HAFFERMAN ENGINEERING, INC.

Timbrshor Homeowners Association

Water System Development Progress Report

Prepared for the

Timbrshor Homeowners Association Annual Meeting

December 18, 2018
Revision 1 December 22, 2018
Revision 2 January 15, 2019
Revision 3 February 4, 2019
Update June 15, 2019

Prepared by

Kurtis M. Hafferman P.E.

Abstract

This report is provided to the Timbrshor Home Owners Association Annual meeting to provide a progress report and schedule update. In addition, changes to the water service plan have been provided and updated costs are included.

HEI has had administrative setbacks that have impacted the Timbrshor project. Kurt Hafferman was affected by a medical issue in April and employee Nick Fucci's mother passed away in February and month and a half later, his sister also passed away. These issues have been fatal to our schedule. HEI is seeking other employees to work on the project but to date has been unsuccessful. Therefore, HEI has only completed a portion of the projects that are needed to move forward. An updated schedule is provided at the end of the report

Attempts to contact the landowner associated to the proximity of Well #8, David McAlpin, have been unsuccessful. It is apparent that the McAlpin's are not interested in further contacts from HEI. None the less, the MDEQ has repeated several times that it is important to have as many well locations approved as is possible at this point in the process. Therefore, HEI continues to include the Well #8 location in the PWS 5 and PWS 6 reports and will pursue a MDEQ deviation from the Well Control Zone requirements in the event a resolution with the McAlpin's can be reached in the future. In addition, as there is a marginal chance of completing a land exchange with the Novinski family in the future, the location for Well #6 is also still included in the PWS 5 and PWS 6 reporting.

HEI has developed an alternative to using Well #8 which is a storage, pipeline and distribution system from Well #5 to service the units previously serviced by Well #8. Within this plan, HEI will combine Well #5 and Well #9 into one system. To avoid water right issues, the wells will be used in a lead-lag configuration. This plan will also eliminate a pump house planned for Well #9. A revised well assignment spreadsheet is included in the report Appendix. It is to be noted that due to the extensive pipeline system and complicated construction to service the units in the northeast quadrant of the THOA subdivision from Well #5, there is a cost increase in the Well #5 and Well #9 development.

HEI still needs to complete contact with unit owners to discuss their desired water service connection location. HEI will ask that all future units be platted or staked on the ground and the desired water service connection provided to HEI before August 1, 2019. HEI may need to adjust the water service location to make sure it does not cross or interfere with the wastewater treatment system connection location.

HEI plans to return to full staffing by late June and will resume the PWS 6 reporting followed by the continued design of the well systems. Current schedules will have the PWS 5 and PWS 6 reports submitted by the end of July and preliminary pipeline and distribution system designed by the end of August. Submittal of the plans and specifications for the entire Timbrshor water system would be to MDEQ by October 1. Currently the MDEQ is inundated with requests for sanitation and subdivision applications and approvals are anticipated to take between 90 to 120 days. Assuming an October 1 submittal by HEI, final approvals could be in February of 2020.

Table of Contents

Introduction

This report is provided to the Timbrshor Home Owners Association Annual meeting to provide a progress report and schedule update. In addition, changes to the water service plan have been provided and updated costs are included.

HEI Status and Progress

HEI has had two major organizational setbacks that have impacted the Timbrshor project. Kurt Hafferman was affected by a medical issue in April and was out of work; the residual effects continue to affect work production. In February HEI's employee Nick Fucci's mother passed away and month and a half later, Nicks sister also passed away. This necessitated that Nick make trips back and forth to Merced California to take care of both of their funerals and settling his Mom and sister's estate. Nick is living in Merced and has stated that he will return by July 1st. Nick is the primary employee working on the Timbrshor project and had not completed his Timbrshor assignment by mid-May; which is critical to our schedule. HEI is seeking other employees to work on the project but current building and development projects in this area has depleted the pool of qualified candidates.

To date HEI has only completed a portion of the projects that where detail in the February 4, 2019 report that are needed to move forward. The PWS 5 reports which address the potential for surface water and groundwater interaction have been completed but the PWS 6 reports have not. Nick started the PWS 6 reports, but they are more extensive than he anticipated. A copy of one of the completed PWS 5 reports and the MDEQ requirements of the PWS 6 report are attached in Appendix 1 to this report.

Well #8 Progress and Changes

Kurt Hafferman made several attempts to contact David McAlpin but was unsuccessful. It has become apparent that the McAlpin's are not interested in further contacts from HEI therefore no more time can be spent pursuing Well 8. HEI has developed an alternative storage pipeline and distribution system from Well 5 to service the units previously serviced by Well 8. Within this plan, HEI decided to combine Well 5 and Well 9 into one system. This was decided when it was determined that there is only one location for Well 9 and it will have to be located within 25 ft. of Well 5. Having two wells this close is a near certainty that these two wells will be developed in the same bedrock fracture zone and will be in immediate and direct connection.

Rather that attempting to drill Well 9 deeper or assume they might not be in immediate contact, HEI made the decision to use the two wells to sustain one storage system. To avoid water right issues, the wells will pump in a lead-lag configuration. A lead-lag system is configured in the electrical system to have the lead well pump to storage, then the lag well will pump to storage, then back to the lead well pump. The system is also used to increase the longevity of both pumps. This plan will also eliminate a pump house planned for Well 9.

In HEI discussions with MDEQ they have repeated several times that it is important to have as many well locations approved as is possible at this point in the process. It is important to remember that the completion of the PWS 5 and PWS 6 reports gives the THOA approval to drill

a well in a selected location, but the pipeline and distribution system still must be engineered and designed. The engineering can be completed later if the THOA needs these locations. For example, if units 216 and 219 gain an access road in the future and desire to have their own well, Well 8 would be available. Therefore, HEI will continue to pursue MDEQ permission to drill in the location of Well 8 and continues to include Well 8 in their PWS 5 and PWS 6 reports and will pursue a deviation from the Well Control Zone requirements.

