

WATER PERMIT NO. 1950-1

Name of Applicant: Wild Turkey Estates Homeowners Association

Address: 19939 Gobbler Rd, Spearfish SD 57783

Phone: 605 722-8905

Amount of Water Claimed: 0.167 cfs (24.2 acre-feet)

Total Acres: NA

Source of Water Supply: groundwater (one well)

Water to be used for: suburban housing development

County: Lawrence

Type of Waste Disposal System:

Location: 1 mile west of Spearfish

PRIORITY Date Received: 2-26-15

Application/License Fee: \$ 700

Corrected Application Received: 3-5-15

Period of Annual Use: January 1 – December 31

Remarks:

Diversion Point: NE 1/4 SE 1/4 Sec 1- T6N-R1E

Land to be Irrigated: NA

Depth of Well: 1350 feet deep

Well Driller:

Remarks:

Type of Map: topo

Prepared by:

Reviewed and the Number Assigned on: 3-5-15

By: **Karen Schlaak**

Notice of Hearing - date to intervene: _____

			1		
				⊕	

Mail to: PMB 2020 DENR - Water Rights 523 E Capitol Ave Pierre, SD 57501-3182 ph. (605) 773-3352	No. <u>1950-1</u> (office use only) Hydrologic Unit <u>10 120203</u>
	Basin <u>Belle Fourche River</u>
	Newspaper <u>Black Hills Pioneer, PO Box 7</u>
	<u>Spearfish 57783 - 605-642-2761</u>

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FEB 26 2015

WATER RIGHTS
PROGRAM

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

Check use(s) of water:

☐ Municipal	☐ Suburban Housing	☐ Recreational	☐ Institutional
☒ Rural Water System	☐ Commercial	☐ Fish & Wildlife	☐ Geothermal Heat
☐ 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.)

N/A

Contact Person: Mark Stadel
PO Box 454

1. Name to Appear on Water Permit Wild Turkey Estates Homeowners Association
 (check one) ☐ Owner ☐ Tenant/lessee ☐ Owner's Legal Agent Bill Tysdal, President
 (name and complete address if different than above name)

Mailing Address 19939 Gobbler Road Spearfish SD 57783
 (Address) (City) (State) (Zip Code)

Home Phone 605-722-8905 Cell _____ Email bill.tysdal@gmail.com

2. Amount of water claimed 0.167 *CFS or 75 **GPM 24.2 ***AF
 (*Cubic Feet per Second) (**Gallons per Minute) (***Acre Feet - storage capacity of dam/dugout or annual use if applicable)

3. Source of water supply Madison Limestone

4. Location of point of diversion NE 1/4, SE 1/4 Section 1, T6N, R1E 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 Year Around January 1 - December 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)

"Preliminary Engineering Report for Wild Turkey Estates Water System, Advanced Engineering and Environmental Services, Inc. November 24, 2014" - included with this application.

I, Bill Tysdal, the applicant, certify that I have read this application, have examined the attached map, and that the matters stated are true.

**SOUTH DAKOTA
WATER PERMIT NO. 1950-1**

Date of first receipt of application February 26, 2015.

Date of return to applicant for corrections, amendments or changes February 27, 2015.

Date of receipt of corrected application March 5, 2015.

The Chief Engineer, on behalf of the Water Management Board, issues Water Permit No. 1950-1 to Wild Turkey Estates Homeowners Association c/o Mark Stadel, PO Box 454, Spearfish SD 57783 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. 1950-1 appropriates 0.167 cubic feet of water per second (24.2 acre-feet annually) from one well to be completed into the Madison Aquifer (1,350 feet deep) located in the NE 1/4 SE 1/4 Section 1-T6N-R1E.
2. The water appropriated shall be used for the purpose of suburban housing development 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. 1950-1 is May 26, 2015.
5. The date from which applicant may claim right is February 26, 2015.
6. One-fifth of the construction is to be completed on or before November 26, 2017.
7. All construction is to be completed on or before May 26, 2020.
8. Water is to be put to beneficial use on or before May 26, 2024.
9. Water rights obtained in compliance with the laws of the State of South Dakota may not be unlawfully impaired by this appropriation.

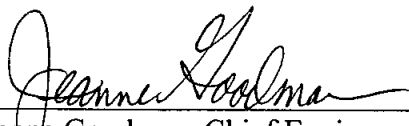
QUALIFICATIONS

1. In accordance with SDCL 46-1-14 and 46-2A-20, Permit No. 1950-1 is issued for a twenty year term. Pursuant to SDCL 46-2A-21, the twenty year term may be deleted at any time during the twenty year period or following its expiration. If the twenty year term is not deleted at the end of the term, the permit may either be cancelled or amended with a new term limitation of up to twenty years. Permit No. 1950-1 may also be cancelled for nonconstruction, forfeiture, abandonment or three permit violations pursuant to SDCL 46-1-12, 46-5-37.1 and ARSD 74:02:01:37.
2. 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.

(continued)

3. The well authorized by Permit No. 1950-1 shall be constructed by a licensed well driller and construction 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.
4. Water Permit No. 1950-1 authorizes a total annual diversion of 24.2 acre feet of water annually from the Madison aquifer.
5. The Water Permit Holder shall report to the Chief Engineer annually the amount of water withdrawn from the Madison aquifer.

WATER MANAGEMENT BOARD

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

JUN 05 2015

date



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 ____ Have test holes been drilled ☐ Yes ☒ No Drilled by ____
(if yes, please provide copies of logs) See attached Preliminary
- b) If existing wells, how many ____ Provide copy of log(s), if available. Drilled by Engineering Report for
Existing Well Information.
- c) Well Depth 1350' Depth to Top of Water Bearing Material 950' Depth to Water from Surface 500'
- d) Distance to nearest existing domestic well:

On applicant's property 150' to existing Minnelusa Well On property owned by others _____

2. Wastewater Disposal System Information

- a) Type of System (i.e. septic tank, drain field) Wild Turkey Estates has individual on-site septic systems.
Nearest system to proposed well is more than 300'.
- b) System Capacity (gallons) _____ Year Constructed _____
- c) Connected to the City of _____ Sanitary System

3. Dugout Information

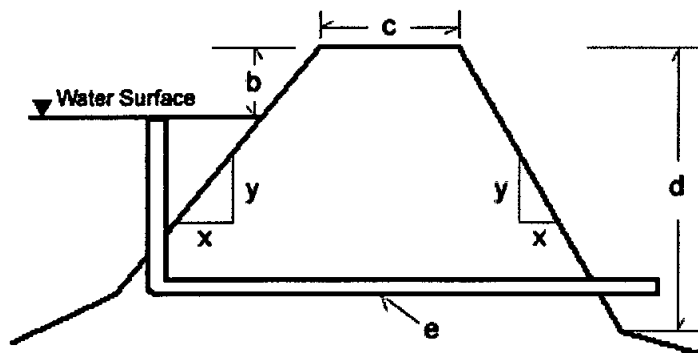
- a) Surface Dimensions N/A Depth _____
- b) Depth to water (ground surface to water level) _____

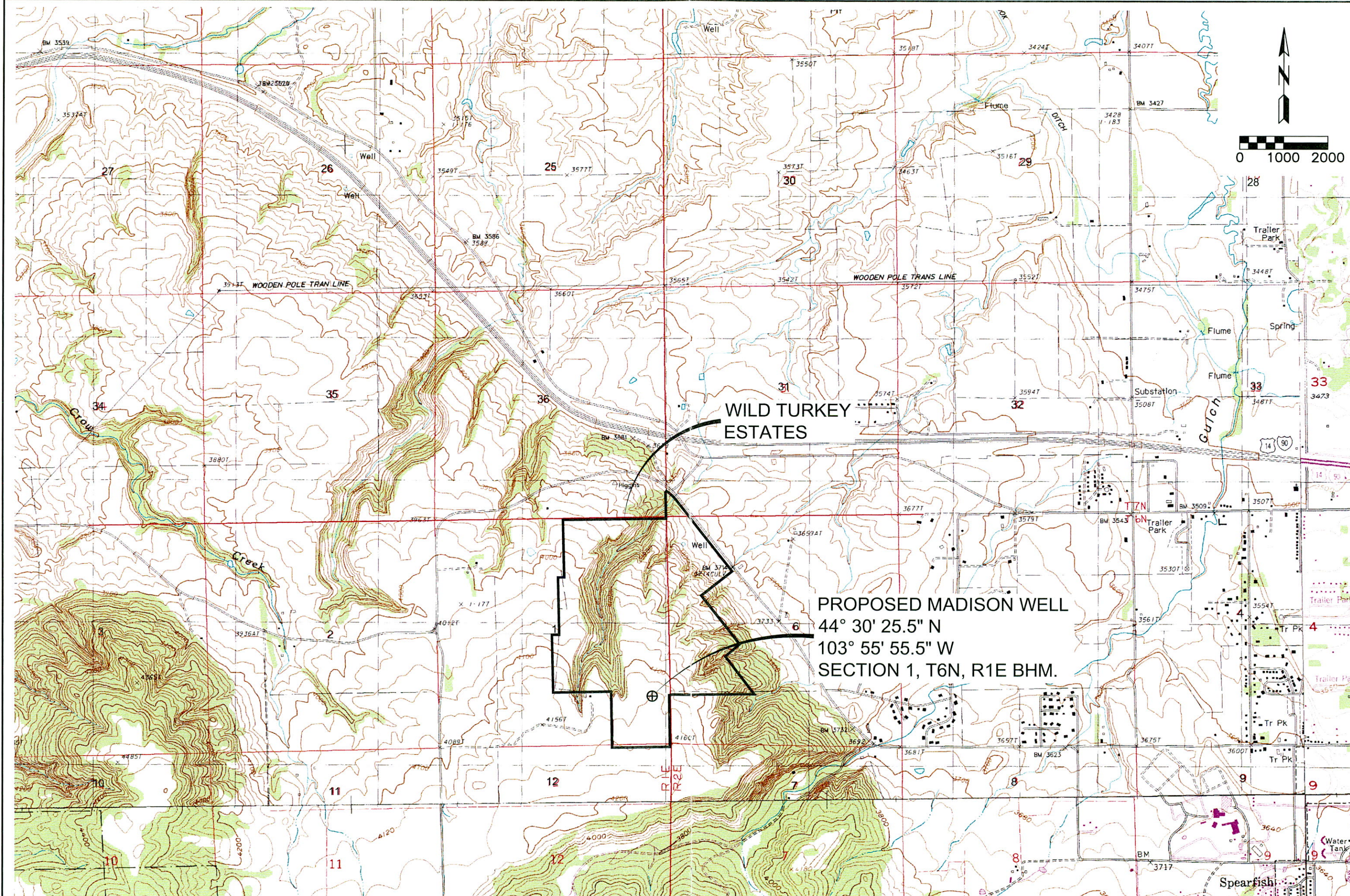
4. Water Storage Dams N/A

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





PROJECT:
WILD TURKEY ESTATES
SPEARFISH, SOUTH DAKOTA

SHEET:
1

SHEET DESCRIPTION:
LOCATION MAP FOR
MADISON WELL

DATE
2/24/14

BY
RF

OKD
GW

DESCRIPTION


1560 Concourse Drive
Rapid City, SD 57703
Phone: (605) 341-7800
Fax: (605) 341-7864
www.ae2s.com

DATE	BY	OKD	DESCRIPTION
2/24/14	RF	GW	

**Preliminary
Engineering
Report
for
Wild Turkey Estates
Water System**

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FEB 26 2015

**WATER RIGHTS
PROGRAM**

Prepared For

**Wild Turkey Estates
Homeowners Association**

**PRELIMINARY
ENGINEERING REPORT**

**Wild Turkey Estates Water
System**

November 24, 2014

AE2S Project #: P12489-1419-600

Preliminary Engineering Report

for

Wild Turkey Estates Water System

Prepared for
Wild Turkey Estates Homeowners Association

Prepared by



November 24, 2014



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- A. Detailed Budgetary Cost Breakdown of Improvement Alternatives

1. Introduction

1.1 Background Information

Wild Turkey Estates is a rural residential subdivision about two miles northwest of Spearfish in Lawrence County. The subdivision was developed in 2009. There are presently seventeen homes constructed and occupied within the subdivision. The subdivision lot sizes range from about two acres to over twenty acres. Homes are relatively large and high value.

The subdivision has a central water supply system which is divided into two service areas. Each service area has a production well, ground level storage reservoir, pressure booster system and distribution piping. The two service areas are separate supply systems with common ownership under the Homeowner Association.

The number of lots and homes is shown in the following table along with basic water system information.

<u>System</u>	<u># Lots</u>	<u>Current # Homes</u>	<u>Well Pump Rate</u>	<u>Reservoir Capacity</u>
Upper	38	9	13 gpm	46,000 gal.
Lower	12	8	19 gpm	25,000 gal.

The overall system layout is shown in Figure 1

In the summer of 2014 the Upper System experienced water supply interruptions due to high usage. The Upper System well pump was not able to supply the reservoir at a rate which maintained water in the storage tank. Other problems with low booster system capacity in the Upper System were experienced resulting in low pressure. The Lower System was constructed without a booster pump with the system pressurized by gravity from the Lower System reservoir. The gravity system proved to be inadequate to maintain service pressure to the homes in the Lower System. The Homeowners Association contracted with Dakota Pump, Inc. to upgrade the Upper booster pump system and to construct a booster pump station for the Lower System.

1.2 Purpose and Scope

In September 2014, the Wild Turkey Estates Homeowner's Association contracted with Advanced Engineering and Environmental Services (AE2S) of Rapid City to perform an engineering evaluation of the water system and to recommend improvements needed to correct identified problems.

The engineering study scope is limited to the adequacy of the supply sources, booster pump systems and reservoirs. The scope does not include evaluation of water quality or distribution system hydraulics. The two well sources are completed into the Minnelusa sandstone aquifer, which typically yields high quality water in this vicinity, thus there are no known water quality problems.

