BROKEN WHEEL RANCH MASTER PLAN

2016 LEVEL I STUDY EXECUTIVE SUMMARY

for

WYOMING WATER DEVELOPMENT COMMISSION

August 2016

47 E. 4th Ave.
P.O. Box 609
Afton, WY 83110
307.885.8500
sunrise-eng.com

SUNRISE ENGINEERING

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Prepared by:

SUNRISE ENGINEERING, INC.
P.O. Box 609
Afton, WY 83110
307-885-8500

1.0 INTRODUCTION

1.1 GENERAL STUDY LOCATION

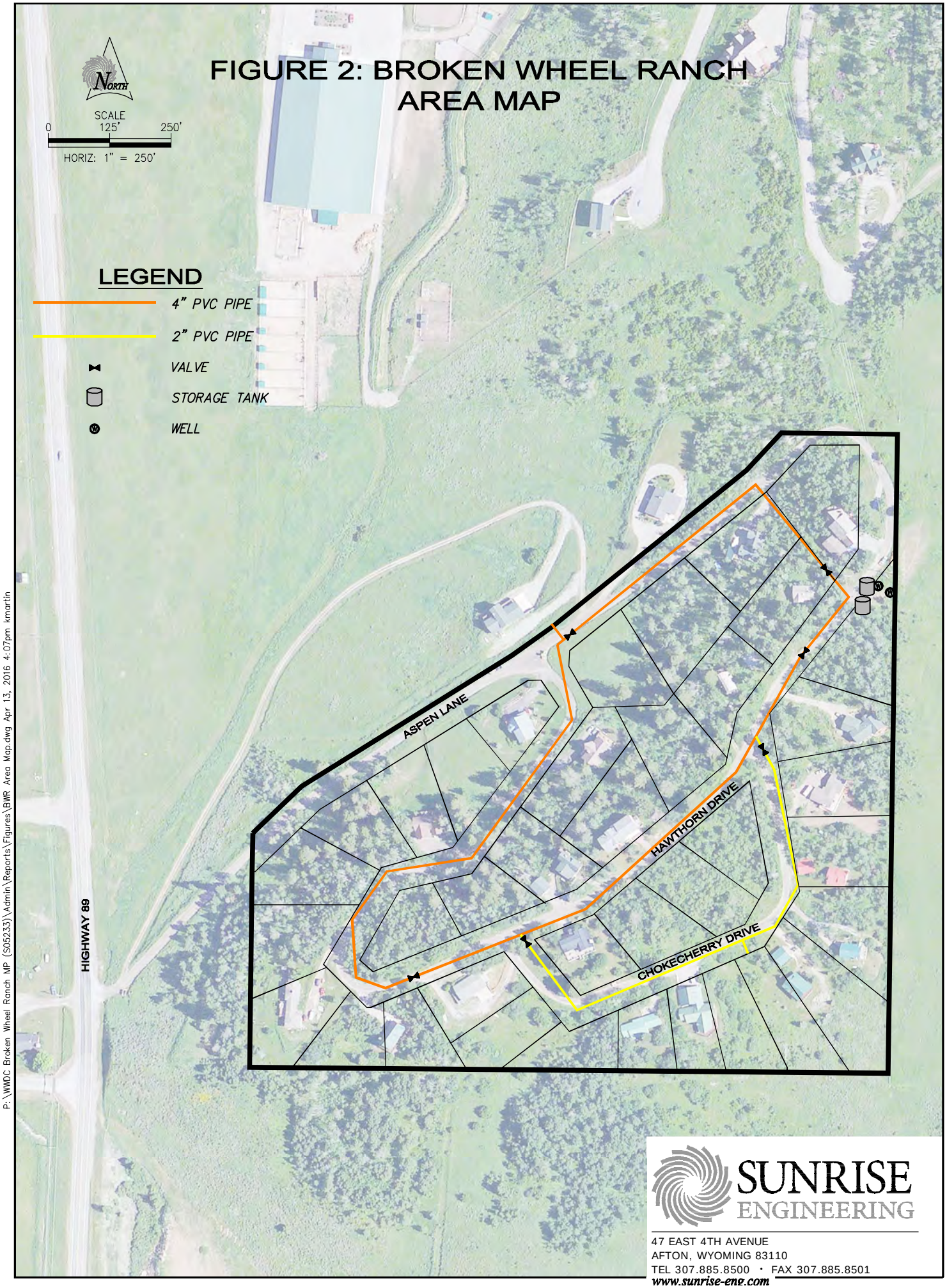
Broken Wheel Ranch (BWR) Property Owners' Association (POA) is a small unincorporated community located in northwestern Lincoln County, approximately 5 miles south of Alpine, Wyoming. The legal description for BWR is the SW ¼ NE ¼, Section 15 of Township 36 North, Range 119 West. See Figure 1 below.

