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Oregon Water Resources Department  
Jon Unger, Grant Administrator  
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Salem, OR 97301

Dear Mr. Unger,

Baker County fully supports the City of Greenhorn in its application for funding to improve their City water system. Historically, the County has provided financial support to the City in an effort to identify improvements to the water system through engineering studies. The Baker County Board of Commissioners believe there is a legitimate concern to improve the water quality to its residents.

Financial support from the Oregon Water Resources Department would greatly benefit the City in their effort to provide safe, clean drinking water. We strongly urge the Water Resources Department to consider fully funding the request.

Best Regards,

William Harvey, Chairman  
Baker County Board of Commissioners

*City of*  
***Greenhorn, Oregon***

**WATER SYSTEM STUDY**

*2015*



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**WATER SYSTEM STUDY  
FOR  
CITY OF GREENHORN, OREGON**

**2015**



RENEWS 12-31-17  
SIGNED 12-22-15

The City of Greenhorn, Oregon, has reviewed this Water System Study and adopted it.

*Dale McSmith - Mayor*  
Signature and Title

12-24-15  
Date

ANDERSON PERRY & ASSOCIATES, INC.

La Grande, Oregon  
Prineville, Oregon  
Walla Walla, Washington

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**MAP**

Existing Water Distribution System Map and Proposed Distribution System Improvements

**APPENDICES**

Appendix A - Water Right Information

Appendix B - Water System Special Use Permit

Appendix C - Water Use Reporting Forms 1990 through 2005, Facility Water Use Report 1990  
through 2014

Appendix D - Oregon Health Authority - Drinking Water Services November 13, 2009, Letter

# 1.0 - Introduction and Background

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## 1.1 Introduction

The City of Greenhorn, Oregon, has used two springs as their water supply since 1903. Due to suspected contamination concerns, the City has recently only relied on one spring source. The springs have historically been able to keep pace with the limited residential water system demands that are placed on the system. However, should the full development potential of the City of Greenhorn be realized, some improvements to the system are likely needed to meet the anticipated demands. The City also has had some positive total coliform tests in the recent past, which could require some system improvements to resolve. Because of these needs, the City desired to develop a study to outline system needs and recommended water system improvements. The City engaged Anderson Perry & Associates, Inc., to complete a Water System Study (WSS) to evaluate water system needs.

A WSS was first prepared for the City of Greenhorn in 2007. The 2007 WSS was never finished, and some improvements to the water system were completed in 2009.

The purpose of this WSS is to outline the water system needs to provide service for full development of available residential building lots for the City of Greenhorn, Oregon. This WSS evaluates the existing water supply, storage, and distribution systems; evaluates alternatives for improving the City's water system; and presents detailed cost estimates for completing the improvements using the public bid process.

## 1.2 Background Information

### *1.2.1 Community and Regional Setting*

The City of Greenhorn is located on the western border of Baker County in northeastern Oregon (see Figure 1). An aerial photo of the City of Greenhorn area is shown on Figure 2. The northwest portion of the City is actually located in neighboring Grant County. Greenhorn is quite isolated, located approximately 55 miles west of Baker City, the county seat of Baker County. Initially, gold exploration was the main economy of the Baker County area. Later, agriculture, ranching, and logging became the primary economy. More recently, tourism has also become a significant part of the local economy.

Greenhorn was first inhabited in the 1860s as miners prospected the nearby area for gold. The City was incorporated in 1903 and continued as a viable community until 1942 when gold mining efforts were significantly reduced as a result of World War II. Based on the July 2014 Portland State University population estimate for Greenhorn, which is the most recent estimate available, there are two residences in Greenhorn, with very few to none occupied year-round.

The elevation of the City of Greenhorn is 6300 feet above mean sea level. This high elevation provides Greenhorn the distinction of being the highest incorporated city in Oregon. The City is surrounded by National Forest, specifically the Wallowa-Whitman National Forest to the east and the Malheur National Forest and private forestlands to the west. The North Fork John Day Wilderness Area is located just northwest of the City.

### 1.2.2 Water System History

The City of Greenhorn's water system was reportedly developed in 1903 when the City was founded. The City's water right was established in 1910 at 1 cubic foot per second (cfs), which is 448.8 gallons per minute (gpm). The entire water system is gravity fed. Water is currently purged at the lowest elevation point of the system to avoid freezing and to help keep water throughout the system as fresh as possible.

Water for the City of Greenhorn is currently provided by two springs located on U.S. Forest Service (USFS) property northwest of the City; however, since 2000 the City has only utilized the west spring due to water quality concerns for the east spring. Spring water travels approximately 1,700 feet downhill via a 4-inch diameter high density polyethylene (HDPE) pipe installed in the mid-1980s to a buried 2,600-gallon concrete storage tank installed in 2009. The tank has a 4-inch overflow for excess water not utilized by the City. This tank was installed in 2009 to replace an undersized 1,100-gallon HDPE tank reportedly installed in 1989. Also included in the 2009 construction was the installation of a 2-inch diameter HDPE 200-pounds-per-square-inch pipeline from the tank approximately 1,800 feet to the City's distribution system. This replaced an older 2-inch diameter HDPE line. The distribution system consists of 2-inch diameter water main lines and 3/4-inch diameter service lines to the City's cabins and homes used by full- and part-time residents.

The Oregon Health Authority - Drinking Water Services has regulatory responsibility over the City of Greenhorn's water system. The regulatory situation for the City's water system is described in more detail in Section 2.0 of this WSS.

### 1.2.3 Water Rights

The City of Greenhorn holds certificated municipal water rights issued by the State of Oregon for the two springs serving the City. A copy of the Certificate of Water Right and the original Application for a Permit to Appropriate the Public Waters of the State of Oregon are presented in Appendix A of this WSS. The City's water right data is summarized on the following table.

**TABLE 1-1  
WATER RIGHTS**

Source	Priority Date	Permit No.	Allowed Volume (cfs)	Allowed Volume (gpm)
Twin Springs	November 7, 1910	504	1.00	448.8

The allowed water right of 1.00 cfs, or 448.8 gpm, exceeds the distribution system's ability to deliver water to the City's users.

### 1.2.4 Water System Operational Permit

The City of Greenhorn's twin spring water supply sources are located on USFS property. As a result, the City has a Special Use Permit with the USFS outlining the terms and conditions for use of the spring water supply sources. A copy of the Special Use Permit is presented in Appendix B of this WSS. The Permit indicates it covers a land area of 1.73 acres in the NW 1/4 of the SW 1/4 of Section 9, Township 10 South, Range 35 East of the Willamette Meridian. The Permit also states it is issued for the following purpose:

“Two spring developments and a 25 ft. by 3,023 ft. right-of-way for a 4-inch water transmission line from the spring southeasterly across the National Forest to private land. The pipeline as constructed is deemed the centerline of the right-of-way.”

### **1.3 Study Goals**

The City of Greenhorn has key goals they hope to accomplish upon completion of the 2007 and this WSS. The goals are summarized hereafter.

#### ***1.3.1 Recommended Spring Collection Improvements***

Evaluate alternatives to address spring collection deficiencies.

#### ***1.3.2 Storage Tank Installation Assessment***

Assess the 2009 installation of a new storage tank for potential water quality impacts to the system and needed improvements.

#### ***1.3.3 Recommended Spring-to-Tank Transmission Line Improvements***

Evaluate alternatives to replace the transmission line between the springs and the storage tank.

#### ***1.3.4 Measurement of Actual Spring Output***

Obtaining more recent and reliable spring flow measurements was a key goal for the 2007 WSS.

#### ***1.3.5 Maximum Residential Dwelling Capacity***

There is a current maximum on available residential lots, as discussed in Section 2.0 of this WSS. A key goal of the 2007 WSS was to determine if full residential development could be supported by the current water supply springs, and, if not, what the maximum residential development would be for the current spring capacity.

#### ***1.3.6 Recommended Distribution Improvements***

A goal of the WSS is to determine what improvements are needed to the distribution system to provide improved service.

#### ***1.3.7 Recommendations to Avoid Potential Freezing***

There are sections of the water system that are not adequately protected from potential freezing. A goal of the 2007 WSS was to identify what improvements are needed to help avoid freezing in the water system.

#### ***1.3.8 Cost Estimates for Recommended System Improvements***

The WSS is to include cost estimates for completing all recommended improvements.

# 2.0 - Water System Requirements

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## 2.1 Introduction

This section of the Water System Study (WSS) outlines the various requirements for the water system. These requirements include defining and establishing the service area, the service population, regulatory requirements, water system demands, and water system design criteria. These items establish the criteria that the water system should meet. By establishing these criteria, the needed improvements to satisfy water system requirements can be defined and recommended.

## 2.2 Service Area of Population

### *2.2.1 Service Area and Land Use*

The City of Greenhorn, Oregon, currently consists of only residential development. Future development within the City is anticipated to be residential in nature. The City indicated there is a total of 31 property owners and that further subdividing and development is not anticipated. While there are areas within the current City limits that could potentially be developed to provide additional residential lots, such as the extreme southern and northern areas, development of these areas is not anticipated. For the 31 property owners, there are currently 18 developed lots and 13 vacant available lots. Not all developed lots are served by the water system.

The City limits encompass an area approximately 0.5 mile from north to south and approximately 0.25 mile from east to west, as shown on Figures 1 and 2. For the purpose of this WSS, only the current water system service area and the currently owned parcels (the 31 property owners within the City of Greenhorn) are included in the service area. If the City intends to develop additional area beyond the current 31 property owners, then this WSS will need to be revised to account for the additional water system demands that would be placed on the limited water system.

### *2.2.2 Population and Planning Period*

To estimate future demands that may be placed on a municipal water system, a determination of the population to be served must be made. Population projections are usually made on the basis of an annual percentage increase estimated from past growth rates, tempered by future expectations. It is difficult to accurately predict the population of a small community over any extended period of time, especially a community as small as Greenhorn. The addition or deletion of just a few residents could significantly affect the population and the overall water system needs. In addition, there are only part-time residents in Greenhorn, many who only reside there two to four weeks per year.

A review of past federal Census data shows no official data is available for 1960 through 1990. The 2000 and 2010 federal Census indicated the population of Greenhorn was 0. The population for the City of Greenhorn has been estimated annually by the Center for Population Research and Census at Portland State University (PSU). This agency is the official source of population data available in Oregon between the official Census data generated at the beginning of each decade. PSU does not project future population increases for individual cities within the state. Therefore, no official future projection is available for Greenhorn. The data presented hereafter was obtained from publications provided by PSU.

**TABLE 2-1  
POPULATION DATA**

Year	Population
1978 through 1999	3
2000 through 2003	0
2004 through 2014	2

Projecting a future population estimate from the data shown on the preceding table is difficult at best. A more feasible approach would be to base the potential future population of Greenhorn on the available property ownership while assuming a density (number of people) per parcels owned. The City currently has 31 total property owners, with 13 of these currently served by one or more water system connections. The City actually has 18 water service connections, but some temporary residents have several connections; therefore, the actual number of active connections serving part-time residents is 13. Greenhorn periodically has part-time and temporary residents and can sometimes have a significant number of people present on a given weekend. To account for these temporary residents and their connections and also allow for full build-out potential for the 31 property owners, a future population of 62 was assumed for the basis of the analysis in this WSS. The design population of 62 accounts for 31 property owners, with two people assumed per ownership. However, it should be recognized that actual growth would likely fall below these figures.

## 2.3 Regulatory Requirements

### 2.3.1 General

According to the Oregon Health Authority - Drinking Water Services (DWS), the City of Greenhorn is not subject to the federal regulatory requirements under the Safe Drinking Water Act because it is currently classified as a “state-regulated” public water system. A state-regulated water system has between 4 and 14 permanent connections or serves 10 to 24 people. Since the City of Greenhorn currently has 13 permanent water system connections and serves only part-time residents for two to four weeks per year, the system is currently considered a state-regulated system but could potentially become a federally regulated water system. However, it is unlikely Greenhorn will develop or have permanent residents to reach the level required to become a federally regulated water system. At this time, the DWS does not have a current file nor has the DWS made a visit to the City of Greenhorn to inspect the water system. The DWS indicated that as a state-regulated water system, sampling requirements for the water supply sources includes the following:

- Quarterly bacteriological test
- Annual nitrate test
- One-time inorganic chemicals

If, in the future, there are 15 or more permanent water connections serving residents, or 25 or more people occupying homes in Greenhorn for six or more months of the year, the City’s water system will become a federally regulated water system. If this occurs, the system would be classified as “non-transient non-community” (NTNC). The potential exists for the City’s system to eventually become a federally regulated community system; therefore, the applicable regulations are summarized hereafter for completeness. If the City of Greenhorn’s water system becomes a NTNC system, it would come under the jurisdiction of two water quality regulating agencies. The first is

the U.S. Environmental Protection Agency (EPA) and the second is the DWS. The State of Oregon assumed responsibility in February 1986 for enforcement of the Federal Safe Drinking Water Act (SDWA). Therefore, the City of Greenhorn will likely continue to deal with the DWS as the principal regulating agency.

### **2.3.2 Regulatory History**

The SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources (rivers, lakes, reservoirs, springs, and groundwater wells). The primary regulations associated with the SDWA address requirements concerning trace minerals, compounds, and micro-organisms that may affect the health of water consumers. The SDWA provides for monitoring, testing requirements, reporting, recordkeeping, and public notification procedures in the event of non-compliance.

The 1986 amendments to the SDWA included provisions for wellhead protection, new monitoring for certain substances, filtration for certain surface water systems, disinfection for certain groundwater systems, and restrictions on lead content in pipe solder and plumbing.

The 1996 amendments to the SDWA included provisions for consumer confidence reporting, stronger protection for microbial contaminants and disinfection byproducts, operator certification, lowering maximum contaminant levels (MCLs), and source water assessments.

Enacted in 1981, the Oregon Drinking Water Quality Act established statutes, which have been amended periodically, and subsequent administrative rules to enforce, at a minimum, the federal SDWA requirements. The DWS administers and enforces drinking water quality standards for public water systems in the State of Oregon. The agency focuses resources in the areas of highest public health benefit and promotes voluntary compliance with state and federal drinking water standards. The DWS also emphasizes prevention of contamination through source water protection, provides technical assistance to water system owners, and provides water system operator training. They also work closely with public water systems to make sure public notification is made in accordance with regulatory guidelines, when required. If the City is unaware of their compliance status or in need of regulatory guidance, it is recommended that the regional DWS office be contacted.

Following is a list of regulations that have been enacted in the past five years:

- 1. Reduction of Lead in Drinking Water Act**, which requires any new installation or purchase of materials used in potable locations to be "lead-free." Lead-free has been redefined as "(A) not containing more than 0.2 percent lead when used with respect to solder and flux; and (B) not more than a weighted average of 0.25 percent lead when used with respect to the wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixtures." This law was enacted on January 4, 2014. Oregon requires drinking water components to be National Sanitation Foundation/American National Standards Institute Standard 61 compliant in order to meet the intent of this law.
- 2. Stage 2 Disinfectants and Disinfection Byproduct Rule (D/DBPR)**, which focuses on public health protection by limiting exposure to disinfection byproducts. The D/DBPR specifically targets total trihalomethanes and five haloacetic acids, which can form in water through disinfectants used to control microbial pathogens. This rule applies to all community water

systems (CWSs) and NTNC water systems that add a primary or residual disinfectant other than ultraviolet light. Stage 2 of the D/DBPR was enacted in 2012 for large CWSs and NTNCs and in October 2013 for all CWSs and NTNC water systems.

- 3. Unregulated Contaminant Monitoring Rule (UCMR).** The EPA uses the UCMR program to collect data for contaminants suspected to be present in drinking water but that do not have health-based standards set under the SDWA. Every five years, the EPA develops a new list of UCMR contaminants, largely based on the Contaminant Candidate List. Oregon Administrative Rule 333-061-0043 requires CWSs to report detection of unregulated contaminants in their annual Consumer Confidence Report.

### ***2.3.3 Upcoming Regulatory Changes***

The following rule will be enacted in the near future:

- 1. Revised Total Coliform Rule,** which requires that total coliform samples be collected, according to a written sample site identification plan subject to state review and revision, by public water systems at sites that are representative of water quality throughout the distribution system. The rule goes into effect on April 1, 2016.

### ***2.3.4 Potential Regulatory Changes***

Following is a list of regulations that may be enacted in the future:

- 1. Radon in Drinking Water Rule,** which would attempt to reduce airborne and waterborne radon concentrations to limit exposure levels. This rule would apply to CWSs that use groundwater or mixed groundwater and surface water.
- 2. Third Contaminant Candidate List (CCL3) Regulatory Determinations.** The EPA has made a preliminary determination to regulate strontium. After public comment, the EPA is expected to release a final determination in 2015. The Fourth Contaminant Candidate List is currently in draft form and is expected to be published in 2015.
- 3. Carcinogenic Volatile Organic Chemicals (cVOC) Rule.** The EPA is developing a proposed national primary drinking water regulation for a group of 16 known cancer-causing compounds, including eight currently regulated cVOCs and up to eight from the CCL3.
- 4. Perchlorate Rule.** The EPA is developing a proposed national primary drinking water regulation for perchlorate. Perchlorate may cause adverse health effects. Scientific research indicates that this contaminant can disrupt the thyroid's ability to produce hormones needed for normal growth and development.
- 5. Hexavalent Chromium.** The EPA currently regulates hexavalent chromium as part of the total chromium drinking water standard. New information on health effects has become available since the original standard was set, and the EPA is reviewing this information to determine whether new health risks need to be addressed. The State of California has already implemented a hexavalent chromium specific MCL.

6. **Fluoridation.** Fluoride MCLs may be lowered in the future as the health impacts of fluoride are fully realized. The current MCL of 4 parts per million could be reduced to 1 or less. This lower MCL could require systems with naturally occurring fluoride above the MCL to treat to reduce levels.
7. **Cybersecurity.** Executive Order 13636: Improving Critical Infrastructure Cybersecurity, was established in February 2013. The order calls for the development of a voluntary, risk-based cybersecurity framework. The EPA will make an evaluation as to whether any additional authority and/or regulations to address cybersecurity in the water sector are needed.

### **2.3.5 Regulatory Conclusions**

Currently, the City of Greenhorn has a state-regulated water system with sampling requirements for bacteriological, nitrates, and inorganic chemicals. Although the City of Greenhorn currently has a state-regulated water system serving very few people, the City's water system could potentially become federally regulated and would, therefore, be subject to several of these regulatory requirements in the future if additional water users are added to the system and use the system six or more months of the year. The City is urged to contact the Pendleton office of the DWS to inquire about the regulations the City must adhere to in order to keep their water system in compliance.

## **2.4 Spring System Capacity**

The capacity of the City of Greenhorn's spring supply system varies depending on the time of year. Unfortunately, the lowest system capacity is in the late summer and early fall period of the year, when water system demands are typically at their highest. To obtain a general idea of spring capacity, historical water use reporting forms from 1990 through 2014 were reviewed. These forms are prepared by the City and submitted annually to the Oregon Water Resources Department (OWRD). Copies of the annual forms from 1990 through 2005 and a Facility Water Use Report from 1990 through 2014 are included in Appendix C.