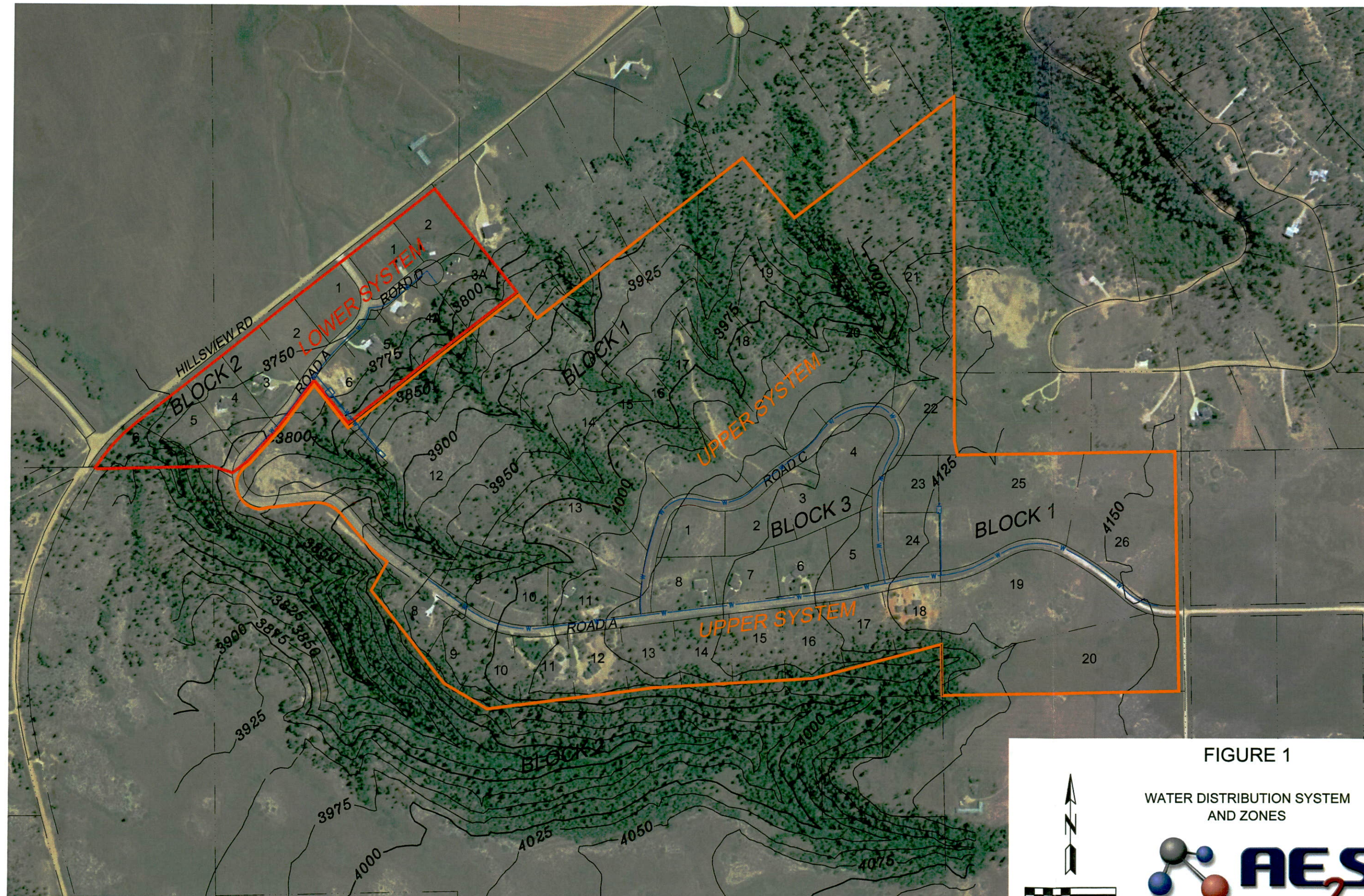


FIGURE 1

WATER DISTRIBUTION SYSTEM
AND ZONES

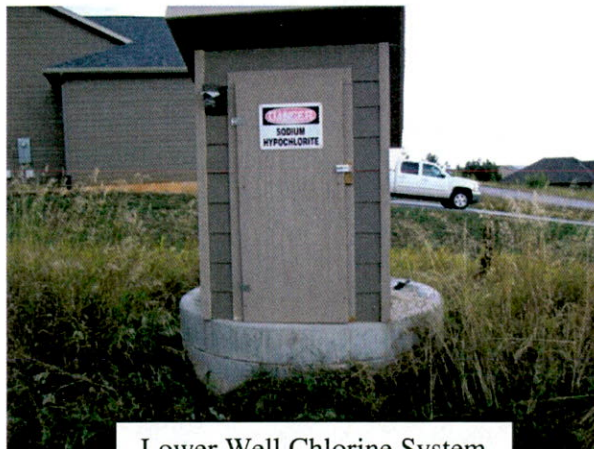


2. Existing System Description

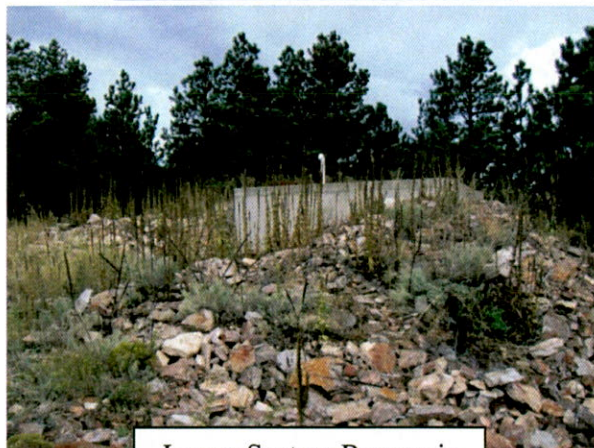
2.1 Lower System

The Lower System uses water produced from a Minnelusa formation well, which was drilled in 1972. The well is referred to as the Beets well (after the property owner at that time). The well is 615' deep with 8" steel casing from the surface to 197' deep, 6" steel casing from 197' to 407' deep, and open hole through the water bearing Minnelusa sandstone to 615' deep. At the time of drilling the static water level was reported to be 50' below the surface and yielded 50 gpm with 210' of drawdown. The current pump is a 1 1/2HP unit pumping at a rate of approximately 18 gpm. The well production is not metered. Liquid sodium hypochlorite is added to the well discharge with a peristaltic metering pump located in a small above ground enclosure near the well.

The well pumps to a 25,000 gallon cast-in-place concrete reservoir located west of the well site at an elevation 130' higher than the well. The well discharge pipe size is 2". The reservoir has a 6" outlet pipe which parallels the 2" well discharge pipe and connects to the distribution system in Gobbler Road between Lots 5 and 6 of Block 1 of the subdivision. A duplex booster pump system in an underground vault boosts the pressure provided by the storage tank elevation (55psi) to about 75 psi in the 2" distribution main in the street.



Lower Well Chlorine System

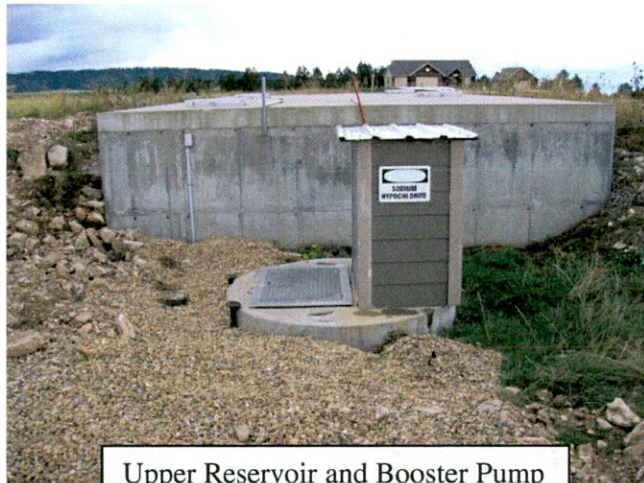


Lower System Reservoir

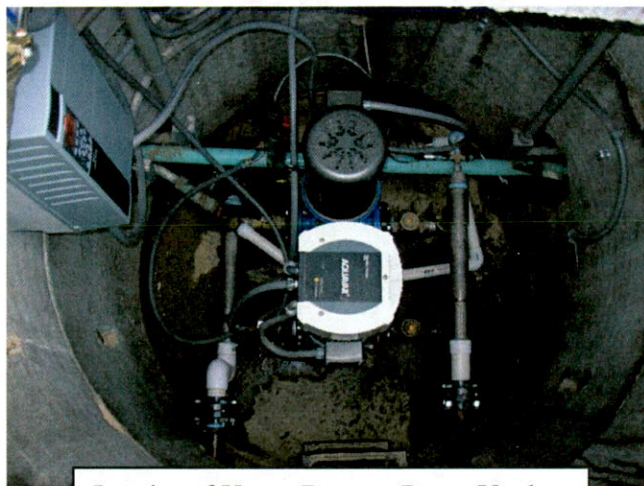
2.2 Upper System

The Upper System uses water produced from a Minnelusa formation well located adjacent to the 46,000 gallon cast-in-place concrete reservoir located on Lot 25, Block 1. The well was constructed in 2007 and is 806' deep with 5" PVC casing from the surface to 560' deep, and 7 ½" diameter open hole through the water bearing sandstone to the bottom. The static water level was reported to be 425' below the surface at the time of drilling. The well produced 16 gpm with a drawdown to 700'. The current pump is a 3 HP unit sized to produce approximately 13 gpm. Liquid sodium hypochlorite is added to the well discharge by a peristaltic type metering pump located in a small enclosure above ground near the reservoir. The well flow is not metered.

The well pumps to the adjacent 46,000 gallon reservoir through 2" PVC pipe. Pump cycling is controlled by electronic probes in the reservoir. An in-ground duplex booster station adjacent to the reservoir draws water from the reservoir and boosts the pressure to about 70 psi in the distribution system. The variable speed pumps can produce up to about 75 gpm at the 70 psi discharge pressure.



Upper Reservoir and Booster Pump



Interior of Upper Booster Pump Vault

2.3 Water Use Records

Customer meters were installed in April 2014 and water use records have been maintained for the five month period May through September 2014. The following tabulation shows the metered use during this period for the Lower and Upper Systems.

Metered Water Usage

System 1 - Lower Well

Customer	Legal	Gallons of Usage					5 Month Total
		May	June	July	August	September	
Hoard	L1, B1	5,624	10,328	9,809	7,315	6,556	39,632
Ray	L2, B1	5,006	3,261	21,671	8,196	3,324	41,458
Lister	L3A, B1	6,779	4,939	9,573	11,332	6,942	39,565
Stefes	L4A, B1	6,999	14,875	17,780	19,245	18,692	77,591
LaLonde	L5, B1	6,246	6,897	47,615	60,173	26,260	147,191
Herrbolt	L6, B1	1,400	1,130	2,350	1,970	1,430	8,280
Viergets	L7, B1	8,467	5,140	26,382	12,788	1,729	54,506
Ritter	L4, B2	5,523	5,119	13,251	6,619	6,275	36,787
Total		46,044	51,689	148,431	127,638	71,208	445,010

Average Day 445,010 gal ÷ 152 days = 2,928 gpd (2.0 gpm) (366 gpd/home)

Peak Month July 148,431 gal ÷ 31 days = 4,788 gpd (599 gpd/home)

Peak Day 2xPeak Month 2 x 4,788 = 9,576 gpd (6.7 gpm) (1197 gpd/home)

System 2 - Upper Well *

Customer	Legal	Gallons of Usage					5 Month Total
		May	June	July	August	September	
Donat	L11, B1	15,900	8,650	36,000	32,900	17,000	110,450
Stadel	L8, B2	6,741	15,306	35,249	26,327	26,648	110,271
Tysdal	L10 & 11, B2	30,120	33,310	89,450	56,250	31,450	240,580
Mechant	L12 & 13, B2	5,627	2,978	5,231	6,382	6,410	26,628
Stinson	L18, B2	2,380	4,837	115,607	66,760	42,877	232,461
Mellot	L6, B3	4,463	12,544	36,851	32,053	23,752	109,663
Nuenke	L7, B3	3,760	3,760	19,300	9,400	4,850	41,070
Duncan	L8, B3	15,770	9,370	38,620	7,240	7,240	78,240
Total		84,761	90,755	376,308	237,312	160,227	949,363

Average Day 949,363 ÷ 152 days = 6245 gpd (4.33 gpm) (780 gpd/home)

Peak Month July 376,308 ÷ 31 = 12,139 gpd (1517 gpd/home)

Peak Day 2 x Peak Month 2 x 12,139 = 24,278 gpd (17 gpm) (3035 gpd/home)

* Note: O'Bryan Lot 1, Block 2 not included due to partial occupancy during the 5 months of record.

The tabulation shows the calculated average day and average day for peak month usage for each system. The peak day use shown above is an approximation based on a multiplier of 2 times the average day during the peak month.

The estimated peak day usage per dwelling unit is relatively high, particularly for the Upper System. The Mountain Plains subdivision south of Spearfish was studied in 2009, and peak day use per dwelling was determined to be about 1150 gpd. The available water use data for Wild Turkey may not be completely representative of long term use patterns due to factors such as high irrigation demands for new lawns. However, precipitation was well above normal in the summer of 2014, so dry year water use may be greater for established landscaping.

For overall planning an average of the recorded Upper and Lower systems usage is recommended.

Water Use Design Basis

Average Day:	570 gpd per home
Peak Day:	2120 gpd per home

3. Future Conditions

3.1 Additional Homes

Full build-out of Wild Turkey Estates will increase water demands and production requirements. The maximum number of homes to be served by the Upper and Lower System is assumed to be equal to the number of platted lots.

<u>System</u>	<u># Lots</u>	<u>Current # Homes</u>	<u>Future Homes</u>
Upper	38	9	29
Lower	12	8	4
Total Subdivision	50	17	33

3.2 Future Water Use Projections

Future water needs may not follow the current water use pattern, but metered usage is the best available information at this time. Projected water needs for full build-out are as follows.

Projected Water Supply Need for Full Build-Out

Average Day:

Lower: 12 homes x 570 gpd = 6,840 gpd (4.8 gpm)

Upper: 38 homes x 570 gpd = 21,660 gpd (15 gpm)

Total 28,500 gpd (20 gpm)

Peak Day:

Lower: 12 homes x 2120 gpd = 25,440 gpd (18 gpm)

Upper: 38 homes x 2120 gpd = 80,560 gpd (56 gpm)

Total 106,000 gpd (74 gpm)

4. Condition and Adequacy of Existing System

4.1 Well Supply

A comparison of existing supply capacity with current and future projected water use is shown following:

System	Current Well Production	Peak Day Now	Peak Day Future
Lower	18 gpm	7 gpm	18 gpm
Upper	13 gpm	17 gpm	56 gpm
Total	31 gpm	24 gpm	74 gpm

It is typically recommended that total production capacity in a community water system be equal to the peak day demand with a safety factor of at least 1.5. Applying a 1.5 safety factor to the current and projected peak day use results in the following total recommended supply capacity.

System	Current Production Capacity	Production Need with 1.5 Safety Factor	
		Now	Future
Lower	18 gpm	11 gpm	27 gpm
Upper	13 gpm	26 gpm	84 gpm
Total	31 gpm	37 gpm	111 gpm

It is concluded that the Lower System well supply is adequate for current conditions, but will not meet future needs. The Upper supply source is not adequate for current or future projected demands.

4.2 Storage

Storage needs for a community water supply are typically based on the following factors.

Equalization Storage - This is the amount of water withdrawn from storage during periods when demand exceeds the supply capacity. This quantity is unique to each system, but is typically estimated at about 20% of peak day usage.

Fire Reserves - Necessary firefighting reserves are established by fire codes and local ordinances. The Lawrence County Subdivision Ordinance requires a minimum of 30,000 gallons for central water systems and 2,000 gallons per lot for subdivisions without central water supply.

Emergency Reserves - Emergency reserves are intended to maintain some level of service during abnormal conditions, such as a power failure or equipment failure, equal to at least one average day usage. It is common and recommended for small systems with only one supply source to provide three days of average day use for emergencies.

Emergency storage and fire reserves are not additive, and the storage need is based upon the larger of fire reserves or emergency reserves. The total needed storage is given by the following formula.

$$\text{Total Storage Need} = \text{Equalization} + \text{Larger of Fire or Emergency}$$

For the Lower and Upper Systems considered separately the calculated storage need is as follows for future full build-out conditions.

Lower System

$$\begin{aligned}\text{Storage} &= .20 (25,440 \text{ gpd}) + \text{Fire } (30,000 \text{ gal}) \text{ or Emergency } (7,400 \text{ gpd}) \\ &= 5,100 \text{ gal} + 30,000 \text{ gal.} \\ &= 35,100 \text{ gallons}\end{aligned}$$

Upper System

$$\begin{aligned}\text{Storage} &= .20 (80,560 \text{ gpd}) + \text{Fire } (30,000 \text{ gal}) \text{ or Emergency } (23,600 \text{ gpd}) \\ &= 16,100 \text{ gal} + 30,000 \text{ gal.} \\ &= 46,100 \text{ gallons}\end{aligned}$$

If the Upper and Lower Systems were combined into one system the total storage need is as follows:

Combined System

$$\begin{aligned}\text{Storage} &= .20 (106,000 \text{ gpd}) + \text{Fire } (30,000 \text{ gal}) \text{ or Emergency } (31,000 \text{ gpd}) \\ &= 21,200 \text{ gal} + 31,000 \text{ gal.} \\ &= 52,200 \text{ gallons}\end{aligned}$$

The following tabulation compares the current storage tank volumes with calculated storage need.