Figure 1: General Vicinity Map

1.2 SYSTEM DESCRIPTION

The current plat was created in February of 1972. There are a total of 38 lots in the subdivision. An 8-inch well was drilled to serve the community, as well as a single residential 6-inch well. Water is pumped from the wells to two concrete storage tanks. The distribution piping consists of a 4-inch polyvinyl chloride (PVC) pipe for the main loop along Hawthorn Drive, and a 2-inch PVC pipe looping along Chokecherry Drive. There are three 4-inch gate valves and two 2-inch gate valves. Two discharge/flushing points are also a part of the system, one for each loop. The 4-inch discharge is located near the intersection of Hawthorn Drive and Aspen Lane. The 2-inch discharge is located on Chokecherry Drive. An overall view of the system can be seen in Figure 2.

FIGURE 2: BROKEN WHEEL RANCH AREA MAP



P:\WWDC Broken Wheel Ranch MP (505233)\Admin\Reports\Figures\BWR Area Map.dwg Apr 13, 2016 4:07pm kmartin

SUNRISE ENGINEERING
47 EAST 4TH AVENUE
AFTON, WYOMING 83110
TEL 307.885.8500 • FAX 307.885.8501
www.sunrise-eng.com

2.0 WATER SYSTEM DESIGN/EVALUATION

2.1 WATER SOURCE

The BWR subdivision currently obtains their water through an 8-inch well located in the northeast corner of the subdivision along Hawthorn Drive. They also own a nearby 6-inch well that is not currently in use. Photographs of the wells can be seen below in Figure 3 and Figure 4.

Figure 3: 8-inch Well

Figure 4: 6-inch Well

2.1.1 Water Rights

According to the State Engineers Office (SEO) the BWR POA owns, or has rights to, the two wells at 15 gallons per minute (gpm) each. Below in Table 1 is the available information from the SEO.

Table 1: Existing Well Information

Well Properties	8-inch Well	6-inch Well
Well Name	BWR Subdivision # 1	Krautter #1
Permit #	87232	87216
Owner	Broken Wheel Ranch POA	Broken Wheel Ranch POA
Date Drilled	11/15/1978	11/15/1978
Date of Water Right	6/6/1988	6/6/1988
Use	Residential - 32 Lots	Residential - 1 Lot
Quantity	15 gpm	15 gpm
Perforations	Torch & Mills Knife	Torch & Mills Knife
Depth of Well	256 Feet	256 Feet
Depth to Ground Water	110 Feet	110 Feet
Motor Type & H.P.	Red Jacket 1.0 H.P.	Red Jacket 1.0 H.P.

2.1.2 Well Inspections

During the well inspection completed on October 1st and 2nd, 2015 by Sunrise Engineering and Thomas Drilling, the following information was obtained:

Table 2: Observed Well Information

Well Properties	8-inch Well	6-inch Well
Motor Type & H.P.	Franklin Electric Pump – 2.0 H.P.	None
Rated Quantity	25 gpm	0 gpm
Condition	Good	Previously Seized
Depth of Well	302.45 Feet	239.70 Feet
Depth to Ground Water	152.30 Feet	162.80 Feet

Figure 5: Well Controls

2.1.3 Flow Observations

This system does not have meters to measure source or usage volumes. Flow observations were conducted to determine how much water was being produced by the 8-inch well. See Figure 5 below for the well controls.

The average result of the flow observation yielded a flow of 21 gpm. At this flow rate, the pump is able to generate between 9,925 and 12,100 gallons of water per day (gpd) (24 hour period). For the purpose of this report, an average number of 11,000 gallons is being used.

2.2 WATER DEMAND/CONSUMPTION

As a part of design, reliable numbers need to be used in determining the amount of water that is consumed by the community. Since there is no metered data available to determine the water demand, we had to use other available information to arrive at these numbers. A consumption rate of 133 gpd was calculated. With a peaking factor of 1.5, the max daily demand is 200 gpdpc. The DEQ value of 125 gpdpc will be used for the average daily demand.