In addition, there is still a marginal chance of completing a land exchange with the Novinski family in the future. Therefore, the location for Well 6 is also still included in the PWS 5 and PWS 6 reporting.

Revised Well 5 and Well 9 Unit Assignment

The draft design for the Well 5 and Well 9 storage system and pipeline and distribution system has been developed and is attached in Appendix 2 to this report. A revised well assignment spreadsheet is included in Appendix 3 to this report.

Revised Well 5 and Well 9 Cost Analysis

HEI has made a preliminary cost analysis for the Well 5 storage and pipeline systems. Due to the extensive pipeline system and complicated construction to service the units in the northeast quadrant of the THOA subdivision from Well 5, there is a cost increase to serve all the units associated to this system. The cost analysis is presented in Appendix 4 to this report. The Board has also asked HEI to include a cost phasing for the Well 5 and Well 9 combination that assumes that half of the users participate in the earliest construction of the well. There are 23 total users assigned to this system so HEI has assumed 12 units will be part of the initial development.

For Phase 1 of the system associated to Well 5 and Well 9, there are eight (8) units that are COSA noncompliant and all are in the northeast quadrant of the THOA subdivision. Therefore, HEI has assumed that all the development will be in the northeast quadrant therefore the Well 9 system would not need to be constructed. The Phase 1 system will include two storage tanks, one pump and control for the storage tank, and 3 Well-X-Trol pressure tanks. The pipeline system to the north will need to be installed to serve the COSA noncompliant units. The Phase 1 costs are estimated to be $129,700 or $10,808 for each of the 12 units associated to Phase 1. A cost for the Phase 1 plan is included in Appendix 5.

The Board has also asked HEI to advise if there are any other significant costs that they are aware of that could increase the costs of the Well 5 and 9 combination.

The most unknown cost in any groundwater well development is the construction of the wells. Although it is presumed wells developed in the proximity of Flathead Lake, near the high snowpack and runoff potential of the eastern adjoining Mission Range of mountains, and given HEI's research of neighboring well logs, wells should produce adequate water supply at all locations. None the less, drilling wells has a level of uncertainty that cannot be foreseen. If a well is drilled to the anticipated water bearing layers and either water is not present or is not present in the amount necessary to meet demand, alternatives may be required. Alternatives

include drilling deeper or relocating and re-drilling. Of the two, deepening the well is typically the alternative recommend by the well drillers and costs would increase by approximately $35/ft. If water is still not encountered at deeper depths, HEI and the well driller would likely recommend moving to another location and starting a new well. If a new well is drilled, the costs would include the costs of first well attempt and the cost of the new well.

The other significant uncertainty is placing the pipeline distribution system for the Well 5 and Well 9 system to the north. It is the opinion of HEI that there is no place to bury a pipeline in the road between the dock below the Peterson unit to the Rotondi unit. Therefore, to serve the Peterson unit and the units to the north, the pipeline must go up the Peterson road and then north and down the hill to the road near the Rotondi unit. HEI considered this pipeline placement to be the most difficult on site. HEI wished to avoid placement of pipes in this area and thus continued to pursue the Well 8 system. The HEI plan is to use an insulted pipe system to allow for shallow burial which should avoid encountering bedrock and thus reducing expensive bedrock excavation. If rock excavation or excavator placement is difficult, this could increase this cost.

Current Projects Requiring THOA Assistance

HEI still needs to complete contact with unit owners to discuss their desired water service connection location. Units that have not been constructed should either be physically staked on the ground or platted on a scale drawing. Drawings should show the unit in the general location as platted in the 2016 submittal to the County for the Wastewater Treatment System. The plat submitted to the County in 2016 is attached in Appendix 6 to this report. If units are staked in the field, please advise HEI when the stakes are placed so that they may make a field visit and take a GPS reading and measurements of the locations. Unit owners should mark on their plots where they wish to have the water service connection enter the building. HEI will ask that all future units be platted or staked on the ground and the desired water service connection provided to HEI before August 1, 2019. Please try to adjust the water service locations to make sure it does not cross or interfere with the wastewater treatment system connection location.

Updated HEI Status and Schedules

HEI hopes to return to full staffing by late June and will resume the PWS 6 reporting followed by the continued design of the well systems. Current schedules will have the final PWS 5 and PWS 6 reports submitted by the end of July and preliminary pipeline and distribution system designed by the end of August. Submittal of the Timbrshor water system should be to MDEQ by October 1. Currently the MDEQ is inundated with requests for sanitation and subdivision applications and approvals are anticipated to take between 90 to 120 days. Assuming an October 1 submittal by HEI, final approvals could be some time in February of 2020.

APPENDIX 1

PWS 5 Report Example

MDEQ PWS 6 Requirements

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY
Metcalf Building
1520 East Sixth Avenue
P.O. Box 200901
Helena, MT 59620-0901

PRELIMINARY ASSESSMENT WORKSHEET

Preliminary Assessment of Ground Water Sources that may be Under the Direct Influence of Surface Water

SYSTEM NAME _____ PWS ID# _____

SOURCE NAME Well 5 COUNTY Lake

DATE _____ NC NTNC C POPULATION _____

Index Points

A. TYPE OF STRUCTURE (Circle ONE that Applies)

Spring 40
Horizontal Well 40
Well……..(0)

B. HISTORICAL PATHOGENIC ORGANISM CONTAMINATION

History or suspected outbreak of Giardia, or other pathogenic organisms associated with surface water with current system configuration 40
No history or suspected outbreak of Giardia or other pathogenic organisms.....(0)

C. HISTORICAL MICROBIOLOGICAL CONTAMINATION

Record of acute (boil order or fecal positive sample) MCL violations of the Total Coliform Rule during the last 3 years (Circle ONE that Applies)

No violations .....(0)
One violation 5
Two violations 10
Three violations 15

Record of non-acute (two coliform positive samples in one month) MCL violations of the Total Coliform Rule during the last 3 years (Circle ONE that Applies)

One violation or none .....(0)
Two violations 5
Three violations.....10
DEQ-verified complaints about turbidity……...5