Storage Volume Adequacy

<u>System</u>	<u>Existing Storage</u>	<u>Storage Need</u>
Lower	25,000 gal.	35,100 gal.
Upper	46,000 gal.	46,100 gal.
Combined System	71,000 gal.	52,300 gal.

Storage provided in the system is judged to be marginally inadequate when the systems are considered separately, but total storage is adequate if the two systems are combined and able to function together.

4.3 Booster Pumps

The Upper and Lower Systems use variable speed constant pressure booster pumps to pressurize the distribution system. Both the Lower and Upper booster stations have duplex pumps located in below ground concrete vaults (5' diameter manholes). The booster systems should pressurize the system to at least 40 psi at all locations and each pump should pump at a rate equal to the projected peak hourly demand.

The peak hourly demand is typically not known in a small system, but can be estimated by using a multiplier times the average day or peak day demand. The most commonly used multipliers are as follows.

Multiplier for Peak Hour Demand

$$\text{Peak Hour} = 2.5 \times \text{Peak Day}$$

or

$$\text{Peak Hour} = 10 \times \text{Average Day}$$

Peak hourly flow projections for the Lower and Upper booster stations using both multipliers are as follows:

Peak Hour Flow Estimate

Demand Now				
<u>System</u>	<u>Average Day</u>	<u>Average Day x 10</u>	<u>Peak Day</u>	<u>Peak Day x 2.5</u>
Lower	2.0 gpm	20 gpm	6.7 gpm	17 gpm
Upper	4.3 gpm	43 gpm	17 gpm	43 gpm

Future Demand				
<u>System</u>	<u>Average Day</u>	<u>Peak Hour Average Day x 10</u>	<u>Peak Day</u>	<u>Peak Hour Peak Day x 2.5</u>
Lower	4.0 gpm	48 gpm	18 gpm	45 gpm
Upper	15 gpm	150 gpm	51 gpm	140 gpm

Dakota Pump, Inc. provided pump performance curves for the booster systems. A comparison of pump performance with existing and projected peak hour demands is shown following:

Pump Performance

<u>System</u>	<u>Peak Hour</u>		<u>Pump Performance</u>	
	<u>Now</u>	<u>Future</u>	<u>Pressure Boost</u>	<u>Flow</u>
Lower	20 gpm	48 gpm	20 psi	70 gpm
Upper	43 gpm	140 gpm	70 psi	90 gpm

The Lower System boosters are adequate for existing and projected full build-out conditions. The Upper boosters are adequate for existing development, but should be upsized when the number of homes on the upper system reaches about 20 to 25.

5. Improvement Alternatives

5.1 Needed Improvements

The principal system deficiency for current and long term conditions is the lack of production capacity. At 13 gpm the Upper well does not produce enough water to meet current peak day demands (17 gpm) or future needs (59 gpm). At 18 gpm, the Lower well pump is adequate for the current peak day (8 gpm) and is probably sufficient for the projected future peak day (19 gpm). Neither system will supply the projected future needs with the recommended 1.5 safety factor (29 gpm Lower and 89 gpm Upper).

Storage tank volumes are considered to be satisfactory for existing and future conditions, but the Lower system does not meet the current county requirements for fire reserves. If the two systems were connected and could share supplies and storage, then total storage is considered to be satisfactory.

The booster pump systems are sufficient for current conditions. As described in Section 4.3, the Upper System booster will need to be upsized in the future.

The following sections describe alternatives available to Wild Turkey Estates to increase the overall water production capacity to provide an adequate supply to the overall system for both current and future conditions.

5.2 Alternatives Considered

5.2.1 Alternate 1 – Hydrofrack Upper Minnelusa Well and Replace Pump

This project would attempt to increase the production capacity of the Upper well using hydraulic fracturing techniques. Water would be pumped into the well from the surface under high pressure to fracture and create additional porosity in the Minnelusa sandstone with the objective of increasing the well capacity above the current 13 gpm.

Alexander Drilling of Hill City has the necessary equipment and has had success in increasing well yields in the Minnelusa as well as other local hardrock aquifers. The information in this section of the report was obtained from discussions with Alexander Drilling.

The existing pump and motor would be removed from the well. The fracking operation would be performed by setting a temporary packer at the top end of the open hole portion of the well and setting a high pressure pipe string from the surface to and through the packer. A high pressure pump would pump water into the well to fracture the sandstone and create more porosity.

The fractured well would then be tested using a test pump to assess the improved capacity. At the completion of the test the existing pump and motor would be re-installed. A new larger pump and motor would be installed at a later time to match the new well characteristics.

The entire fracking and testing operation can be completed in 2 to 3 days, and the Upper reservoir has sufficient capacity to supply the system during the well work.

The potential increase in well yield using this technique is unknown for this location, but doubling well production has been achieved at other locations.

The total estimated cost of this alternative is \$24,700 for the fracking and new well pump and motor (assumed 25 gpm, 7.5 HP). A detailed cost breakdown is included in the Appendix to this report.

5.2.2 Alternate 2 – Connect Upper and Lower Distribution Systems

This alternative would connect the Lower System to the Upper System to allow the Lower well production to be supplied to meet the shortfall in the Upper System. Figure 2 shows the conceptual layout and pipe routing in Gobbler Road. A booster pump station is needed to lift water from the lower system and deliver into the Upper distribution piping. The figure shows the suggested location of the booster to provide about 30 psi of suction side pressure on the pumps. A pressure regulating valve in the booster station can be included to allow Upper System water to be backfed into the Lower System in the event of a Lower well pump failure.

An automatic control system using cellular phone technology between the Upper reservoir and the booster station is suggested. When the Upper reservoir is depleted the control system would lock out the Upper System booster and transfer service to the connecting booster which would use Lower System water to supply the Upper System. When the Upper well refills the tank to a predetermined level, then the booster pump duty would be returned to the Upper booster system.

This alternative allows the two separate systems to share the two wells and to provide emergency service to either system during a pump failure in one of the wells. Total water production capacity is not changed with this alternative alone.

The total estimated cost of this alternative is \$161,000 for pipeline, booster system and controls. Detailed cost breakdowns are included in the Appendix.



5.2.3 Alternate 3 – Replace Lower Well Pump

The Lower well was reported to have a potential yield of 50 gpm at the time of drilling in 1972. Installing a pump capable of producing 50 gpm appears to be feasible. The upper and lower casing sizes are large enough to accommodate a 4” pump and motor which can produce 50 gpm. The required motor size of 10 HP requires three phase power, and the existing electrical system is 230 v. single phase. For purposes of this report it is assumed that a digital phase converter in weather proof enclosure will be installed at the site to allow the existing single phase service to supply the required three phase pump power. Further investigation will be needed to assess other electrical and control system components for necessary upgrades.

This improvement, when completed in conjunction with an interconnection of the Upper and Lower systems, will more than double the current total overall water production capacity from 31 gpm to 63 gpm.

The total estimated cost of this work is \$32,000. Refer to the Appendix for a detailed cost breakdown.

5.2.4 Alternate 4 – Booster Pump and Transmission Main from Lower Reservoir to Upper Reservoir

This alternative would interconnect the Lower System with the Upper System with a pump system and dedicated transmission main which would pump directly from the Lower reservoir to the Upper reservoir without using the existing distribution piping. It would provide an efficient way to utilize the extra production capacity from the Lower well (with pump upgrade) and provide water directly to the Upper System reservoir to augment the low capacity Upper well.

The project layout is illustrated in Figure 3. The booster pump system and controls are assumed to be located in a structure constructed on the top of the Lower reservoir. A cellular phone based control system would be used to start the pump system based upon low water level in the Upper reservoir. The existing Upper system booster pumps would remain unchanged.

The total estimated cost for this alternative is \$254,700 Cost breakdowns are included in the Appendix.

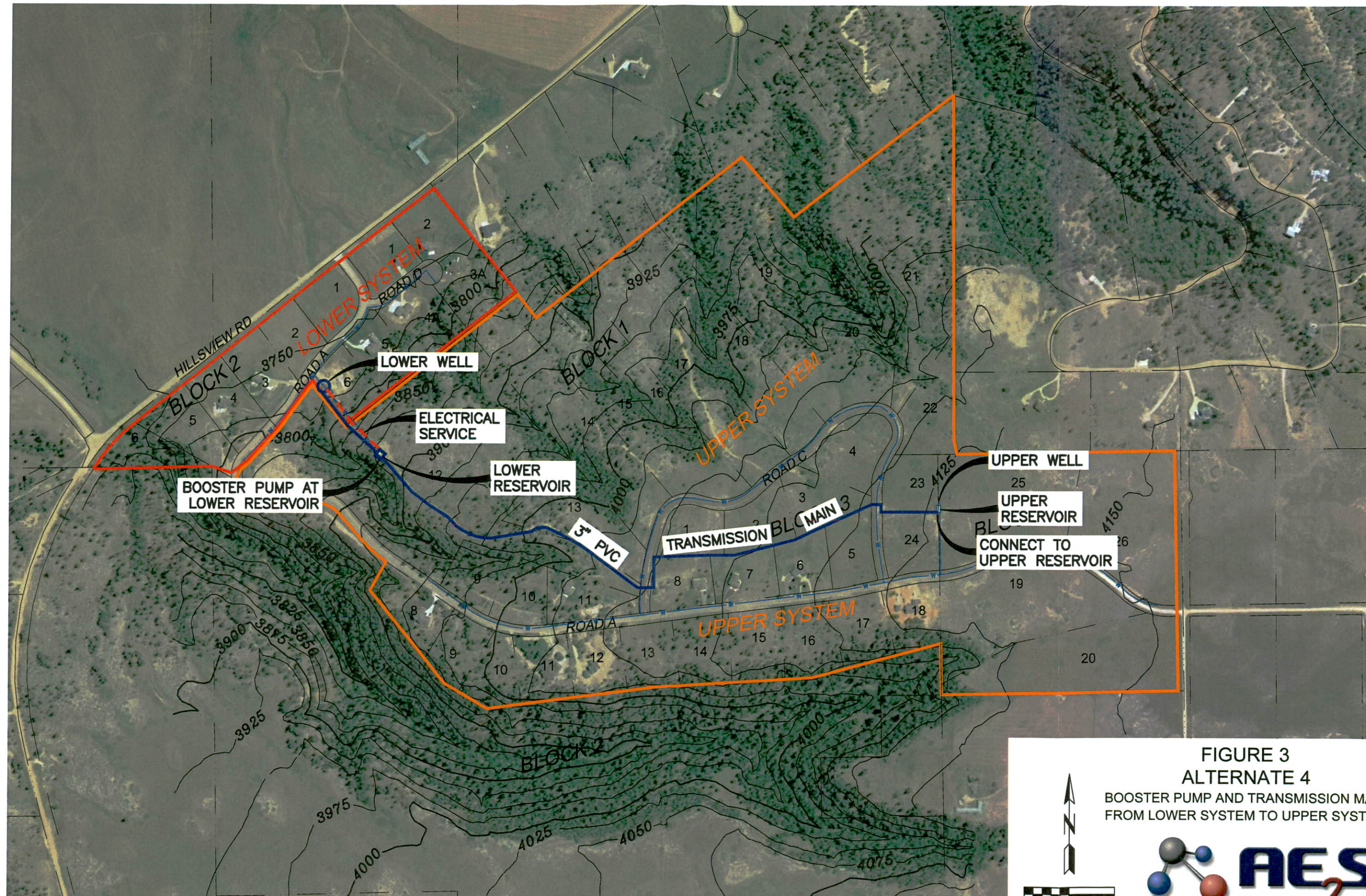


FIGURE 3
ALTERNATE 4
 BOOSTER PUMP AND TRANSMISSION MAIN
 FROM LOWER SYSTEM TO UPPER SYSTEM



5.2.5 Alternate 5 – New Minnelusa Well for Upper System

This alternative would augment the deficient production in the Upper System with a new well to supplement the existing Upper well. This could be completed with or without the hydrofracking of the existing Upper well (Alternate 1). If hydrofracking were to be successful in the existing well, then hydrofracking of the new well at the time of construction could be considered.

The preliminary location for a new well is shown in Figure 4. It is necessary to provide some distance between wells in the same aquifer to avoid drawdown interference. Separation of 500' or more is assumed to be sufficient in this case.

Although a new Minnelusa well in combination with the existing well would likely not provide the estimated ultimate need for the Upper System (78 gpm), it would as a minimum handle the current Upper Zone deficiency and defer the need for one or more of the other alternative improvements.

The cost of a new Minnelusa well, including well house, well pump system, transmission pipeline and control system is \$137,500. Itemized costs are included in the Appendix.

5.2.6 Alternate 6 – New Madison Well for Upper System

This alternative consists of drilling a new Madison limestone formation well at the site of the Upper reservoir to augment the Upper System supply. The Madison formation is below the Minnelusa and typically yields substantially more water than the Minnelusa. Yields of 100 gpm or more are common. The nearest Madison well to Wild Turkey Estates is at Pope and Talbot, about 2.5 miles southwest. The Pope and Talbot well yielded over 300 gpm at the time of drilling in 1987.

Drilling a new Madison well at the Upper reservoir site would avoid significant pipeline construction and consolidate production facilities at a single location, thus avoiding telemetry costs and new electric service costs also.

For purposes of this study, the assumed yield and pumping rate is estimated at 85 gpm, sufficient to supply all water needs for the Upper System. An 85 gpm pumping rate will require a 6" diameter pump and motor (20 HP), thus the well casing size will need to be 7" diameter.

Other work at the reservoir site would include a well house, hypochlorite feed system, and piping system to the reservoir. Three phase power is needed for a 20 HP motor and a digital phase converter is included to allow the use of the existing single phase power supply.

The estimated total cost for this alternative is \$275,000. A cost breakdown is included in the Appendix.