The annual water use reporting forms from 1990 through 2005 show that the springs have varied in capacity from a low of about 10 gallons per minute (gpm) in October (1991, 1994, and 1995) to a high of 75 gpm in June (1997). Comparing each month from year to year shows a significant variation in spring flow. For example, spring flows in August have varied from a low of 17 gpm in 1995 to a high of 47 gpm in 2002, nearly triple the flow when comparing the same month for different years. This wide variation in spring flow suggests the spring capacity is highly susceptible to precipitation and snow pack. The spring capacity has never been measured below 10 gpm. The water use summary form from 1990 through 2014 shows similar annual water use over the entire 24-year period. Thus, it was assumed the spring flow data from 1990 through 2005 is still representative of the spring system capacity.

To provide a better idea of the capacity of the spring sources, City of Greenhorn personnel conducted more recent flow monitoring. The monitoring was completed by measuring the tank overflow flow rate and measuring the end of distribution purge flow rate at the lowest part of the water system. These two figures were then combined to provide an idea of the spring capacity, assuming little to no water use was occurring. For the period from August 24 through November 7, 2006, the total spring flow ranged from a high of 26.1 gpm in late August to a low of 17.2 gpm in early November. This data fits within the wide range of flows reported on the OWRD forms. A summary of the data obtained from OWRD reporting forms is shown on Table 2-2 and City personnel measurements is presented on Table 2-3. It is

also recommended that the City perform weekly source flow measurements to develop a more reliable dataset on spring source capacity over time.

**TABLE 2-2  
SPRING FLOW DATA**

Historical Flow Data (1990 through 2005)	
Month	Flow Range (gpm)
June	38 to 75
July	24 to 60
August	17 to 47
September	13 to 38
October	10 to 25

*The above data were obtained from spring flow annual reports submitted to the OWRD.*

**TABLE 2-3  
SPRING MONITORING FLOW DATA**

2006 Spring Flow Monitoring Data			
Date	Overflow Flow Rate (gpm)	Pressure Relief Flow Rate (gpm)	Total Spring Flow (gpm)
August 24, 2006	25	1.1	26.1
August 31, 2006	23	1.1	24.1
September 7, 2006	25	1.1	26.1
September 27, 2006	15.5	1.0	16.5
October 11, 2006	15.2	1.0	16.2
October 19, 2006	16.4	1.0	17.4
November 7, 2006	16.2	1.0	17.2

*The above data were obtained by the City at low demand periods to estimate total spring flow. Flow measurements were obtained using a 5-gallon bucket and a stopwatch. See the WSS text for an explanation of the water system configuration.*

## 2.5 Water System Demands

### 2.5.1 Water Demands

For the purpose of sizing the needed water system improvements and projecting future needs, future water demands can be estimated from past water use characteristics and population projections. Water use characteristics are usually expressed in terms of flow versus time. This allows components of the water system to be sized for the maximum demands that will be placed on them. The rates of water use that are important in evaluation of a water supply system are:

- **Average Daily Demand (ADD).** The total amount of water used during a 1-year period divided by 365 days.
- **Peak Daily Demand (PDD).** The maximum total amount of water used during any 24-hour period.
- **Peak Hourly or Peak Instantaneous Demand.** A measure of the maximum flow of water for the maximum use hour of all available data. This is also sometimes estimated if hourly data is not available.

Water supply facilities are normally designed for PDD. A well would normally be sized for supplying the needed water during the PDD, without continuous 24-hour operation. For example, when water usage during high-use summer days requires a well to pump 18 hours or more per day to keep up with the demand, the addition of another supply source may be warranted. The City of Greenhorn's spring system operating by gravity flow can provide 24-hour flow without taxing mechanical equipment. In this case, the 24-hour capacity of the spring system is taken into account when evaluating water supply and demands. Distribution components (booster pumps and distribution pipelines) are sized to deliver peak hourly demands so they can adequately accommodate surges in demand. Storage reservoirs are sized to make up the difference between water supply capacity and peak hourly water demands. Additional storage capacity (reserve) is usually provided in water storage reservoirs for both emergencies and fire suppression.

To be utilized for projecting future water demands, past water use characteristics are normally converted to a per capita (per person) rate of use. This is done by dividing the average day by the number of people being served by the water system. These water demand rates would then be expressed as gallons per capita day (gpcd). This value multiplied by a population projected for some future year would then give the estimated total demand rate for that year. Since the City of Greenhorn is so small and the historic population has not demonstrated any measurable trend, a population projection will not provide a meaningful representation of the anticipated future population. A determination of the number of service connections would be more prudent when evaluating future water demands.

Typical water demands in a city are greatly affected by outdoor watering activities. PDD normally occur in the summer during higher water use periods. Yards and extensive landscaping are not present for the structures in Greenhorn. Thus, the City does not normally experience these higher peak demands that can result from outdoor water use, such as prolonged yard watering. This needs to be considered when estimating water demands for Greenhorn. Published average day residential water demands for a single person, not considering irrigation uses for lawns, are typically in the following range:

- 70 to 100 gpcd, meaning gallons per person per day

To estimate water system demands, the total number of property owners must be considered, assuming a density of people per property owned. For the purpose of this WSS, it was assumed there are a total of 31 property owners, with a density of two people per ownership. It was also assumed the residential water system demand would be 100 gallons per person per day, the upper range of typical residential demands. This average water system demand occurs over a 24-hour period. Typically, the demands placed on the water system will be higher during daytime hours. For this purpose, it was assumed PDD will be 2.5 times higher than average day demands, meaning the 24-hour demand of 100 gpcd will be compressed into a shorter time period, with peak flows occurring at key times of the day, such as in the morning hours and late afternoon hours. The anticipated water demands placed on the water system, at full development of 31 properties with two people per ownership, are summarized on Table 2-4.

**TABLE 2-4  
SUMMARY OF DESIGN CRITERIA**

<b>Residential Building Lot Availability</b>	
Current Active Properties	13
Total Property Ownership	31
Total Potential Build-out	31
<b>Population</b>	
Assume Two People per Ownership	
Design Population at Full Development	62
<b>Water System Demands</b>	
ADD <sup>1</sup>	100 gpcd
Average Daily Flow (total gallons)	6,200 gallons
Average Daily Flow (gpm)	4.31 gpm
Peak Hourly Flow <sup>2</sup>	11 gpm
Supply Flow Required	11 gpm
Available Supply Flow <sup>3</sup>	13 to 60 gpm
<b>Storage</b>	
Emergency Reserve (Two Days) <sup>4</sup>	12,400 gallons
Fire Fill Reserve <sup>5</sup>	1,200 gallons
Total Required Storage	13,600 gallons

<sup>1</sup>Assumes residential demands are 100 gallons per person per day. No demand allocation for yard watering. No commercial or other demands are anticipated.

<sup>2</sup>Assumed to be 2.5 times ADD.

<sup>3</sup>Based on historical and recent spring flow data.

<sup>4</sup>Assumes a two-day emergency with no spring flow at ADD.

<sup>5</sup>Fire fill reserve is to fill U.S. Forest Service (USFS) or other small fire trucks.

The anticipated water system demands summarized on Table 2-4 show an average daily flow of just over 4 gpm with a peak daily flow of 11 gpm. This flow is equal to the lowest measured flow from the springs. The spring sources typically have more than 11 gpm capacity, so the springs appear able to meet anticipated PDD at full residential development. It is important to note that these anticipated demands do not include yard watering, do not assume a higher per ownership density than two people, nor do they include development of a commercial or other facility that would use water at higher than typical residential rates.

### **2.5.2 Fire Demand**

Realistically, the City of Greenhorn's water system does not have the ability to provide a meaningful fire flow. For comparison purposes, the typical recommended fire flows for residential areas within a City are in the range of 750 gpm to 1,000 gpm with a one- to two-hour duration. Unless the City installed a significantly larger reservoir and larger transmission and distribution system main lines, the system is limited to fire flows that are likely in the range of 50 gpm or so. For the purpose of this WSS, it was assumed full residential fire flows in the range of 750 to 1,000 gpm are not attainable and are not a requirement of the water system.

It is recommended the City consider, as part of any proposed water system improvements project, a few new water flushing hydrants, which can also serve as small capacity fire hydrants, in the distribution system. The City could also consider purchasing some standard fire hoses and nozzles

that would at least provide some basic equipment for fighting fires. While the fire flow capacity of the water system is quite low, it can provide some basic fire protection. A fire truck fill station is also recommended for the ability to fill USFS or other small fire trucks. The water flushing hydrants, hoses, nozzles, and truck fill station would potentially help the City have the means to attempt to protect structures from a forest fire.

## 2.6 Design Criteria

In establishing design standards for a water system, primary consideration must be given to state and federal rules and regulations governing water quality and construction standards for water systems. These regulations, as previously stated, are set by both the EPA and the DWS. In addition to these public health and safety requirements, there are many other factors that control the design parameters for municipal water systems. The City must evaluate many other factors such as financial feasibility, philosophy and policies of the City Council, past system performance and service, and expectations of water users. All of these factors are important and can influence the standards by which water system improvements are made.

There have been many assumptions made herein to estimate the anticipated water system demands (the design criteria) to help evaluate what improvements need to be made to the water system. It is important these assumptions are understood, especially the limitations the assumptions placed on the water system and future development of the City. These assumptions are summarized on Table 2-4 and are outlined hereafter for completeness.

- No yard watering is anticipated.
- Thirty-one property owners represent total build-out capacity.
- Two people per ownership is the anticipated population density, resulting in 62 people.
- No commercial or other non-residential demands are considered.
- Reservoir sizing has been determined assuming a two-day emergency at ADD. This is discussed in more detail in Section 3.0 of this WSS.

Table 2-4 presents a summary of the water system design criteria for evaluating the existing water system and developing improvements to satisfy present and future needs. The applications of these criteria are discussed further in Section 3.0 of this WSS, which address the water supply, storage, and distribution system facilities. Table 2-4 presents the design criteria based on an estimated service population of 54 and the estimated ADD and PDD. Storage volumes are derived from calculations presented in Section 3.0 of this WSS. The design criteria presented on Table 2-4 are used as base information in later sections of this WSS for evaluating existing and future system needs and capability.

# 3.0 - Water System Improvement Alternatives

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## 3.1 General

Section 3.0 of this Water System Study (WSS) summarizes the current condition of the City's water system components as well as recommended improvements. Cost estimates for the recommended improvements are presented in Section 4.0 of this WSS. The water supply, storage, and distribution systems are discussed in detail hereafter.

## 3.2 Water Supply System

As stated earlier, the City of Greenhorn obtains its municipal water supply from a system of two springs located approximately 0.5 mile northwest of the City. The two springs are roughly adjacent to each other (west and east).

The east spring area is an unsecured area where spring water is collected from an old, mostly blocked mine shaft, which then flows through an old bathtub (spring box), before flowing through 4-inch high density polyethylene (HDPE) pipe to the new storage tank. The spring box has an unlocked wooden lid. As mentioned previously, the City has not used this spring source since 2000. A photo of the east spring box can be seen on Figure 3, Photo 1. The east source should be isolated from the drinking water system due to potential water quality concerns. The nature of the collection source being an open mine shaft leaves it highly susceptible to contamination, which would likely be classified as a surface water source by the Oregon Health Authority - Drinking Water Services (DWS), requiring additional treatment once the system is federally regulated. If the east source were to be used again as a drinking water source for the City of Greenhorn, significant improvements would be required. Flow data collected from 1990 to 2006 did not include spring flow from the east source. Therefore, the spring capacity compared against future City full build-out demand analysis from Section 2.0 indicates that current and future demands can be supplied solely by the west spring source. However, it would be wise for the City to invest in improvements to the east spring source to provide additional supply capacity and redundancy.

To bring the east spring source into compliance, the City will need to seal off the mine shaft entrance to ensure the spring water is considered groundwater and will need to construct a sealed spring box with a sealed and lockable lid for the spring outlet. Other needed improvements include an in-line flowmeter and screen unit to help remove any potential debris from the system. The in-line screen and flowmeter would be installed in a small vault on the downstream exterior of the spring box to allow for easy access and maintenance without having to open the spring box lid.

The west spring area is also an unsecured area where spring water is collected in the bottom of a concrete spring manhole structure, before flowing through 4-inch HDPE pipe and combining with the east spring pipe and continuing to the new storage tank. A photo of the west spring area can be seen on Figure 3, Photo 2. The manhole has a very heavy wood and steel lid resting on top and was unlocked at the time of the August 30, 2014, site visit. The lid required a truck-mounted hoist to remove it. Upon inspection, the manhole structure appeared to be in good condition; however, a near-surface water stream was observed trickling into the manhole structure between the ground and concrete. This water stream is likely surface water that has traveled down the outside surface of the manhole structure and

under the concrete spring box and was observed comingling with spring water before flowing into the tank feed transmission line. A photo of the inside of the west spring box can be seen on Figure 3, Photo 3. This surface water path leaves the water system susceptible to contamination and is likely the source of positive total coliform tests seen over the past couple of years. It is recommended that the manhole structure be sealed between the ground and concrete to prevent surface water contamination. This would also prevent potential contamination from small animals and insects entering the spring box. It is also recommended to install fencing around the spring collection area in order to secure it from grazing and wild animals, as well as unwanted human contact.

The spring box was observed to have an unscreened 4-inch transmission line outlet and two overflow outlets, of which one is screened. The overflows drain to daylight. It is recommended that a screen be installed on the transmission line outlet outside the spring box in a small vault to prevent debris and small animals from entering the system. An in-line flowmeter should also be installed in the exterior vault that would contain the screen unit. The second overflow should be removed and the spring box penetration sealed.

It is also recommended that the west spring box lid be replaced by a metal lid that can be opened by a single operator. The lid should have a good lock and a seal so insects, small animals, other debris, etc., cannot enter the springs between the lid and the concrete structure. All of these recommended west spring improvements would provide a more secure and operator-friendly west spring supply source.

The City indicates that the main transmission line between the springs and the tank may be leaking and needs replaced. Reportedly, the line was installed with bells uphill, leaving it susceptible to surface water infiltration. The current transmission line also has sections that are exposed to the elements (see Figure 3, Photo 4) and are susceptible to damage and freezing. It is recommended the springs to tank transmission line be replaced with a buried 4-inch polyvinyl chloride (PVC) or HDPE line.

### **3.2.1 Water Supply Analytical Data**

In 1996, the City began voluntary quarterly sampling of the water system. Based on records provided by the City, the City sampled water from the distribution system in July 2000 for analysis of nitrate, nitrite, sulfate, total cyanide, fluoride, and 11 metals (antimony, arsenic, barium, beryllium, cadmium, chromium, mercury, nickel, selenium, sodium, and thallium). All of these constituents were either not detected or were detected at concentrations less than their corresponding EPA primary maximum contaminant levels. Constituents detected in the sample included nitrate, sulfate, fluoride, arsenic, barium, cadmium, chromium, and sodium.

The City also provided records of total and fecal coliform sampling results for the period from December 1996 through April 2002. For this period, one sample was obtained from a faucet at a particular residence roughly on a quarterly basis. Fecal coliforms were detected in quarterly samples obtained in November 1997 and September 1998. Total coliforms were detected in quarterly samples obtained in February 1997; August 1997; November 1997; and March, June, and September 1998. Since September 1998, quarterly samples obtained from the distribution system have been free of total and fecal coliforms.

The City experienced some total coliform contamination in routine samples in 2009. The suspected source of the contamination was the storage reservoir, with suspected groundwater intrusion into the storage reservoir. Bill Goss, P.E., from the DWS, inspected the water system on October 7, 2009,

and obtained two system samples from the reservoir overflow and from the Dale McLouth (mayor) residence. Neither of these samples contained coliforms. Bill Goss, P.E., prepared a summary letter, along with recommendations for the water system. The recommendations prepared by Bill Goss, P.E., are consistent with the recommendations summarized in this WSS. A copy of the November 13, 2009, letter from the DWS is included in Appendix D for reference.

### ***3.2.2 Water Quality and Regulations***

Because of the history of total coliform contamination and DWS regulations concerning spring sources, it is imperative for the City to eliminate coliform contamination in order to keep a groundwater classification and avoid costly treatment associated with a surface water source.

## **3.3 Water Storage System**

### ***3.3.1 Existing Water Storage System***

The City of Greenhorn's existing water storage tank is located approximately one-third mile northwest of the City. The belowground tank was installed in 2009, consisting of a pre-cast concrete bottom stacked with concrete rings and a concrete top. The reservoir is approximately 6 feet in diameter and approximately 12 feet deep. The total volume is approximately 2,600 gallons. The tank provides distribution system pressures ranging from approximately 40 to 55 pounds per square inch (psi). Photos of the existing storage tank can be seen on Figures 3 and 4, Photos 5 and 6.

Water enters the tank from a single inlet on the top and leaves the tank through a single outlet on the bottom. A tank discharge isolation valve was also installed. The tank has a 4-inch overflow that is routed downhill to daylight (see Figure 3, Photo 7) and is open at the pipe's end. The tank also has buried perforated pipe surrounding the base, which routes infiltrating surface water away from the tank (see Figure 4, Photo 8). The tank also has a vent that appears to be properly sealed. It is recommended that the end of the tank overflow pipe have a flap valve installed to prevent small animals and insects from entering the tank.

On August 30, 2014, the storage tank was drained and entered for inspection. In general, the tank was found to be in good condition, and it appears to have been installed properly. There were no leaks observed between the concrete rings (see Figure 4, Photo 9). The tank looked structurally sound with no observed cracking. Some surface water rusting of exposed rebar was observed in a few concrete rings and at the floor and wall intersection. This rusting could lead to long-term structural tank issues as well as introduce iron-based bacteria into the system. Photos of the rusting can be seen on Figure 4, Photos 10 and 11. A small amount of sediment accumulation was observed in the bottom of the tank. It is recommended that the tank lid be replaced with a more operator-friendly, sealable, lockable, hinged lid. A photo of the existing tank lid can be seen on Figure 4, Photo 12.

### ***3.3.2 Water Storage Design Parameters***

Water storage facilities are utilized to meet several purposes. Storage reservoirs are used to provide operational control for water supply facilities. When a reservoir drops a few feet from the full level, a signal can be activated to call for additional water supply. The amount of storage required for this type of control is called operating storage. Stored water must also be available to supply water during periods in which the demand for water exceeds the available water supply. This reserve is

called equalization storage. Fire reserve storage is also normally present to provide sufficient storage volume to fight fires. Lastly, a reserve is often provided for emergencies that may arise and interfere with production from water supply sources. Such emergencies could be created by power outages, mechanical equipment failure, or sudden water contamination. The amount of storage to be provided for an emergency depends on the likelihood and the impact of such an occurrence. The amount of emergency storage provided usually becomes a balance between what is needed and what can be afforded. This storage allowance is usually called emergency reserve.

