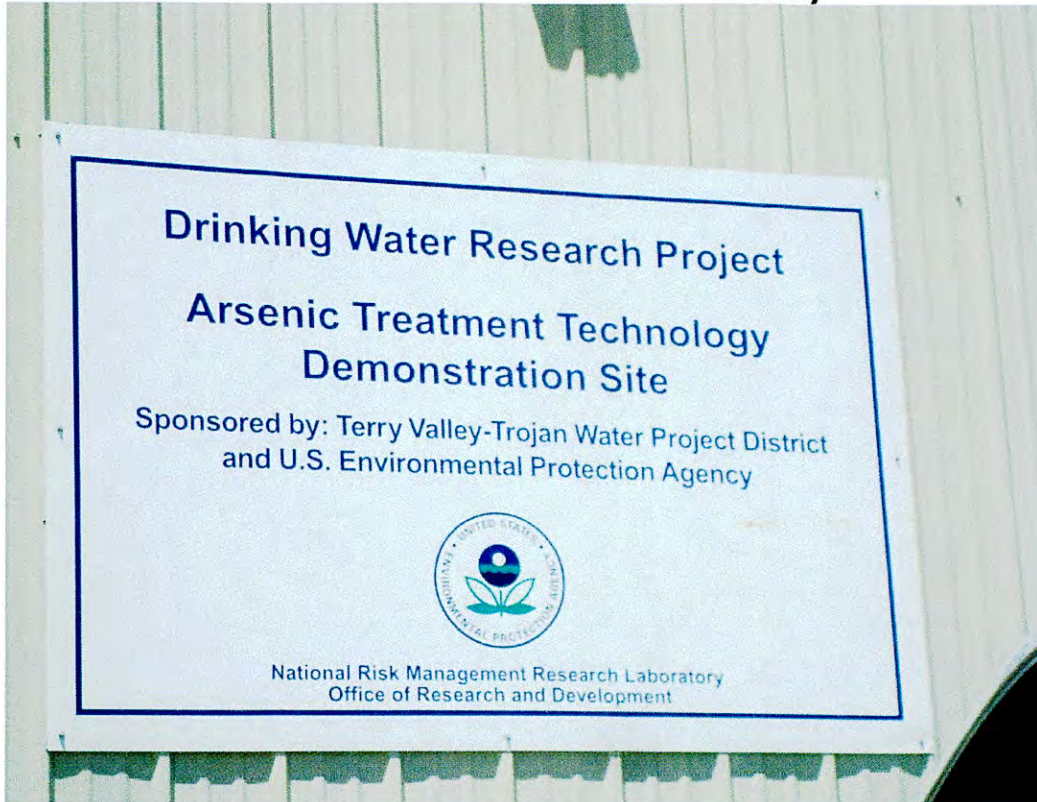
C-1 Two Johns Well



C-2 Booster Pump Station



C-3 Arsenic Treatment Facility



C-3 Arsenic Treatment Facility



C-4 Concrete Storage Tank



C-5 Steel Storage Tank



BOSS TANK
The Storage Authority

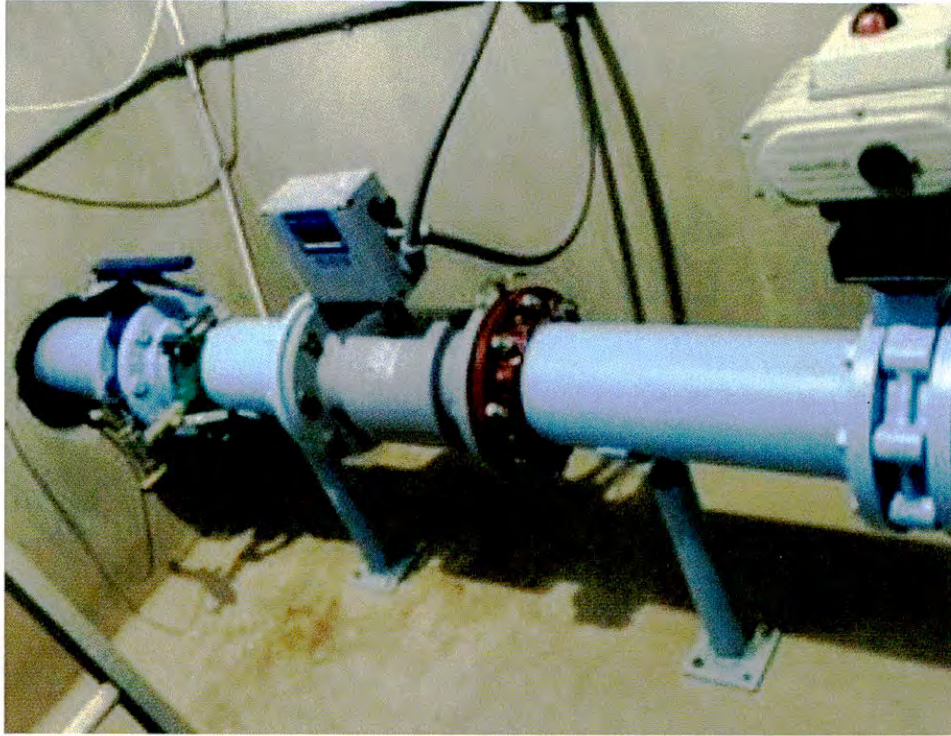
5227 West 58 Highway
Crownpoint, KS 67038
Phone: 620-766-2142
Fax: 620-766-2143
www.bosstank.com