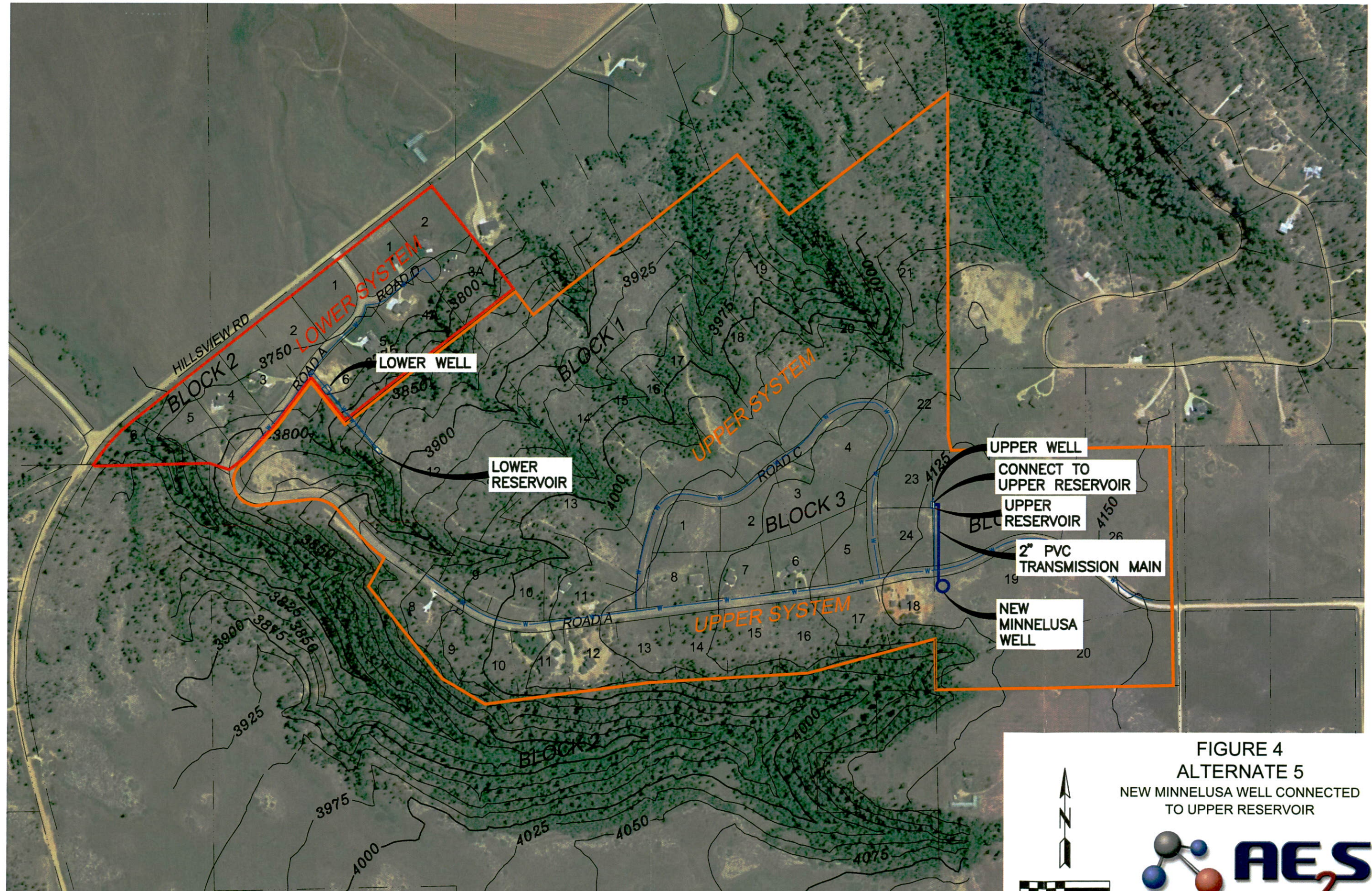


FIGURE 4
 ALTERNATE 5
 NEW MINNELUSA WELL CONNECTED
 TO UPPER RESERVOIR



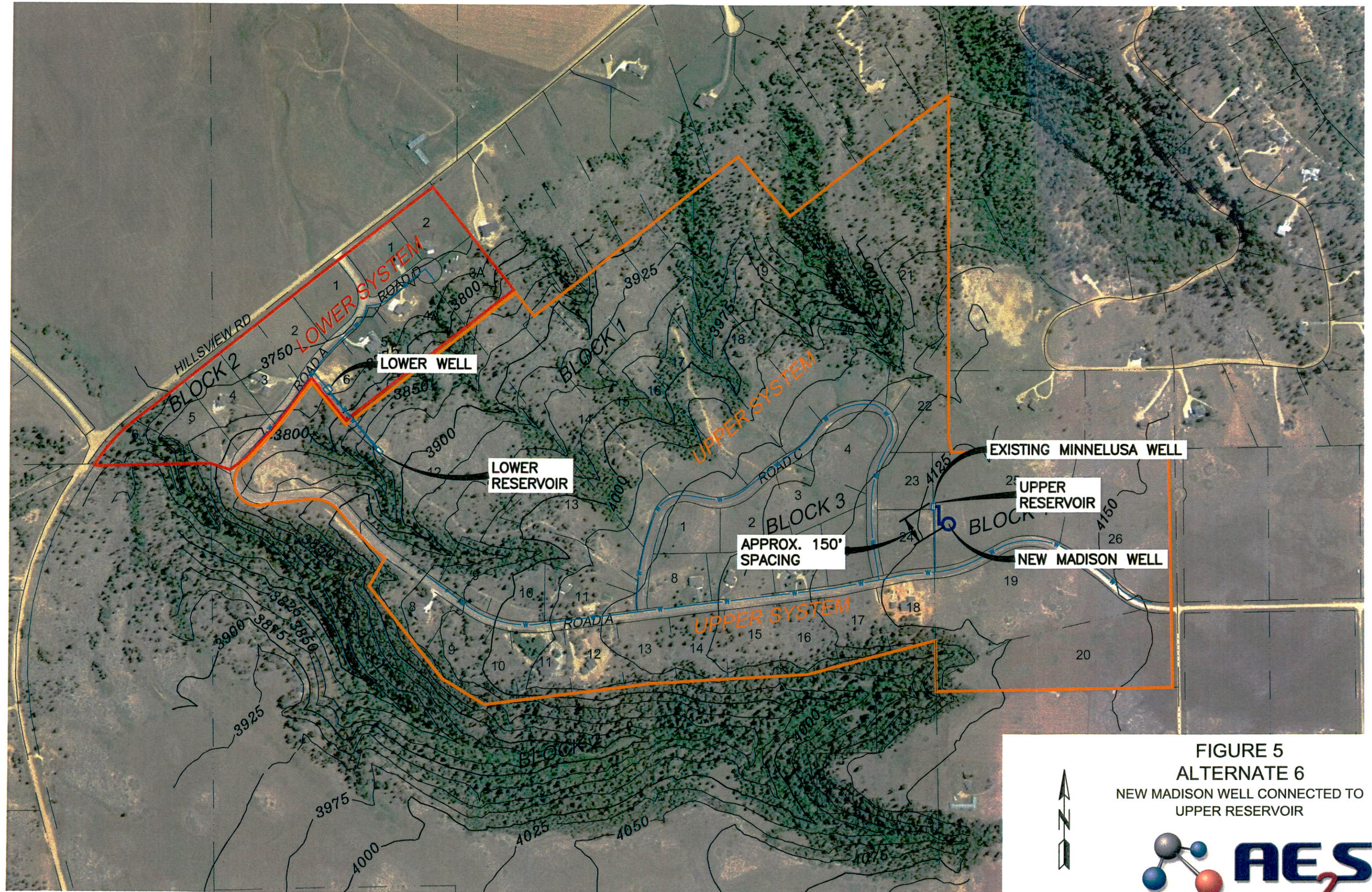


FIGURE 5
ALTERNATE 6
NEW MADISON WELL CONNECTED TO
UPPER RESERVOIR



6. Recommendations

6.1 Supply Improvements

Following is a summary of alternative improvement projects reviewed in this report.

Summary of Alternatives

<u>Alternative</u>	<u>Description</u>	<u>Cost</u>
1	Hydrofrack Upper Well	\$ 24,700
2	Connect Upper and Lower Distribution	\$161,000
3	Replace Lower Well Pump	\$ 32,000
4	Booster and Transmission Main	\$254,700
5	New Minnelusa Well	\$152,500
6	New Madison Well	\$275,000

Alternative 1 is relatively economical and has the potential to solve the immediate supply problem in the Upper System. This option is not without risk, but would allow time for long-term supply upgrades to be selected and financing arranged.

Alternative 2 and 3 should be considered together. The distribution system interconnection will not be effective long-term without a pump upgrade in the Lower well. Although this combination of improvements is costly, it provides for redundancy in the supply and storage system and will make use of the extra capacity in the lower well. These improvements are considered to be relatively risk free.

Alternative 4 is not recommended due to high cost.

Alternative 5 New Minnelusa well can be considered for future supply needs, but only if hydrofracking of the existing well is successful. Drilling a new low yielding well (10 to 15 gpm) is not worth the cost.

It is recommended that Alternative 6 – New Madison Well be considered for the future, when the number of homes served creates demand which taxes the capacity of the two existing wells, then a Madison well provides the best chance for a high yielding supply.

In general the recommended prioritization and scheduling of improvements is as follows:

Recommend Prioritization of Improvements

<u>Recommended Improvement</u>	<u>Complete When</u>
1 – Hydrofrack Upper Well	Now
2 – Connect Upper and Lower	25+ Homes
3 - Replace Lower Well Pump	
6 – New Madison Well	40+ Homes

Appendix A

Detailed Cost Budgetary Cost Breakdowns of Improvement Alternatives

Budgetary Cost Estimate
Alternate 1 - Hydrofrack Upper Well and Replace Pump

Item	Quantity	Unit Cost	Total
Contractor Mobilization	1 LS	\$1,500.00	\$1,500.00
Remove Pump and Motor	1 LS	\$500.00	\$500.00
Hydrofrack Operations	1 LS	\$4,000.00	\$4,000.00
Furnish and Install Test Pump	1 LS	\$1,000.00	\$1,000.00
Test Pumping	4 HRS	\$250.00	\$1,000.00
Re-install Existing Pump *	1 LS	\$500.00	\$500.00
Furnish New Pump and Motor**(25 gpm, 7.5HP)	1 LS	\$2,500.00	\$2,500.00
Install Pump and Motor with Air Line	1 LS	\$1,000.00	\$1,000.00
Phase Converter	1 LS	\$4,500.00	\$4,500.00
Electrical Alterations	1 LS	\$2,000.00	\$2,000.00
Incidental Work Allowance	1 LS	\$2,000.00	\$2,000.00
		Sub-total	\$20,500.00
		Construction contingencies (15%)	\$3,000.00
		Total Construction	\$23,500.00
		Engineering Services (5%)	\$1,200.00
		Total of Alternative 1	\$24,700.00

** Re-install pump to maintain service during selection, ordering, delivery of new pump and motor, and completion of necessary electrical upgrades.*

*** Based on hypothetical 25 gpm pump rate. Actual pump rate will be determined by test pumping.*

Budgetary Cost Estimate
Alternate 2 - Connect Upper and Lower Distribution Systems

Item	Quantity		Unit Cost	Total
Contractor Mobilization	1	LS	\$5,000.00	\$5,000.00
3" PVC Water Main	1400	LF	\$20.00	\$28,000.00
3" Water Main Fittings	6	EA	\$300.00	\$1,800.00
3" Gate Valve and Box	3	EA	\$600.00	\$1,800.00
Rock Excavation - Trench	1400	LF	\$25.00	\$35,000.00
Connect to Existing Water Main	2	EA	\$500.00	\$1,000.00
Booster Pump Structure/Finishes	100	SF	\$200.00	\$20,000.00
Booster Pump with VFD (50 gpm, 7.5HP)	2	EA	\$6,000.00	\$12,000.00
2" Booster System Piping and Valves	1	LS	\$4,000.00	\$4,000.00
2" Water Meter	1	EA	\$600.00	\$600.00
2" Pressure Control Valve	1	EA	\$1,800.00	\$1,800.00
Electrical Service to Well House	1	LS	\$1,500.00	\$1,500.00
Booster Electrical System	1	LS	\$1,500.00	\$1,500.00
Upper Reservoir Level Control Probes	1	LS	\$800.00	\$800.00
Cellular Based Booster Control System	1	LS	\$4,000.00	\$4,000.00
Site Restoration	3500	SY	\$1.00	\$3,500.00
Incidental Work Allowance	1	LS	\$5,000.00	\$5,000.00
			Sub-total	\$127,300.00
			Construction contingencies (15%)	\$19,100.00
			Total Construction	\$146,400.00
			Engineering Services (5%)	\$14,600.00
			Total of Alternative 2	\$161,000.00

Budgetary Cost Estimate
Alternate 3 - Replace Lower Well Pump

Item	Quantity		Unit Cost	Total
Contractor Mobilization	1	LS	\$1,500.00	\$1,500.00
Remove Existing Pump, Column Pipe, Cable	1	LS	\$1,000.00	\$1,000.00
Furnish Well Pump and Motor (50 gpm, 10HP)	1	LS	\$3,000.00	\$3,000.00
Furnish 2" Steel Column Pipe	400	LF	\$10.00	\$4,000.00
Furnish 2" Check Valve	2	EA	\$500.00	\$1,000.00
Furnish #4 Submersible Cable	420	LF	\$10.00	\$4,200.00
Furnish 1/4" Air Line	420	LF	\$0.50	\$200.00
Install Well Pump and Accessories	1	LS	\$2,000.00	\$2,000.00
Phase Converter (1Ø to 3Ø)	1	LS	\$5,800.00	\$5,800.00
Electrical Alterations/Upgrades	1	LS	\$3,000.00	\$3,000.00
Test Pumping	1	LS	\$1,500.00	\$1,500.00
Well Disinfection	1	LS	\$500.00	\$500.00
			Sub-total	\$27,700.00
			Construction contingencies (10%)	\$2,800.00
			Total Construction	\$30,500.00
			Engineering Services (5%)	\$1,500.00
			Total of Alternative 3	\$32,000.00

Budgetary Cost Estimate

Alternate 4 - Booster Pump and Transmission Main from Lower Reservoir to Upper Reservoir

Item	Quantity		Unit Cost	Total
Contractor Mobilization	1	LS	\$10,000.00	\$10,000.00
3" PVC Water Main	3250	LF	\$16.00	\$52,000.00
3" Water Main Fittings	8	EA	\$300.00	\$2,400.00
3" Gate Valve and Box	2	EA	\$500.00	\$1,000.00
Rock Excavation - Trench	3000	LF	\$25.00	\$75,000.00
Connect to Upper Reservoir Piping	1	LS	\$500.00	\$500.00
Remove and Replace AC Pavement	300	SF	\$6.00	\$1,800.00
Booster Pump Structure and Finishes	60	SF	\$200.00	\$12,000.00
Booster Pump with VFD (50 gpm, 5HP)	1	LS	\$6,000.00	\$6,000.00
2" Booster System Piping and Valves	1	LS	\$4,000.00	\$4,000.00
2" Water Meter	1	EA	\$600.00	\$600.00
2" Pressure Reducing Valve	1	EA	\$2,000.00	\$2,000.00
Electrical Service to Lower Reservoir	1	LS	\$9,000.00	\$9,000.00
Booster Electrical System	1	LS	\$1,500.00	\$1,500.00
Upper Reservoir Level Control Probes	1	LS	\$1,500.00	\$1,500.00
Cellular Based Booster Control System	1	LS	\$4,000.00	\$4,000.00
Site Restoration	8000	SY	\$1.00	\$8,000.00
Incidental Work Allowance	1	LS	\$10,000.00	\$10,000.00
			Sub-total	\$201,300.00
			Construction contingencies (15%)	\$30,200.00
			Total Construction	\$231,500.00
			Engineering Services (5%)	\$23,200.00
			Total of Alternative 4	\$254,700.00

Budgetary Cost Estimate
Alternate 5 - New Minnelusa Well for Upper System

Item	Quantity	Unit Cost	Total
Contractor Mobilization	1 LS	\$2,500.00	\$2,500.00
Bore Hole, 7 1/2"	800 LF	\$25.00	\$20,000.00
Steel Casing, 5"	560 LF	\$15.00	\$8,400.00
Grouting Casing	560 LF	\$5.00	\$2,800.00
Well Development/Testing	1 LS	\$1,500.00	\$1,500.00
Water Quality Sampling/Testing	1 LS	\$500.00	\$500.00
Well Disinfection	1 LS	\$500.00	\$500.00
Pitless Adapter	1 LS	\$2,500.00	\$2,500.00
Well House Structure/Finishes	100 SF	\$200.00	\$20,000.00
2" Piping and Valving	1 LS	\$4,000.00	\$4,000.00
2" Water Meter	1 EA	\$600.00	\$600.00
Hypochlorite Feed Equipment	1 LS	\$1,500.00	\$1,500.00
Furnish Well Pump and Motor (15 gpm, 3HP)	1 LS	\$2,500.00	\$2,500.00
Furnish 2" Column Pipe	650 LF	\$8.00	\$5,200.00
Furnish 2" Check Valve	2 EA	\$300.00	\$600.00
Furnish #6 Submersible Cable	650 SF	\$6.00	\$3,900.00
Furnish 1/4" Air Line	650 SF	\$0.50	\$300.00
Install Well Pump and Accessories	1 LS	\$2,000.00	\$2,000.00
2" PVC Piping to Reservoir*	500 LF	\$16.00	\$8,000.00
Rock Excavation - Trench	200 LF	\$30.00	\$6,000.00
2" Curb Stop and Box	1 EA	\$500.00	\$500.00
Connect to Reservoir Piping	1 LS	\$500.00	\$500.00
Remove and Replace AC Pavement	150 SF	\$8.00	\$1,200.00
Electrical Service to Well Site	200 LF	\$30.00	\$6,000.00
Well Pump Electrical System	1 LS	\$3,000.00	\$3,000.00
Cellular Based Control System and Integration	1 LS	\$4,000.00	\$4,000.00
Site Restoration	2000 SY	\$1.00	\$2,000.00
Incidental Work Allowance	1 LS	\$10,000.00	\$10,000.00
		Sub-total	\$120,500.00
		Construction contingencies (15%)	\$18,100.00
		Total Construction	\$138,600.00
		Engineering Services (10%)	\$13,900.00
		Total of Alternative 5	\$152,500.00

* Follow existing 6" pipe alignment to minimize rock excavation.