Emergency storage is usually provided for the minimum of a one- to three-day supply in the event of a power outage, mechanical problems, or other problems that would interrupt the reliable supply of water. In most cases, this would be the minimum amount of time to repair or replace a well pump or other equipment. The amount of emergency storage required is largely dependent upon the reliability of the water supply sources. The City of Greenhorn's spring system operates by gravity flow, not needing mechanical equipment to operate. A failure of the water supply line could eliminate the springs as the City's supply until the line could be repaired. Contamination of the spring source could eliminate the City's water supply until the contamination is remediated. Based on the water supply capacity and reliability, a two-day emergency reserve would reasonably meet the City of Greenhorn's emergency storage needs. To provide the one-day emergency reserve at the projected average use rates and population, a total emergency storage volume of 12,400 gallons would be required.

Operating storage is normally provided to facilitate operation of mechanical equipment required to fill a storage tank. Since the City of Greenhorn's storage tank is gravity fed from the springs and any unused water is overflowed to drain at the tank, an operating storage is not required.

Equalization storage is normally provided to balance out the difference between peak hourly demand and water supply capacity during a peak day demand period. Since the springs continually flow into the storage tank and can meet the estimated peak hourly flow of 10 gallons per minute (gpm), an equalization storage is not required.

Fire flow storage is normally provided to accommodate large flows for a short period in order to support firefighting efforts. As mentioned before, the City of Greenhorn's water system does not have the ability to provide a meaningful fire flow. For comparison purposes, the typical recommended fire flows for residential areas within a City are in the range of 750 gpm to 1,000 gpm with a one- to two-hour duration. Unless the City installed a significantly larger reservoir and larger transmission and distribution system main lines, the system is limited to fire flows that are likely in the range of 50 gpm or so. For the purpose of this WSS, it was assumed full residential fire flows in the range of 750 to 1,000 gpm are not attainable and are not a requirement of the water system. However, a fire fill reserve of 1,200 gallons is recommended for the capacity to fill U.S. Forest Service or other small fire trucks in the event of a fire.

In establishing design standards for a water system, primary consideration must be given to state and federal rules and regulations governing water quality and construction standards for water systems. These regulations are set by both the EPA and the DWS. In addition to these public health and safety requirements, there are many other factors that control the design parameters for municipal water systems. The City must evaluate many other factors such as financial feasibility, philosophy and policies of the City Council, past system performances and service, and expectations

of the water users. All of these factors are important and can influence the standards by which water system improvements are made.

### ***3.3.3 Recommended Storage Capacity***

It is recommended that the City maintain a storage volume of 13,600 gallons, if feasible and if growth occurs. A tank of this size could provide the design storage volumes for a population of 62 people as summarized on Table 2-2.

In 2009, the City of Greenhorn installed a new buried 2,600-gallon concrete storage tank. The new tank is in good condition and performing adequately with no major findings during the August 30, 2014, inspection. While it would be preferable to have additional storage for future development and growth, there are no recommended storage capacity improvements at this time. If the City begins to grow beyond its current 13 connections with additional development and residents, additional storage volume would be a wise investment.

## **3.4 Distribution System**

### ***3.4.1 Water Distribution System***

The pipe extending from the storage tank to the distribution system is approximately 1,800 feet of 2-inch HDPE and was installed with the new storage tank in 2009. It was reportedly buried at a depth of about 20 inches. It is normally recommended that water lines are buried at a depth of at least 36 inches or more, depending on the severity of cold weather in the area. However, the continuous flow of the springs through the pipeline likely helps keep the line from freezing.

The entire City is served by gravity flow and has distribution system pressures reportedly ranging from 40 to 55 psi. The water main lines within the City of Greenhorn are 2-inch HDPE, and 2-inch PVC mains branch off from it, with service lines being 3/4-inch PVC. There is a main isolation valve with a wooden valve house at the end of the tank-to-distribution transmission line as well as an end-of-distribution valve that controls the distribution purge flow. Photos of the start-of-distribution valve house and end-of-distribution purge valve can be seen on Figure 5, Photos 13 and 14. Each of the PVC distribution mains has an isolation valve where it comes off the main HDPE line. There are no hydrants on the system.

None of the water users have water meters. A map of the existing distribution system is shown on the map at the end of this WSS.

Because of the small size of the distribution system main lines and limited source and storage capacity, the City has very limited fire protection. An alternative to costly upsizing of the storage reservoir and distribution main lines would be to install a few new water flushing hydrants throughout the City, which can also serve as a small capacity fire hydrant. Fire hose could be laid from these connections to nearly every residential location in the City, giving the City the ability to fight a residential fire. A truck fill station is also recommended within the distribution system to support firefighting efforts. A truck fill station would provide valuable capability to fill a fire tanker truck in the event of a fire, while providing water system protection through a required air gap. A conceptual drawing of a truck fill station can be seen on Figure 6.

The City of Greenhorn's distribution system has some dead-end lines that could lead to water quality problems, primarily during periods of low water use. It is recommended increased system circulation be provided by connecting the mains on Worley Street and Phoenix Street with a new 2-inch HDPE main line. The location of the proposed water line is shown on the map found at the end of this WSS.

# 4.0 - Summary of Recommended Improvements

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The recommended water system improvements for the water supply, storage, and distribution systems are summarized in detail in Section 3.0, including the reasoning for the improvements. This section of the Water System Study contains a summary of all recommended improvements, including estimated costs.

Estimated costs for the improvements recommended herein have been prepared assuming the work is completed using the public bid process. The costs also include an additional 35 percent that includes administration, design engineering, construction engineering, legal fees, and a 10 percent construction contingency. Including these items is a requirement of funding agencies to ensure adequate funding is available, which includes a 10 percent contingency.

## 4.1 Water Supply Improvements

The recommended water supply improvements include the following:

### *4.1.1 Existing Spring Improvements*

To maintain the springs as a secure source of water supply for the City, additional improvements should be made. These improvements include the following:

- West Spring Source
  - Replace the concrete spring box lid with an operator-friendly lid that is easily opened, is lockable, and is sealed.
  - Seal the exterior of the connection between the concrete spring box to the block foundation for the spring to prevent exterior water intrusion.
  - Install a new vault on the spring outlet line with a flowmeter and in-line screen to facilitate flow readings and screen cleaning and maintenance.
  - Install fencing around the spring area to keep out livestock and wild animals from the area adjacent to the spring.
  - Install a screen on the main spring box overflow outlet, and remove and seal the protrusion for the secondary overflow pipe.
- East Spring Source
  - Install a new vault for the spring source to include an operator-friendly lockable, sealed, lid.
  - Install a new vault on the spring outlet line to include a flowmeter and an in-line screen to facilitate flow readings and screen cleaning and maintenance.
  - Open the mine shaft entrance to facilitate construction of a wall to seal the mine shaft from all intrusion. The wall should include a sealed, lockable door to facilitate access.

The estimated cost for the existing spring improvements is \$17,000 for the west spring, and \$62,000 for the east spring, as summarized on Figure 7.

#### ***4.1.2 New Spring to Storage Tank Transmission Line***

A new 4-inch diameter polyvinyl chloride or high density polyethylene water line is recommended from the springs to the storage tank. The estimated construction cost for the new transmission line is \$84,000, as summarized on Figure 8.

### **4.2 Storage Improvements**

The recommended storage improvements include the following:

#### ***4.2.1 Existing Tank Improvements***

The existing tank is in relatively good shape. Based on the August 30, 2014, inspection, improvements that should be completed to the new tank include installing a flap valve on the end of the tank overflow pipe and replacing the existing lid with a more operator-friendly, sealable, and lockable hinged lid. The estimated cost for the existing tank improvements is \$3,700, as summarized on Figure 9. Additional storage capacity is preferred if financially feasible and if additional growth occurs.

### **4.3 Distribution System Improvements**

The recommended distribution system improvements are as follows:

#### ***4.3.1 Priority Improvements - New Water Flushing Hydrants/Connections***

Three water flushing hydrants, which can also serve as small capacity fire hydrants, are recommended throughout the distribution system. By purchasing several hundred feet of fire hose and the proper nozzles, the City would potentially have the means to fight a residential structure fire using only gravity flow from the new storage tank. The estimated cost for the new fire connections is summarized on Figure 10.

#### ***4.3.2 Priority Improvements - Distribution System Valves***

It is recommended water system isolation valves be installed to facilitate isolation of some areas of the distribution system. The estimated cost for the recommended new valves is summarized on Figure 10.

#### ***4.3.3 Additional Improvements - Distribution System Main Lines***

It is recommended a new water line be installed from Worley Street to Phoenix Street to provide looping to dead-end lines. The estimated cost for the recommended new distribution system line is summarized on Figure 10.

#### ***4.3.4 Additional Improvements - Truck Fill Station***

A truck fill station is recommended within the distribution system. A truck fill station would provide valuable capability to fill a fire tanker truck in the event of a fire, while providing water system protection through a required air gap. The estimated cost for the recommended truck fill station is summarized on Figure 10.

#### ***4.3.5 Summary of Distribution System Improvements***

The recommended priority improvements, which include new valves, water flushing hydrants, and hoses has a total estimated cost of \$15,600, as summarized on Figure 10. The additional improvements, which includes 2-inch main lines and a truck fill station, has a total estimated cost of \$41,000, as summarized on Figure 10.

### **4.4 Total Estimated Cost Summary**

#### ***4.4.1 Priority Recommended Improvements***

The recommended priority water system improvements include the west spring, reservoir, transmission line, valving, and water flushing hydrant/hose improvements. These are the minimum recommended improvements the City should complete, if possible. The total estimated cost for the priority recommended improvements is \$120,300 as summarized on Figure 11.

#### ***4.4.2 Additional Recommended Improvements***

If funding permits, it would be beneficial to the City to complete additional improvements to the water system. These additional improvements include the east spring, distribution system main line, and a truck fill station. The total estimated cost for the additional recommended improvements is \$103,000 as summarized on Figure 11.

# 5.0 - Project Financing and Implementation

---

Section 5.0 of this Water System Study (WSS) provides basic financing information for the City's water system. An implementation plan is also presented should the City desire to proceed with a water system improvements project.

## 5.1 Introduction

The City of Greenhorn has an initial connection fee of \$350. There are no monthly charges for the water system. There are no water meters currently in the system.

## 5.2 Project Funding

The total estimated cost of the priority recommended water system improvements outlined in Section 4.0, including a 10 percent construction contingency is \$120,300, as summarized on Figure 11.

## 5.3 Existing Debt Capacity of Water Department

The City of Greenhorn has very little debt capacity within the current water user base. Effectively, there are only 13 permanent water users. If a typical municipal loan rate of 4 percent for 20 years is considered, each \$5.00 increase in the monthly base rate, assuming 13 connections, represents approximately \$10,600 in total debt capacity. Thus, a rate increase of \$5.00 would yield a loan of about \$10,600, a rate increase of \$10.00 would yield a loan of about \$21,200, etc. Typical monthly water costs required by many funding agencies prior to being considered for grant funds is in the range of \$35 to \$40 or more per month. Assuming \$25 of the monthly rate would be available for debt service, the City could obtain a loan of approximately \$53,000. This scenario is likely not financially feasible for the City of Greenhorn, due to the part-time nature of many of the City's water system connections. Thus, implementation of any type of major improvement without using external funds, grant funds, and/or City reserves is not financially feasible for the City of Greenhorn.

## 5.4 Project Implementation

If the City desires to complete some or all of the water system improvements, the following action items and implementation steps need to be made by the City of Greenhorn. The steps outlined are general in nature and include the major steps and processes that need to be undertaken.

### 5.4.1 Action Items

1. The City will need to formally adopt the WSS.
2. The City will need to select improvements to be completed.
3. The City will need to initiate talks with Baker County for funding opportunities.
4. The City may desire to hold public information meetings to inform its citizens of the needs and scope of the project, to answer questions, and to generate support for the project and a potential water rate increase.

### **5.4.2 Implementation Steps**

Should the City wish to proceed with a water system improvements project, the following implementation plan outlines the key steps the City would need to undertake to proceed with project implementation.

<b><u>ITEM</u></b>	<b><u>COMPLETION DATE</u></b>
1. Finalize the WSS	November/December 2015
2. Initiate Baker County Funding Meetings	November/December 2015
3. Finalize Project Funding	December 2015
4. Design and Bid Improvements	Spring 2016
5. Construct Improvements	Summer 2016
8. Close Out Project	Fall 2016

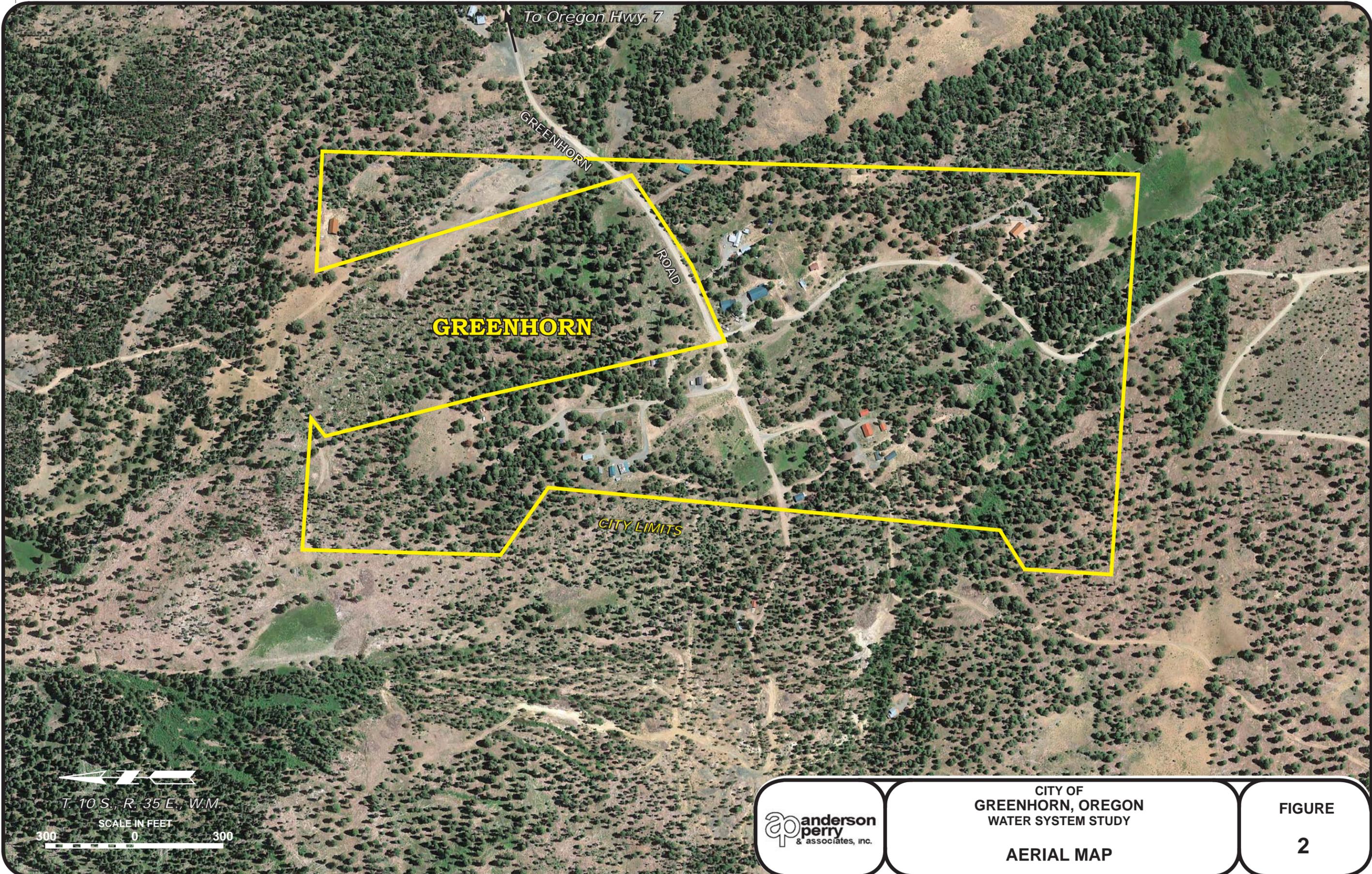
### **5.5 Conclusions**

The improvements outlined herein have been developed to meet the City of Greenhorn's basic water system needs for the next 20 years or more while also considering available project funding. Water system improvements as outlined in this WSS will provide the City with a more reliable water system that would meet the needs of the City for many years to come. If additional growth begins to occur, it is recommended the City also consider additional storage capacity.

## Figures

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CITY OF  
GREENHORN, OREGON  
WATER SYSTEM STUDY  
**AERIAL MAP**

FIGURE  
**2**



PHOTO 1 - East Spring box.



PHOTO 2 - West Spring box.



PHOTO 3 - Inside of west spring box.



PHOTO 4 - Example of exposed transmission line to tank.



PHOTO 5 - Buried storage tank location - vent pipe visible.



PHOTO 6 - Concrete storage tank in stalled in 2009.



PHOTO 7 - Storage tank overflow line discharge.



PHOTO 8 - Drain piping around storage tank.



PHOTO 9 - Storage tank ring joint.



PHOTO 10 - Rebar rust in storage tank.



PHOTO 11 - Rebar rust in storage tank.



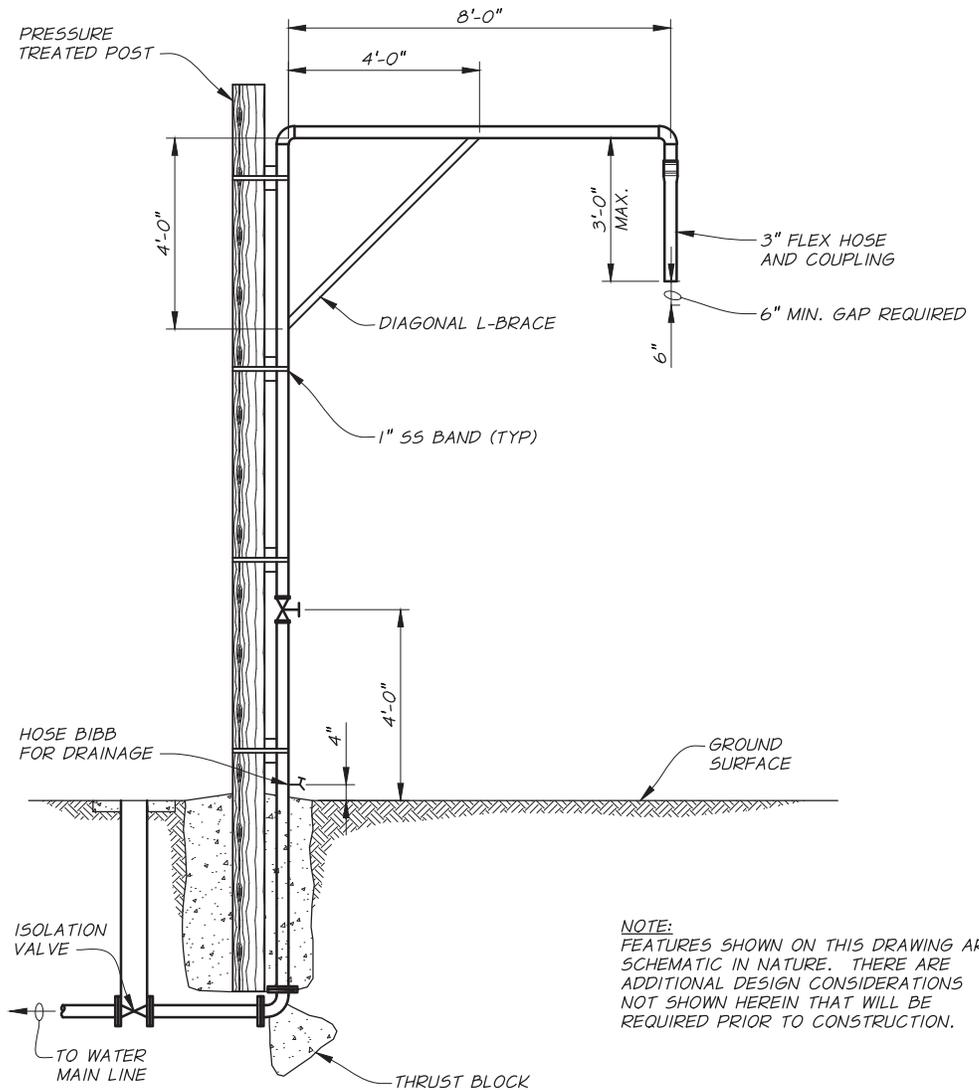
PHOTO 12 - Storage tank top/lid.