Date: 7/08
Order Number: 100001
Customer: ST 1 3182
Height: 24.3 ft
Product Group: Pipeline Water
Capacity: 100,000 Gallons
Working Capacity: 75,000 Gallons
Steel Liner

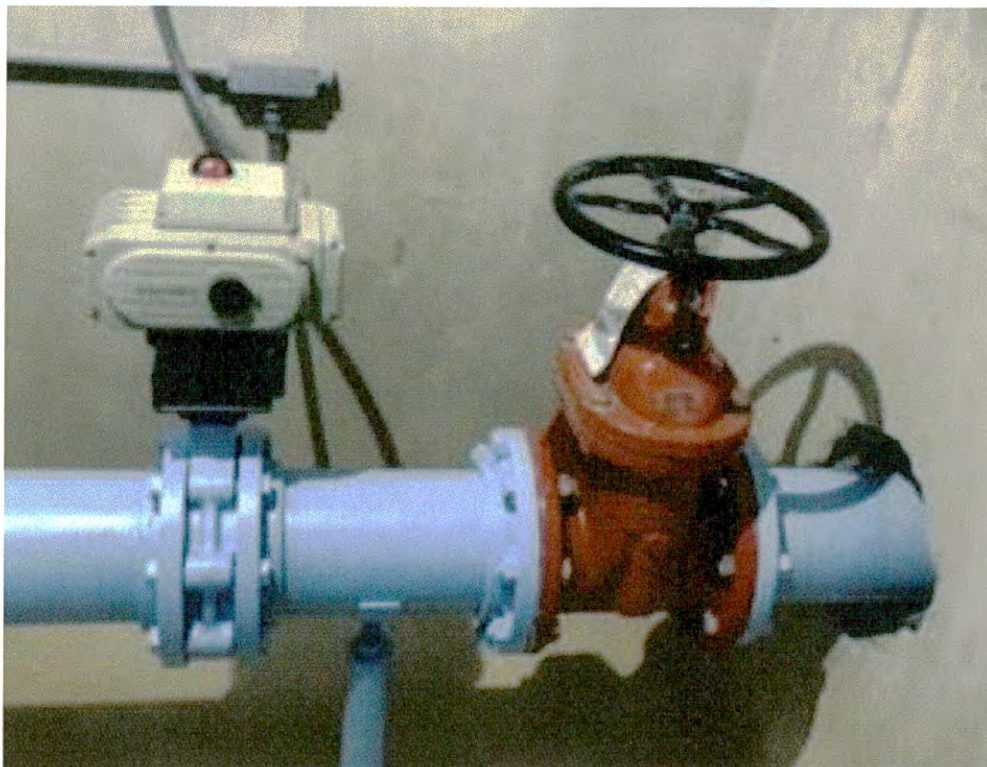
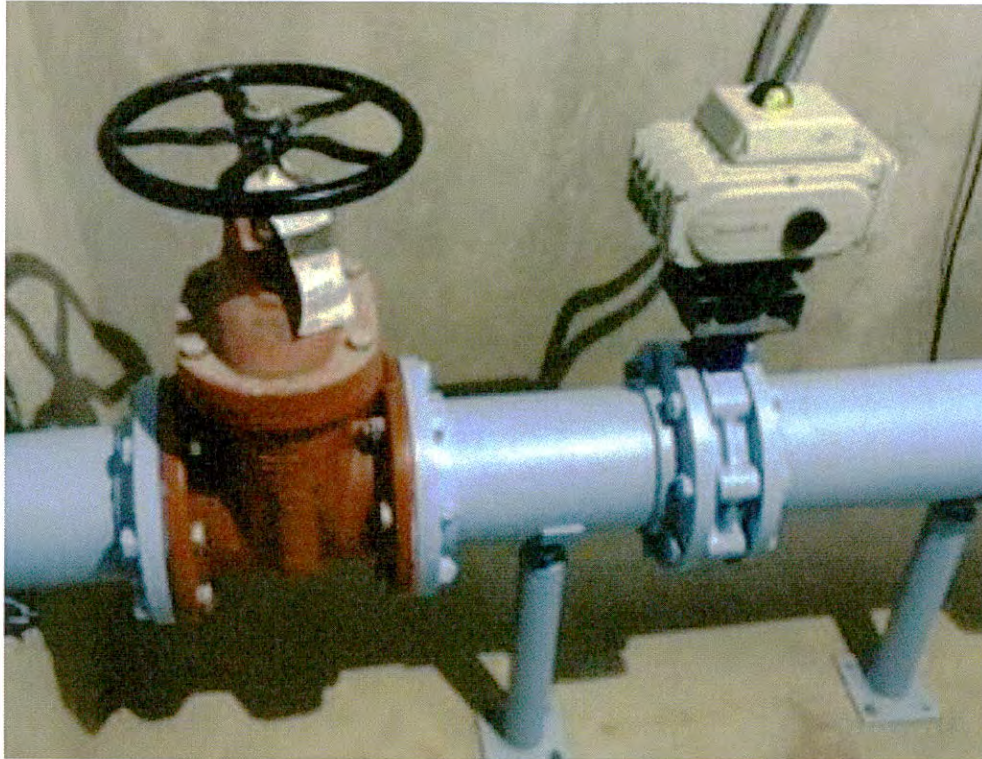
C-6 Control Valve Vault and Construction