D. HYDROLOGICAL FEATURES

Horizontal distance between surface water and the source:
Greater than 250 feet .....480 feet.....(0)
175 - 250 feet 10

100 - 174 feet 20
Less than 100 feet 40

E. WELL SEAL

Poorly constructed well (uncased, or annular space not sealed to depth of at least 18 feet below land surface),
or casing construction is unknown 15

F WELL INTAKE CONSTRUCTION

In wells tapping unconfined or semi-confined aquifers, with a depth below land surface to top of perforated interval or screen greater than 100 feet ..... (0)
50 - 100 feet 5
25 - 49 feet 10
0 - 24 feet 15
Unknown 15

G. STATIC WATER LEVEL

In wells tapping unconfined or semi-confined aquifers, depth to static water level below land surface greater than 100 feet 0
50 - 100 feet 5
25 - 49 feet ..... est 47 feet (10)
0-24 feet.....15
Unknown 15

H. WELL CAP CONSTRUCTION

Poor sanitary seal, or seal without acceptable material 15

TOTAL SCORE _____

I. PRELIMINARY ASSESSMENT DETERMINATION (Circle **ONE** that Applies)

1. (PASS:) Source is not under the direct influence of surface water.
2. FAIL: Well must undergo further GWUDISW analysis.
3. FAIL: Spring, must undergo further GWUDISW analysis.
4. FAIL: Well or horizontal well less than 100 feet from surface water, must undergo further GWUDISW analysis.
5. FAIL: Well will PASS if well construction deficiencies (section E or F) are repaired.
6. FAIL: Well may PASS if well construction details (section E, F, or G) become available.

ANALYST Kurt Hafferman - Hafferman Engineering

ANALYST AFFILIATION Project Engineer

COMMENTS: _____

_____

Instructions for Completing A PWS-6 Report
For Community or Non-Community Non-Transient Public Water Supplies

(Revised – 01/19/2017)

The Source Water Delineation and Assessment Reports (SWDAR) for community or non-transient non-community public water supplies should include the sections outlined below and must adequately describe the water supply, the aquifer or surface water source, and potential sources of regulated contaminants. In addition to the text pages, several simple maps should be included to show the well(s), on-site structures, water distribution system, sewage disposal, roads, source water protection regions (described below – Table 1), general land uses, and potential sources of regulated contaminants (See Attached Example Report). If a well log is available, a copy should be included with the report **(Note-well log must be submitted before final approval can be given).** Reports should be written to show existing AND proposed development features. For more guidance on contact the Source Water Protection Program at (406) 444-6697. A resource to help you create maps of potential contaminants is DEQ's online mapping application (see: http://svc.mt.gov/deq/wmadst/); the application has online instructions and help functions. The DEQ Circular 4 referenced below is available at http://deq.mt.gov/Portals/112/Water/PWSUB/Documents/engineers/2014/DEQ4-2013-Final.pdf. A spreadsheet to assist with time-of-travel calculations is available in Appendix U (http://deq.mt.gov/Water/WQINFO/nondeg/howtonondeg).

SWDAR Outline

1. **INTRODUCTION AND PURPOSE:** Include the public water supply (PWS) name, address, primary contact person, telephone number, and date of report. Identify who completed this report and include contact information.

2. **PWS INFORMATION:** Describe the location and nature of the water supply (i.e. town, subdivision, school, etc). If this is a new source at an existing PWS, describe why it is needed. Identify how many individuals the PWS will serve and the actual or projected water demand in gallons per day, (DEQ Circular 4 Tables 3.1.1 & 2, column 4). Describe the location of the well or surface water intake with respect to the on-site sewage treatment system components (septic system). Show the exact location of the septic system, mixing zones, and parcel boundaries for this property and neighboring properties on the map.

3. **DELINEATION:** Use the following headings within this section of the report. **Hydrologic Conditions:** Use Table 1 to determine which set of source water protection regions are required for the water supply. Show the protection region boundaries on one or more of the maps. Describe the aquifer or surface water source sufficiently to justify your delineation and to assign a sensitivity rank (see Table 2). **Well Information:** Use Table 3 to list pertinent information and attach driller's logs for each well if available. **Aquifer Properties:** Use Table 4 to list aquifer properties. Describe source water quality available.

4. **INVENTORY:** Discuss and show ownership and land uses within the control and inventory regions. Table 5 lists land use codes that can be used on the map. You can use either mapping tool to build maps showing significant potential sources of contamination within the inventory region. Use Table 6 to identify the types of significant potential contaminant sources you should identify. Fill out a copy of Table 7 to list each potential contaminant source.

5. **SUSCEPTIBILITY:** Describe the risk the contaminant sources identified in your inventory pose to the new well. You can use the following recommended procedure for the susceptibility analysis or you can request DEQ's Source Water Protection Staff complete the susceptibility analysis.

   Recommended Procedure:

   Use Table 8 to assign a hazard rating for each potential contaminant source you have listed in Table 7.

   Use Table 9 to help you identify natural or man-made barriers for each source listed in Table 7. Only barriers in Table 9 should be used in the susceptibility assessment.

   Use Table 10 to assign susceptibility ratings for each source listed in Table 7.

   In the text, describe any other source water protection efforts that will be used to address and minimize the susceptibility ratings listed in Table 7. Finally, discuss water treatment measures already being used by the PWS.

6. **LIMITATIONS**
   Identification of potential contaminant sources is limited to those regulated for this class of PWS and is generally based on readily available public information and reports. Unregulated activities or unreported contaminant releases will likely be missed and not considered in this report. The delineation method utilizes simplifying assumptions that may not fully represent complex ground water flow systems but is intended to be conservative and protective of public health.

7. **REFERENCES:** List other references used for this report. Table 11 shows the suggested reference format.

Support Figures

Table 1. Methods and criteria for delineating source water protection regions for PWSs.