**PHOTO 13 - Structure over main valve junction at transmission line connection point to the distribution system.**



**PHOTO 14 - Pressure sustaining valve at low point in distribution system.**



**TYPICAL TRUCK FILL STATION**

N.T.S.

**ESTIMATED COSTS  
WATER SUPPLY IMPROVEMENTS  
YEAR 2016 COSTS**

<b>ITEM</b>	<b>DESCRIPTION</b>	<b>UNIT</b>	<b>ESTIMATED QUANTITY</b>	<b>UNIT PRICE</b>	<b>TOTAL PRICE</b>
<b>West Spring Improvements</b>					
1.	Mobilization (7%)	LS	All Req'd	800 \$	800
2.	New Spring Box Lid	LS	All Req'd	3,800	3,800
3.	Seal Exterior/Interior	LS	All Req'd	600	600
4.	New Vault, Screen, Flowmeter	LS	All Req'd	6,500	6,500
5.	New Fencing	LS	All Req'd	700	700
6.	Overflow Piping Modifications	LS	All Req'd	200	200
<b>Subtotal Estimated Construction Cost</b>					<b>\$ 12,600</b>
Administration, Legal, Design and Construction Engineering, Permitting, and Construction Contingency @ 35%					4,400
<b>Total Estimated Cost, West Spring Improvements</b>					<b>\$ 17,000</b>
<b>East Spring Improvements</b>					
1.	Mobilization (7%)	LS	All Req'd	3,000 \$	3,000
2.	New Spring Vault Lid	LS	All Req'd	6,000	6,000
3.	New Outlet Line Vault with Screen and Flowmeter	LS	All Req'd	2,000	2,000
4.	New Access Wall to Seal Mine Shaft	LS	All Req'd	35,000	35,000
<b>Subtotal Estimated Construction Cost</b>					<b>\$ 46,000</b>
Administration, Legal, Design and Construction Engineering, Permitting, and Construction Contingency @ 35%					16,000
<b>Total Estimated Cost, East Spring Improvements</b>					<b>\$ 62,000</b>



CITY OF  
GREENHORN, OREGON  
WATER SYSTEM STUDY

**ESTIMATED COSTS - WATER  
SUPPLY IMPROVEMENTS**

**FIGURE  
7**

**ESTIMATED COSTS  
TRANSMISSION LINE IMPROVEMENTS  
YEAR 2016 COSTS**

<b>ITEM</b>	<b>DESCRIPTION</b>	<b>UNIT</b>	<b>ESTIMATED QUANTITY</b>	<b>UNIT PRICE</b>	<b>TOTAL PRICE</b>
1.	Mobilization (7%)	LS	All Req'd	4,000 \$	4,000
2.	4-inch Transmission Line	LF	1,700	32	54,400
3.	Connection to Existing Line	EA	3	500	1,500
4.	3-inch Valves	EA	3	800	2,400
<b>Subtotal Construction Cost</b>					<b>\$ 62,300</b>
Administration, Legal, Design and Construction Engineering, Permitting, and Construction Contingency @ 35%					21,700
<b>Total Estimated Cost, Transmission Line Improvements</b>					<b>\$ 84,000</b>

**ESTIMATED COSTS  
STORAGE RESERVOIR IMPROVEMENTS  
YEAR 2016 COSTS**

<b>ITEM</b>	<b>DESCRIPTION</b>	<b>UNIT</b>	<b>ESTIMATED QUANTITY</b>	<b>UNIT PRICE</b>	<b>TOTAL PRICE</b>
1.	Mobilization (7%)	LS	All Req'd	200 \$	200
2.	New Reservoir Lid, Lockable	LS	All Req'd	2,000	2,000
3.	Overflow Line Flap Valve	LS	All Req'd	500	500
<b>Subtotal Construction Cost \$</b>					<b>2,700</b>
Administration, Legal, Design and Construction Engineering, Permitting, and Construction Contingency @ 35%					1,000
<b>Total Estimated Cost, Storage Reservoir Improvements \$</b>					<b>3,700</b>

**ESTIMATED COSTS  
DISTRIBUTION SYSTEM IMPROVEMENTS  
YEAR 2016 COSTS**

ITEM	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
<b>Recommended Priority Improvements</b>					
1.	Mobilization (7%)	LS	All Req'd	700 \$	700
2.	2-inch Valves	EA	8	650	5,200
3.	Water Flushing Hydrant with Auxiliary Valve	EA	3	1,400	4,200
4.	Cotton Jacket, Rubber-Lined Fire Hose, and Nozzles	LS	All Req'd	1,500	1,500
<b>Subtotal Estimated Construction Cost</b>					<b>\$ 11,600</b>
Administration, Legal, Design and Construction Engineering, Permitting, and Construction Contingency @ 35%					4,000
<b>Total Estimated Cost, Priority Distribution System Improvements</b>					<b>\$ 15,600</b>
<b>Additional Improvements</b>					
1.	Mobilization (7%)	LS	All Req'd	2,000 \$	2,000
2.	2-inch Main Line	LF	550	20	11,000
3.	Connection to Existing Line	EA	2	500	1,000
4.	Truck Fill Station	LS	All Req'd	12,000	12,000
5.	Surface Restoration	SY	450	\$10	4,500
<b>Subtotal Estimated Construction Cost</b>					<b>30,500</b>
Administration, Legal, Design and Construction Engineering, Permitting, and Construction Contingency @ 35%					10,500
<b>Total Estimated Cost, Additional Distribution System Improvements</b>					<b>\$ 41,000</b>

**SUMMARY OF ESTIMATED COSTS  
WATER SYSTEM IMPROVEMENTS  
YEAR 2016 COSTS**

FIGURE NO.	DESCRIPTION	ESTIMATED CONSTRUCTION COST	CUMULATIVE ESTIMATED CONSTRUCTION
<b>Priority Recommended Improvements</b>			
7.	West Spring Improvements	\$ 17,000	\$ 17,000
8.	Transmission Line Improvements	84,000	101,000
9.	Reservoir Improvements	3,700	104,700
10.	Valve and Water Flushing Hydrant/Hose Improvements	15,600	120,300
<b>Total Estimated Costs, Priority Recommended Water System Improvements (Year 2016 Costs)</b>			<b>\$ 120,300</b>
<b>Additional Recommended Improvements</b>			
7.	East Spring Improvements	\$ 62,000	\$ 62,000
10.	Distribution System Lines and Truck Fill Station	41,000	103,000
<b>Total Estimated Costs, Additional Recommended Water System Improvements (Year 2016 Costs)</b>			<b>\$ 103,000</b>

# Appendices Table of Contents

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Appendix A - Water Right Information

Appendix B - Water System Special Use Permit

Appendix C - Water Use Reporting Forms 1990 through 2005, Facility Water Use Report 1990 through 2014

Appendix D - Oregon Health Authority - Drinking Water Service November 13, 2009, Letter

**APPENDIX A**  
**Water Right Information**

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STATE OF OREGON

WATER DIVISION No. 2 COUNTY OF GRANT

CERTIFICATE OF WATER RIGHT

(For rights perfected under original, enlargement or secondary permits)

This is to Certify, That S. C. RICHARDSON, MAYOR and JOHN W. MARSHALL, RECORDER of Greenhorn, State of Oregon, has made proof to the satisfaction of the STATE WATER BOARD of Oregon, of a right to the use of the waters of Twin Springs located in the NW 1/4 of Section 9, T. 10 S.R. 35 E.W.M.

for the purpose of Municipal supply

under Permit No. 504 of the State Engineer, and that said right to the use of said waters has been perfected in accordance with the laws of Oregon and duly confirmed by order of the STATE WATER BOARD of Oregon, made and entered

of record in the Record of Proceedings of said Board, at Salem, in Volume 1 at page 225, on the 29th day of September, 1916; that the priority of the right hereby confirmed dates from November 7, 1910; that the amount of water to which such right is entitled and hereby confirmed, for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed 1.00 cubic feet per second.

A description of the lands under such right, and to which the water hereby confirmed is appurtenant, or, if for other purposes, the place where such water is put to beneficial use, is as follows: The City of Greenhorn, in Grant County, State of Oregon.

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described.

Rights to the use of water for power purposes are limited to a period of forty years from the date of priority of the right, as herein set forth, subject to a preference right of renewal under the laws existing at the date of the expiration of the right for power purposes, as hereby confirmed and limited.

Witness the seal and signature of the STATE

WATER BOARD affixed this 2nd day of November, 1916.

STATE WATER BOARD

(SEAL OF STATE WATER BOARD)

By JOHN H. LEWIS, State Engineer, President

Attest: M. F. MERS, Secretary

\*Permit No. 504  
**APPLICATION FOR A PERMIT TO APPROPRIATE THE PUBLIC  
 WATERS OF THE STATE OF OREGON**

I, S C Richardson, Mayor, & John W. Marshall, Recorder of Greenhorn, Oregon  
(Name of Applicant)  
 of Greenhorn, County of Baker  
(Postoffice)  
 State of Oregon, do hereby make application for a permit to appropriate  
 the following described public waters of the State of Oregon, subject to existing rights.

If the applicant is a corporation, give date and place of incorporation.....  
February 21st, 1903

1. The source of the proposed appropriation is.....  
(Name of stream)  
Twin Springs

2. The amount of water which the applicant intends to apply to beneficial use is All the  
 water of said Twin Springs & is less than one cubic foot per second  
cubic feet per second.

3. The use to which the water is to be applied is.....  
(Irrigation, power, mining, manufacturing,  
 domestic supplies, etc.)  
Municipal purposes.

4. The point of diversion is located initial point at the Springs bears S 62 ° E 932  
ft. from the ¼ Sec. cor. bet. Secs. 8 & 9, T. 10 S. R 35 E. Will Mer., Ore.  
(Give distance and bearing to section corner)

being within the NW ¼ of SW ¼ of Sec. Nine, Tp. 10 South  
(Give smallest legal subdivision) (No. N. or S.)  
 R. 35 East, W. M., in the County of Grant  
(No. E. or W.)

5. The pipe line to be about one  
(Main ditch, canal or pipe line)  
miles in length, terminating in the SE ¼ of SE ¼ of Sec. 9, Tp. 10 S  
(Smallest legal subdivision) (No. N. or S.)  
 R. 35 E, W. M., the proposed location being shown throughout on the accompanying map.  
(No. E. or W.)

6. The name of the ditch, canal or other works is.....  
Greenhorn Townsite Municipal Water Supply Pipe Line

**Description of Works**

**Diversion Works—**

7. (a) Height of dam.....feet, length on top.....feet, length at bottom  
 .....feet; material to be used and character of construction.....  
(Loose rock, concrete,  
 masonry, rock and brush, timber crib, etc., wasteway over or around dam)

(b) Description of headgate.....  
(Timber, concrete, etc., number and size of openings)

\*A different form of application is provided where an appropriation is to be made by the enlargement of existing works, or where storage works are contemplated. These forms can be secured without charge, together with instructions, by addressing the State Engineer, Salem, Oregon.

**Canal System—**

8. (a) Give dimensions at each point of canal where materially changed in size, stating miles from headgate. At headgate: Width on top (at water line).....feet; width on bottom.....feet; depth of water.....feet; grade.....feet fall per 1000 feet.

(b) At.....miles from headgate: Width on top (at water line).....feet; width on bottom.....feet; depth of water.....feet; grade.....feet fall per 1000 feet.

.....  
.....  
.....

**Fill in the Following Information Where the Water is Used for:**

**Irrigation—**

9. The land to be irrigated has a total area of.....acres, located in each smallest legal subdivision, as follows: .....

(Give area of land in each smallest legal subdivision which you intend to irrigate)

.....  
.....  
.....  
.....  
.....

(If more space required, attach separate sheet)

**Power, Mining, Manufacturing or Transportation Purposes—**

10. (a) Total amount of power to be developed.....horsepower.

(b) Total fall to be utilized.....feet.  
(Head)

(c) The nature of the works by means of which the power is to be developed.....

(d) Such works to be located in.....of Sec. ....  
(Legal subdivision)

Tp. ...., R. ...., W. M. ....  
(No. N. or S.) (No. E. or W.)

(e) Is water to be returned to any stream?.....  
(Yes or No)

(f) If so, name stream and locate point of return.....  
.....Sec. ...., Tp. ...., R. ...., W. M. ....  
(No. N. or S.) (No. E. or W.)

(g) The use to which the power is to be applied is.....

(h) The nature of the mines to be served.....

Municipal Supply—

11. To supply the city of Greenhorn  
Baker County, having a present population of 100 and an estimated  
(Name of) population of \_\_\_\_\_ in 19\_\_\_\_\_

12. Estimated cost of proposed works, \$ 1500.00

13. Construction work will begin on or before Aug 1st, 1911  
pipe line

14. Construction work will be completed on ~~or~~ before Dec 1, 1911

15. The water will be completely applied to the proposed use on or before \_\_\_\_\_  
December, 1911

Duplicate maps of the proposed ditch or other works, prepared in accordance with the rules of the Board of Control, accompany this application.

S C Richardson, Mayor  
(Name of Applicant)  
John W. Marshall, (City Recorder)

Signed in the presence of us as witnesses:

- (1) Geo. R. Wiegand Greenhorn, Oregon.  
(Name) (Address of Witness)
- (2) Geo. W. Massamorl " "  
(Name) (Address of Witness)

Remarks: We already have a pipe line laid from the mountains to the town, a stand pipe, tower & tank, & distribution pipes installed & in use, but the source of our present supply so nearly dries up in summer that it will not pay to maintain the pipe line for the amount of water we receive therefrom. We, therefore, wish to remove the pipe from the present line, from the point "A" on plat to the present source, & lay the same pipe on the lines indicated. We wish to lay our drain tile collecting pipes & our conducting pipe line as soon as possible & then build our reservoir at as early a date as we have the means with which to do it. We have ample funds now on hand to construct the proposed system excepting the reservoir. We wish to avoid indebtedness & therefore request that we have several years in which to build the reservoir.

STATE OF OREGON, }  
County of Marion } ss.

This is to certify that I have examined the foregoing application, together with the accompanying maps and data, and return the same for correction or completion, as follows:

In order to retain its priority, this application must be returned to the State Engineer. with corrections, on or before \_\_\_\_\_, 19\_\_\_\_\_

WITNESS my hand this \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_\_

State Engineer.

6-

Application No. 1062

Permit No. 504

PERMIT

To appropriate the public waters of the State of Oregon

Division No. 2 District No.

This instrument was first received in the office of the State Engineer at Salem, Oregon, on the 7 day of November 19 10, at 8:00 o'clock A.M. Returned to applicant for correction

Corrected application received

Approved

Jan 24 1911

Recorded in Book No. 2 of Permits on

Page 504

John H Lewis

\$8.00

State Engineer

STATE OF OREGON,

County of Marion

SS.

This is to certify that I have examined the foregoing application and do hereby grant the same, subject to the following limitations and conditions:

The amount of water appropriated shall be limited to the amount which can be applied to beneficial use and not to exceed One (1.00) cubic feet per second.

Actual construction work shall begin on or before Jan 24 1912 and shall thereafter be prosecuted with reasonable diligence and be completed on or before Jun 24 1913

Complete application of the water to the proposed use shall be made on or before Jan 24 1914

WITNESS my hand this 24th day of January, 19 11

John H Lewis

State Engineer.

**APPENDIX B**  
**Water System Special Use Permit**

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U. S. DEPARTMENT OF AGRICULTURE Forest Service  SPECIAL-USE PERMIT  Authority: <u>Act of October 21, 1976</u> <u>FLPMA</u>	Holder No.	Issue Date	Expir. Date
	<u>1 2 1 5-01</u>	<u>  /  /  </u>	<u>1 2/3 1/0 5</u>
	Type Site(s)	Authority	Auth. Type
	<u>  -  -  9 1 5</u>	<u>  -  -  </u>	<u>  -  -  -  </u>
	Region/Forest/District	State/County	
	<u>0 6/ 1 6 / 0 9</u>	<u>4 1/ 0 0 1</u>	
	Cong. Dist.	Latitude	Longitude
	<u>0 2</u>	<u>  -  -  -  </u>	<u>  -  -  -  </u>

The City of Greenhorn, Jack Hashagen of P.O. Box 473  
 (Holder Name) (Billing Address - 1)

Ontario Oregon 97914  
 (Billing Address - 2) (City) (State) (Zip Code)

(hereinafter called the Holder) is hereby authorized to use or occupy National Forest System lands, to use subject to the conditions set out below, on the Wallowa-Whitman National Forest.

This permit covers 1.73 acres and is described as NW1/4 SW1/4 of Section 9, T10S, R35E, W.M.; as shown on the location map attached to and made a part of this permit, and is issued for the purpose of: Two spring developments and a 25 ft. X 3023 ft. right-of-way for a 4 inch water transmission line from the spring southeasterly across the National Forest to private land. The pipeline as constructed is deemed the centerline of the right-of-way.

The above described or defined area shall be referred to herein as the "permit area".

TERMS AND CONDITIONS

I. AUTHORITY AND GENERAL TERMS OF THE PERMIT

A. Authority. This permit is issued pursuant to the authorities enumerated at Title 36, Code of Federal Regulations, Section 251 Subpart B, as amended. This permit, and the activities or use authorized, shall be subject to the terms and conditions of the Secretary's regulations and any subsequent amendment to them.

B. Authorized Officer. The authorized officer is the Forest Supervisor or a delegated subordinate officer.

C. License. This permit is a license for the use of federally owned land and does not grant any permanent, possessory interest in real property, nor shall this permit constitute a contract for purposes of the Contract Disputes Act of 1978 (41 U.S.C. 611). Loss of the privileges granted by this permit by revocation, termination, or suspension is not compensable to the holder.