C-6 Control Valve



C-6 Control Valve



RECEIPT

WATER RIGHTS PROGRAM

South Dakota Department of Environment and Natural Resources

Date July 14, 202017

RECEIVED OF ~~Terry Valley Trojan Water Project District PO Box 515 Lead 57754-0515~~

The following amount in fees for services rendered as provided for by law:

Fee for Application for Permit No. <u>1969-1</u> to Appropriate Water, to construct and to put water to beneficial use	~~500~~ 00
Fee for Application for Permit No. _____ to Appropriate Water for Future use	500 00
Fee to retain Future Use Permit No. _____ after period of seven years.	
Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water License No. _____	
Fee for Filing Transfer Form _____	
Fee for _____	
Fee for Issuing New Well Driller's License No. _____ for C.Y. _____	
Fee for Renewal of Well Driller's License No. _____ for C.Y. _____	
Fee for Issuing Well Pump Installer's License No. _____ for C.Y. _____	
Fee for Renewal of Well Pump Installer's License No. _____ for C.Y. _____	
(Any Other Work Provided by Law)	
TOTAL	500 00

No. **08299**

By

Jeanne Goodman
Chief Engineer

zme

RECEIPT

WATER RIGHTS PROGRAM

South Dakota Department of Environment and Natural Resources

Date July 24, 2017

RECEIVED OF Terry Valley-Trojan Water Project District Box 515 Lead, SD

The following amount in fees for services rendered as provided for by law:

Fee for Application for Permit No. _____ to Appropriate Water, to construct and to put water to beneficial use	200	00
Fee for Application for Permit No. _____ to Appropriate Water for Future use		
Fee to retain Future Use Permit No. _____ after period of seven years.		
Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water License No. <u>1969-1</u>		
Fee for Filing Transfer Form _____		
Fee for _____		
Fee for Issuing New Well Driller's License No. _____ for C.Y. _____		
Fee for Renewal of Well Driller's License No. _____ for C.Y. _____		
Fee for Issuing Well Pump Installer's License No. _____ for C.Y. _____	200	00
Fee for Renewal of Well Pump Installer's License No. _____ for C.Y. _____		
(Any Other Work Provided by Law)	TOTAL	

No. **08308**

By

Jeanne Goodman
Chief Engineer

2471



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182

denr.sd.gov

RECEIVED

JUL 24 2017

WATER RIGHTS
PROGRAM

July 17, 2017

Terry Trojan Well No. 2
c/o Linda Derosier
PO Box 515
Lead SD 57754

Dear Ms. Derosier:

Thank you for submitting the *Application for a Permit to Appropriate Water* regarding the additional well for the Terry Trojan Water District located in Lawrence County.

We received your check for \$500.00. The total application/license fee is \$700.00. Please submit an additional \$200.00.

If you have any questions, please contact me.

Sincerely,

Karen Schlaak
Water Rights Program
605 773-3352
karen.schlaak@state.sd.us



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE SOUTH DAKOTA 57501-3182
<http://denr.sd.gov>

**RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT
APPLICATION NO. 1969-1, Terry Trojan Water District**

Pursuant to SDCL 46-2A-2, the following is the recommendation of the Chief Engineer, Water Rights Program, Department of Environment and Natural Resources concerning Water Permit Application No. 1969-1, Terry Trojan Water District, c/o Linda Derosier, PO Box 515, Lead SD 57754.