2.3 WATER STORAGE

There are two concrete storage tanks that are a part of the system. The northern most tank, Tank “A”, is roughly an 8-foot by 8-foot by 10-foot tank. The overall volume of the tank is approximately 4,787 gallons. The southern tank, Tank “B”, is roughly 12-foot by 8-foot by 8-foot tank. The overall volume of this tank is approximately 5,745 gallons. The total storage capacity of the two tanks are 10,532 gallons.

2.4 WATER SYSTEM CONCLUSIONS

Since the water system only operates with one well, the storage requirement is governed by the water source rule as previously discussed in Section 2.1.2 Water Source Analysis. The source and storage must meet or exceed twice the MDD. Table 3 below shows the requirements for current and future conditions.

Table 3: Source & Storage Summary

	MDD (gpd)	2*MDD (gpd)	Source Capacity (gpd)	Existing Storage (gallons)	Does Source + Storage ≥ 2*MDD (Yes/No)
Current Conditions	10,000	20,000	11,000	10,532	Yes
Buildout Conditions	14,600	29,200	11,000	10,532	No

BWR will have to increase its storage and/or increase the capacity of the well by 7,700 gallons in order to be in compliance for future conditions.

The BWR water system can add one (1) more service connection before the current conditions no longer satisfy the DEQ requirements.

3.0 REGIONALIZATION

The BWR subdivision is located near a couple of other subdivisions with private water systems that are operated through their respective Property Owners Association (POA) or Home Owners Association (HOA). To the north, Trail Ridge, Shadow Dancer, and Salt River Cove have a combined water system operated through the Trail Ridge POA. This water system is conveniently located adjacent to BWR; there is approximately 600 feet between the two systems. To the south of BWR are individual homes in the Dell Creek area. The nearest water system to the south is located approximately 1.75 miles at Nordic Ranches, which is a privately owned and operated system.

Sunrise presented the idea of potentially joining water systems in the future out of advantage and necessity to Trail Ridge POA. We expressed that we had conceptually studied the hydraulic possibilities of joining the systems and discovered that a connecting pipeline, metering station and rate of flow control valve could efficiently place Trail Ridge Water into the BWR storage tanks. They discussed the concept, and later responded that the POA was not interested in combining water systems at this time. They are currently having internal issues with their system and feel that they can't add BWR at this time.

4.0 HYDRAULIC ANALYSIS

A hydraulic analysis utilizing a computer model was used in the study process to size the distribution piping based on the projected flow demands and required pressures. In this case, it helps determine if the existing distribution piping is adequately or under sized for the current and/or future conditions. The BWR system was modeled using the Innovyze H2O Net water modeling software.

It appears from the hydraulic model and field investigations that the main concern/problem with the water system is the pressure along the east side of Hawthorn Drive due to the elevation, or lack thereof, between the storage tanks and the service connections to the lots. The current distribution pipe sizes appear to be adequate.

In order to increase the pressure for the 15 lots that don't meet the minimum requirement of 35 psi, as set by the Wyoming DEQ Rules and Regulations Chapter 12, we explored two possibilities:

1. Install a booster pump outside of the existing storage tanks and boost the entire distribution system by 30 psi. This would bring the 15 lots into compliance.
2. Create a second pressure zone for the 15 lots. This would require installing a booster pump along with a dedicated service line to the 15 lots and boosting the pressure by 30 psi. The rest of the water system and service connections would remain as is on the gravity system.

Of these two options, the first will be recommended due to a lower construction cost. This option allows us to increase the pressure across the board without installing new pipelines and services. The lots along the lower portion of the system will have a higher pressure around 86 psi, which is acceptable. Another benefit of option number one is the use of the connecting pipes and being able to keep the looped system which leads to better water circulation and will be easier to operate and maintain.

5.0 WATER QUALITY

According to the water operator, Ben Mavy, EPA has classified BWR as a Transient Non-Community Water System (TNCWS). A TNCWS is defined by EPA as a public water system that provides water in a place such as a gas station or campground where people do not remain for long periods of time (EPA). With this classification, BWR is required to collect water quality samples quarterly. As of April 2016, water quality samples will be required to be collected monthly. EPA also reviews an annual lab report looking for Nitrogen, specifically as Nitrate or Nitrite. All of the results of samples collected within the last year have yielded good tests and are all in conformance.