D. Amendment. This permit may be amended in whole or in part by the Forest Service when, at the discretion of the authorized officer, such action is deemed necessary or desirable to incorporate new terms, conditions, and stipulations as may be required by law, regulation, land management plans, or other management decisions.

*John Caspell*  
*P.O. Box 819 John's # 541 - 755 - 5143*  
*Prairie City 97860 Cabin*

E. Existing Rights. This permit is subject to all valid rights and claims of third parties. The United States is not liable to the holder for the exercise of any such right or claim.

F. Nonexclusive Use. Unless expressly provided in additional terms, this permit is not exclusive. The Forest Service reserves the right to use or allow others to use any part of the permit area for any purpose.

G. Public Access and Use. Unless specifically limited under additional terms to this permit, the holder agrees to allow the public free and unrestricted access to and use of the permit area at all times for all lawful purposes. To facilitate public use of the permit area, all existing roads or roads as may be constructed by the holder shall remain open to the public, except for roads as may be closed by joint agreement of the holder and the authorized officer.

H. Forest Service Right of Entry and Inspection. The Forest Service shall have free and unrestricted access at all times, including the right to enter into all buildings, dwellings, and other facilities to ensure compliance with the terms and conditions of this permit. In addition, the Forest Service may enter the authorized facilities for any purpose or reason consistent with any right or obligation of the United States under any law or regulation.

I. Assignability. This permit is not assignable or transferable. If the holder through death, voluntary sale or transfer, enforcement of contract, foreclosure, or other valid legal proceeding shall cease to be the owner of the improvements, this permit shall terminate.

J. Permit Limitations. Nothing in this permit allows or implies permission to build or maintain any structure or facility, or to conduct any activity unless specifically provided for in this permit. Any use not specifically identified in this permit must be approved by the authorized officer in the form of a new permit or permit amendment.

## II. TENURE AND ISSUANCE OF A NEW PERMIT

A. Expiration at the End of the Authorized Period. This permit will expire at midnight on December 31, 2000. Expiration shall occur by operation of law and shall not require notice, any decision document, or any environmental analysis or other documentation.

B. Minimum Use or Occupancy of the Permit Area. Use or occupancy of the permit area shall be exercised at least 365 days each year, unless otherwise authorized in writing under additional terms of this permit.

C. Notification to Authorized Officer. If the holder desires issuance of a new permit after expiration, the holder shall notify the authorized officer in writing not less than six (6) months prior to the expiration date of this permit.

D. Conditions for Issuance of a New Permit. At the expiration or termination of an existing permit, a new permit may be issued to the holder of the previous permit or to a new holder subject to the following conditions:

1. The authorized use is compatible with the land use allocation in the Forest Land and Resource Management Plan.
2. The permit area is being used for the purposes previously authorized.
3. The permit area is being operated and maintained in accordance with the provisions of the permit.
4. The holder has shown previous good faith compliance with the terms and conditions of all prior or other existing permits, and has not engaged in any activity or transaction contrary to Federal contracts, permits, laws, or regulation.

E. Discretion of Forest Service. Notwithstanding any provisions of any prior or other permit, the authorized officer may prescribe new terms, conditions, and stipulations when a new permit is issued. The decision whether to issue a new permit to a holder or successor in interest is at the absolute discretion of the Forest Service.

### III. RESPONSIBILITIES OF THE HOLDER

A. Plans. If required by the authorized officer, all plans for development, layout, construction, reconstruction, or alteration of improvements on the permit area, as well as revisions of such plans, must be prepared by a licensed engineer, architect, and/or landscape architect. Such plans must be approved in writing by the authorized officer or a designated representative before the commencement of any work. A holder may be required to furnish as-built plans, maps, or surveys, or other similar information, upon completion of construction.

B. Maintenance. The holder shall maintain the improvements and permit area to standards of repair, orderliness, neatness, sanitation, and safety acceptable to the authorized officer, and consistent with applicable Federal, State, and local health and safety and other requirements.

C. Hazard Analysis. The holder has a continuing responsibility to identify and abate hazardous conditions on the permit area which could affect the improvements or pose a risk of injury to individuals. Any actions to abate such hazards shall be performed after consultation with the authorized officer.

D. Compliance with Laws, Regulations, and other Legal Requirements. The holder, in exercising the uses authorized by this permit, will assume responsibility for compliance with the regulations of the Department of Agriculture and all Federal, State, county, and municipal laws, ordinances, or regulations which are applicable to the area or operations covered by this permit. The obligations of the holder under this permit are not contingent upon any duty of the Forest Service to inspect the premises. A failure by the Forest Service, or other governmental officials, to inspect is not a defense to noncompliance with any of the terms and conditions of this permit.

E. Fire Prevention and Suppression. The holder shall take all reasonable precautions to prevent and suppress forest fires. Open fires are prohibited except with written permit from the authorized officer or the authorized officer's agent.

F. Change of Address. The holder shall immediately notify the authorized officer of a change in address.

G. Change in Ownership of the Authorized Improvements. This permit is not assignable and terminates upon change of ownership of the improvements. The holder shall immediately notify the authorized officer when a change in ownership is pending. Notification by the present holder and potential owner shall be executed using Form FS-2700-3, Special Use Application and Report, or Form FS-2700-3a, Request for Termination of and Application for Special-Use Permit. Upon receipt of the proper documentation, the authorized officer may issue a permit to the new owner of the improvements.

#### IV. LIABILITY

For purposes of this section, "holder" includes the holder's heirs, assigns, agents, employees, and contractors.

A. Risk of Loss. The holder assumes all risk of loss of the property. Loss to the property may result from, but is not limited to, theft, vandalism, fire, avalanches, rising waters, winds, falling limbs or trees, and acts of God. If the authorized improvements are destroyed or substantially damaged, the authorized officer shall conduct an analysis to determine whether the improvements can be safely occupied in the future and whether rebuilding should be allowed.

B. Damage to Property of the United States. The holder has an affirmative duty to protect from injury and damage the land, property, and other interest of the United States. Damage includes, but is not limited to, fire suppression costs and all costs and damages associated with or resulting from the release or threatened release of a hazardous substance occurring during or as a result of the holder's activities on, or related to, the lands property, and other interests covered by the permit.

1. The holder shall compensate in full the United States for damages occurring under the terms of this permit or under any law or regulation applicable to the National Forests. The holder shall be liable for all injury, loss, or damage, including fire suppression, or other costs associated with rehabilitation or restoration of natural resources, associated with the holder's use or occupancy. Compensation shall include, but is not limited to, the value of resources damaged or destroyed, the costs of restoration, cleanup, or other mitigation, fire suppression or other types of abatement costs, and all administrative, legal (including attorney fees), and other costs in connection therewith.

2. With respect to roads, the holder shall be liable for damages to all roads and trails of the United States open to public use caused by the holder's use to the same extent as provided under paragraph IV (B)(1), except that liability shall not include reasonable and ordinary wear and tear.

3. In addition to liability provided in this paragraph, the holder may incur strict liability for certain high hazard situations if so provided by additional clauses appended to this permit.

C. Indemnification and Liability of the United States. The holder shall comply with all applicable federal, state, and local laws and regulations, including but not limited to the Federal Water Pollution Control Act, 33 U.S.C. 1251 et seq, the Oil Pollution Act, 33 U.S.C. 2701 et seq, the Clean Air Act, 42 U.S.C. 7401 et seq, the Resource Conservation and Recovery Act, 42 U.S.C. 6901 et seq, and the Comprehensive Environmental Response, Control, and Liability Act, 42 U.S.C. 9601 et seq, as subsequently amended. The holder shall indemnify, defend, and hold the United States harmless for any violations incurred under any such laws and regulations or for any costs, damages, claims, liabilities, and judgements arising from past, present, and future acts or omissions of the holder in connection with the use and/or occupancy authorized by this permit. This indemnification and hold harmless agreement includes,

but is not limited to, acts and omissions of the holder in connection with the use and/or occupancy authorized by this permit which result in: (1) violations of the above or any applicable laws and regulations; (2) judgments, claims, or demands assessed against the United States; (3) costs, expenses, and damages incurred by the United States; or (4) other releases or threatened releases on or into land, property, and other interest of the United States by solid waste and/or hazardous substance(s).

The holder's indemnification of the United States shall also include any damage to life or property arising from the holder's occupancy or use of land, property, and other interest of the United States. The United States has no duty to inspect permit area or to warn of hazards and, if the United States does inspect the permit area, it shall incur no additional duty nor liability for identified or non-identified hazards. This covenant may be enforced by the United States in a court of competent jurisdiction.

#### V. TERMINATION, REVOCATION, AND SUSPENSION

A. General. For purposes of this permit, "termination", "revocation", and "suspension" refer to the cessation of uses and privileges under the permit.

"Termination" refers to the cessation of the permit under its own terms without the necessity for any decision or action by the authorized officer. Termination occurs automatically when, by the terms of the permit, a fixed or agreed upon condition, event, or time occurs. For example, the permit terminates at expiration. Terminations are not appealable.

"Revocation" refers to an action by the authorized officer to end the permit because of noncompliance with any of the prescribed terms, or for reasons in the public interest. Revocations are appealable.

"Suspension" refers to a revocation which is temporary and the privileges may be restored upon the occurrence of prescribed actions or conditions. Suspensions are appealable.

B. Revocation or Suspension. The Forest Service may suspend or revoke this permit in whole or part for:

1. Noncompliance with Federal, State, or local laws and regulations.
2. Noncompliance with the terms and conditions of this permit.
3. Reasons in the public interest.
4. Abandonment or other failure of the holder to otherwise exercise the privileges granted.

C. Opportunity to Take Corrective Action. Prior to revocation or suspension for cause pursuant to Section V (B), the authorized officer shall give the holder written notice of the grounds for each action and a reasonable time, not to exceed 90 days, to complete the corrective action prescribed by the authorized officer.

D. Removal of Improvements. Upon abandonment, revocation, termination, or expiration of this authorization, the holder shall remove within a reasonable time prescribed by the authorized officer all structures and improvements, except those owned by the United States, and shall restore the site. If the holder fails to remove all structures or improvements within the prescribed period, they shall become the property of the United States and may be sold, destroyed or otherwise disposed of without any liability to the United States. However, the holder shall remain liable for all cost associated with their removal, including costs of sale and impoundment, cleanup, and restoration of the site.

## VI. FEES

- A. Termination for Nonpayment. This permit shall automatically terminate without the necessity of prior notice when land use rental fees are 90 calendar days from the due date in arrears.
- B. The holder shall pay an annual fee of FORTY Dollars (\$ 40.00 for the period from January 1, 1996, to December 31, 1996, and thereafter annually on January 1, FORTY Dollars (\$ 40.00 : Provided, charges for this use shall be made or readjusted whenever necessary to place the charges on a basis commensurate with the fair market value of the authorized use.
- C. Payment Due Date. The payment due date shall be the close of business on January 1 of each calendar year payment is due. Payments due the United States for this use shall be deposited at File No. 71652, P.O. Box 60,000, San Francisco, CA 94160-1562 in the form of a check, draft, or money order payable to "Forest Service, USDA." Payments shall be credited on the date received by the designated Forest Service collection officer or deposit location. If the due date for the fee or fee calculation statement falls on a non workday, the charges shall not apply until the close of business on the next workday.
- D. Late Payment Interest. Pursuant to 31 USC 3717, and regulations at 7 CFR Part 3, Subpart B, and 4 CFR Part 102, an interest charge shall be assessed on any payment or financial statement not received by the due date. Interest shall be assessed using the most current rate prescribed by the United States Department of Treasury's Fiscal Requirements Manual (TFRM-6-8020.20). Interest shall accrue from the date the payment or financial statement was due. In the event that two or more billings are required for delinquent accounts, administrative costs to cover processing and handling of the delinquent debt will be assessed.
- E. Additional Penalties. In the event of permit termination pursuant to provisions VI (A), and prior to the issuance of a new permit, a penalty of 6 percent per year shall be assessed on any fee amount overdue in excess of 90 days from the payment due date. This penalty shall accrue from the due date of the first billing or the date the fee calculation financial statement was due. The penalty is in addition to interest and any other charges specified in the above paragraph.
- F. Disputed Fees. Disputed fees are due and payable by the due date. No appeal of fees will be considered by the Forest Service without full payment of the disputed amount. Adjustments, if necessary, will be made in accordance with settlement terms or appeal decision.
- G. Delinquent Fees.
1. Delinquent fees and other charges shall be subject to all rights and remedies afforded the United States pursuant to Federal law and implementing regulations (31 U.S.C. 3711 et seq.).
  2. The authorized officer shall require payment of fees owed the United States under any Forest Service authorization before issuance of a new permit.

## VII. OTHER PROVISIONS

- A. Members of Congress. No Member of or Delegate to Congress or Resident Commissioner shall benefit from this permit either directly or indirectly, except when the authorized use provides a general benefit to a corporation.
- B. Appeals and Remedies. Any discretionary decisions or determinations by the authorized officer are subject to the appeal regulations at 36 CFR 251, Subpart C, or revisions thereto.
- C. Removal and Planting of Vegetation. This permit does not authorize the cutting of timber or other vegetation. Trees or shrubbery may be removed or destroyed only after the authorized officer, or authorized officer's agent, has approved, and has marked or otherwise designated that which may be removed or destroyed. Timber cut or destroyed shall be paid for by the holder as follows: Merchantable timber at appraised value and young-growth timber below merchantable size at current damage appraisal value, provided that the Forest Service reserves the right to dispose of the merchantable timber to others than the holder at no stumpage cost to the holder. Trees, shrubs, and other plants may be planted in such manner and in such places about the premises as may be approved by the authorized officer.
- D. Superior Clauses. In the event of any conflict between any of the preceding printed clauses or any provision thereof and any of the following clauses or any provision thereof, the preceding printed clauses shall control.
- E. Holder shall take all measures necessary to protect the health and safety of all persons affected by its activities performed in connection with the construction, operation, maintenance, or termination of the right-of-way, and shall promptly abate as completely as possible any physical or mechanical procedure, activity, event, or condition, existing or occurring at any time: (1) that is susceptible to abatement by the holder, (2) which arises out of, or could adversely affect the construction, operation, maintenance, or termination of all or any part of the 4-inch water transmission pipeline, and (3) that causes or threatens to cause: (a) a hazard to the safety of workers or to public health or safety, or (b) serious and irreparable harm or damage to the environment (including but not limited to areas of vegetation or timber, fish or other wildlife populations, or their habitats, or any other natural resource). Holder shall immediately notify the authorized officer of all serious accidents which occur in connection with such activities. (B-26)
- F. This permit supersedes a special-use permit designated: City of Greenhorn on January 14, 1991 and signed by Charles L. Ernst, acting Forest Supervisor. (X-18)
- G. This permit is granted with the express understanding that should future location of United States Government-owned improvements or road rights-of-way require the relocation of the holder's improvements, such relocation will be done by, and at the expense of, the holder within a reasonable time as specified by the authorized officer. (X-33)
- H. This permit is not exclusive; that is, the Forest Service reserves the right to use or permit others to use any part of the permitted area for any purpose, provided such use does not interfere with the rights and privileges hereby authorized. (X-49)
- I. This permit confers no right to the use of water by the holder. (X-74)

Public reporting burden for collection of information, if requested, is estimated to average 1 hour per response for annual financial information; average 1 hour per response to prepare or update operation and/or maintenance plan; average 1 hour per response for inspection reports; and an average of 1 hour for each request that may include such things as reports, logs, facility and user information, sublease information, and other similar miscellaneous information requests. This includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Agriculture, Clearance Officer, OIRM, AG Box 7630, Washington D.C. 20250; and to the Office of Management and Budget, Paperwork Reduction Project (OMB # 0596-0082), Washington, D.C. 20503.

This permit is accepted subject to the conditions set out above.

HOLDER NAME: City of Greenhorn

By: Jack Husbayer  
(Holder Signature)

\_\_\_\_\_  
(Holder Signature)

Date: \_\_\_\_\_

U. S. DEPARTMENT OF AGRICULTURE  
Forest Service

By: [Signature]  
(Authorized Officer Signature)

Forest Supervisor  
(Title)

Date: 2/21/97

Attachment to Special Use Application and Report

Amend existing authorization The City of Greenhorn, Oregon

# SECTION 9

## TW 10S

## R 35E

Spring Development Site: NW<sub>4</sub> NW<sub>4</sub> SW<sub>4</sub>, Sec. 9  
T. 10S., R. 35E W/M

RESOLUTION NO. 86-016

PROJECT NAME: Twin Springs

PROJECT NO. 86-W-001

Pipeline Site: Beginning in the NW<sub>4</sub> NW<sub>4</sub> SW<sub>4</sub> of Section 9, T 10S, R 35E, thence easterly to the NE<sub>4</sub> NW<sub>4</sub> SW<sub>4</sub>, thence southerly and Easterly thru the E<sub>2</sub> NE<sub>4</sub> NW<sub>4</sub> SW<sub>4</sub>, to the surg tank located in the SE<sub>4</sub> NW<sub>4</sub> SW<sub>4</sub>, thence easterly thru the SW<sub>4</sub> NE<sub>4</sub> SW<sub>4</sub> and the SE<sub>4</sub> NE<sub>4</sub> SW<sub>4</sub> and the SW<sub>4</sub> NW<sub>4</sub> SE<sub>4</sub>, wherein it enters the Greenhorn Mining Claim MS 458.

North

SCALE: 1" = 660 Ft.