The Chief Engineer is recommending APPROVAL of Application No. 1969-1 because 1) there is reasonable probability that there is unappropriated water available for the applicant's proposed use, 2) the proposed diversion can be developed without unlawful impairment of existing rights, 3) the proposed use is a beneficial use and 4) it is in the public interest with the following qualifications:

1. The well approved under this Permit will be located near domestic wells and other wells which may obtain water from the same aquifer. The well owner under this Permit shall control his withdrawals so there is not a reduction of needed water supplies in adequate domestic wells or in adequate wells having prior water rights.
2. The well authorized by Permit No. 1969-1 shall be constructed by a licensed well driller and construction of the well and installation of the pump shall comply with Water Management Board Well Construction Rules, Chapter 74:02:04 with the well casing pressure grouted (bottom to top) pursuant to Section 74:02:04:28.
3. The Permit holder shall report to the Chief Engineer annually the amount of water withdrawn from the Deadwood aquifer.
4. Water Permit No. 1969-1 authorizes a total annual diversion of 46.0 acre feet of water.

See report on application for additional information.

Jeanne Goodman, Chief Engineer
October 3, 2017

REPORT TO THE CHIEF ENGINEER

Water Permit Application No. 1969-1

Terry Trojan Water District

September 21, 2017

Water Permit Application No. 1969-1 proposes to appropriate water at an annual volume of 46 acre-feet (ac-ft) with a maximum diversion rate of 0.22 cubic feet per second (cfs) from one well to be completed into the Deadwood aquifer (DDWD). The proposed well is expected to be completed to an approximate depth of 850 feet and will be located in the SW ¼ NE ¼ of Section 2, T4N-R2E, approximately 3 miles west-southwest of Lead, SD. The water from this application will be used for the water distribution system needs of the Terry Trojan Water District. The Terry Trojan Water District also holds Water Right No. 1406A-1 for 0.178 cfs of groundwater from the underground workings of the Two Johns Mine. This application is for a new well to increase the system capacity and to provide a secondary source of water.

AQUIFER: Deadwood (DDWD)

HYDROGEOLOGY

The Deadwood aquifer is a major regional aquifer that occurs within the porous and permeable portions of the Deadwood Formation. The Deadwood Formation is a Lower Ordovician to Upper Cambrian aged formation consisting of conglomerate, sandstone, shale, siltstone, and limestone (Redden et al., 2013). Within Lawrence County, the Deadwood Formation underlies approximately 428,800 acres and contains an estimated 7,504,000 acre-feet of recoverable water in storage (Allen et al., 1985). The well for this application is sited on the edge of an outcrop of Tertiary aged igneous intrusive which is surrounded by outcrop of both the Deadwood Formation and the combined Whitewood Limestone – Winnipeg Formation (Redden et al., 2013). In the Lead-Deadwood area, there was very limited contact metamorphism between the country rock and the Tertiary age igneous intrusions, with the intrusives primarily creating deformation by increasing the volume of the rock (Redden, 1975). Near Bald Mountain, Shapiro and Gries (1970) showed that the Deadwood Formation has been thickened from 300 feet to 600 feet through the emplacement of sills. A cross-section of the Two Johns Mine shows Tertiary aged Rhyolite intruding and emplacing a sill between the Basal Conglomerate of the Deadwood Formation and the Basal Quartzite of the Deadwood Formation (Shapiro and Gries, 1970). There are no well completion reports or lithologic logs located near this intrusive body, so it is unclear of the exact nature of the subsurface at the application's location (SD Geological Survey, 2017; Water Rights, 2017b).

A depth of 850 feet was estimated for the well on the preliminary engineering report provided with the application. The potentiometric surface of the Deadwood aquifer at the proposed well location was estimated to be between the elevations of 5,800 feet and 5,900 feet above sea level (NGVD of 1929) (Strobel et al., 2000). Rahn (1979) characterized the Deadwood aquifer as having "moderately low permeability", though there have been areas where porous and permeable sand units have been encountered. There are several faults in the area, and although none have been indicated as passing near the proposed well location (Redden et al., 2013), faults and fractures within the Deadwood Formation may be critical to obtaining the desired pump rate.

Recharge to the Deadwood aquifer is through direct infiltration of precipitation that falls on the outcrop of the Deadwood Formation. Driscoll and Carter (2001) estimated the recharge from precipitation to the Deadwood aquifer to be 14,500 acre-feet per year. The discharge from the aquifer was estimated to be 10,100 acre-feet per year from well withdrawals and springflow. The remaining discharge of 4,400 acre-feet per year was attributed to other types of groundwater outflow, assuming the amount of storage within the aquifer remained constant.