If Your Source of Water Is:	Delineate These Water Protection Regions	Method For Each Region:	Minimum Distance Values & Type of Inventory Required: **LU** – Land Uses; **P&N** – Pathogens and Nitrate sources
1. Ground Water that is: • Unconfined/Semi-confined*,	Control Inventory	Fixed radius Fixed radius	Distance - 100 feet Distance - 1 mile
• Confined	Control Inventory	Fixed radius Fixed radius	Distance - 100 feet Distance - 1000 feet
*Ground Water that is hydraulically Connected to Surface Water	Buffer Zone	Fixed Distance	One-half mile buffer extending upstream a distance corresponding to a 4-hour TOT but not to exceed ten miles or the nearest intake. Buffer will not exceed the extent of the watershed.
Surface water	Spill Response	Fixed Distance	One-half mile buffer extending upstream a distance corresponding to a 4-hour TOT but not to exceed ten miles or the nearest intake. Buffer will not exceed the extent of the watershed.

Table 2. Source Water (Aquifer) Sensitivity Table.

High Source Water Sensitivity	**Moderate Source Water Sensitivity**	**Low Source Water Sensitivity**
▪ Surface water and GWUDISW ▪ Unconsolidated Alluvium (unconfined) ▪ Fluvial-Glacial Gravel ▪ Terrace and Pediment Gravel ▪ Shallow Fractured or Carbonate Bedrock	▪ Semi-consolidated Valley Fill sediments (semi-confined) ▪ Unconsolidated Alluvium (semi-confined)	▪ Consolidated Sandstone Bedrock ▪ Deep Fractured or Carbonate Bedrock ▪ Semi-consolidated (confined)

Table 3. Source well information for *public water supply name.*

Information	Well #1	Well #2
PWS Source Code	-	-
Well Location (T, R, Sec or lat, long)	-	-
MBMG #	-	-
Water Right #	-	-
Date Well was Completed	-	-
Total Depth	-	-
Perforated Interval	-	-
Static Water Level	-	-
Pumping Water Level	-	-
Drawdown	-	-
Test Pumping Rate	-	-
Specific Capacity	-	-

Table 4. Estimates of aquifer properties and pumping demand**.**

Input Parameter	Range of Values and units	Values Used (for each well if more than one)			
		Well #1	Well #2	Well #3	Well #4
PWS Source Code	-	-	-	-	-
Transmissivity	-	-	-	-	-
Thickness	-	-	-	-	-
Hydraulic Conductivity	-	-	-	-	-
Hydraulic Gradient	-	-	-	-	-
Flow Direction	-	-	-	-	-
Effective Porosity	-	-	-	-	-
Pumping Rate	-	-	-	-	-

Table 5. Land Use Types and Map Codes.

Land Use Type	Map Code	Land Use Type	Map Code
Sewered residential	SR	Industrial	I
Sewered commercial	SC	Railroad right-of-way,	RRW
Sewered mixed	SM	Highway right-of-way	HRW
Unsewered residential	UR	Agricultural dryland crop	ADC
Unsewered mixed	UM	Agricultural irrigated crop	AIC
Unsewered commercial	UC	Agricultural irrigated pasture	AIP
-	-	Agricultural dryland pasture	ADP
-	-	Forest	F

Table 6. Identification of Significant Potential Contaminant Sources.

Septic Systems	Landfills
Animal Feeding Operations	Abandoned Mines
Underground Storage Tanks	MPDES Wastewater Dischargers
Underground Storage Tanks Leaks	Municipal Sanitary Sewer
State and Federal Superfund Sites	Municipal Storm Sewers
RCRA Large Quantity Generators	Highways, Railways, Pipelines
Underground Injection Wells	Cultivated Croplands
Wastewater Treatment	**Other:** Activities or substances that can compromise source water quality.

Table 7. (MT SWPP Table 5). Significant potential contaminant sources for *enter PWS name. (Examples included)*

Source	Contaminants	Description *(Location and nature of hazard)*	Hazard Rating	Barriers	Susceptibility
Animal Feeding Operation	*Pathogens and Nitrates*	-	*Moderate*	-	-
Sanitary Sewer Main	*Pathogens and Nitrates*	-	-	-	-
Septic Systems	*Pathogens and Nitrates*	-	-	-	-
Underground Pipeline	*Fuels*	-	-	-	-

Table 8a. (MT SWPP Table 6) SURFACE WATER SOURCES: Hazard of potential contaminant sources.

Potential Contaminant Source	High Hazard	Moderate Hazard	Low Hazard
Point Sources	Potential for direct discharge to Source Water	Potential for discharge to GW that is hydraulically connected to SW	Potential contaminant sources present within the watershed
Septic Systems	More than 300 per sq. mi.	50 – 300 per sq. mi.	Less than 50 per sq. mi.
Municipal Sanitary Sewer (percent land use)	More than 50 percent of region	20 to 50 percent of region	Less than 20 percent of region
Cropped Agricultural Land (percent land use)	More than 50 percent of region	20 to 50 percent of region	Less than 20 percent of region

Table 8b. (MT SWPP Table 6) UNCONFINED AQUIFERS: Hazard of potential contaminant sources.

Potential Contaminant Source	High Hazard	Moderate Hazard	Low Hazard
Point Sources	Within 1 year TOT	Between 1 to 3 years TOT	Over 3 years TOT
Septic Systems	More than 300 per sq. mi.	50 – 300 per sq. mi.	Less than 50 per sq. mi.
Municipal Sanitary Sewer (percent land use)	More than 50 percent of region	20 to 50 percent of region	Less than 20 percent of region
Cropped Agricultural Land (percent land use)	More than 50 percent of region	20 to 50 percent of region	Less than 20 percent of region

Table 8c. CONFINED AQUIFERS (modified from MT SWPP Table 6): Hazard of potential contaminant sources.