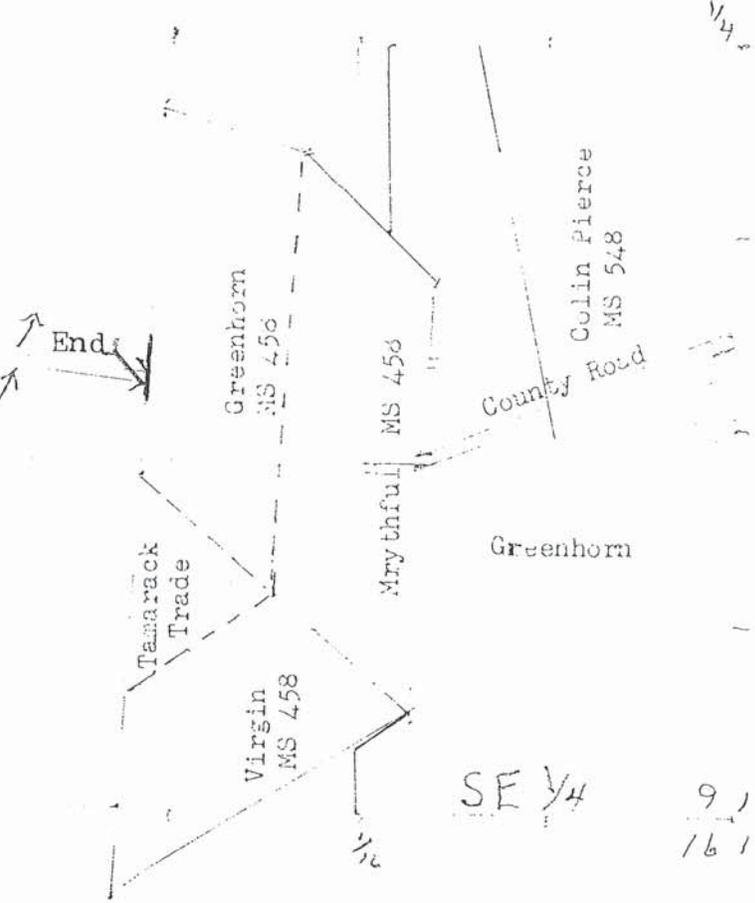
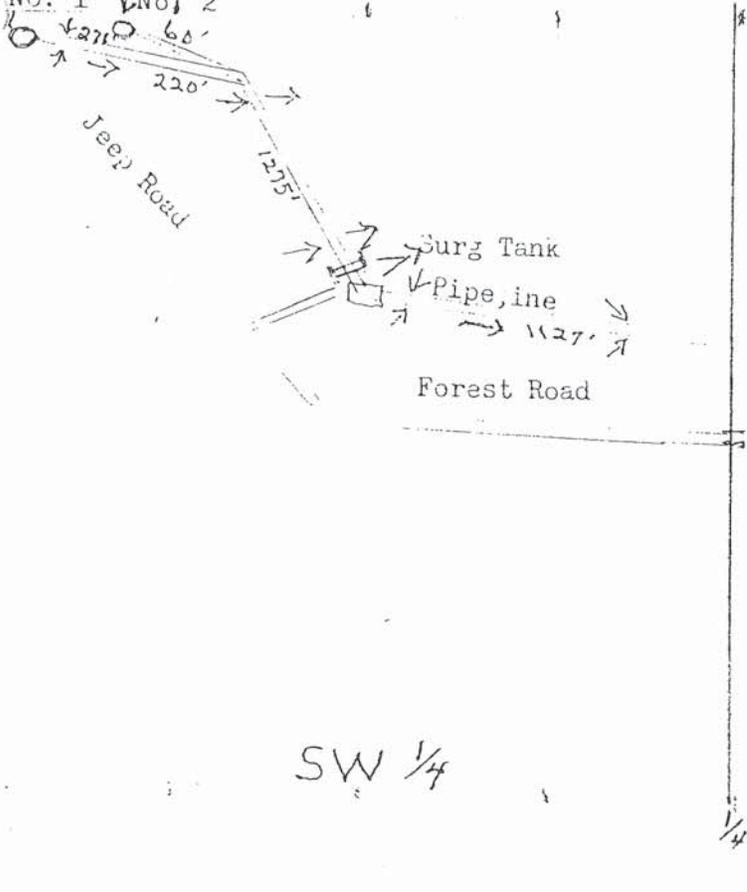
Ground Slope

An Easement has been granted by the Poyser family to the City of Greenhorn wherein the pipeline crosses the Greenhorn & Mrythful Panted Mining Claims.

Baker Co. Deeds 71-39-11-12 9/28/71  
Grant Co. Deeds 126-795-796 8/25/82

Spring Spring

No. 1 No. 2



9.1  
16.1

SECTION 9  
 TW. 10 S., R 35 E.

Spring Development Site: NW $\frac{1}{4}$ , NW $\frac{1}{4}$ , SW $\frac{1}{4}$ , Section 9,  
 T. 10S, R. 35E., W/M.

RESOLUTION NO. 90-001

Pipeline Site: Beginning in the NW $\frac{1}{4}$  NW $\frac{1}{4}$  SW $\frac{1}{4}$  of  
 Section 9, T. 10S, R. 35E W/M; thence easterly  
 to the NE $\frac{1}{4}$  NW $\frac{1}{4}$  SW $\frac{1}{4}$  thence easterly and southerly  
 thru the E $\frac{1}{2}$  NE $\frac{1}{4}$  NW $\frac{1}{4}$  SW $\frac{1}{4}$ , to the surge tank  
 located in the SE $\frac{1}{4}$  NW $\frac{1}{4}$  SW $\frac{1}{4}$ ; thence easterly thru  
 the SW $\frac{1}{4}$  NE $\frac{1}{4}$  SW $\frac{1}{4}$  and the SE $\frac{1}{4}$  NE $\frac{1}{4}$  SW $\frac{1}{4}$  and the SW $\frac{1}{4}$   
 NW $\frac{1}{4}$  SE $\frac{1}{4}$ , wherein it enters the Greenhorn Patented  
 Mining Claim, Mineral Survey No. 458.

PROJECT NAME: Twin Springs

PROJECT NO. 86-W-001

Scale, 1"=660 Ft.

Ground Slope  $\rightarrow$



An Easement has been granted by the Poyser family  
 to the City of Greenhorn, wherein the pipeline crosses  
 the Greenhorn and Myrthful Patented Mining Claims,  
 Mineral Survey No. 458.

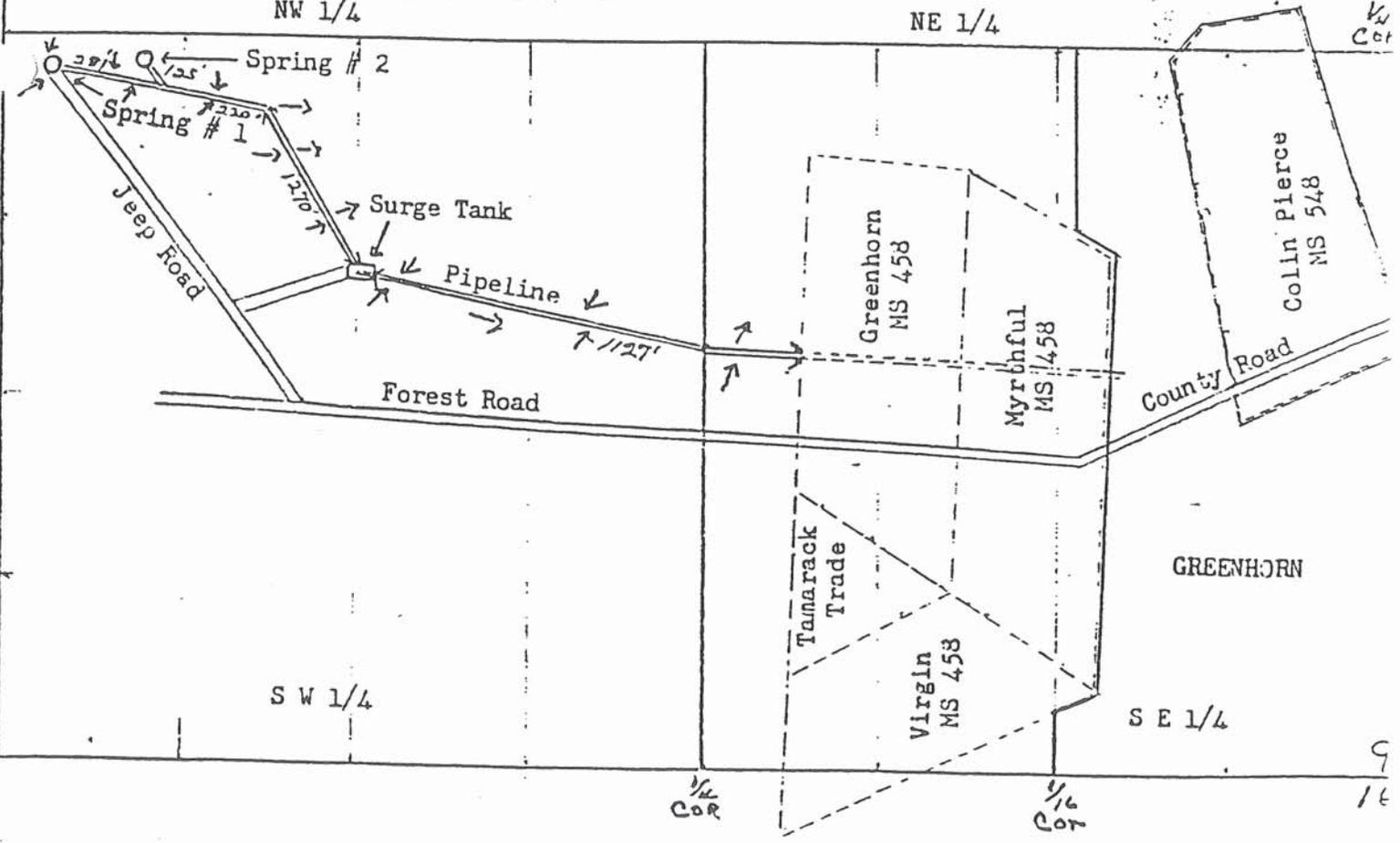
Baker County: Deeds 71-39-11-12 9/28/71

Grant County: Deeds 126-795-796 8/25/82

NW 1/4

NE 1/4

1/4  
Cor



9  
16

**APPENDIX C**  
**Water Use Reporting Forms**  
**1990 through 2005**

**Facility Water Use Report 1990**  
**through 2014**

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Oregon Water Resources Department  
Water-use Reporting: Monthly Quantities Form

Reporting Entity CITY OF GREENHORN  
 Contact Person Joseph G. Gray, Water Administrator  
 Address 15236 S.E. La Marquita Way  
 City, State, Zip Milwaukie, Oregon 97267

User-ID: 1117  
 Water-Year 1990

POD-ID: 11534

Type of Use: Municipal

Month	Volume diverted or in storage			
	Units (circle one): gallons, cubic feet, acre-feet			
October 1989	No estimate (not available)			
November	"	"	(area closed)	
December	"	"	(area closed)	
January 1990	"	"	(area closed)	
February	"	"	(area closed)	
March	"	"	(area closed)	
April	"	"	(area closed)	
May	"	"	(area closed)	
June	44 gal per min			
July	30	"	"	"
August	28	"	"	"
September	25	"	"	"

Number of acres irrigated (if applicable): N/A

MAILED  
11-24-90  
JG

Method of measuring or estimating flow (please describe clearly): Use of a measured 5 gallon container and a stop watch, with a minimum of three tests during measuring time.

The City of Greenhorn, obtains its water from two springs, located on Forest Servie land, under the authority of a Special Use Permit. The springs, from a settling tank, into a 4 inch transmission line, proceeds for approximately 1500 feet downhill to a surge tank. The tank is equipped with an intake line of two inches, being reduced from the 4 inch line. The discharge line is also two inches that proceedson down hill to the city. There is also a two inch overflow line at the discharge end of the tank. Both of the springs are capped at the point where the water is obtained. The method we use to determine our water flow gives us a good idea as to how much water we have to supply the cities needs. There are approximately 12 land owners in our "Histroic Ghost Town", however at the present not all can be in the city at the same time, which takes off some of our water pressure. The tests that we use above are from the overflow pipe, with the town supply shut off. As to the description of our system indicates, this is strictly a gravity flow operati. Our high reading of 44 gal per min is 1.09 cu ft per sec.

Oregon Water Resources Department  
Water-use Reporting: Monthly Quantities Form

Reporting Entity City of Greenhorn  
 Contact Name Joseph G. Gray, Water Administrator  
 Address 15236 S.E. LaMarquita Way  
 City, State, Zip Milwaukie, Oregon 97267

User-ID: 1117  
 Water Year 1991

POD-ID: 11534

Type of Use: Municipal

Month	Volume diverted or in storage			
	Units (circle one): gallons, cubic feet, acre-feet			
October 1990	10	gal.	per.	min.
November	No estimate (area closed)			
December	"	"	"	"
January 1991	"	"	"	"
February	"	"	"	"
March	"	"	"	"
April	"	"	"	"
May	"	"	"	"
June	43	gal.	per.	min.
July	37.5	"	"	"
August	30	"	"	"
September	26	"	"	"

Number of acres irrigated (if applicable): N/A

MAILED  
11/4/91  
[Signature]

Method of measuring or estimating flow (please describe clearly):

Use of a measured five(5) gallon container and a stop watch, with city water turned off at the holding tank, with a minimum of three(3) test during the measuring time. Tests are taken at the entrance to the holding tank.

Oregon Water Resources Department  
Water-use Reporting: Monthly Quantities Form

Reporting Entity CITY OF GREENHORN  
 Contact Name Joseph G. Gray, Water Administrator  
 Address 15236 SE LaMarquita Way  
 City, State, Zip Milwaukie, Oregon 97267

User-ID: 1117  
 Water Year 1992

POD-ID: 11534

Type of Use: Municipal

Month	Volume diverted or in storage					
	Units (circle one): gallons, cubic feet, acre-feet					
October	<u>20</u>	<u>gal</u>	<u>per</u>	<u>min.</u>		
November	<u>No estimate (area closed)</u>					
December	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>
January	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>
February	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>
March	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>
April	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>
May	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>
June	<u>38.7</u>	<u>gal</u>	<u>per</u>	<u>min.</u>		
July	<u>33.3</u>	<u>"</u>	<u>"</u>	<u>"</u>		
August	<u>29.5</u>	<u>"</u>	<u>"</u>	<u>"</u>		
September	<u>25</u>	<u>"</u>	<u>"</u>	<u>"</u>		

Number of acres irrigated (if applicable): N/A

Method of measuring or estimating flow (please describe clearly):

Use of a measured 5 gallon container and a stop watch, with city water turned off at the holding tank. A minimum of three test were taking during each measuring period. Tests are taken at the entrance of the holding tank.

Oregon Water Resources Department

Monthly Quantities Form

Reporting Entity CITY OF GREENHORN

User-Id: 1117

Contact Name Joseph G. Gray, Water Administrator

Water Year 1993

Address 15236 SE LaMarquita Way

City, State, Zip Milwaukie, OR 97267

POD-ID: 11534

Type of Use: Municipal

<u>Month</u>	<u>Volume diverted or in storage</u> <u>Units (circle one): Gallons, Cubic Feet, Acre-feet</u>
October	<u>15.5 gal. per. min.</u>
November	<u>No Estimate (area closed)</u>
December	<u>" " " "</u>
January	<u>" " " "</u>
February	<u>" " " "</u>
March	<u>" " " "</u>
April	<u>" " " "</u>
June	<u>47.5 gal.per. min.</u>
July	<u>41.5 " " "</u>
August	<u>34 " " "</u>
September	<u>26 " # "</u>

Number of acres irrigated (if applicable): N/A

**Method of measuring flow (please describe clearly):**

Use of a measured five (5) gallon container and a stop watch. City water is turned off at the tank. The water flow is then measured as it comes into the system. A minimum of three tests are taking during each test period and the average taken.

Oregon Water Resources Department

**Monthly Quantities Form**

Reporting Entity CITY OF GREENHORN

User-Id: 1117  
(If applicable)

Contact Name JOSEPH G. GRAY

Address 15236 SE La Marquita Way

Water Year 1994

City, State, Zip Milwaukie, OR 97267

POD-ID: 11534  
(enter the Permit Number if there is no POD-ID)

Type of Use: Municipal

<u>Month</u>	<u>Volume diverted or in storage</u> <u>Units (circle one): Gallons, Cubic Feet, Acre-feet</u>
October	<u>10 gal per min</u>
November	<u>No estimate (area closed)</u>
December	<u>No estimate (area closed)</u>
January	<u>No estimate (area closed)</u>
February	<u>No estimate (area closed)</u>
March	<u>No estimate (area closed)</u>
April	<u>No estimate (area closed)</u>
May	<u>No estimate (area closed)</u>
June	<u>40 ga per min</u>
July	<u>32.5 gal per min</u>
August	<u>25 gal per min</u>
September	<u>15 gal per min</u>

Number of acres irrigated (if applicable): N/A

Method of measuring flow (please describe clearly):

Use of a measured five (5) gallon container and a stop watch. A minimum of three (3) test are taken during each reporting month. Measurements taken at the holding tank with the city supply pipe turned off.

Oregon Water Resources Department

Monthly Quantities Form

Reporting Entity CITY OF GREENHORN  
 Contact Name JOSEPH G. GRAY  
 Address 15236 SE LA MARQUITA WAY  
 City, State, Zip MILWAUKIE, OR. 97167

User-Id: 1117  
 (If applicable)

Water Year 1995

POD-ID: 11534  
 (enter the Permit Number if there is no POD-ID)

Type of Use: MUNICIPAL

<u>Month</u>	<u>Volume diverted or in storage</u>			
	<u>Units (circle one) (Gallons) Cubic Feet, Acre-feet</u>			
October	<u>10 gal per min</u>			
November	<u>No estimate (area closed)</u>			
December	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>
January	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>
February	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>
March	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>
April	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>
May	<u>"</u>	<u>"</u>	<u>"</u>	<u>"</u>
June	<u>38 gal per min</u>			
July	<u>24 gal per min</u>			
August	<u>17 gal per min</u>			
September	<u>13 gal per min</u>			

Number of acres irrigated (if applicable): NONE

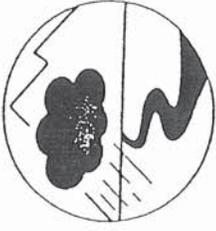
Method of measuring flow (please describe clearly): Use of a measured 5 gallon container. A minimum of 3 test are taken during each reporting month. Readings taken at holding tank with city water supply turned off. This is the only means the city has of measuring flow.





96-97

USER-ID 4117



Oregon Water Resources Department  
October 1996 through September 1997  
Annual Water Use - Monthly Quantities Form

Facility POD-ID	October - 1996	November - 1996	December - 1996	January - 1997	February - 1997	March - 1997	April - 1997	May - 1997	June - 1997	July - 1997	August - 1997	September - 1997	TOTAL *
	12 G / m	No Estimate (April Closed)	11 cc	11	11	11	11	11	15.6 gal per min	60 gal per min	31.5 gal per min	30 gal per min	

\* Describe the units of measure as G (gallons), KG (thousand gallons), MG (million gallons), CF (cubic feet), MCF (million cubic feet), or AF (acre-feet)

Describe method of measuring the water used: 5 gallon Pail with <sup>stop</sup> Watch. If use is irrigation, total number acres irrigated \_\_\_\_\_

I certify this information is true and accurate to the best of my knowledge.

Signature: Jack Hunsberger Title: Water Admin Reporting Entity: City of Greenhorn Date: Nov. 24-1997



USER-ID 1117  
1998



Oregon Water Resources Department  
October 1997 through September 1998  
Annual Water Use - Monthly Quantities Form

Facility POD-ID	October - 1997	November - 1997	December - 1997	January - 1998	February - 1998	March - 1998	April - 1998	May - 1998	June - 1998	July - 1998	August - 1998	September - 1998	TOTAL *
	25 Gal per min	NA Estimate (Closed Area)	" "	" "	" "	" "	" "	" "	60 Gal per min	55 Gal per min	47 Gal per min	37.5 Gal per min	

\* Describe the units of measure as G (gallons), KG (thousand gallons), MG (million gallons), CF (cubic feet), MCF (million cubic feet), or AF (acre-feet)

Describe method of measuring the water used: 5 gallon Pail with watch If use is irrigation, total number acres irrigated \_\_\_\_\_

I certify this information is true and accurate to the best of my knowledge.