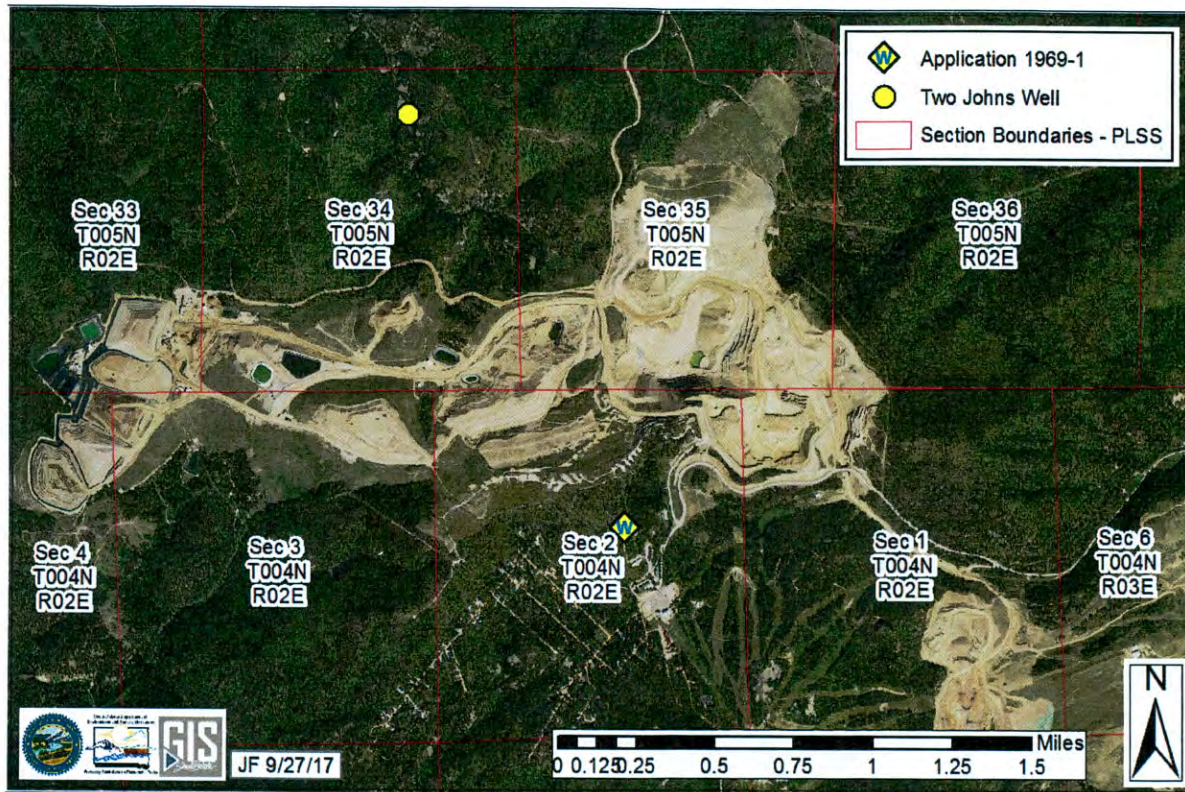


Figure 1. Map showing the location of this application (Water Rights, 2017a)

South Dakota Codified Law 46-2A-9

Pursuant to SDCL 46-2A-9, a permit to appropriate water may be issued only if there is a reasonable probability that there is unappropriated water available for the applicant's proposed use, that the proposed diversion can be developed without unlawful impairment of existing rights and that the proposed use is a beneficial use and in the public interest. This report will address the availability of unappropriated water and existing rights within the Deadwood aquifer.

WATER AVAILABILITY

The probability of unappropriated water available from an aquifer can be evaluated by considering SDCL 46-6-3.1, which requires "No application to appropriate groundwater may be approved if, according to the best information reasonably available, it is probable that the quantity of water withdrawn annually from a groundwater source will exceed the quantity of the average estimated annual recharge of water to the groundwater source." If the source of the water is older than or stratigraphically lower than the Greenhorn Formation and a water distribution system has applied for a permit, the Board need not take into consideration the balance of aquifer recharge and withdrawal. Here, the water source is older or lower than the

Greenhorn Formation and a water distribution system is involved. Therefore, the balance of withdrawal and recharge does not need be considered. However, a brief discussion on the balance of withdrawal and recharge is included below.

Water Availability

Development of the Deadwood aquifer has generally been limited to areas in or near the outcrop due to the fact that most of the aquifer is overlain by productive aquifers. Relatively few wells have been completed into the Deadwood aquifer, and the water use from the Deadwood Formation is fairly low. There are 32 Water Rights/Permits appropriating water from the Deadwood aquifer in South Dakota. Water use by appropriative use type include: 11 permits/rights for commercial use; 15 permits/rights for suburban housing developments; one permit for industrial use; two permits/rights for irrigation; one water right for municipal use; one water right for domestic use; and one water right for a rural water system (Water Rights, 2017a). The combined maximum diversion rate of these appropriative rights/permits totals 4.914 cfs (Water Rights, 2017a). Appropriations limited by their diversion rate typically only pump 60% of the time, so actual withdrawals average approximately 2.948 cfs, or 2,136 acre-ft/yr. This application is seeking to use 46 acre-ft annually. It is doubtful that the combined use from the Deadwood aquifer exceeds 2,500 acre-feet per year.