Budgetary Cost Estimate
Alternate 6 - New Madison Well for Upper System

Item	Quantity	Unit Cost	Total
Contractor Mobilization	1 LS	\$10,000.00	\$10,000.00
Bore Hole, 9-3/4"	950 LF	\$40.00	\$38,000.00
Bore Hole, 6-1/4"	400 LF	\$35.00	\$14,000.00
Steel Casing, 7"	940 LF	\$30.00	\$28,200.00
Geophysical Logging	1 LS	\$7,500.00	\$7,500.00
Grouting Casing	950 LF	\$10.00	\$9,500.00
Well Development	1 LS	\$3,000.00	\$3,000.00
Test Pumping	1 SF	\$3,000.00	\$3,000.00
Water Quality Sampling and Testing	1 LS	\$500.00	\$500.00
Well Disinfection	1 LS	\$1,000.00	\$1,000.00
Pitless Adapter	1 LS	\$3,000.00	\$3,000.00
Submersible Pump and Motor (60 gpm, 20 HP)	1 LS	\$7,800.00	\$7,800.00
3" Column Pipe	700 LF	\$16.00	\$11,200.00
3" Check Valve	4 EA	\$400.00	\$1,600.00
#6-3 Submersible Cable	750 LF	\$6.00	\$4,500.00
Install Pump and Accessories	1 LS	\$3,000.00	\$3,000.00
Well House Structure and Finishes	150 SF	\$200.00	\$30,000.00
3" Well House Piping and Valves	1 LS	\$10,000.00	\$10,000.00
Connect to Upper Reservoir Piping	1 LS	\$500.00	\$500.00
3" Water Meter	1 LS	\$1,200.00	\$1,200.00
Hypochloride Feed Equipment	1 LS	\$1,500.00	\$1,500.00
Electrical Phase Converter (15 kw)	1 LS	\$7,500.00	\$7,500.00
Well Pump Electrical and Control System	1 LS	\$4,500.00	\$4,500.00
Site Restoration	2500 SY	\$1.00	\$2,500.00
Incidental Work Allowance	1 LS	\$10,000.00	\$10,000.00
		Sub-total	\$213,500.00
		Construction contingencies (15%)	\$32,000.00
		Total Construction	\$245,500.00
		Engineering Services (12%)	\$29,500.00
		Total of Alternative 6	\$275,000.00



1560 Concourse Drive
Rapid City, SD 57703
Phone (605) 341-7800
Fax (605) 341-7864

Letter of Transmittal

DATE: 10-21-2014	JOB NO: P12489-2014-000
ATTENTION: Eric Gronlund, PE	
RE: Wild Turkey Estates	

TO: S.D. Dept. of Environment & Natural Resources
PMB 2020
Water Rights Program
Joe Foss Building
523 E. Capitol
Pierre, SD 57501-3182

RECEIVED

FEB 26 2015

**WATER RIGHTS
PROGRAM**

WE ARE ☒ SENDING
☐ HAND DELIVERING

☒ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change Order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
1			Water Permit Application.
1			Application Fee (\$700).
1			Well Location Map.
1			Preliminary Engineering Report.

THESE ARE TRANSMITTED as checked below:

☒ For approval ☐ Reviewed ☐ Revise and resubmit
☐ For your use ☐ Rejected ☐ Resubmit _____ copies for approval
☐ As requested ☐ Make corrections noted ☐ Return _____ corrected prints
☐ For review and comment ☐ Other _____

REMARKS:

Eric:

Let me know if you have questions or need any additional information.

COPY TO: Bill Tysdal, Wild Turkey Estates

SIGNED: _____

Greg Wierenga, PE



1560 Concourse Drive
Rapid City, SD 57703
Phone (605) 341-7800
Fax (605) 341-7864

Letter of Transmittal

DATE:	3/3/2015	JOB NO:	12489-2014-000
ATTENTION:	Karen Schlaak, PE		
RE:	Wild Turkey Estates		
	Revised Water Permit Application.		

TO: S.D. Dept. of Environment & Natural Resources
Division of Environmental Services
Drinking Water Program
Joe Foss Building
523 E. Capitol Ave.
Pierre, SD 57501-3182

RECEIVED

MAR 05 2015

**WATER RIGHTS
PROGRAM**

WE ARE ☒ SENDING
☐ HAND DELIVERING

☒ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change Order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
1			Revised Water Permit Application.

THESE ARE TRANSMITTED as checked below:

☐ For approval ☐ Reviewed ☐ Revise and resubmit
☐ For your use ☐ Rejected ☐ Resubmit _____ copies for approval
☐ As requested ☐ Make corrections noted ☐ Return _____ corrected prints
☐ For review and comment ☐ Other _____

REMARKS:

Karen:

Expected annual water use under full build out of 38 homes is 7.9 million gallons/year or about 24.2 ac. ft/year.

The top of the Madison formation is approximately 950' below the ground at this location. We anticipate drilling about 400' into the Madison for a total depth of 1350'. The potentiometric surface is projected to be about 500' below the surface.

COPY TO: _____

SIGNED: _____

Greg Wierenga, P.E.

RECEIPT

WATER RIGHTS PROGRAM

South Dakota Department of Environment and Natural Resources

Date 2/26, 20 15

RECEIVED OF Wild Turkey Estates H O A Inc PO Box 454 Spearfish SD 57783

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	500	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. _____	200	00
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	700	00

No. 07300

By J. James Goodwin
Chief Engineer



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

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

denr.sd.gov

February 27, 2015

Greg Wierenga
AE2S
1560 Concourse Dr
Rapid City SD 57703

RE: Wild Turkey Estates Homeowners Association

Dear Mr. Wierenga:

Thank you for submitting the *Application for a Permit to Appropriate Water* on behalf of the Wild Turkey Estates Homeowners Association. In order to complete the application, the following is required.

- On Item No. 2, Amount of Water Claimed, please complete the annual volume (acre-feet). Based on "Future Water Use Projections" at full build-out, the average daily use is 20 gpm which equates to 32.3 acre-feet annually. This may be overly conservative. Please provide an annual volume. A generally accepted practice is a diversion rate converted to a volume of acre-feet based on 60% pumping.
- Enclosed is the Form 2A, Supplemental Information. On Item No. 1 regarding the Well Information, please complete c) Well Depth for the proposed Madison well. Based on the Budget Cost estimate the well is estimated to be 950 feet. If this correct?

Currently, the report states the two Minnelusa wells serve separate distribution systems. Based on each wells production, a water permit is not required. However, if the two systems (Upper & Lower) are connected, a water permit will be required since the reasonable domestic use criteria will be exceeded.

If you have any questions, please contact Eric Gronlund or me.

Sincerely,

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

enclosures

Schlaak, Karen

From: Schlaak, Karen
Sent: Monday, May 04, 2015 1:56 PM
To: 'Greg.Wierenga@AE2S.com'
Subject: RE: Wild Turkey Estates Water Permit

The staff engineer report has been completed for the application for the Madison well and awaiting the chief engineers recommendation (probably this week). You should be aware that Wild Turkey Estates (Mark Stadel) filed another application for the two Minnelusa wells. At the time we are ready to public notice the first application, we will be contacting them to see if they would like to wait and have the two applications public noticed at the same time.

If you have any questions, let me know.
Karen

From: Greg.Wierenga@AE2S.com [<mailto:Greg.Wierenga@AE2S.com>]
Sent: Friday, May 01, 2015 10:26 AM
To: Schlaak, Karen
Cc: Mark Stadel
Subject: RE: Wild Turkey Estates Water Permit

Karen:

Could you update me on status of Wild Turkey water permit?

Greg Wierenga

From: Schlaak, Karen [<mailto:Karen.Schlaak@state.sd.us>]
Sent: Tuesday, March 24, 2015 7:34 AM
To: Greg Wierenga
Subject: RE: Wild Turkey Estates Water Permit

The application for the association was complete on March 9, 2015. We have 60 days from that date to complete a report and recommendation. New applications go to the bottom of the stack. Depending on the work load, this report and recommendation should be complete before the 60 days. Feel free to check on the status in a couple of weeks. The association will be sent a letter with the report, recommendations and information regarding the public notice process when we are to that point.

Karen Schlaak
Water Rights Program
523 E Capitol Ave
Pierre SD 57501
Phone: 605 773-3352

From: Greg Wierenga [<mailto:Greg.Wierenga@AE2S.com>]
Sent: Monday, March 23, 2015 5:24 PM
To: Schlaak, Karen
Subject: Wild Turkey Estates Water Permit

Jacobson, Gail

From: Schlaak, Karen
Sent: Tuesday, May 05, 2015 10:06 AM
To: Jacobson, Gail
Subject: FW: Wild Turkey Estates

From: Mark Stadel [<mailto:Mark.Stadel@ringcontainer.com>]
Sent: Tuesday, May 05, 2015 9:53 AM
To: Schlaak, Karen
Subject: Re: Wild Turkey Estates

Here is the PO box

Box 454

Thanks

Mark Stadel
Sent from my iPhone

On May 5, 2015, at 7:15 AM, Schlaak, Karen <Karen.Schlaak@state.sd.us> wrote:

Sounds good.

From: Mark Stadel [<mailto:Mark.Stadel@ringcontainer.com>]
Sent: Tuesday, May 05, 2015 8:03 AM
To: Schlaak, Karen
Subject: Re: Wild Turkey Estates

Thanks Karen instead of the address that was on the application I will get you are PO box so if people comment they are not sending it to a residence. Hope to have that very soon.

Mark Stadel
Sent from my iPhone

On May 5, 2015, at 6:31 AM, Schlaak, Karen <Karen.Schlaak@state.sd.us> wrote:

Okay. The information regarding the public notice will go to the address on the application which is 19939 Gobbler Rd, Spearfish SD 57783. If there is a different address, please let me know. Someone from the Association will need to contact the newspaper to authorize publication and arrange for payment. That will be explained in the letter which will go in the mail today.
Karen

From: Mark Stadel [<mailto:Mark.Stadel@ringcontainer.com>]
Sent: Monday, May 04, 2015 6:21 PM

To: Schlaak, Karen
Cc: Greg Wierenga (Greg.Wierenga@AE2S.com)
Subject: Re: Wild Turkey Estates

Let's move forward with the Madison and then will do another publication for the other two wells later. The Madison is more critical to keep on track.
Thanks

Mark Stadel
Sent from my iPhone

On May 4, 2015, at 3:53 PM, Schlaak, Karen <Karen.Schlaak@state.sd.us> wrote:

The report and recommendation on your application for the Madison Aquifer well is complete and we are ready to send the public notice to the Spearfish paper. Our question is if you would like us hold the Madison well application until the report and recommendation are complete for the two Minnelusa wells application? We could combine the two applications into one public notice and save you the cost of one publication. This would delay the entire process another month or so.

We can proceed with public notice of the Madison Aquifer well application for next week if you want. Please let me know as soon as possible.

Thanks,

Karen Schlaak
Water Rights Program
523 E Capitol Ave
Pierre SD 57501
Phone: 605 773-3352

The information contained in this communication is privileged and confidential and is for the use of the intended recipient only. If you are not the intended recipient, you are notified that any dissemination, distribution, copying or use of this communication is prohibited. If you are not the proper person to have received this communication, please notify the sender immediately and permanently delete this communication from your records and data.

The information contained in this communication is privileged and confidential and is for the use of the intended recipient only. If you are not the intended recipient, you are notified that any dissemination, distribution, copying or use of this communication is prohibited. If you are not the proper person to have received this communication, please notify the sender immediately and permanently delete this communication from your records and data.

Schlaak, Karen

From: Schlaak, Karen
Sent: Monday, May 18, 2015 12:47 PM
To: mark.stadel@ringcontainer.com
Subject: Wild Turkey Estates

Your packet of information that was mailed on May 5th was returned by the post office because we had an incorrect PO Box on the mailing label. I'm re-mailing the information to you today. You can disregard the information about the public notice and contacting the paper etc. I talked with the Black Hills Pioneer and they stated the notice had been published on May 13. So we are good there.

The report and recommendation of the chief engineer are included in the packet.

Sorry for the screw-up.

Karen Schlaak
Water Rights Program
523 E Capitol Ave
Pierre SD 57501
Phone: 605 773-3352



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

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523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182

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**RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT
APPLICATION NO. 1950-1, Wild Turkey Estates Homeowners Association**

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. 1950-1, Wild Turkey Estates Homeowners Association, c/o Bill Tysdal, President, 19939 Gobbler Road, Spearfish SD 57783

The Chief Engineer is recommending Approval of Application No. 1950-1 with a 20 year term pursuant to SDCL 46-1-14 and 46-2A-20 because 1) although evidence is not available to justify issuing this permit without a 20 year term limitation, 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. In accordance with SDCL 46-1-14 and 46-2A-20, Permit No. 1950-1 is issued for a twenty year term. Pursuant to SDCL 46-2A-21, the twenty year term may be deleted at any time during the twenty year period or following its expiration. If the twenty year term is not deleted at the end of the term, the permit may either be cancelled or amended with a new term limitation of up to twenty years. Permit No. 1950-1 may also be cancelled for nonconstruction, forfeiture, abandonment or three permit violations pursuant to SDCL 46-1-12, 46-5-37.1 and ARSD 74:02:01:37.
2. 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.
3. The well authorized by Permit No. 1950-1 shall be constructed by a licensed well driller and construction 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.
4. Water Permit No. 1950-1 authorizes a total annual diversion of 24.2 acre feet of water annually from the Madison aquifer.
5. The Water Permit Holder shall report to the Chief Engineer annually the amount of water withdrawn from the Madison aquifer.

See report on application for additional information.


Jeanne Goodman, Chief Engineer
May 5, 2015

Report to the Chief Engineer
Application No. 1950-1
Wild Turkey Estates Homeowners Association
April 6, 2015

Water Permit Application Number 1950-1 proposes to appropriate water from the Madison aquifer at a rate of 0.167 cubic feet per second (cfs) with an annual rate of 24.2 acre-feet per year. The proposed well depth is 1,350 feet with the proposed well to be located in the NE ¼ SE ¼ Section 1-T6N-R1E. The water is to be used for a suburban housing development.

The developed portion of the housing development currently obtains its water from two Minnelusa wells on separate systems. Currently the well production of each of these separate systems falls under reasonable domestic use. However current water production does not meet current peak demands of the Upper System and estimated full build out demand for the development. The current plan for Wild Turkey Estates is that the Upper System will be served by the existing Minnelusa well and the new Madison well, with the new Madison well covered by this application (Weirenga, 2015). The Lower System will continue as a separate system served by its existing Minnelusa well, and may in the long term be connected to the Upper System (Weirenga, 2015). The water permit application for Wild Turkey Estates Homeowners Association to cover the Minnelusa portion of the Upper System and the possible future connection of the two systems is currently under review.