Jack Hashagen  
Signature  
Jack Hashagen  
Name - Please Print

Water Admin.  
Title  
City of Greenhorn  
Reporting Entity

Nov. 21 - 1998  
Date

Please complete and mail to: Water Resources Department; Water Use Reporting Program;  
158 12<sup>th</sup> Street NE; Salem, OR 97310-0210



USER-ID 1117

1998

Oregon Water Resources Department  
October 1998 through September 1999  
Annual Water Use - Monthly Quantities Form

1999



Year					
October - 1998	25 Gal per min				
November - 1998	No Estimate (Area Closed)				
December - 1998	" " "				
January - 1999	" " "				
February - 1999	" " "				
March - 1999	" " "				
April - 1999	" " "				
May - 1999	" " "				
June - 1999	60 Gal per min				
July - 1999	50 Gal per min				
August - 1999	42 Gal per min				
September - 1999	33 Gal per min				
Other					

Use the units of measure as G (gallons), KG (thousand gallons), MG (million gallons), CF (cubic feet), MCF (million cubic feet), or AF (acre-feet)  
Describe the method of measuring the water used: 5 gallon pail with stop watch If use is irrigation, total number acres irrigated         

I certify that this information is true and accurate to the best of my knowledge.

Signature: Josh Hoshogen Title: Water Admn Reporting Entity: City of Greenham Date: Nov 1-1999

Name - Please Print: Josh Hoshogen



USER-ID \_\_\_\_\_

1999

Oregon Water Resources Department  
October 1999 through September 2000  
Annual Water Use - Monthly Quantities Form

2000



Year					
October - 1999	15 Gal per min				
November - 1999	No Estimate (Area closed)				
December - 1999	" " "				
January - 2000	" " "				
February - 2000	" " "				
March - 2000	" " "				
April - 2000	" " "				
May - 2000	" " "				
June - 2000	60 Gal per min				
July - 2000	58 Gal per min				
August - 2000	40 Gal per min				
September - 2000	32 Gal per min				
Other					

Use the units of measure as G (gallons), KG (thousand gallons), MG (million gallons), CF (cubic feet), MCF (million cubic feet), or AF (acre-feet)

Describe the method of measuring the water used: 5 gallon pail with stop watch If use is irrigation, total number acres irrigated \_\_\_\_\_

I certify that this information is true and accurate to the best of my knowledge.

Hashagen Water Admn City of Greenhorn Nov 2-  
Signature Title Reporting Entity Date

k Hashagen  
Please Print



# 2000

Oregon Water Resources Department  
October 1999 through September 2000  
Annual Water Use - Monthly Quantities Form

USER-ID 1117

# 2001



Facility POD-ID						
October - 2000		15 Gal per Min				
November - 2000		No Estimate (Area Filled)				
December - 2000		" "				
January - 2001		" "				
February - 2001		" "				
March - 2001		" "				
April - 2001		" "				
May - 2001		" "				
June - 2001		52 Gal per Min				
July - 2001		48 Gal per Min				
August - 2001		38 Gal per Min				
September - 2001		28 Gal per Min				
TOTAL *						

\* Describe the units of measure as G (gallons), KG (thousand gallons), MG (million gallons), CF (cubic feet), MCF (million cubic feet), or AF (acre-feet)

Describe method of measuring the water used: 5 gal per min with water use is irrigation, total number acres irrigated

I certify this information is true and accurate to the best of my knowledge.

Jack Hashagen Signature  
Water Admin Title  
City of Greenhorn Reporting Entity  
Nov. 8-01 Date

Please complete and mail to: Water Resources Department; Water Use Reporting Program;  
 158 12<sup>th</sup> Street NE; Salem, OR 97310-0210

# 2001

Oregon Water Resour. Department  
October 2001 through September 2002  
Annual Water Use - Monthly Quantities Form

# 2002

WATER

WRD

Facility	POD-ID	Units	Month	Quantity	Total	Units
	11234		October - 2001	15 gal/min		
			November - 2001	No. of. used		
			December - 2001			
			January - 2002			
			February - 2002			
			March - 2002			
			April - 2002			
			May - 2002			
			June - 2002	50 gal/min		
			July - 2002	50 gal/min		
			August - 2002	37 gal/min		
			September - 2002	30 gal/min		
			TOTAL *			

\* Describe the units of measure as G (gallons), KG (thousand gallons), MG (million gallons), CF (cubic feet), MCF (million cubic feet), or AF (acre-feet)

Describe method of measuring the water used: Meters 5 gal per 1500 lbs If use is irrigation, total number acres irrigated  
I certify this information is true and accurate to the best of my knowledge.

Brad Payne  
Signature

City Recorder  
Title

City of Coosworth  
Reporting Entity

12-21-02  
Date

Brad Payne  
Name - Please Print

Please complete and mail to: Water Resources Department; Water Use Reporting Program;  
158 12<sup>th</sup> Street NE; Salem, OR 97310-0210

# 2002

Oregon Water Resources Department  
October 2002 through September 2003  
Annual Water Use - Monthly Quantities Form

USER-ID 1117

# 2003



Facility POD-ID	11534					
October - 2002	13 gal (per min)					
November - 2002	No Estimate	area closed				
December - 2002	"	"				
January - 2003	"	"				
February - 2003	"	"				
March - 2003	"	"				
April - 2003	"	"				
May - 2003	"	"				
June - 2003	60 gal per min					
July - 2003	37.5 gal per min					
August - 2003	17.6 gal per min					
September - 2003	13 gal per min					
TOTAL *						

\* Describe the units of measure as G (gallons), KG (thousand gallons), MG (million gallons), CF (cubic feet), MCF (million cubic feet), or AF (acre-feet)

Describe method of measuring the water used: 5 gallon bail with stop. If use is irrigation, total number acres irrigated       
I certify this information is true and accurate to the best of my knowledge.

John B Caspell  
Signature

John B Caspell  
Name - Please Print

Water Admin. Title  
City of Greenhorn Reporting Entity  
11-18-03 Date

Please complete and mail to: Water Resources Department; Water Use Reporting Program;  
725 Summer Street NE; Suite A, Salem, OR 97301-2430

# 2003

Water Resources Department  
October 2003 through September 2004  
Annual Water Use - Monthly Quantities Form

# 2004



Facility POD-ID	October - 2003	November - 2003	December - 2003	January - 2004	February - 2004	March - 2004	April - 2004	May - 2004	June - 2004	July - 2004	August - 2004	September - 2004	TOTAL *
11534	11.4 gal	No Estimate	area closed	"	"	"	"	"	64 gal	45.6 gal	28.3 gal	20.4 gal	

\* Describe the units of measure as G (gallons), KG (thousand gallons), MG (million gallons), CF (cubic feet), MCF (million cubic feet), or AF (acre-feet)

Describe method of measuring the water used: 5 gal per with stop watch. If use is irrigation, total number acres irrigated \_\_\_\_\_  
I certify this information is true and accurate to the best of my knowledge.

John B Caspell  
Signature

Water Admin, City of Greenhorn  
Title

John B Caspell  
Name - Please Print

11-10-04  
Date

Please complete and mail to: Water Resources Department; Water Use Reporting Program;  
725 Summer Street NE; Suite A, Salem, OR 97301-1271, or Fax 503-986-0902.



2004

Oregon Water Resources Department  
October 2004 through September 2005  
Annual Water Use - Monthly Quantities Form

USER-ID 1117



2005

Facility POD-ID	2004	2005			
October - 2004	13.8 gals	per minute			
November - 2004	area closed	no estimate			
December - 2004					
January - 2005					
February - 2005					
March - 2005					
April - 2005					
May - 2005	47 gals	per minute			
June - 2005	41.5 gals	per minute			
July - 2005	28.5 gals	per minute			
August - 2005	20.68 gals	per minute			
September - 2005	17.14 gals	per minute			
TOTAL *					

\* Describe the units of measure as G (gallons), KG (thousand gallons), MG (million gallons), CF (cubic feet), MCF (million cubic feet), or AF (acre-feet)

Describe method of measuring the water used: 5 gal pail with stop watch If use is irrigation, total number acres irrigated \_\_\_\_\_

I certify this information is true and accurate to the best of my knowledge. 3 times and then average

Signature John B Caspell Title Water Admin. for City of Greenhorn Date 11-01-05

Name - Please Print John B Caspell

Please complete and mail to: Water Resources Department; Water Use Reporting Program;  
725 Summer Street Suite A, Salem, OR 97301-1271, or Fax 503-986-09

# Facility Water Use Report



## Report ID 11534

TWIN SPRINGS;  
 (10S-35E-9-NW SW)  
Cert:1153 OR \*  
CITY OF GREENHORN

Records per page:

### Acre-feet (AF) of Water Used

Water Year*	Method of Measurement	Acre-feet (AF) of Water Used												Total Water Used	Irrigated Acres
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep		
2014	OTH	2.12	1.86	0.00	0.00	0.00	0.00	0.00	5.89	0.57	5.19	3.90	2.91	22.44	
2013		2.19	1.92	0.00	0.00	0.00	0.00	0.00	0.00	5.28	5.21	3.56	2.65	20.81	
2012		3.38	2.92	0.00	0.00	0.00	0.00	0.00	0.00	5.04	3.84	3.96	3.98	23.10	
2011		3.01	1.99	0.00	0.00	0.00	0.00	0.00	0.00	7.29	7.12	5.48	4.11	29.01	
2010		3.01	1.86	0.00	0.00	0.00	0.00	0.00	5.21	5.57	4.93	3.84	3.31	27.73	
2009		2.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.23	5.75	5.21	2.78	22.17	
2008		2.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.83	6.63	4.52	1.29	23.33	
2007		1.31	0.00	0.00	0.00	0.00	0.00	0.00	5.89	5.17	4.11	1.25	0.93	18.66	
2006		1.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.12	5.87	4.33	2.94	21.20	
2005		1.89	0.00	0.00	0.00	0.00	0.00	0.00	6.44	5.50	3.90	2.83	2.27	22.84	
2004		1.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.48	6.25	3.88	2.70	22.88	
2003		1.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.95	5.14	2.41	1.72	19.01	
2002		2.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.63	6.85	5.07	3.98	24.58	
2001		2.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.89	6.58	5.20	3.71	24.44	
2000		2.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.95	7.95	5.48	4.24	27.68	
1999		0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.95	6.85	5.75	4.38	25.28	
1998		0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.95	7.53	6.44	4.97	27.24	
1995		1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.04	3.29	2.33	1.72	13.75	
1994		1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.30	4.45	3.42	1.99	16.54	
1993		2.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.28	5.69	4.66	3.45	22.19	
1992		2.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.13	4.56	4.04	3.42	19.90	
1991		1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.70	5.14	4.11	3.45	19.76	
1990			0.00	0.00	0.00	0.00	0.00	0.00						0.00	
1989			0.00	0.00	0.00	0.00	0.00	0.00						0.00	

\*The water year is named for the calendar year in which it ends. Example: the 2014 water year begins Oct. 1, 2013 and ends Sep. 30, 2014.

### Method(s) of Measurement:

OTH 5-gallon bucket & stopwatch (2014)

- Monthly amounts indicate:
  - For diverted rights, the total amount diverted during the month;
  - For storage rights, the amount generally stored in the reservoir/pond during the month, as represented by the volume of water impounded on approximately the same day each month.
- Water Use amounts have all been converted to "acre-feet" (AF), regardless of the original measurement unit reported. One AF is the volume of water that will cover an acre of ground one foot deep = 325,850 gallons.

**APPENDIX D**  
**Oregon Health Authority - Drinking Water**  
**Services November 13, 2009, Letter**

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# Oregon

Theodore R. Kulongoski, Governor

## Department of Human Services

Public Health Division

Drinking Water Program

700 SE Emigrant, Rm. 240

Pendleton, OR 97801

(541) 276-8006

FAX (541) 276-4778

November 13, 2009

Dale McLouth  
28932 S. Cramer Road  
Molalla, Oregon 97038



### Re: Water System Survey for the City of Greenhorn

Thank you for your time and assistance in conducting the water system survey at the **City of Greenhorn** on October 7, 2009. The main purpose of the survey is to evaluate the entire water system in terms of supplying safe drinking water to the public. I have enclosed a copy of the survey report for your records. Please review the report and let me know if you find any errors.

The City's water system does not meet the definition of a Public Water System due regularly serving fewer than 10 people per day. The system therefore is not subject to regulation by the Department. However, I do encourage the City to meet the standards of a regulated public water system, which would help ensure safe drinking water for those who consume the water in Greenhorn.

Both water samples that I collected during the survey tested absent for coliform bacteria and met water quality standards. I have the following recommendations and comments:

#### Lower Spring Collector:

The design and construction of the lower collector presents the highest risk of allowing contamination to be introduced into the system of any facility observed during the survey.

1. The seal for the lid on the collector should be improved to prevent possible intrusion by animals and insects.
2. The spring collector should be inspected and cleaned regularly.
3. The spring collector should ultimately be replaced with a structure that meets the Department's construction standards. I have enclosed a copy of the construction standards for your reference.
4. Any openings into the abandoned mine shaft should be sealed off as best as possible to prevent any animals from being able to access the source water and collection piping.
5. Fencing should be installed around the collection structure.

*"Assisting People to Become Independent, Healthy and Safe"*  
An Equal Opportunity Employer



### **Upper Spring Collector:**

1. The old diversion ditch above the collector should be improved to divert any water flowing on the ground surface away from the collection structure.
2. A seal should be provided between the steel lid and the concrete to prevent possible intrusion by animals and insects.
3. The spring collector should be inspected and cleaned regularly.
4. The brush should be cleared from the area immediately surrounding the collection structure.
5. Fencing should be installed around the collection area and collection structure.

### **3000 Gallon Reservoir:**

The new reservoir generally meets the Department's construction standards. There was evidence of some seepage through cracks in the reservoir walls before it was buried. As long as the footing drain at the base of the reservoir prevents the water table from rising above the level of any cracks, there is little risk of contamination from groundwater entering through the reservoir walls. If you wish to completely eliminate this risk, I recommend improving the lining inside the reservoir to eliminate all seepage.

### **Sample Collection:**

Regularly collecting water quality samples is the best way to demonstrate that the water is safe to drink.

1. I recommend collecting coliform bacteria samples at least on a quarterly basis with the possible exception of the winter season. If samples are collected at the overflow from the 3000 gallon reservoir I recommend removing the screen before collecting any samples.
2. I recommend collecting a set of inorganic chemicals (IOC's) one time to measure the concentrations of naturally occurring elements such as arsenic and mercury. This is important as the lower spring collects water from an abandoned mine shaft.
3. An annual nitrate sample is also recommended.

Dale McLouth  
November 13, 2009  
Page 3 of 3

Should the City decide to make any improvements to the water system in the future, the Department would gladly review any plans prior to construction.

If you have any questions or need this information in an alternate format please call me at 541-966-0900.

Sincerely,

A handwritten signature in cursive script that reads "William Goss". The signature is written in black ink and includes a long horizontal flourish extending to the right.

William Goss, P.E.  
Regional Engineer

enclosures

c. Drinking Water Program, Portland  
Fran Villwock, Mayor  
Frank Collett

### Inventory and Narrative

Outstanding Performer

County: Baker

Type	Status	Size	Season	
<input type="checkbox"/> Community (C) <input type="checkbox"/> Non Transient Non-Community (NTNC) <input type="checkbox"/> Transient Non-Community (TNC) <input type="checkbox"/> State Reg/Non EPA (NP)	Population:	2	<input type="checkbox"/> All year <input checked="" type="checkbox"/> Seasonal Begins: (mm/dd)    4/1	
	Connections:	16		Ends: (mm/dd)    11/30
	Service Chars:	MU, RA	<b>Coliform Sampling</b>	
	Ownership:	4	Period: <input type="checkbox"/> Monthly <input type="checkbox"/> Quarterly	
<b>License</b>		Samples Required: n/a		
<input checked="" type="checkbox"/> Not Lic <input type="checkbox"/> HD <input type="checkbox"/> Ag				
<b>Operator Certification Required</b>			<b>Responsible Agency</b>	
WD n/a	WT n/a	FE <input type="checkbox"/> Small WS <input type="checkbox"/>	<input type="checkbox"/> State <input type="checkbox"/> County <input type="checkbox"/> Dept of Agriculture	

**Primary Administrative Contact (Mailing Address):**

Contact Name: Dale McLouth Phone: (503) 829-2278  
 Title: property owner Cell: (503) 310-0913  
 Street Address: 28932 S Cramer Rd. Emergency #: ( )  
 City/State/Zip: Molalla, OR 97038 Email: dalemclouth@molalla.net

**Legal/Owner Address:**

Contact Name: Fran Villwock Phone: (503) 897-2632  
 Title: Mayor Cell: ( )  
 Street Address: P.O. Box 1142 Emergency #: ( )  
 City/State/Zip: Mill City, OR 97360 Email:

**System Physical Address:**

Contact Name:  Phone: ( )  
 Title:  Cell: ( )  
 Street Address:  Emergency #: ( )  
 City/State/Zip: Greenhorn, OR Email:

**Emergency Systems Available:**

Name: n/a PWS ID#: 41

**Narrative:**  
 The City of Greenhorn does not meet the definition of a public water system due to regularly serving fewer than 10 people per day. The water supply consists of two springs. The spring collectors feed into a transmission line, then into a 3000 gallon buried concrete reservoir and then into town by gravity. The majority of the transmission line from the springs to the reservoir was replaced with HDPE in 2009. The 3000 gal. reservoir was installed in 2009, replacing a buried plastic tank. Pressure in town is approx 75 psi.