A simple comparison between estimated average annual recharge (14,500 ac-ft/yr) and estimated annual withdrawals from rights/permits (2,500 ac-ft/yr) shows that there is likely to be unappropriated water available from the Deadwood aquifer. The estimates of springflow and losses to other types of groundwater outflow from the Deadwood aquifer by Driscoll and Carter (2001) show that there is water available to capture from the Deadwood aquifer through well withdrawals.

Observation Well Data

Administrative Rule of South Dakota 74:02:05:07 requires that the Water Management Board *"shall rely upon the record of observation well measurements in addition to other data to determine that the quantity of water withdrawn annually from the aquifer does not exceed the estimated average annual recharge to the aquifer."*

The Water Rights Program monitors five observation wells completed in the Deadwood aquifer (Water Rights, 2017c). The nearest observation well monitored by the Water Rights Program is LA-96A, located approximately 4.4 miles to the southwest of the proposed well location. The hydrograph for this monitoring well (Figure 2) shows the aquifer responds well to climatic conditions, and this monitoring well responds in a fashion similar to the rest of the monitoring wells in the Deadwood aquifer. The water levels rise during periods when recharge to the aquifer exceeds the sum of withdrawals and natural discharge from the aquifer, and the water levels decline when the sum of withdrawals and natural discharge from the aquifer is greater than the recharge to the aquifer. Over the period of record, the water level shown in the hydrograph has remained relatively stable with climatic variability showing a difference of about 13 feet between wetter and drier periods. The means the amount of recharge to and the natural discharge from the aquifer greatly exceeds withdrawals. The observation well data indicates there is a reasonable probability that there is unappropriated water available from the Deadwood aquifer.

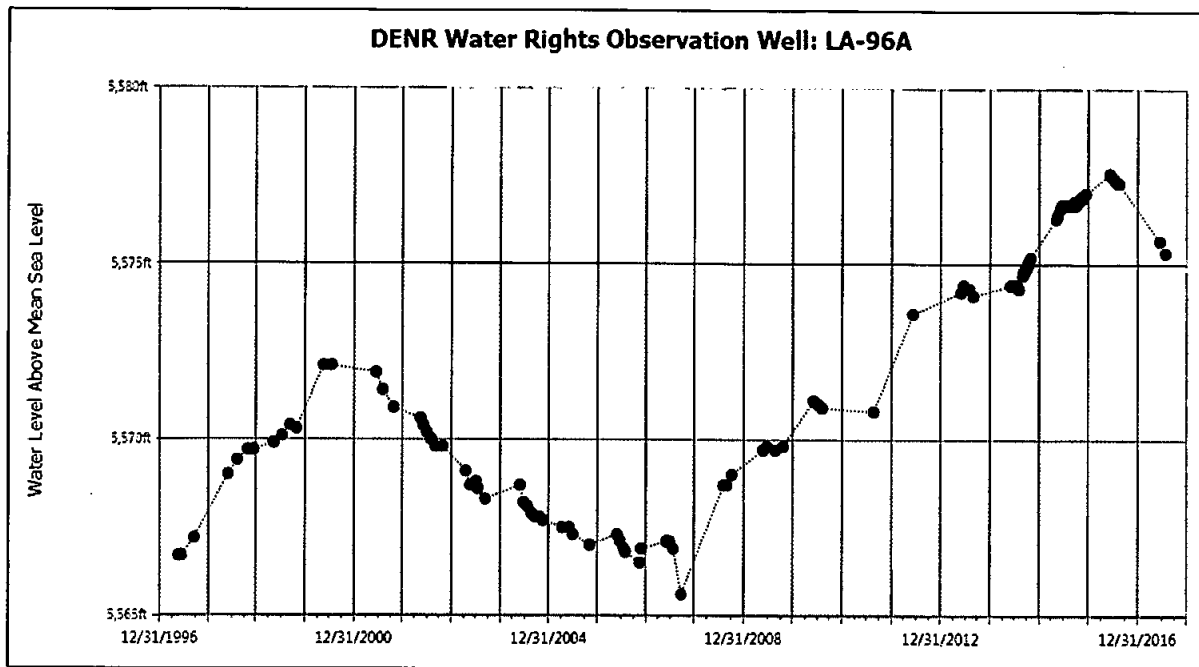


Figure 2: Hydrograph for DENR Water Rights Observation Well LA-96A (Water Rights, 2017c)

EXISTING WATER RIGHTS

The nearest existing water right/permit identified as using the Deadwood aquifer is Vested Water Right No. 1174-1 for Wharf Resources Inc. and is located approximately half a mile north-northwest of the proposed well location. Vested Water Right No. 1174-1 appropriates 0.67 cfs for municipal and commercial use from one well ("Squaw Creek Shaft Pump Station"). The next nearest existing water right/permit is Water Right 1406A-1, located approximately 1.5 miles to the northwest of the proposed well location. Water Right 1406A-1 is for the Terry Trojan Water District and is licensed for 0.178 cfs from the Two Johns Mine.