Potential Contaminate Sources	The PWS well is not sealed through the confining layer	Other wells in the inventory region are not sealed through the confining layer	All wells in the inventory region are sealed through the confining layer
Point Sources	High	Moderate	Low
Septic Systems (# per square mile)	High: > 300 Moderate: 50 to 300 Low: < 50	Moderate: > 300 Low: < 300	Low
Sanitary Sewer (% land use)	High: > 50 Moderate: 20 to 50 Low: < 20	Moderate: > 50 Low: < 50	Low
Cropland (% land use)	High: > 50 Moderate: 20 to 50 Low: < 20	Moderate: > 50 Low: < 50	Low

Table 9. List of Barriers

Well Construction Related Barriers: • Intake depth of >50 feet below static water level. • Well seal (grout) extends into confining layer above aquifer • Meets Board of Water Well Contractor Requirements	**Engineering Related Barriers:** • Existing program to replace/repair sewer lines • Stormwater control structures in place • Leak detection and monitoring for pipelines • Secondary containment in place (fuel and chemical storage tanks)
Location and size of Potential Contaminant Source Related Barriers: • Cross or down-gradient location for the contaminant source • Distance from the PWS well(s) • Small non-commercial facility	**Permit Related Barriers:** • Permitted facility in compliance with permit requirements • CAFO* or AFO** plant is operating within its regulatory permit • Groundwater monitoring program in place and active • On-going remediation and monitoring or completion of remediation • Documented removal of contaminant source (fuel and chemical storage tanks, soils etc.)
Soil and Aquifer Related Barriers: • Thick unsaturated zone above the aquifer, greater than 100 feet • Continuous clay layer(s) overlie the aquifer • Clay rich surface soils • Upward ground-water gradient (ground-water discharge area)	**Disaster and Emergency Response Related:** • Emergency Response Plan In Place • Local and County Emergency Response Capacity

* Confined Animal Feeding Operation. ** Animal Feeding Operation

Table 10. (MT SWPP Table 5). Relative susceptibility to specific contaminant sources as determined by hazard and the presence of barriers.

Presence Of Barriers	Hazard		
	High	**Moderate**	**Low**
No Barriers	Very High Susceptibility	High Susceptibility	Moderate Susceptibility
One Barrier	High Susceptibility	Moderate Susceptibility	Low Susceptibility
Multiple Barriers	Moderate Susceptibility	Low Susceptibility	Very Low Susceptibility

Table 11. Suggested format for listing references.

Author Name, Date of Publication, Title of Report or Document: Publication Source and Report or Volume Number, page number.

Example:

- Kendy, E., and R.E. Tresch, 1996, Geographic, Geologic, and Hydrologic Summaries of Intermontane Basins of the Northern Rocky Mountains, Montana: U.S. Geological Survey Water Resources Investigations Report 96-4025, 233 p.
- Morrison – Maierle, Inc., 1980. Flower Creek Basin Flower Creek Dam Libby, Montana. MT-1458. 23 p.

Town of Sheridan

June 1, 2001

Public Water Supply: PWS ID: 00329
Town of Sheridan

INTRODUCTION AND PURPOSE

The purpose of this PWS-6 report is to assess threats to a new supply well for the Sheridan water supply system. The primary contact for this water supply is Mr. Kelly Elser, P.O. Box 78, Sheridan, Mt. 59749. Jim Stimson, Hydrogeologist with the Montana Department of Environmental Quality (DEQ), prepared the final report.

PWS INFORMATION

Sheridan is located in lower Ruby Valley in Madison County along State Highway 287, about 36 miles northeast of Dillon (Figure 1A). DEQ public water supply records indicate the water system serves 723 residents and is classified as a community system because it serves at least 25 year-round residents. Public water and sewer services are provided within the city limits. A waste treatment lagoon is located about one-quarter mile northwest of town (Figure 1B).

The primary water supply consists of four wells located in a well field on the west-side of town (Figure 1B). Use of one of the wells is limited due to construction problems. Water from the well field is pumped to two storage reservoirs northeast of town near Nonpariel Creek and then re-routed through a variety of service connections to Sheridan residents.

Average water use is estimated at 183 gallons per minute (gpm), that is 263,520 gallons per day (gpd), with peak demand estimated at 329 gpm (473,760 gpd) during the summer. The water is not disinfected but the system is equipped to provide gas chlorination. Concerns over water supply shortages due to drought conditions during the summer of 2000 and chronic production problems with the number 4 well prompted efforts to drill the new supply well. The new well will be located in the existing well field and therefore, information from the existing wells will be used to develop a conceptual model for ground-water flow for the new well and to estimate aquifer properties.