6.0 EPA SANITARY SURVEY

In 2014, EPA conducted a sanitary survey of the BWR water system. Through the inspection, five items were identified as being deficient, or not up to "code".

Two items have been corrected at the time of this report. BWR POA has requested a variance on one item, and EPA has granted it. Two of the items will require an engineering design and approval through WDEQ for a permit to construct. Both of these items are being recommended to be corrected to bring them up to standards.

7.0 RECOMMENDATIONS

The improvements that are being recommended will remedy the current deficiencies as listed by the EPA Sanitary Survey as well as address the future issues that the BWR system will encounter. The proposed improvements are being recommended to be completed in one phase.

7.1 PROPOSED IMPROVEMENTS

To bring the water system into compliance with EPA and DEQ, we are recommending that the following be completed as a part of the project:

7.1.1 Hatch

In order to bring the southern tank hatch into compliance, we recommend welding a 24-inch tall pipe to the existing opening. The pipe will require a fabricated lid with a water tight seal to keep any possible dust/sediment or bugs out of the water supply.

7.1.2 Pressure

To increase the pressure we are recommending a single phase duplex Grundfos BoosterpaQ Model # MPC-E 2CR10-4, or similar packaged system. This system will need a vault, or building to house the pumps, valves, control panel, etc. We propose installing the booster pump system at the storage tank outlets.

7.1.3 Service Connections

As a part of this study we evaluated the existing water system components. In this evaluation, we noted that many of the service connection locations are unknown. The ones that were located, many have broken valve boxes. For this reason, we feel it would be prudent to locate all active service connections and install new valve boxes, and/or curb stops as a part of this phase.

7.1.4 Meter

As previously mentioned, there is no meter on the water system. In order to get an accurate value of how much water is being consumed we recommend installing a new 4-inch Sensus OMNI T² Meter. This meter has the ability to accurately measure from low flows of 2.0 gpm up to flows of 1250 gpm.

7.1.5 Land

In order for expansion of the water system (i.e., booster pump, and/or additional storage), additional land is going to be required. We recommend purchasing a part of, or all of Lot 1 (0.87 acres) to prepare for the future development of the water system.

7.1.6 Storage

With the addition of one new residence the BWR water system will begin to fall out of compliance with the DEQ requirements on storage. At this point in time, it is recommended to build another storage tank to store enough water for full buildout conditions. This will require a storage tank to hold 10,000 gallons.

7.1.7 Source

An additional water source is being recommended in order to provide for the increased water demand for additional users. This can be accomplished by drilling a new well; or water can be purchased through an agreement with the Trail Ridge POA. This would require new piping and valves in order to receive water from Trail Ridge.

7.2 DISTRICT FORMATION

In order for these recommendations to be constructed, it is anticipated that BWR will need to receive State and/or Federal funding. In order to apply for funding, BWR will need to form a Water and Sewer District, or a Special Service and Improvement District.

At the time of this report, BWR has submitted a signed petition and documentation to the Lincoln County Commissioners to form a Special Service and Improvement District.

8.0 OPINION OF PROBABLE COST

Two opinions of probable costs are presented, reflecting the current recommended improvements which must be funded by an agency other than the WWDC, and a second EOPC which includes improvements which do conform with WWDC funding criteria. These opinions of probable cost are based on today's value and are subject to change as the design process begins along with changes in the economy.

8.1 ENGINEER'S OPINION OF PROBABLE COST

As highlighted in the recommendations, the opinion of probable cost for Non-WWDC eligible improvements is shown below in Table 4.

Table 4: EOPC (Non-WWDC Eligible)

Design Phase	Cost	
Engineering Design	$ 22,000	
Permitting (DEQ)	$ 9,000	
Legal Fees	$ 3,000	
Pre-Construction Costs (Subtotal #1)		$ 34,000
Construction Phase		
Cost of Project Components		
Mobilization	$ 20,000	
Grundfos 3 hp Booster Pump, Piping, Meter	$ 42,000	
Electrical Connection	$ 8,000	
Service Connections -Locate, Install Valve Box (20)	$ 17,000	
Install Vault	$ 38,000	
Install 4-inch PVC Pipe (50 L.F.)	$ 4,800	
30" Hatch	$ 2,200	
Drain and Clean Storage Tank	$ 2,900	
Weld Steel Extension on Existing Lid	$ 3,500	
Construction Costs (Subtotal #2)	$ 139,000	
Engineering Costs (10%)	$ 14,000	
Construction and Engineering Costs (Subtotal #3)	$ 153,000	
Contingency (15%)	$ 23,000	
Construction Cost Total (Subtotal #4)		$ 176,000
Total Project Cost		$ 210,000

8.2 ENGINEER'S OPINION OF PROBABLE COST

As highlighted in the recommendations, the opinion of probable cost for WWDC eligible improvements is shown below in Table 5.