Given the lack of information on the Deadwood aquifer at the proposed well location, it is currently unknown if the aquifer is unconfined or confined in this area. The effects of drawdown on other wells in the Deadwood aquifer are currently unknown, but given the distances, the pump rates, and no history of well interference issues in the area, effects on adequate wells as a result of pumping are not expected to be significant. This permit, if approved, is unlikely to adversely impact adequate wells in the area.

CONCLUSIONS

1. This application proposes to appropriate water at an annual volume of 46 acre-feet with a maximum diversion rate of 0.22 cubic feet per second from one well (850 ft deep) to be completed into the Deadwood aquifer (DDWD).
2. There is a reasonable probability unappropriated water is available from the Deadwood aquifer.

3. Due to a lack of aquifer information in the area, the ability of this well to supply the requested appropriation is currently unknown.
4. There is a reasonable probability the use from the new well as proposed by this application will not adversely impact adequate wells for existing water rights and domestic use.



John Farmer
SD DENR – Water Rights Program

REFERENCES

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Water Rights. 2017b. Well Completion Report Files. SD DENR-Water Rights Program, Joe Foss Bldg., Pierre, South Dakota.

Water Rights. 2017c, "Observation Well Database", SD DENR-Water Rights Program, Joe Foss Bldg., Pierre, South Dakota.

OCT 16 2017

WATER RIGHTS
PROGRAM

Affidavit of Publication

STATE OF SOUTH DAKOTA:

COUNTY OF LAWRENCE:

Letitia Lister of said County and State being first duly sworn, on her oath says: That the BLACK HILLS PIONEER is a legal daily newspaper of general circulation, printed and published in the City of Spearfish, in said County and State by Letitia Lister, and has been such a newspaper during the times hereinafter mentioned; and that said newspaper has a bonafide circulation of at least 200 copies weekly, and has been published within said County in the English language for at least one year prior to the first publication of the notice herein mentioned, and is printed in whole or in part in an office maintained at the place of publication; and that I, Letitia Lister, the undersigned, am the Publisher of said newspaper and have personal knowledge of all the facts stated in this affidavit; and that the advertisement headed:

Notice Of Application
No. 1969-1

a printed copy of which is hereto attached, was printed and published in said newspaper for 1 successive and consecutive weeks, the first publication being made on the 12th day of Oct, 2017, and the last publication on the _____ day of _____, that the full amount of fees charged for publishing same, to-wit: The sum of \$25.41, insures solely to the benefit of the publisher of the BLACK HILLS PIONEER, that no agreement or understanding for a division thereof has been made with any person and that no part thereof has been agreed to be paid to any other person whomsoever.

Letitia Lister
Subscribed and sworn to before me this 12th day of Oct, 2017

Ardita R. Lister
Notary Public, Lawrence County, South Dakota
My commission expires: 10-24-2022

NOTICE OF APPLICATION NO. 1969-1 to Appropriate Water

Notice is given that Terry Trojan Well No. 2, c/o Linda Derosier, Executive Director, PO Box 515, Lead SD 57754 has filed an application for a water permit to appropriate 46 acre-feet of water annually at a maximum diversion rate of 0.22 cubic feet of water per second from one well to be completed into the Deadwood Aquifer (approximately 850 feet deep) located in the SW 1/4 NE 1/4 Section 2-T4N-R2E for a water distribution system serving the Terry Trojan Water District located approximately three miles west of Lead SD.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 1969-1 with qualifications because 1) unappropriated water is available, 2) existing rights will not be unlawfully impaired, 3) it is a beneficial use of water, and 4) it is in the public interest. The Chief Engineer's recommendation with qualifications, the application, and staff report are available at <http://denr.sd.gov/public> or contact Eric Gronlund for this information, or other information, at the Water Rights Program address provided below.

Any person interested in opposing or supporting this application or recommendation must file a written petition with BOTH the applicant and Chief Engineer. The applicant must file a petition if contesting the Chief Engineer's rec-

ommendation. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E Capitol, Pierre SD 57501 (605 773-3352)" and the applicant's mailing address is given above. A petition filed by either an interested person or the applicant must be filed by October 23, 2017.

The petition may be informal, but must include a statement describing the petitioner's interest in the application, the petitioner's reasons for opposing or supporting the application, and the signature and mailing address of the petitioner or the petitioner's legal counsel, if legal counsel is obtained.

If the applicant does not contest the recommendation of the Chief Engineer and no petition to oppose the application is received, the Chief Engineer shall act on the application pursuant to the recommendation with no hearing held before the Water Management Board. If a petition opposing the application or contesting the recommendation is filed, then a hearing will be scheduled and the Water Management Board will consider this application. Notice of the hearing will be given to the applicant and any person filing a petition.

Steven M. Pirner,
Secretary,
Department of
Environment and
Natural Resources.

Published once at the total approximate cost of \$26.80.