DELINEATION

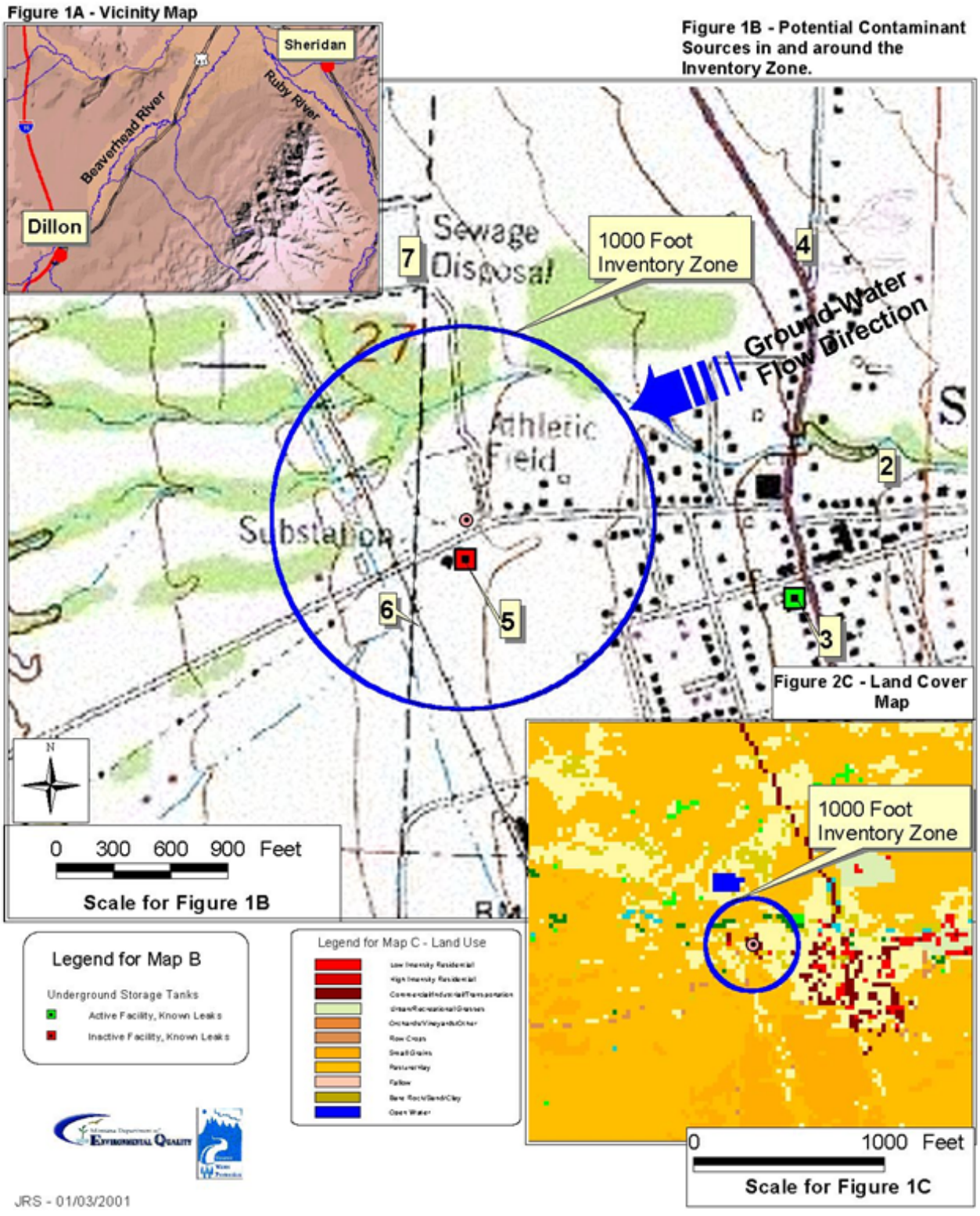
Table 1 of the PWS-6 Template for Community and Non-Transient Non-Community PWSs was used to determine the type of inventory regions needed for this report. Two source water protection zones are delineated for the Sheridan water supply well. They include a 100-foot fixed radius control zone and a 1,000 foot fixed radius inventory region. The latter is used because the aquifer is interpreted to be semi-confined.

Hydrologic Conditions

Hydrogeologic studies indicate that Quaternary and Tertiary sedimentary deposits are the source of Sheridan's water supply. The majority of the wells in the vicinity of Sheridan are between 15 and 60 feet deep. These wells tap a shallow water table aquifer within the Quaternary alluvium. The town's public supply wells are between 100 and 412 feet deep and production is from shallow Quaternary alluvium and deeper zones within the upper Tertiary sedimentary deposits. Geologic cross-sections from a preliminary ground-water study show that multiple confining clay layers are present in the area but in some places these layers thin and terminate. In other words, the confining layers are not laterally extensive.

Sheridan Public Water Supply

Figure 1.



C:\My Documents\Delineation Projects\Sheridan\00329-PWS-6_Final.doc

G:\WP\0_SWP_Section\PWS6_Reviews\Draft_Guidance\Draft_PWS6_CNCNT_011917.doc

Therefore, the aquifer used by the Sheridan water supply is interpreted to be semi-confined, and is assigned a rank of "moderate source water sensitivity", in accordance with Table 2 of the PWS-6 template for Community or Non-Community Non-Transient Public Water Supplies (DEQ Source Water Protection Program, 2000).

Well Information

Table 1 of this report shows that Sheridan's public water supply wells range in depth from 100 to 412 feet. Two wells located in the well field west of Sheridan encountered 40 to 100 feet of "hard pan" or "clay" that can be interpreted as impermeable confining layers.

Aquifer Properties

Table 2 summarizes aquifer information for the Sheridan area. The table includes parameter values used in TOT calculations to support completing the susceptibility analysis for potential contaminant sources identified within the inventory region (Figures 1B and C).

Limitations

Values in Table 2 come from a limited number of studies conducted in the lower Ruby Valley. As a consequence, it is uncertain how accurately the values portray the aquifer's properties. Calculated TOT distances are considered to be conservative estimates based on available data and the professional judgement of the analyst writing this report.

INVENTORY

The wells are located at a ball park on the west side of town. The control zones include land outside the town park. One or more of the control zones are encroached upon by a county road, irrigation ditch, and sewer main (see Figure 1.).

Table 3 lists the significant potential contaminant sources for the control and inventory zones. Numbers in the source column of the table provide a cross-reference to maps shown in above figure. Recreation, hay production, and grazing are the primary land uses near the well field. Based on an analysis of the USGS National Landcover Dataset (USGS 2000), land use within the entire inventory zone is approximately 52% agriculture, 18% undeveloped residential, 23% grassland, 4% low-density residential, and 3% commercial. Land use in the recharge region is dominated by grass- and shrub-land (56%), forestland (32%), and agricultural land (11%).

Two former fuel leak sites are included in the inventory, despite the fact they lie just outside the inventory zone boundary. They are included because the inventory boundary is delineated based on incomplete information, and there are uncertainties concerning aquifer properties and ground-water flow direction. Modification of the inventory zone boundary to include both sites could be warranted if future studies indicate these areas contribute water to the Sheridan supply wells.

The railway, which would normally be considered a significant potential contaminant source, is not included in the inventory and susceptibility analysis because it is abandoned.

SUSCEPTIBILITY

The proximity of a potential contaminant source to the well site or the density of non-point potential contaminant sources determines the threat of contamination. Hazard and the existence of barriers to contamination determine susceptibility; see Table 10 of the PWS-6 Template for Community and Non-Transient Non-Community PWSs. Barriers can be anything that decreases the likelihood that contaminants will reach a well. Barriers can be engineered structures, management actions or natural conditions (See Table 9 of the PWS-6 Template).