Aquifer: Madison (MDSN)

Aquifer Characteristics and Hydrogeology

The Madison aquifer is a regional aquifer that underlies portions of Montana, Nebraska, North Dakota, South Dakota, Wyoming, and Canada (Peterson, 1984). This aquifer occurs within the Mississippian aged Madison Limestone. The Madison Limestone is locally referred to as the Pahasapa Limestone in the Black Hills. The Madison aquifer typically occurs within upper portion of the Madison Limestone where solution features and fractures have increased the permeability of the Madison Limestone (Greene, 1993).

The Madison limestone is a generally massive gray to buff limestone that is locally (Black Hills area) dolomitic (Strobel et al., 1999). The upper portion is karstic in nature containing solution features that result in widespread secondary permeability (Kyllonen and Peter, 1987). The primary porosity of the aquifer is low, with average porosity being estimated at 11% and effective porosity estimated at 5% (Rahn, 1979). However aquifer characteristics are variable due to the local heterogeneity of the aquifer as a result of the presences of joints, fractures, solution features and regional variation in the aquifer (Greene et al., 1999). The Madison underlies the Minnelusa Formation with the lower portion of the Minnelusa acting as a confining layer between the two aquifers, which may have increased permeability in the area of

the outcrop as a result of brecciation and fractures from folding (Kyllonen and Peter, 1987). Putnam and Long (2007) expand on this noting that “the hydraulic connection between the Madison Limestone and the Minnelusa Formation is spatially variable and probably results from faults, fractures, and breccia pipes.” However aquifer tests in the Madison aquifer conducted in the Spearfish area reported on in Greene et al. (1999) did not observe drawdown in area Minnelusa observation wells. The lower part of the Madison Limestone and the Englewood Limestone serves as a confining layer between the Madison and the underlying Deadwood (Greene, 1993).

In the Black Hills, the Madison aquifer is recharged by streamflow losses and infiltration of precipitation where the Madison outcrops (Carter et al. 2001a). Carter et al. (2001a) estimates combined average annual recharge from precipitation and streamflow to the Madison and Minnelusa aquifers in the Black Hills area for water years 1931-1998 at 344 cfs (249,211 acre-ft). When considering the distribution of this recharge between aquifers, Carter et al. (2001a) notes that both aquifers receive a similar volume of recharge from precipitation. However, recharge due to streamflow is thought to be slightly higher in the Madison aquifer due to the upgradient location of its outcrops (Carter et al. 2001a). Based on this Carter et al. (2001a) estimated that the Madison aquifer receives about 55% (137,066 acre-ft) and the Minnelusa aquifer receives about 45% (112,145 acre-ft) of the combined average annual recharge, although it is noted that this is subject to temporal and spatial variability based on outcrop patterns. The amount of recoverable water in storage for the Madison aquifer in western South Dakota is estimated at 644,827,200 acre-feet of which an estimated 9,446,400 acre-feet is in Lawrence county (Allen et al., 1985). However, due to the large amount of heterogeneity in the characteristics of the Madison aquifer water availability at any one location is subject to variability. Putnam and Long (2007) observe this in the wide ranges of well yields present in the aquifer with the majority of yields ranging from 10 to 200 gallons per minute and some well yields ranging from 400 to 1,750 gallons per minute.

The proposed area for this well is located about five miles north of the main Madison Limestone outcrop and about 2.5 miles northeast and 4.5 miles north northeast of two dome feature related Madison outcrops. Regional water movement in the Madison aquifer is toward the northeast in this portion of the Black Hills, resulting from water moving north from the Madison outcrop and eastward around the Black Hills (Putnam and Long, 2007). Of the 26 observation wells in the Madison aquifer monitored by the Water Rights program, the nearest observation wells to the proposed well location for this application are LA-96B' (≈2.9 miles to the south southeast), LA-87A (≈3.7 miles to the west northwest), and LA-88C (≈4.5 miles to the southeast). The hydrographs for these observation wells are shown in Figures 1, 2, and 3. These observation well hydrographs indicate that climatic conditions are governing water levels and demonstrate water level variations as a result of climatic conditions. In comparing the potentiometric surface of the Madison aquifer at observation well LA-96B to the potentiometric surface of the Minnelusa aquifer in nearby observation well LA-96C (as shown in Figure 4), the differences would suggest a lack of hydraulic connection between the two aquifers.

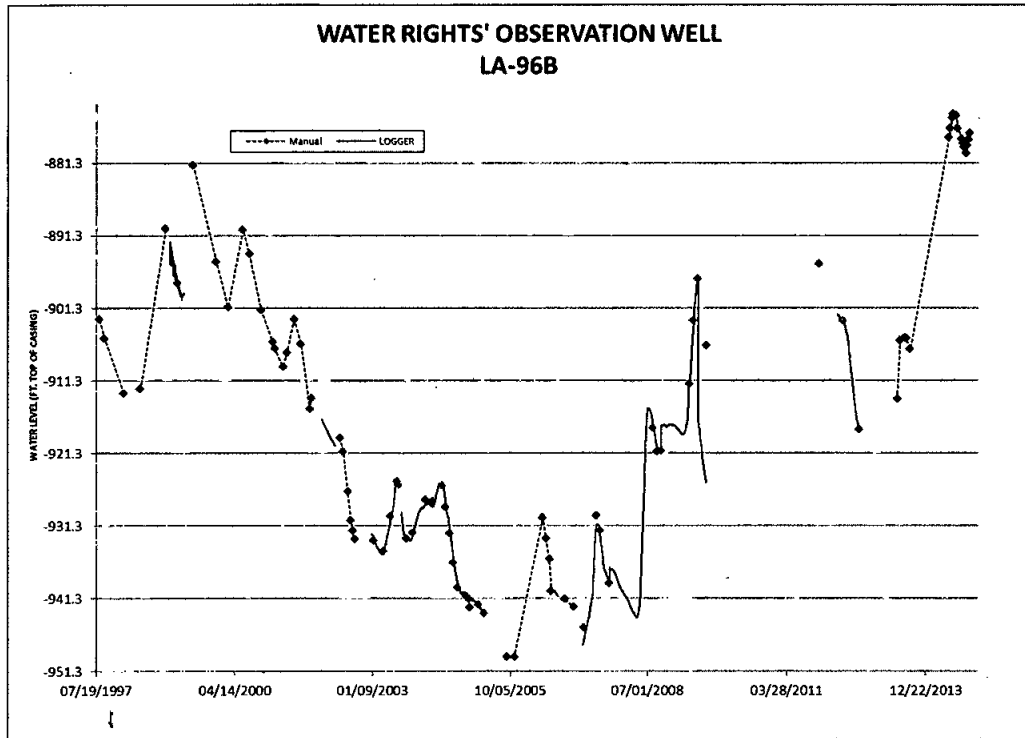


Figure 1: Hydrograph of observation well LA-96B (Water Rights, 2015a)

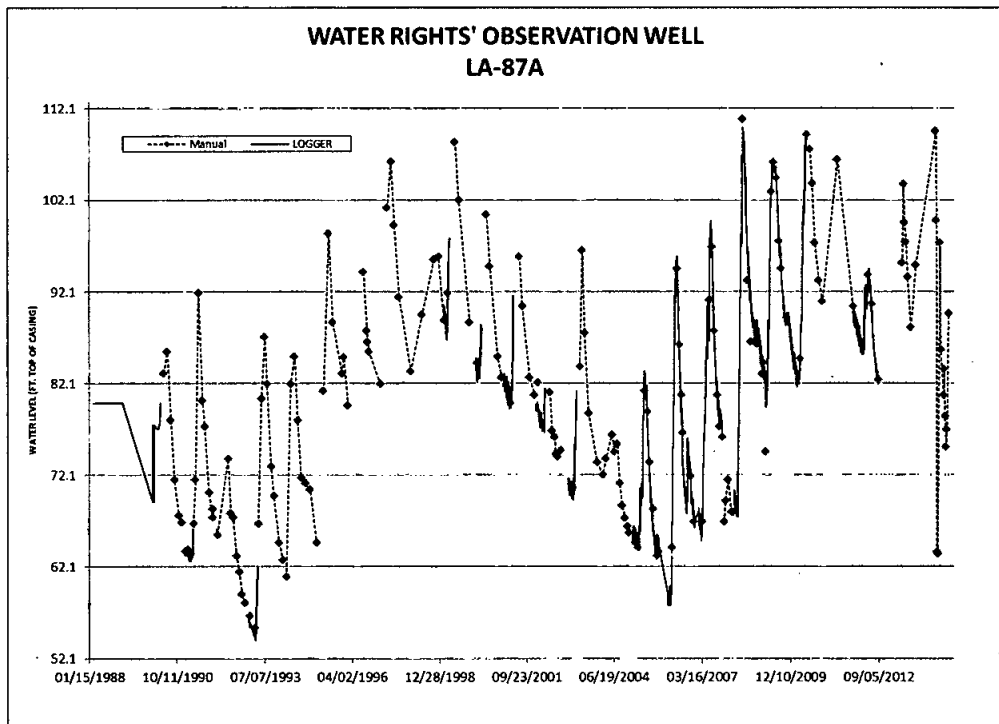


Figure 2: Hydrograph of observation well LA-87A (Water Rights, 2015a)

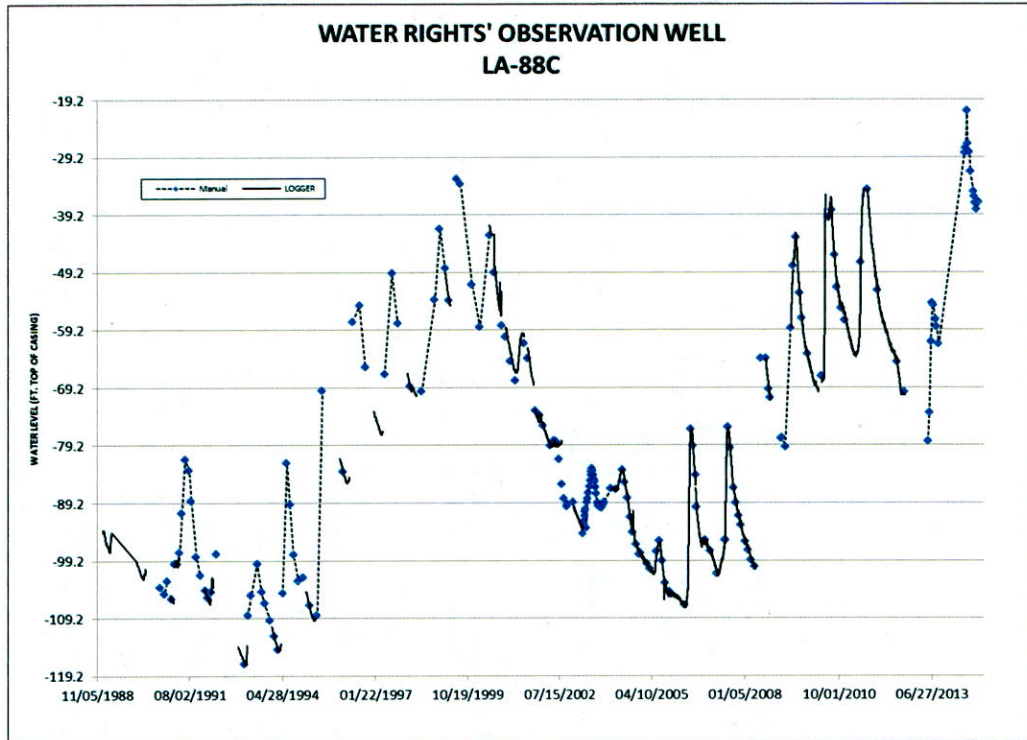


Figure 3: Hydrograph of observation well LA-88C (Water Rights, 2015a)

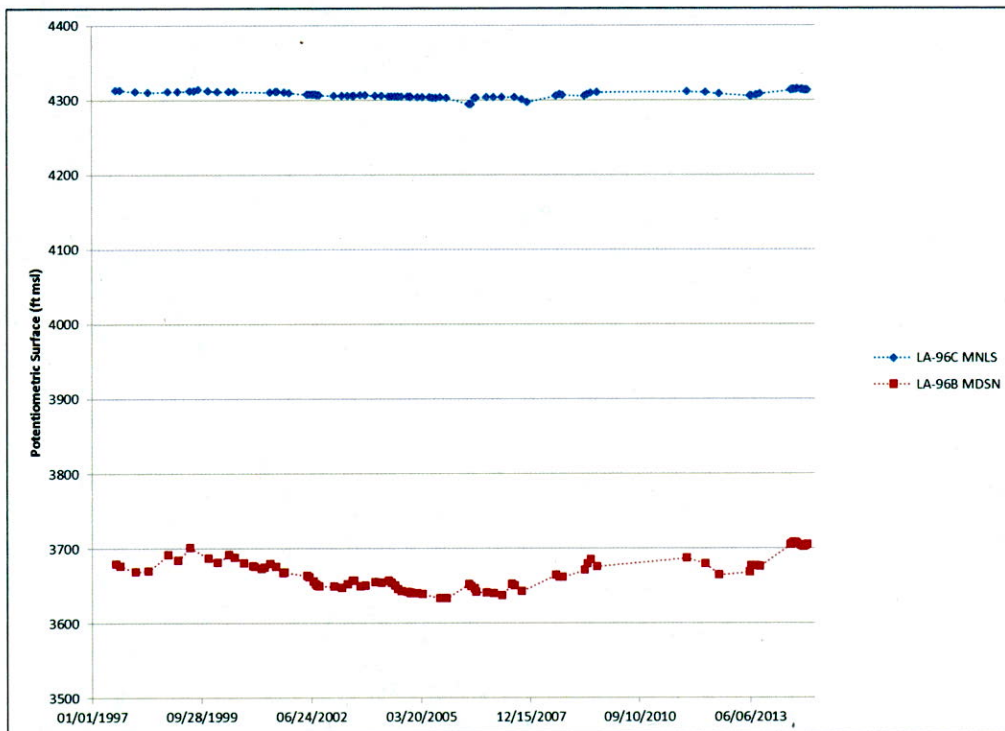


Figure 4: Potentiometric surface of Madison and Minnelusa aquifers at paired observation wells LA-96B and LA-69C (Water Rights, 2015a)

At the proposed location for this well the top of the Madison is at about 840 feet below grade (Carter and Redden, 1999 as digitized by Williamson et al., 2000). The potentiometric surface of the Madison at the proposed well location is about 500 feet below grade (Mckaskey, 2013 and Strobel et al., 2000 as digitized by Williamson et al., 2000). The Madison aquifer is expected to be under confined conditions at this location. Based on the information provided by this application, the proposed well depth is 1,350 feet deep. The proposed location for this well is also about 0.2 miles to the northeast of the LaFlamme anticline (Strobel et al., 1999 as digitized by Williamson et al., 2000).

South Dakota Codified Law (SDCL) 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 from the aquifer that are pertinent to this application.

Water Availability

Water Permit Application No. 1950-1 proposes to appropriate water from the Madison aquifer. 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. An application may be approved, however, for withdrawals of groundwater from any groundwater formation older than or stratigraphically lower than the greenhorn formation in excess of the average estimated annual recharge for use by water distribution systems." Here, the Madison aquifer is older than the Greenhorn Formation. Additionally, pursuant to SDCL 46-1-6 (17) a water distribution system is defined as "a system of piping, valves, storage tanks, pumps, and appurtenances by which water is conveyed for domestic or municipal use by a common distribution system, including a municipality as defined in § 9-1-1, a nonprofit rural water supply company as defined in § 10-36A-1, a water user district as defined in § 46A-9-2, a sanitary district as defined in chapter 34A-5, or homes, including mobile homes as defined in § 32-3-1, and manufactured homes as defined in § 34-34A-1.1 supplied by a common distribution system." In considering the water use for this application in relation to this definition, a suburban housing development falls under this definition as either homes supplied by a common distribution system or domestic use conveyed by a common distribution system. Therefore, as a result of the exception provided in SDCL 46-6-3.1 the recharge/withdrawal issue need not be considered in the case of this application.