Service area characteristic and owner type codes:

Service Area Characteristics		
Primary	Secondary	CODE
Residential	City or Town	MU
	Mobile Home Park	MP
	Subdivision	SU
	Rural	RA
	Other	OR
Transient	Recreation (parks, campground, beaches, ski areas, marinas)	PA
	Service Station	SS
	Summer Camp	SK
	Restaurant/Store	RS
	Highway Rest Area	HR

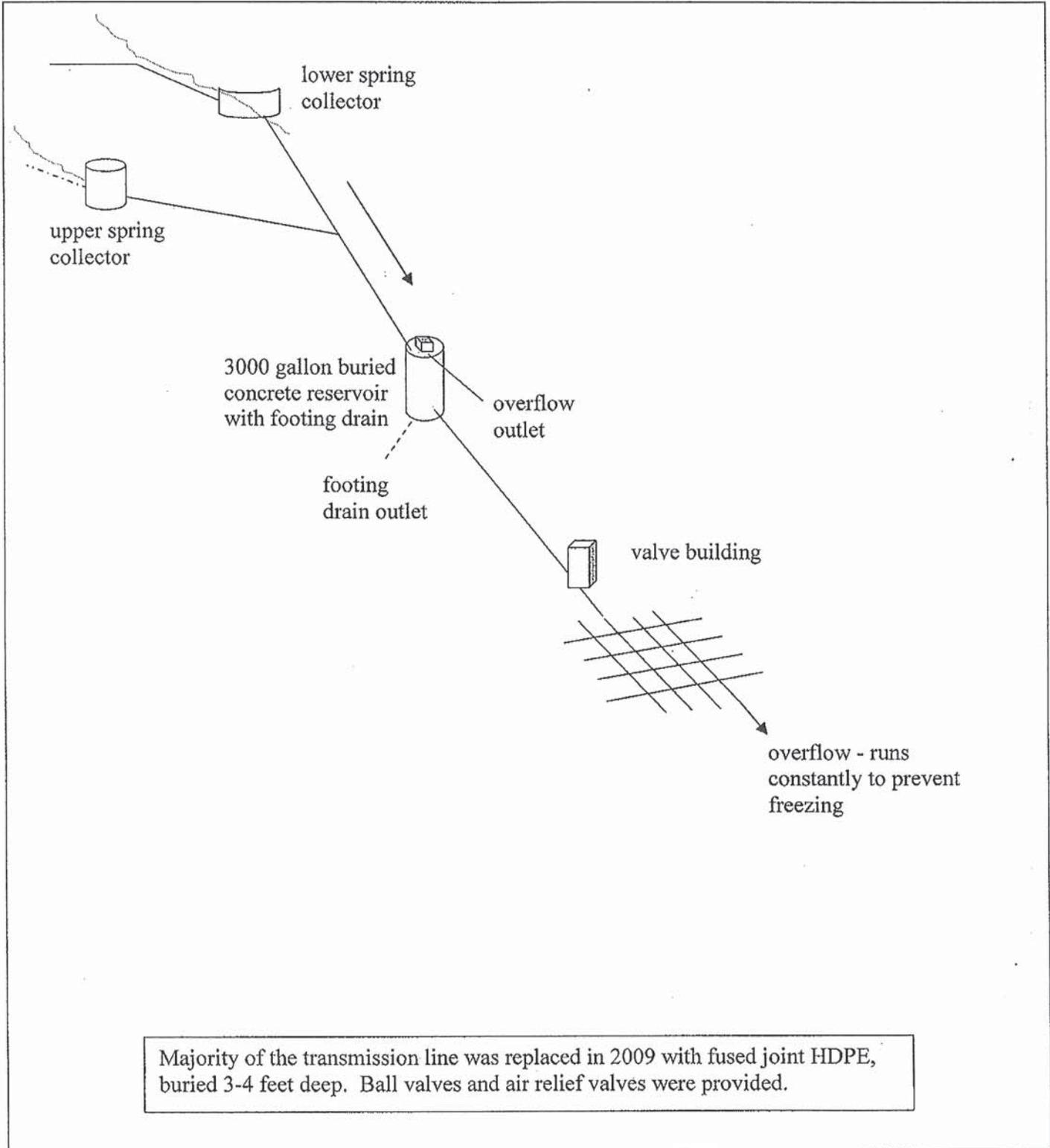
Determining System Type				
Population/ Daily Use	Number of Connections	>25 Same Daily Users	≥25 Year Round Residents	System Type
<10	<4	No	No	Not a System
10 – 24	4-14	–	–	State Reg/Non- EPA
25+	–	No	No	Transient Non- Community
25+	–	Yes	No	Non- Transient Non- Community
25+	15+	Yes	Yes	Community

Coliform Bacteria Sampling		
Community systems	Monthly samples based on population*	
Non-Transient, Transient, State-Regulated Systems	Groundwater population served	
	Surface water	
	≤1000 1 per quarter	>1000 Monthly based on population*
		Monthly sampling based on population*

Owner Type	Code
Federal Government	1
Private	2
State Government	3
Local Government	4
Mixed Public/Private	5

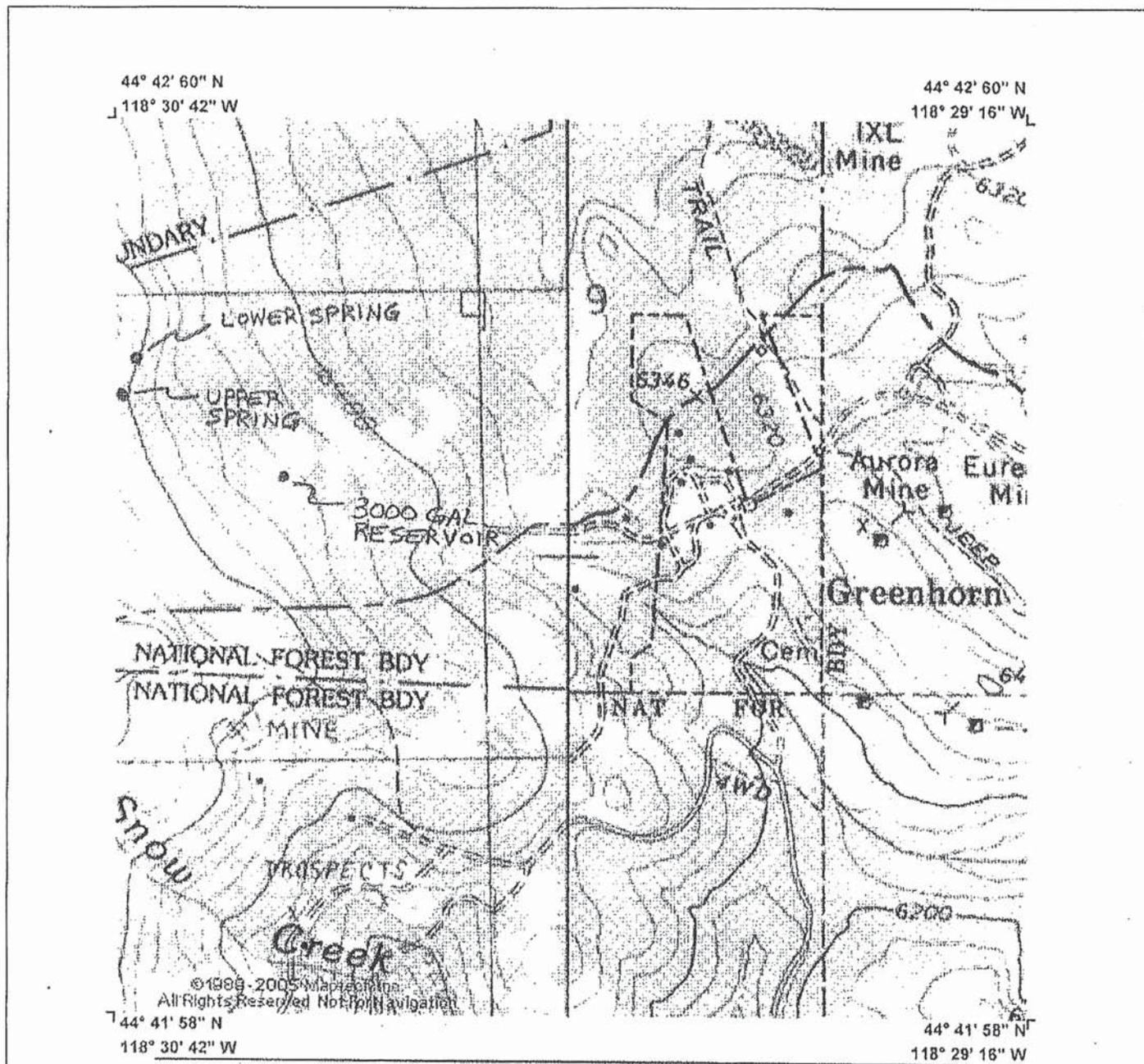
* Population	Samples per month
Up to 1,000	1
1,001 to 2,500	2
2,501 to 3,300	3
etc	See rules or call DWP

### Water System Schematic



Majority of the transmission line was replaced in 2009 with fused joint HDPE, buried 3-4 feet deep. Ball valves and air relief valves were provided.

### Water System Location Map



Upper spring: 44° 42' 41.0" -118° 30' 41.2"
Lower spring: 44° 42' 43.0" -118° 30' 39.7"
Reservoir: 44° 42' 34.8" -118° 30' 25.6"
Overflow at bottom of system: 44° 42' 41.4" -118° 29' 30.1"

### Source Information

ID	Entry Points (Location where water enters distribution and is sampled)	Source Type						Availability				Treatment Codes**	
		Ground	Surface	GWUDI	Pur. ground	Pur. surface	Permanent	Seasonal	Begins	Ends	Emergency		None
A	EP for springs	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input checked="" type="checkbox"/>					
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	

ID	Individual Sources (Contributing to Entry Point)	*Land Use	Capacity (GPM)	Source Type					Availability					Treatment Codes**	
				Ground	Surface	GWUDI	Pur. ground	Pur. surface	Permanent	Seasonal	Emergency	Abandoned	Disconnected		None
AA	Upper Spring		3+	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
AB	Lower Spring		7+	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

\*Land Use Codes: (A) Pristine Forest (B) Irrigated Crops (C) Non-Irrigated Crops (D) Pasture (E) Light Industry (F) Heavy Industry (G) Urban-Sewered Area (H) Rural On-Site Sewage Disposal (I) Urban On-Site Sewage Disposal (J) Rangeland (K) Managed Forest (L) Commercial (M) Recreational Use  
\*\*See "Treatment" page for treatment code descriptions.

List current operational patterns for all sources (e.g., Well 1 used continuously @ 100 gpm. Be as specific as possible)  
Spring flows were measured at reservoir overflow. Upper spring 3 gpm, lower spring 7 gpm. The springs would be expected to have higher flows in winter and spring.

**Yes No**

Does the water system have water rights for all sources?  Not Required  
  For GW systems, have there been any modifications to the existing well(s) or spring(s) (e.g. deepened, change in screened interval, springbox reconstruction, etc.)? Describe below:

n/a

Has a Source Water Assessment been completed by  DWP or  DEQ? If yes, attach delineation map and review boundaries with operator.

Has system implemented source water protection strategies? If yes, describe below:

Is the water system interested in source water protection? If yes, contact regional geologist at 541-726-2587.

**Comments:**

**Spring/Other Source**

Source ID: AA Source Name: Upper Spring

Type:  Spring  Infiltration Gallery  Ranney Well  Dug Well  Other: \_\_\_\_\_

**Spring Data**

- |  | Yes                                 | No                                  |
|--|-------------------------------------|-------------------------------------|
| • Meets setback from hazards.....        | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| • Raw water sample tap.....              | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| • Treated water sample tap (if treating) | <input type="checkbox"/>            | <input type="checkbox"/>            |
| Fencing around spring area.....          | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| Springbox.....                           | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |

N/A

**Infiltration Gallery**

Number of laterals   
Average depth (ft.)

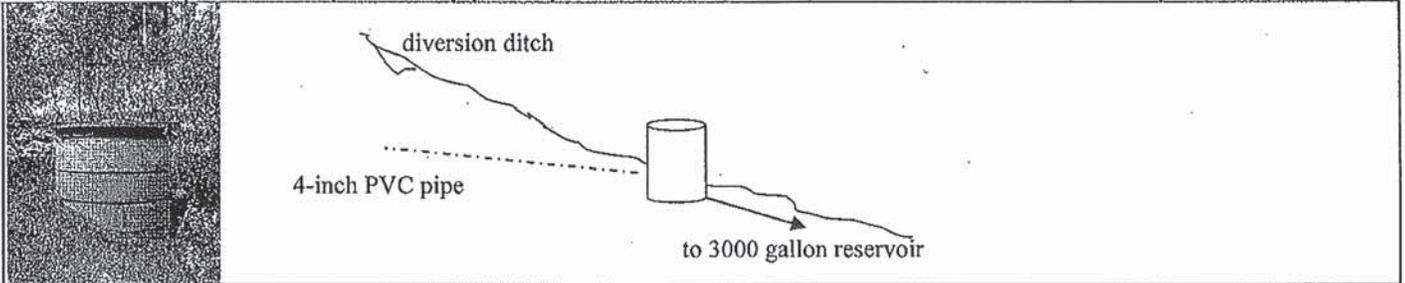
Springbox Type: concrete

**Dug Well**

Depth of well   
Construction material

- |                                    | Yes                                 | No                                  |
|------------------------------------|-------------------------------------|-------------------------------------|
| • Impervious durable material..... | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Hatch.....                         | <input type="checkbox"/>            | <input type="checkbox"/>            |
| Locked.....                        | <input type="checkbox"/>            | <input type="checkbox"/>            |
| Overlapping lid.....               | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| • Watertight access.....           | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| Intercepting ditch.....            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| • Screened overflow.....           | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Bottom drain & shutoff valve.....  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |

Drawing of source construction: (include details of access hatch, drain, overflow, description of collection piping, if known, diversion ditch, placement of perforated pipe, etc.). ---insert photo if possible---



**Does surrounding area have:**

- | Yes  | No                                  | Distance away:  |
|--|-------------------------------------|---|
| <input type="checkbox"/>   | <input checked="" type="checkbox"/> | Septic tanks/gravity sewer _____ ( <input type="checkbox"/> ≥ 50 feet)  |
| <input type="checkbox"/>   | <input checked="" type="checkbox"/> | Drainfield/pressure sewer _____ ( <input type="checkbox"/> ≥ 100 feet)  |
| <input checked="" type="checkbox"/>  | <input type="checkbox"/>            | Grazing < 50 feet _____   |
| <input type="checkbox"/>   | <input checked="" type="checkbox"/> | Surface water body (name) _____   |
| <input type="checkbox"/>   | <input checked="" type="checkbox"/> | Other sanitary hazards _____  |
| <input type="checkbox"/>   | <input checked="" type="checkbox"/> | Is there evidence of Infiltration of surface water run off?             |
| <input type="checkbox"/>   | <input checked="" type="checkbox"/> | Has source been evaluated by DWP for direct influence of surface water? |
| <input type="checkbox"/>   | <input checked="" type="checkbox"/> | Does water quality vary seasonally? Explain: _____                      |
| <input type="checkbox"/> <b>G</b> Is source considered: groundwater (G), surface water (S), or groundwater under the direct influence (I)? |                                     |   |

**Comments:**

Spring collector constructed ~1992. Collection pipe is reportedly 4-inch white PVC that extends into hillside. Recommend improving intercepting ditch above spring collector, sealing gaps between concrete and steel lid, clearing brush near collector, fencing area around spring.

**Spring/Other Source**

Source ID: AB Source Name: Lower Spring  
 Type:  Spring  Infiltration Gallery  Ranney Well  Dug Well  Other: \_\_\_\_\_

**Spring Data**

- |  | Yes                                 | No                                  |
|--|-------------------------------------|-------------------------------------|
| • Meets setback from hazards.....        | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| • Raw water sample tap.....              | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| • Treated water sample tap (if treating) | <input type="checkbox"/>            | <input type="checkbox"/>            |
| Fencing around spring area.....          | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| Springbox.....                           | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Springbox Type: <u>bathtub</u>           |                                     |                                     |
| • Impervious durable material.....       | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Hatch.....                               | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Locked.....                              | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Overlapping lid.....                     | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| • Watertight access.....                 | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| Intercepting ditch.....                  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| • Screened overflow.....                 | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| Bottom drain & shutoff valve.....        | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |

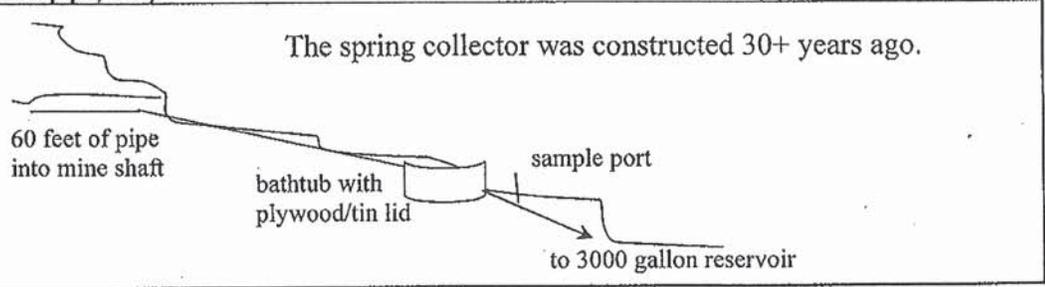
**Infiltration Gallery**

Number of laterals   
 Average depth (ft.)

**Dug Well**

Depth of well   
 Construction material

Drawing of source construction: (include details of access hatch, drain, overflow, description of collection piping, if known, diversion ditch, placement of perforated pipe, etc.). ---insert photo if possible---



**Does surrounding area have:**

- | Yes                                 | No                                  |   |
|-------------------------------------|-------------------------------------|---|
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Septic tanks/gravity sewer  |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Drainfield/pressure sewer   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | Grazing   |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Surface water body (name)   |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Other sanitary hazards  |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Is there evidence of Infiltration of surface water run off?             |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Has source been evaluated by DWP for direct influence of surface water? |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | Does water quality vary seasonally? Explain: _____                      |

**Distance away:**

\_\_\_\_\_ (  ≥ 50 feet)  
 \_\_\_\_\_ (  ≥ 100 feet)  
 < 50 feet

**G** Is source considered: groundwater (G), surface water (S), or groundwater under the direct influence (I)?

**Comments:**  
 Water collected by a pipe that extends 60 feet into an abandoned mine shaft. The pipe feeds into a collection structure made out of a bathtub. Recommend first improving lid to make a better seal, and ultimately replacing the bathtub with a new collection structure. Also filling in opening to mine shaft to prevent animal intrusions.

### Storage and Pressure Tanks

Number	Name	Tank Type*	Tank Material	Year Built	Volume (gal.)
1	Buried reservoir	G	concrete	2009	3000

\* (G) Ground (E) Elevated (P) Pressure

Total Volume: 3000

Reservoir Features		Reservoir Number: 1									
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Hatch	● Secured (e.g. locked, bolted, etc) .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	● Watertight.....	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Curbed lid (shoe box style) .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Features	Drain to daylight .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Overflow .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	● Overflow/drain protected (screen/flap/valve) ...	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	● Screened vent .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Water level gauge .....	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Bypass piping .....	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Fence/gate .....	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Cathodic plates watertight .....	<input checked="" type="checkbox"/>	N/A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Maintenance	Alarm for high or low levels .....	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Exterior in good condition .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Interior in good condition .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Approved interior coating .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Inspection schedule .....	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Cleaning schedule .....	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Plumbing Config.	Continuously disinfected ( ● post '81 redwood)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Separate inlet/outlet .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Baffling .....	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pressure Tanks	Used for contact time .....	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Baffling .....	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pressure Tanks	Used for contact time .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Accessible for maintenance .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Separate inlet/outlet .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Bypass piping .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Access port .....	<input type="checkbox"/>	N/A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Drain .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Pressure relief device .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Air bladder/diaphragm .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Valve for adding air .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Water level sight glass .....	<input type="checkbox"/>	N/A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				<b>Comments</b> Reservoir constructed of stacked 6 ft dia. concrete rings, 14 ft deep, sealed and lined with Thoro Waterplug hydraulic cement. Footing drain and overflow are piped to daylight. Some seepage through seams/cracks was noted prior to burial. Recommend improving interior lining to stop all seepage.							