Table 3 lists results from the susceptibility analysis for significant potential contaminant sources. Agricultural lands northeast of Sheridan make up about 52% of the inventory region. Municipal sewer lines within Sheridan City Limits appear to underlie approximately 20% of the inventory region east of the well. Two former leaking underground storage tank sites are present in the area, one within the inventory region. The tanks belong to the Sheridan Service Station and Bulk Station.

A segment of a railroad is located west and down-gradient from the well location (Number 6 on the map above). The town’s waste water treatment lagoons are located north of the well site and outside the inventory region.

LIMITATIONS

The terms “drinking water supply” or “drinking water source” refer specifically to the source of the Sheridan public water supply and not any other public or private water supply. Only significant potential sources of contamination in areas that contribute water to the drinking water source are considered in this report. A source is

considered significant if substances that are used, generated or stored are highly hazardous to human health or if the volume on-site is relatively large. Some potential or existing sources of contamination may be unintentionally missed in the inventory. The report will be periodically updated when new information becomes available. The term "contaminant" is used in this report to refer to constituents for which maximum concentration levels (MCLs) have been specified under the national primary drinking water standards, and to certain constituents that do not have MCLs but are considered to be significant health threats.

REFERENCES

- DEQ Source Water Protection Program, 2000, PWS-6 Template for Community or Non-Community Non-Transient Public Water Supplies. Available from the DEQ web site: http://www.deq.state.mt.us/wqinfo/SWP/Circulars.htm
- Hannaman, D. L. and Wideman, C. J., 1988, Sequence stratigraphy of Cenozoic rocks; Geologic Society of American V. 103, p. 1335-1345.
- Kuenzi, W.D. and Fields, R. W., 1971, Tertiary stratigraphy, structure, and geologic history of the Jefferson Basin, Montana; Geologic Society of American V. 82, p. 3374-3394.
- Rupple, E. T., 1993, Cenozoic tectonic evolution of South West Montana and East-Central Idaho, Montana Bureau of Mines and Geology (MBMG) Memoir 65.
- Ruby Valley Conservation District in association with the Ruby Valley Watershed Committee, 2000, Preliminary report on the ground-water resources of the Mill and Indian Creek subwatershed, lower Ruby Valley, Montana. Draft Hydrogeologic Report, Madison County Conservation District.
- U.S. Geological Survey, 2000. National Landcover Dataset, Montana. 30-meter electronic digital landcover dataset interpreted from satellite imagery.

Table 1. Source well information for City of Sheridan. NR = Not Reported

Well Information	Well # 1	Well # 2	Well # 3	Well #4	City Well	City Well (Tolson Well)
PWS Source Code	03	02	05	NR	NR	NR
Well Location (T, R, Sec or lat, long)	04S 05W 27 DB	04S 05W 26 CCDA	04S 05W 27 DB	04S 05W 27 DB	04S 05W 27 DA	04S 05W 26 CDA
MBMG #	107982	107951	107984	107983	107980	107954
Water Right #	NR	NR	NR	NR	NR	NR
Date Well was Completed	01/01/89	11/28/89	01/03/90	01/01/89	01/01/82	01/01/67
Total Depth (ft)	100	225	412	400	300	58
Perforated Interval (ft)	NR	81 - 225	250 -412	NR	NR	NR
Static Water Level*	18	20	22	16	9	8
Pumping Water Level *	NR	220	NR	NR	97	44
Drawdown (ft)	NR	200	NR	NR	88	36
Test Pumping Rate (gpm)	50	30	300	500	80	125
Specific Capacity	NR	0.15	NR	NR	0.91	3.47

*** feet below land surface**

Table 2. Estimates of aquifer properties and pumping demand**.** (Table 5 of template)

Input Parameter	Values used for TOT Calculations	Range of Values from Sheridan wells	
		Well # 3	Well #2
PWS Source Code	-	05	02
Transmissivity (gpd/ft)	18,000	14,000 - 18,000	14,000 - 18,000
Thickness (ft)	103	62	144
Hydraulic Conductivity (gpd/ft^2)	175	226 - 290	97 - 125
Hydraulic Gradient	0.02	NR	NR
Flow Direction	South-Southwest (S 70 - 75 W)	NR	NR
Effective Porosity	0.1	NR	NR
Pumping Rate (gpd)	368,640 Average of 263,520 and 473,760 reported on page 1 of text.	300 gpm	30gpm
Stagnation Point Distance (ft)	165		
Lateral Boundary Limit (ft)	520		
1-Year TOT Distance (ft)	1,679		
3-Year TOT Distance (ft)	5,037		

Table 3. (MT SWPP Table 5). Significant potential contaminant sources for City of Sheridan Source Water.

Source	Contaminants	Description *(Location and nature of hazard)*	Hazard Rating	Barriers	Susceptibility
1. Dryland Agricultural Crop Lands and grazing	SOC, Nitrate	52% ag-land in the inventory zone	High	Depth >50 ft. below water level Some Ag-land is down-gradient of well	Moderate
2. Sanitary Sewer Main near wells	Pathogens & Nitrates	About 20% sewered in Inventory Region	Moderate	Depth >50 ft. below water level	Moderate
3. Leaking Underground storage site (LUST)*	Gasoline	Just outside inventory zone	Moderate	Depth >50 ft. below water level	Moderate
4. Segment of Highway 287*	Hazardous Materials (VOCs & SOCs)	Highway is east and outside of the Inventory Region	Low	Depth >50 ft. below water level	Low
5. Underground storage site (UST)	Gasoline	Approx. 500 feet south of well	High	Remediated as of 04/21/2006 Intake Depth >50 ft. below water level	Moderate
6. Montana Rail Link Railroad	Various organic chemicals	Segment is located west of well	High	Emergency response Down-gradient Location	Low
7. Waste Water Treatment Lagoons*	Pathogens & Nitrates	Located north of the well site and outside the Inventory Region	Low	Depth >50 ft. below water level Lagoons are cross-gradient to well	Low

GWIC Id: 107982
DNRC Water Right: P072317-00

Section 1: Well Owner(s)
1) TOWN OF SHERIDAN (MAIL)
PO BOX 78
SHERIDAN MT 59749 [12/09/1989]