#460
Oct 12

Schlaak, Karen

From: Schlaak, Karen
Sent: Tuesday, October 03, 2017 9:26 AM
To: Legals (legals@bhppioneer.com)
Subject: 1969-1, Terry Trojan Well No. 2
Attachments: 1969-1public.short.docx; FORM8.FRM.doc

Attached is a notice to be published on October 12, 2017.

Terry Trojan Well No. 2, c/o Linda Derosier, PO Box 515, Lead SD 57754 (605 722-7560) has been notified to contact you to authorize publication and arrange for payment.

Please send the affidavit or return the attached Proof of Publication form ASAP to the Water Rights Program, 523 E Capitol, Pierre SD 57501.

Let me know if you have questions. Please acknowledge receipt of this email.

Karen Schlaak
SD DENR, Water Rights Program
(605) 773-3352





DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182

denr.sd.gov

**NOTE: TO BE SURE OF PUBLICATION ON
THE CORRECT DATES, CONTACT
THE NEWSPAPER RIGHT AWAY.**

October 3, 2017

Terry Trojan Well No. 2
c/o Linda Derosier, Executive Director
PO Box 515
Lead SD 57754

Dear Ms. Derosier:

Water Permit Application No. 1969-1 for a water distribution system has been examined and found to comply with the South Dakota Water Laws and applicable rules. A notice has been sent to the Black Hills Pioneer printed at Spearfish SD (Ph # 605-642-2761). You will need to contact the newspaper and authorize publication of this notice. For your information, a copy of the notice, the recommendation of the Chief Engineer and report on the application are enclosed. Please review the notice prior to publication and notify this office, if you have any corrections or questions.

Be sure to contact the above newspaper to authorize publication of your Notice and to arrange for payment. Early contact with the paper can eliminate delays. Upon receiving authorization from you, the publisher has been instructed to publish your notice. The newspaper has also been instructed to send us the Proof of Publication. We must receive Proof of Publication before action can be taken on the application.

Sincerely,

Eric Gronlund
Natural Resources Engineer
(605) 773-3352

enclosures

NOTE: If you plan to contest any part of the Chief Engineer's recommendation, you must file a petition pursuant to the procedures outlined in the attached notice of hearing. The Water Management Board will then consider your concerns during a hearing on the application.

NOTICE OF APPLICATION NO. 1969-1 to Appropriate Water

Notice is given that Terry Trojan Well No. 2, c/o Linda Derosier, Executive Director, PO Box 515, Lead SD 57754 has filed an application for a water permit to appropriate 46 acre-feet of water annually at a maximum diversion rate of 0.22 cubic feet of water per second from one well to be completed into the Deadwood Aquifer (approximately 850 feet deep) located in the SW 1/4 NE 1/4 Section 2-T4N-R2E for a water distribution system serving the Terry Trojan Water District located approximately three miles west of Lead SD.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 1969-1 with qualifications because 1) unappropriated water is available, 2) existing rights will not be unlawfully impaired, 3) it is a beneficial use of water, and 4) it is in the public interest. The Chief Engineer's recommendation with qualifications, the application, and staff report are available at <http://denr.sd.gov/public> or contact Eric Gronlund for this information, or other information, at the Water Rights Program address provided below.

Any person interested in opposing or supporting this application or recommendation must file a written petition with BOTH the applicant and Chief Engineer. The applicant must file a petition if contesting the Chief Engineer's recommendation. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E Capitol, Pierre SD 57501 (605 773-3352)" and the applicant's mailing address is given above. A petition filed by either an interested person or the applicant must be filed by October 23, 2017.

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If the applicant does not contest the recommendation of the Chief Engineer and no petition to oppose the application is received, the Chief Engineer shall act on the application pursuant to the recommendation with no hearing held before the Water Management Board. If a petition opposing the application or contesting the recommendation is filed, then a hearing will be scheduled and the Water Management Board will consider this application. Notice of the hearing will be given to the applicant and any person filing a petition.

Steven M. Pirner, Secretary, Department of Environment and Natural Resources. Published once at the total approximate cost of _____.



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182

denr.sd.gov

JAN 09 2018

Terry Trojan Well No. 2
c/o Linda Derosier
PO Box 515
Lead SD 57754

Dear Ms. Derosier:

Enclosed is Water Permit No. 1969-1 authorizing construction of your water diversion system and beneficial use of the water, not exceeding the limits as specified in the Water Permit.

A Form 10, *Notice of Completion of Works and Application of Water to Beneficial Use*, is enclosed. Please return this completed form after you have finished the system and have put the water to beneficial use. An investigation can then be scheduled so the water license may be issued, thus completing the acquisition of a water right.

An information sheet *Common Water Right Questions?* is also enclosed. This sheet is intended to answer some of the questions associated with obtaining and keeping a water right.

Sincerely,

Jeanne Goodman, Chief Engineer
Water Rights Program
605 773-3352

enclosures