Table 5: EOPC (WWDC Eligible)

Design Phase		Cost		
Engineering Design	$	23,000		
Permitting (DEQ)	$	8,000		
Legal Fees	$	-		
Land & Right-of-Way	$	65,000		
Pre-Construction Costs (Subtotal #1)			**$**	**96,000**
Construction Phase				
Cost of Project Components				
Mobilization	$	25,000		
10,000 Gallon Storage Tank	$	30,000		
Pipe Connection (1,200 L.F.)	$	38,000		
Drill 8-inch Well (100 L.F.)	$	26,000		
10 x 10 Wellhouse	$	18,000		
Pump, Motor Controls & Accessories	$	22,000		
Electrical	$	12,000		
Construction Costs (Subtotal #2)			**$**	**171,000**
Engineering Costs (10%)	$	17,000		
Construction and Engineering Costs (Subtotal #3)	**$**	**188,000**		
Contingency (15%)	$	34,000		
Construction Cost Total (Subtotal #4)			**$**	**222,000**
Total Project Cost			**$**	**318,000**

Total Project Costs		
Non-WWDC (State or Federal)	**$**	**210,000**
WWDC Eligible	**$**	**318,000**
	$	**528,000**

9.0 WATER RATE & LOAN ANALYSIS

In order for BWR to secure any sort of funding, an analysis needs to be completed on their current income to determine if the rates are sufficient or if they need to be increased in order to pay back the loans.

9.1 Current Budget

Financial data was provided from the BWR POA to Sunrise for five fiscal years. The POA currently collects dues from all of the land owners (29), regardless if they have a water service connection or not. As previously discussed, there are currently no meters in the system, so there is not a tiered rate based on water consumption. Based on records kept by the POA, we were able to break the dues down into three categories; water expenses, road improvements and a savings account.

In the breakdown of the operating expenses over the past five years, a majority of the dues are used towards road improvements and less towards water expenses. The dues collected were $500 per year per land owner. The POA has raised their yearly dues to $600 per land owner for the 2015 – 2016 year in anticipation of increased water costs. The overall operating and maintenance budget is $17,400. Below in Table 6 is a summary of the water rates.

Table 6: Water Rates Summary

Item	Years					
	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Yearly Water Budget	$2,201.52	$1,560.47	$1,129.99	$3,531.10	$6,090.00	$6,090.00
Monthly Water Rate	$6.33	$4.48	$3.25	$10.15	$17.50	$17.50

9.2 Users and Lot Owners Consideration

The total lots in BWR is 38. However, the projected probable maximum buildout is 29 users. There are currently 20 homes connected to the system. It is recommended that the district adopt a policy that operation and maintenance costs be paid for by the homes using the water system. The cost for the capital improvements should be borne by all lots who either now, or in the future desire to have a water service connection. Lot owners with adjacent lots could give up that right to have a second service connection and thus avoid the assessment. This is similar to the policy they currently have in regards to POA annual fees.

Under this plan the O & M costs will be divided by 20 users and the capital construction costs divided by 29 lot owners.

It is recommended that grants and loans should be applied for through the MRG and SRF program as well as a Level II application to WWDC to perform a hydrogeologic groundwater feasibility study to locate the best location for a well.

9.3 End User Costs

It is estimated that the historic average monthly cost for O&M per user is $8.37. However, by adding the anticipated expense for power costs of $88 per month to operate the booster pump and the new well, the new O&M cost should be estimated as $12.75 per month per user. Adding the equivalent monthly debt payment ($32.30) to the O&M cost yields an estimated monthly cost of having water at $45.05. It is recommended that the monthly O & M rates be increased to $12.75 per water user with an estimated $387 per year per lot assessment to cover the debt payment. Table 7 below represents the summary of the user rates.

Table 7: Recommended Water Rates

Item	Current	Future
O&M Costs	$ 8.37	$ 12.75
Debt Repayment	$ -	$ 32.30
Total User Monthly Payment	$ 8.37	$ 45.05

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