Existing Water Rights/Permits

The location of the diversion points for nearby Madison aquifer water rights/permits are shown in Figure 5. The nearest diversions point for water rights/permits appropriating water from the Madison aquifer to the proposed well location for this application is Water Right No. 1854-1. The diversion point for Water Right No. 1854-1 is located about 2.5 miles to the northeast. Due to the distances involved Application No. 1950-1 is not expected to adversely impact existing water rights/permits completed into the Madison aquifer. Additionally it is worth noting that the proposed well location for this application is just outside the future use area for the City of Spearfish under Water Permit No. 1872-1. Given the large area covered by the City of Spearfish's future use permit this application is not expected to hinder development of the future use permit.

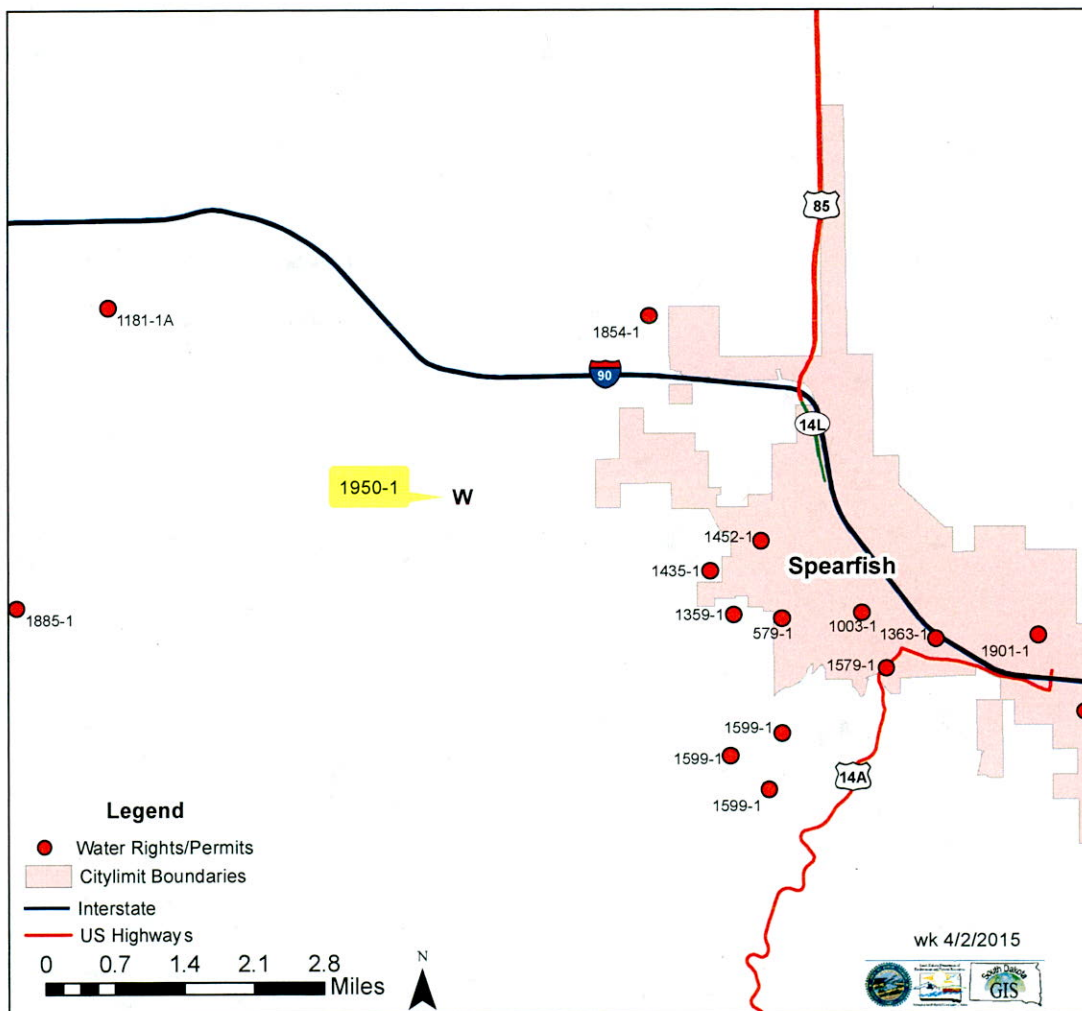


Figure 5: Approximate diversion points for water rights/permits completed into the Madison aquifer in the area of this application (Water Rights, 2015b).

There are several well completion reports on file with the SDDENR-Water Rights Program within two miles of the proposed well location for this application that could be completed into the Madison aquifer, some of which appear to be in the housing development to the southeast of the proposed location for this well. However, in this area well completion reports on file are primarily for wells completed into the overlying Minnelusa. Aquifer testing in the Spearfish area reported on by Greene et al. (1999) and area observation wells suggest a lack of hydraulic connection between the Madison and the Minnelusa, so this application is not expected to impact area Minnelusa wells. Since the Madison aquifer is under confined conditions the location for the proposed well for this application, drawdown as a result of pumping is likely to occur. The precise amount and radius of drawdown cannot be quantified without aquifer testing, especially considering the large variability in aquifer characteristics. However, theoretical drawdown can be estimated utilizing the Theis equation and data from Madison aquifer testing in the Spearfish area reported on by Greene et al. (1999). Greene et al. (1999) reported transmissivity values ranging from 2,900 to 41,700 feet squared per day with a storativity of 1×10^{-4} . Utilizing the lowest of these transmissivity values with a pumping rate of 0.167 cfs and a time of 365 days yields the Theis curve shown in Figure 6. In examining Figure 6 it can be observed that even with a conservative estimate of well drawdown from available data for the area of this application at 2,000 feet from the production well less than five feet of drawdown is estimated. Taking the climatic water level variations demonstrated in the observation well hydrographs in this area of the aquifer into account the amount of drawdown estimated as a result of this application is relatively insignificant.

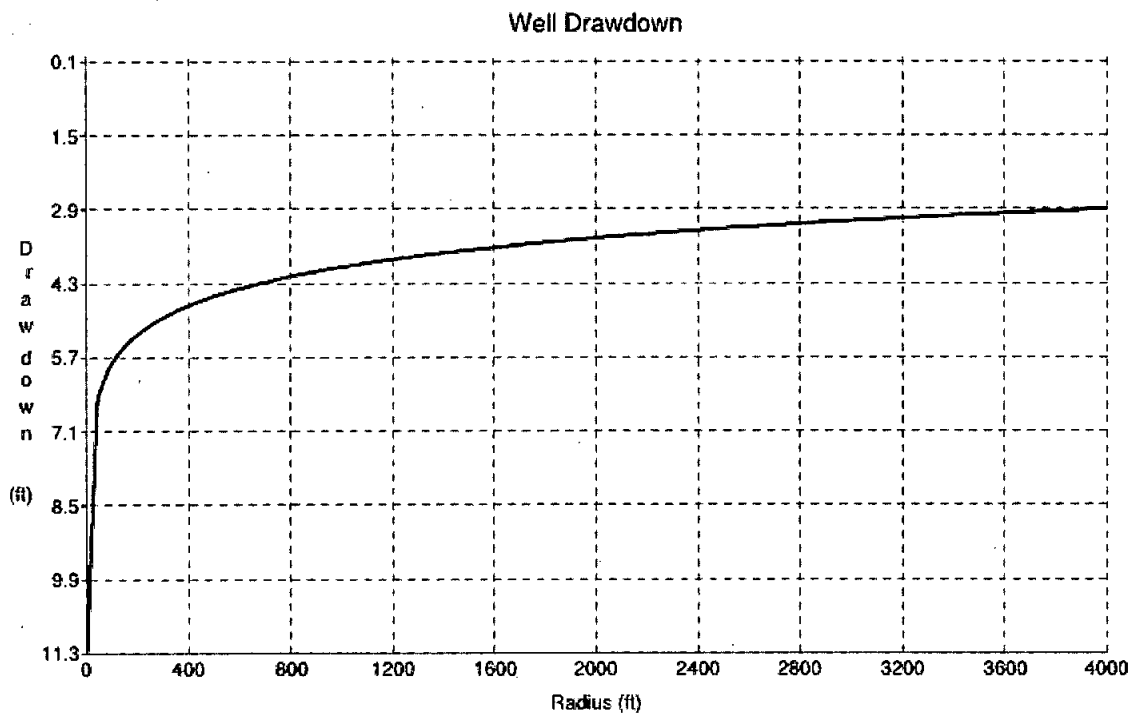


Figure 6: Theoretical drawdown (i.e. calculated)

An adequate well as defined by South Dakota Administrative Rules is “a well constructed or rehabilitated to allow various withdrawal methods to be used, to allow the inlet to the pump to be placed not less than 20 feet into the saturated aquifer or formation material when the well is constructed, or to allow the pump to be placed as near as possible to the bottom of the aquifer as is practical if the aquifer thickness is less than 20 feet.” In the past the Water Management Board has recognized that to place water to maximum beneficial use a certain amount of drawdown may occur. ARSD 74:02:04:20(7) defines an adversely impacted domestic well as an adequate well in which “the water level of the aquifer has declined to a level that the pump will no longer deliver sufficient water for the well owner’s needs.” In the case of Water Permit Application No. 2313-2 for the Coca-Cola Bottling Company of the Black Hills the Water Management Board adopted findings that noted that if the increased costs or decreased production as a result of the impacts of legitimate users on artesian head pressure could be considered an adverse impact it would conflict with SDCL 46-1-4 (Water Rights, 1995). SDCL 46-1-4 requires the water resources of the state be put to beneficial use to the maximum extent of which they are capable (Water Rights, 1995). Additionally pursuant to SDCL 46-6-6.1 artesian head pressure is not protected as a means of groundwater delivery.

Public Interest Issues

In considering the Madison aquifer in this area of the Black Hills the possibility of affecting the discharge of artesian springs could potentially be an obstacle to increased development of the Madison in this area. Springs in northern Lawrence county have geochemical and isotope components indicating water with a Madison or partial Madison origin. Using the system of Rahn and Gries (1973) these could be considered as type 2 springs which, “do not dry up and serve as points of permanent discharge from the carbonate aquifer.” The geochemical modeling done by Klemp (1995) indicated that McNenny Pond, Higgins Gulch, and Cox Lake are primarily Madison in origin, Mirror Lake is a mixture of Madison and Minnelusa in origin, and the Old Spearfish Hatchery spring is 70% Madison and 30% Minnelusa in origin. Putnam and Long (2007) indicate that based on isotope analysis the likely source water for Higgins Gulch and Old Spearfish Hatchery springs is likely from recharge from local outcrops of Madison and Minnelusa. For Cox Lake and McNenny Pond isotope data indicates spring discharge originating in the Limestone Plateau area (Putnam and Long, 2007). For Mirror Lake isotope data indicates spring discharge originating in the Limestone Plateau area with some contributions from local recharge or overlying formations (Putnam and Long, 2007).

In considering the deferral of Water Permit Application No. 2585-2 for the Southern Black Hills Water System the Water Management Board adopted a conclusion of law stating that “The only protection South Dakota law provides when considering an application for an underground water permit for flow from an artesian spring is under the public interest criteria.” (Water Rights, 2015b). This is understandable since pursuant to SDCL 46-6-6.1 artesian head pressure is not protected as a means of groundwater delivery, therefore decreased discharge from these artesian springs could probably not be considered an adverse impact. However since these

spring discharges contribute to stream base flow protection of their artesian head pressure may be in the public interest.

The proposed location for the well for this application is about 3.7 miles southeast of Old Spearfish Hatchery spring and about 3.5 miles southeast of Higgins Gulch Spring (Naus et al., 2001). Due to the distances involved and the relatively low diversion rate proposed by this application (0.167 cfs) it is unlikely that drawdown from the well for this application will have any impact on the aforementioned springs, since a fairly large change in the hydraulic gradient in the locale of the springs would be needed to affect the groundwater flow rates and therefore spring discharge. The springs to the northwest of the proposed location for this well are located even further away with the nearest being Cox Lake about five miles to the northwest (Naus et al., 2001).

Term Limitation on Madison Water Permits

In considering water permits of the Madison aquifer that involve the construction of new wells, pursuant to SDCL 46-2A-20, "...no water permit for construction of works to withdraw water from the Madison formation in Butte, Fall River, Custer, Lawrence, Meade and Pennington counties may be issued for a term of more than twenty years, unless the Water Management Board determines, based upon the evidence presented at a hearing that:

(1) Sufficient information is available to determine whether any significant adverse hydrologic effects on the supply of water in the Madison formation would result if the proposed withdrawal were approved; and

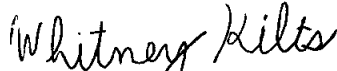
(2) The information, whether provided by the applicant or by other means, shows that there is a reasonable probability that issuance of the proposed permit would not have a significant adverse effect on nearby Madison formation wells and springs."

Additionally pursuant to SDCL 46-2A-21, "At the end of the twenty-year limitation, the board may cancel a permit or amend the permit with a new term limitation of up to twenty years, if the board is unable to make a finding after notice and hearing that sufficient information is available to delete the term limitation."

Evidence is not available to justify issuing this permit without the 20 year term limit.

Conclusions

1. Water Permit Application No. 1950-1 proposes to appropriate water from the Madison aquifer at a rate of 0.167 cfs with an annual limit of 24.2 acre-feet from a well proposed to be located in the NE ¼ SE ¼ Section 1-T6N-R1E with a proposed depth of 1,350 feet.
2. Since the Madison aquifer is older than the Greenhorn Formation and a water distribution system is involved, the recharge/withdrawal issue need not be considered.
3. This application is not expected to adversely impact existing adequate wells.


Whitney Kilts

SDDENR-Water Rights Program

Approved by


Ken Buhler

SDDENR-Water Rights Program

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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. 1950-1

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 13th day of May, 2015 and the last publication on the _____ day of _____, that the full amount of fees charged for publishing same, to-wit: The sum of \$ 24.87, 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.

[Signature]
Subscribed and sworn to before me this 14th day of May, 2015

[Signature]
Notary Public, Lawrence County, South Dakota
My commission expires: 10-24-2016

NOTICE OF APPLICATION NO. 1950-1 to Appropriate Water

Notice is given that Wild Turkey Estates Homeowners Association, c/o Bill Tysdal, President, PO Box 450, Spearfish SD 57783 has filed an application for a water permit to appropriate 0.167 cubic feet of water per second (24.2 acre-feet annually) from one well to be completed into the Madison Aquifer (1,350 feet deep) located in the NE 1/4 SE 1/4 Section 1-T6N-R1E for suburban housing development use.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 1950-1 for a 20-year term pursuant to SDCL 46-1-14 and 46-2A-20 because 1) although evidence is not available to justify issuing the permit without a 20 year term limitation, there is reasonable probability that there is unappropriated water available, 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.

In accordance with SDCL 46-2A-23, the Chief Engineer will act on this application, as recommended, unless a petition is filed opposing the application or the applicant files a petition contesting the Chief Engineer's recommendation. 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.

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 May 26, 2015.

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. Information concerning this application is available at <http://denr.sd.gov/public>. Contact Eric Gronlund at the above Water Rights Program address to request copies of information pertaining to this application. Steven M. Pirner, Secretary, Department of Environment and Natural Resources.

Published once at the total approximate cost of \$24.87.

#436
May 13



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

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

denr.sd.gov

May 13, 2015

Black Hills Pioneer
PO Box 7
Spearfish SD 57783

ATTENTION: Legal Public Notice

Enclosed is a Notice on Application No. 1950-1 to Appropriate Water. Please publish the notice once on May 13, 2015. The text of the notice can be e-mailed to your paper by contacting Karen Schlaak at (605) 773-3352.

The applicant must verify to you that the notice is to be published and arrange for payment. **Please BILL the APPLICANT for the cost of publication.** The APPLICANT is Wild Turkey Estates Homeowners Association, c/o Bill Tysdal, President, PO Box 450, Spearfish SD 57783 (Ph # 605-722-8905).

Please send the Water Rights Program an affidavit or the enclosed Proof of Publication form immediately.

The applicant pays the cost of publication, but the Water Rights Program records require an affidavit or Proof of Publication. Delays in receiving the affidavit can be costly to the applicant.

Sincerely,

Eric Gronlund
Natural Resources Engineer
605 773-3352

enclosures



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(S) RIGHT AWAY.**

May 5, 2015

Wild Turkey Estates Homeowners Association
Bill Tysdal- President
PO Box 450
Spearfish SD 57783

Dear Mr. Tysdal:

Water Permit Application No. 1950-1 for suburban housing development use 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(s) 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(s) to authorize publication of your Notice and to arrange for payment. Early contact with the paper(s) 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

cc: Greg Wierenga PE, AE2S, 1560 Concourse Dr, Rapid City SD 57703

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.

Instruction to Newspaper - Publish the Notice on May 13, 2015. The applicant is responsible for payment. The text of the notice can be e-mailed to your paper by contacting Karen Schlaak at (605) 773-3352 or email: Karen.schlaak@state.sd.us.

NOTICE OF APPLICATION NO. 1950-1 to Appropriate Water

Notice is given that Wild Turkey Estates Homeowners Association, c/o Bill Tysdal, President, PO Box 450, Spearfish SD 57783 has filed an application for a water permit to appropriate 0.167 cubic feet of water per second (24.2 acre-feet annually) from one well to be completed into the Madison Aquifer (1,350 feet deep) located in the NE 1/4 SE 1/4 Section 1-T6N-R1E for suburban housing development use.

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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

JUN 05 2015

Wild Turkey Estates Homeowners Association
Mark Stadel
PO Box 454
Spearfish SD 57783

Dear Sir:

Enclosed is Water Permit No. 1950-1 authorizing construction of your water diversion system and beneficial use of the water, not exceeding the limits as specified in the Water Permit.

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 informational 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

SOUTH DAKOTA WATER WELL COMPLETION REPORT

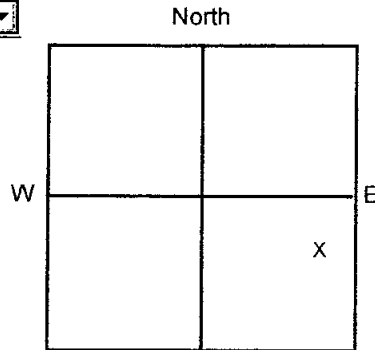
SD EForm - 1621LD V1

11-02

Location NE 1/4 SE 1/4 Sec 1 Twp 6N Rg 1E

County Lawrence ☒

Please mark well location with an "X"



Well Completion Date

June 19, 2015

← 1 Mile →

Distance to nearest potential pollution source (septic tank, abandoned well, feed lot, etc.)?
200 ft. from septic tank (identify source)

PROPOSED USE:

☐ Domestic/Stock ☒ Municipal ☐ Business ☐ Test holes
☐ Irrigation ☐ Industrial ☐ Institutional ☐ Monitoring well

METHOD OF DRILLING:

Rotary - Air

CASING DATA:

☒ Steel ☐ Plastic ☐ Other

If other describe _____

PIPEWEIGHT	DIAMETER	FROM	TO	HOLE DIAMETER
23 LB/FT	7 IN	+2 FT	730 FT	9 7/8 IN
LB/FT	IN	FT	FT	IN
LB/FT	IN	FT	FT	IN

GROUTING DATA:

Grout Type	No. of Sacks	Grout Weight	From	To
cement	285	15 Lb/gal	0 Ft	730 Ft
		Lb/gal	Ft	Ft

Describe grouting procedure

pressure grout through casing. Trimmy pipe from 262' to surface

SCREEN:

☐ Perforated pipe ☐ Manufactured

Diameter _____ Inches Length _____ Feet

Material _____

Slot Size _____ Set From _____ Feet to _____ Feet

Other information _____

WAS A PACKER OR SEAL USED?

☐ Yes ☒ No

If so, what material? _____

Describe packer(s) and location _____

DISINFECTION: Was well disinfected upon completion?

☒ Yes, How? chlorine solution

☐ No, Why Not? _____

Lab to which water quality sample sent for analysis _____

Well Owner: Wild Turkey Estate H.O.A

Business Name: _____

Address: PO Box 454

City, State, Zip: Spearfish ☒ SD ☒ 57783

WELL LOG:

FORMATION	DEPTH	
	FROM	TO
Minnekahta	0	20
Opeche	20	115
Minnelusa	115	680
Madison	680	983

STATIC WATER LEVEL 412 FEET

If flowing: closed in pressure _____ PSI

GPM flow _____ through _____ Inch pipe

Controlled by ☐ Valve ☐ Reducers ☐ Other _____

Reduced flow rate _____ GPM

Can well be completely shut in? _____

WELL TEST DATA:

☐ Pumped Describe: Air developed
720' - 3 hrs. @ 150 GPM

☐ Bailed

☒ Other

Pumping Level Below Land Surface

620 Ft. After 1/2 Hrs. pumped 100 GPM

520 Ft. After 1/2 Hrs. pumped 37 GPM

If pump installed, pump rate: _____ GPM

REMARKS

This well was drilled under license # 331 and this report is true and accurate.

Drilling firm: Taylor Drilling Co.

Signature of License Representative: _____

Signature of Well Owner or Equitable Property Holder: _____

RECEIVED

JUL 20 2015

Date: _____

WATER RIGHTS PROGRAM

Schlaak, Karen

From: ccmellott <ccmellott@gmail.com>
Sent: Wednesday, February 24, 2016 8:37 PM
To: Schlaak, Karen
Subject: Wild Turkey Estates Homeowner Association

Karen:

Hello my name is Cris Mellott, Mark Stadel no longer takes care of the water in Wild turkey, and has left the HOA board. I am under contract as the HOA Water Operator taking care of the water for the subdivision.

Water Permit No. 1950-1 used 159,994 gal. in 2015. 1953-1 does not have a meter on the well at this time.

My contact info. is:
Cris Mellott
19960 Gobbler road
Spearfish SD 57783
Phone Number 208-660-6187

If you have any questions please contact me.

Thank you,

Cris Mellott

Sent from my Galaxy Tab® S

Report of Examination of Works and/or Application of Water to Beneficial Use For Permit No. 1950-1

I have this day, July 21, 2017 made a thorough examination of the water use system constructed by **Wild Turkey Estates Home Owners Association, % David Nuenke, 19954 Gobbler Rd, Spearfish, SD 57783** of Permit No. **1950-1**, bearing the priority of 2/26/2015 authorizing the diversion of 0.167 cu. ft. per second water from one well for suburban housing purposes, in Lawrence County.

Inspection contact & relationship to permit holder, if applicable: **Cris Mellot, Water Operator**
208-660-6187

A. Works used to divert the water:

Well Information:

- 1) Well Drilling Firm: Taylor Drilling (2015)
- 2) No. of Wells 1
- 3) Depth(s) 983 feet
- 4) Well log is available Yes

Casing:

- 1) Diameter 7"
- 2) Length 730 feet
- 3) Type steel

Screen:

- 1) Type open hole
- 2) Length 253 feet
- 3) Static water level 412 feet

Pump:

- 1) Make Grundfos
- 2) Model 85S200-17
- 3) Size 6"
- 4) Capacity 75 GPM (Air test @ completion – 37 gpm @ 520', 100 gpm @ 620', 150 gpm @ 720')
This is a variable speed pump set to deliver 75 gpm to the underground storage.
- 5) Horsepower rating 20 hp

B. Works used to transport water to place of use:

- 1) Type PVC
- 2) Size various inches
- 3) Length various feet

C. Works used to apply water to beneficial use:

The well delivers water to a 46,000 gallon underground concrete storage reservoir. A duplex booster station located in a pump house over the reservoir boosts the pressure to 65 psi. for distribution to the individual lots. At full build out the well will serve the upper system consisting of 38 of the 50 lots in Wild Turkey Estates. Approximately 15 lots in the upper system were developed or in some phase of construction at time of inspection.

D. Compliance with Permit Requirements:

1) Permit qualifications being abided by: Yes

2) Exceptions to compliance are: none

E. Condition and Location:

1. The system is in good condition with the point of diversion located as follows:

1,355' N and 355' W of the SE corner Section 1 T6N R1E (44.507089, -103.932176)

2. The works are capable of diverting and conveying to the place of use .167 cu. ft. per second (75 gpm) of water which is to be used for **suburban housing** use and the license should be issued for .167 cfs.

3. All structures, wells and lands on map: **No, only the well and storage location.**

F. Comments or other permit(s) associated with the project: Wild Turkey Estates HOA also holds Water Permit #1953-1 for two additional wells. One of these wells serves as a stand-by source for the upper system. The other well serves the lower system consisting of 12 lots in Wild Turkey Estates. The two systems are not connected and the water system operator believes it is unlikely they ever will be connected due to the difficulty of constructing the piping through the shallow soils and underlying rock.



Steven Quissell
Water Rights Inspector
DENR Water Rights Program

Date report completed: July 25, 2017



2015 well, pump house and 46,000 gallon storage



Pump house boosters and appurtenances

Water Rights #1950-1 and #1953-1
Wild Turkey Estates Home Owners Assn.
July 21, 2017

Sec.35
T007N
R01E

Sec.36
T007N
R01E

Sec.31
T007N
R02E

Sec.32
T007N
R02E

Sec.2
T006N
R01E

Sec.1
T006N
R01E

Sec.6
T006N
R02E

Sec.5
T006N
R02E

Permit #1950-1
Lat: 44.507089

2015 Well
Lon: -103.932176

Permit # 1953-1
Lat: 44.507175

2008 Well
Lon: -103.931639

25,000 gal. storage

46,000 gal. storage

Permit # 1953-1 1972 well
Lat: 44.516355 Lon: -103.92910

469'

544'

209'

355'

1,355'

1,362'

Sec.11
T006N
R01E

Steven Quissell
Water Rights Inspector
DENR Water Rights Program

Sec.12
T006N
R01E

Steven Quissell

Sec.7
T006N
R02E

Sec.8
T006N
R02E

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, IGP, swisstopo, and the GIS User Community

1950-1

SD EForm - 1311LD V1

Form 10

NOTICE OF COMPLETION OF WORKS AND
APPLICATION OF WATER TO BENEFICIAL USE

MAIL TO: PMB 2020

Date

7/21/17

DENR - Water Rights Program

523 E Capitol Ave

Pierre, SD 57501-3182

ph. (605) 773-3352

FROM:

~~Bill Fysdal~~ Chris Menott

(name)

~~19960~~ 19959 Gobber Road

(address)

Spanish

(city)

S.D.

(state)

57783

(zip)

208-660-6187

~~605-722-8905~~

(phone)

I have completed the construction of the water use system and I have put the water to beneficial use to the maximum extent it is going to be used.

1950-1

Water Permit No. 1953-1 states that the water use system is to be constructed by

5/26/2020

6/27/2020

(date)

, and water is to be put to beneficial use by

5/26/2024

6/22/2024

(date)

The water use system was completed on

7/15/15

(date)

Applying the water to beneficial use was completed on

7/15/15

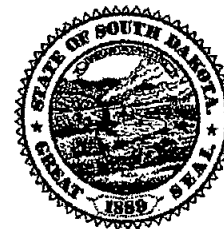
(date)

You may schedule an investigation so that the water license may be issued.

X ~~Bill Fysdal~~ Chris Menott

X

Chris Menott



1950-1



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

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

MAY 29 2018

1950-1
1953-1

David Nuenke
Wild Turkey Estates Home Owners Association
19954 Gobbler Rd
Spearfish SD 57783

Dear Mr. Nuenke:

Enclosed are Water License Nos. 1950-1 and 1953-1. They are the final water right documents completing the process of obtaining Water Rights. Included with the licenses is a map prepared by the staff engineer who conducted the field investigation.

For your information SDCL 46-6-27 requires that if in the future, the owner of an existing well, constructs a replacement well and does not plan to use the old well, the old well is considered abandoned and must be plugged. Also, any well that is being used or is not considered abandoned must be valved and controlled, if flowing, or sealed and capped so that no leaking occurs either underground or at the surface.

As long as you use the water beneficially, as stated in the Water Licenses, the State Water Laws provide the Home Owners Association has a continuing right to use the water. If you have any questions, please contact our office.

Sincerely,

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

enclosures

c: Cris Mellott, Water Operator, 19960 Gobbler Rd, Spearfish SD 57783

STATE OF SOUTH DAKOTA

WATER LICENSE NO. 1950-1

(1) Wild Turkey Estates Home Owners Association, 19954 Gobbler Rd, Spearfish SD 57783 made Application No. 1950-1, February 26, 2015 for a water permit to divert 0.167 cubic feet of water per second from ground water, one well (Madison Aquifer), Lawrence County, South Dakota for suburban housing development purposes. Permit No. 1950-1, with a priority date of February 26, 2015 was approved May 26, 2015 and issued to the applicant for diversion of water with construction of the described water supply system to be completed on or before May 26, 2020 and for the application to beneficial use of said water on or before May 26, 2024.

The Permit holder submitted a "*Notice of Completion of Works and Application of Water to Beneficial Use*" on July 21, 2017. The "*Notice*" stated the water use system was completed and the water placed to beneficial use in July, 2015.

(2) It is certified that the permit holder has complied with the provisions of South Dakota State Law relating to completion of the construction of the water supply system and is entitled to divert 0.167 cubic feet of water per second for beneficial use. The location of the diversion point is:

- 1,355'N and 355'W of the SE corner of Section 1, T6N, R1E (NE ¼ SE ¼)
Latitude 44.507089, Longitude -103.932176

The home owners association also holds Water Right No. 1953-1 authorizing two wells in the Minnelusa Aquifer.

(3) The permit holder has complied with the provisions of South Dakota State Law relating to the application of water to beneficial use.

(4) Pursuant to South Dakota Water Law 46-5-30.1 Wild Turkey Estates Home Owners Association, 19954 Gobbler Rd, Spearfish SD 57783 the holder and/or owner of Water Right No. 1950-1 is issued a license to appropriate water, the right to use 0.167 cubic feet of water per second from ground water, one well (Madison Aquifer) with a priority date of February 26, 2015 from the location specified in (2) of this license for suburban housing development purposes.

This license is subject to South Dakota Water Law, any limitations or conditions listed in Water Right No. 1950-1 and subject to the following qualifications:

- In accordance with SDCL 46-1-14 and 46-2A-20, Permit No. 1950-1 is issued for a twenty year term. Pursuant to SDCL 46-2A-21, the twenty year term may be deleted at any time during the twenty year period or following its expiration. If the twenty year term is not deleted at the end of the term, the Permit may either be cancelled or amended with a new term limitation of up to twenty years. Permit No. 1950-1 may also be cancelled for non-construction, forfeiture, abandonment or three permit violations pursuant to SDCL 46-1-12, 46-5-37, 46-5-37.1, and Board Rule ARSD 74:02:01:37.

continued

- 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.
- The well authorized by Permit No. 1950-1 shall be constructed by a licensed well driller and construction shall comply with the 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. *The well was drilled in June, 2015 by Taylor Drilling Company. A copy of the well completion report is on file with the Water Rights Program.*
- Water Permit No. 1950-1 authorizes a total annual diversion of 24.2 acre feet of water annually from the Madison Aquifer.
- The Water Permit Holder shall report to the Chief Engineer annually the amount of water withdrawn from the Madison Aquifer.



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

MAY 29 2018

date