Section 2: Location

Township	Range	Section	Quarter Sections
04S	05W	27	SW¼ SW¼ NW¼ SE¼

County	Geocode
MADISON	

Latitude	Longitude	Geomethod	Datum
45.4561	-112.204	MAP	NAD27

Ground Surface Altitude	Ground Surface Method	Datum	Date

Addition	Block	Lot

Section 3: Proposed Use of Water
PUBLIC WATER SUPPLY (1)

Section 4: Type of Work
Drilling Method: AIR ROTARY
Status: NEW WELL

Section 5: Well Completion Date
Date well completed: Tuesday, December 05, 1989

Section 6: Well Construction Details
Borehole dimensions

From	To	Diameter
0	20	13
20	100	8

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2	82	8				STEEL
82	100	0				OPEN HOLE

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
40	80	8		1 1/2 X 1/4	PERFS

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	20	CEMENT	

Total Depth: 100
Static Water Level: 18
Water Temperature:

Pump Test *

Depth pump set for test _ feet.
150 gpm pump rate with _ feet of drawdown
after 8 hours of pumping.
Time of recovery _ hours.
Recovery water level _ feet.
Pumping water level 61 feet.

** During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

Section 8: Remarks

Section 9: Well Log
Geologic Source
Unassigned

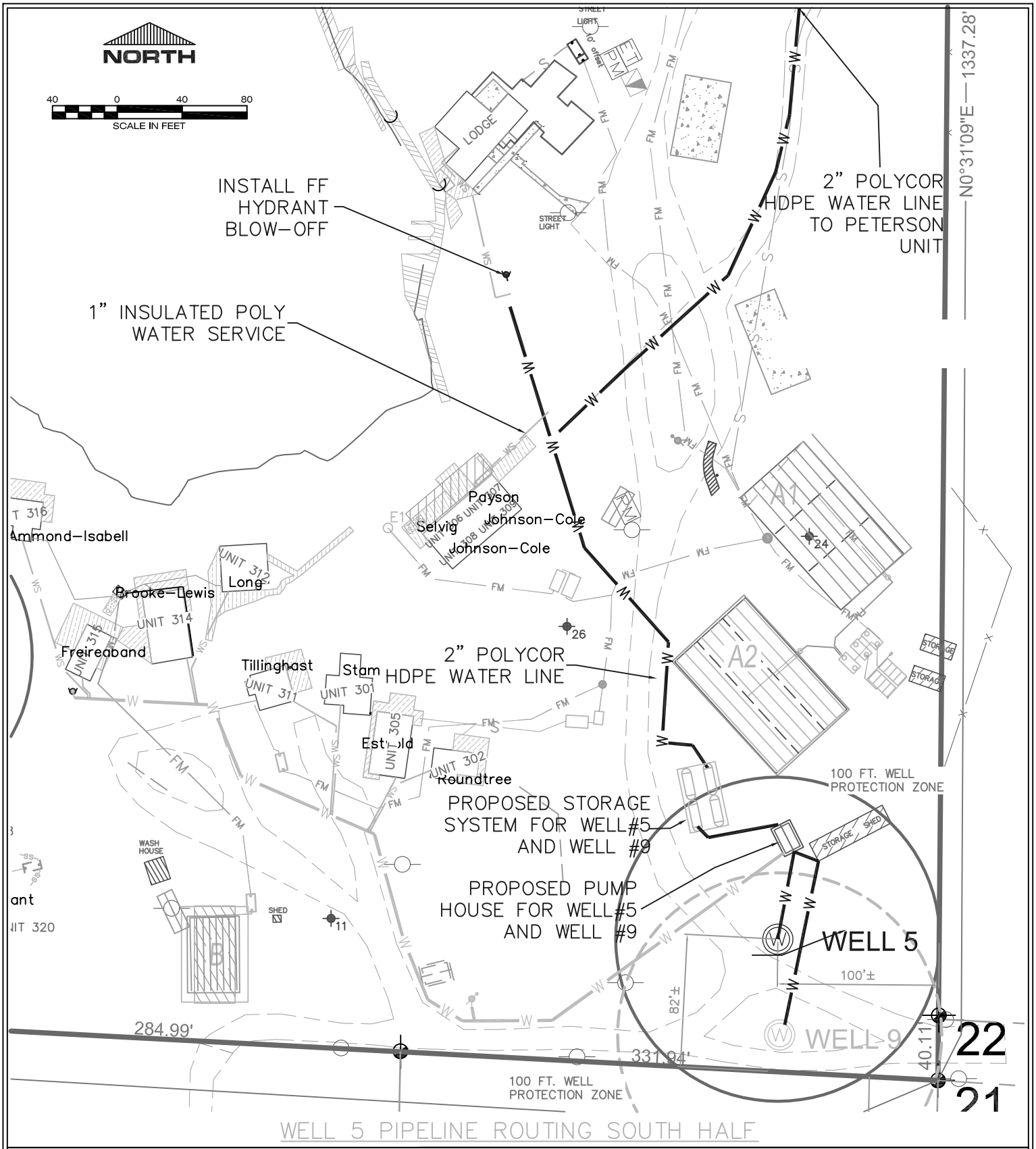
From	To	Description
0	2	TOP SOIL
2	25	BOULDERS GRAVEL
25	40	GRAVEL AND CLAY
40	80	SAND AND GRAVEL
80	100	HARD PAN

Driller Certification
All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name:
Company: LINDSAY DRILLING CO INC
License No: WWC-253
Date Completed: 12/5/1989

APPENDIX 2

Revised Design for Well 5 and Well 9: Storage, Pipeline and Distribution System Plan



WELL 5 PIPELINE ROUTING SOUTH HALF

HAFFERMAN ENGINEERING, INC.
P.O. BOX 1891
KALISPELL, MT 59901-1891
PHONE: 406-257-8708
FAX: 406-257-8710
EMAIL: info@billmayer.com
ONLINE: www.billmayer.com

DRAWING TITLE:

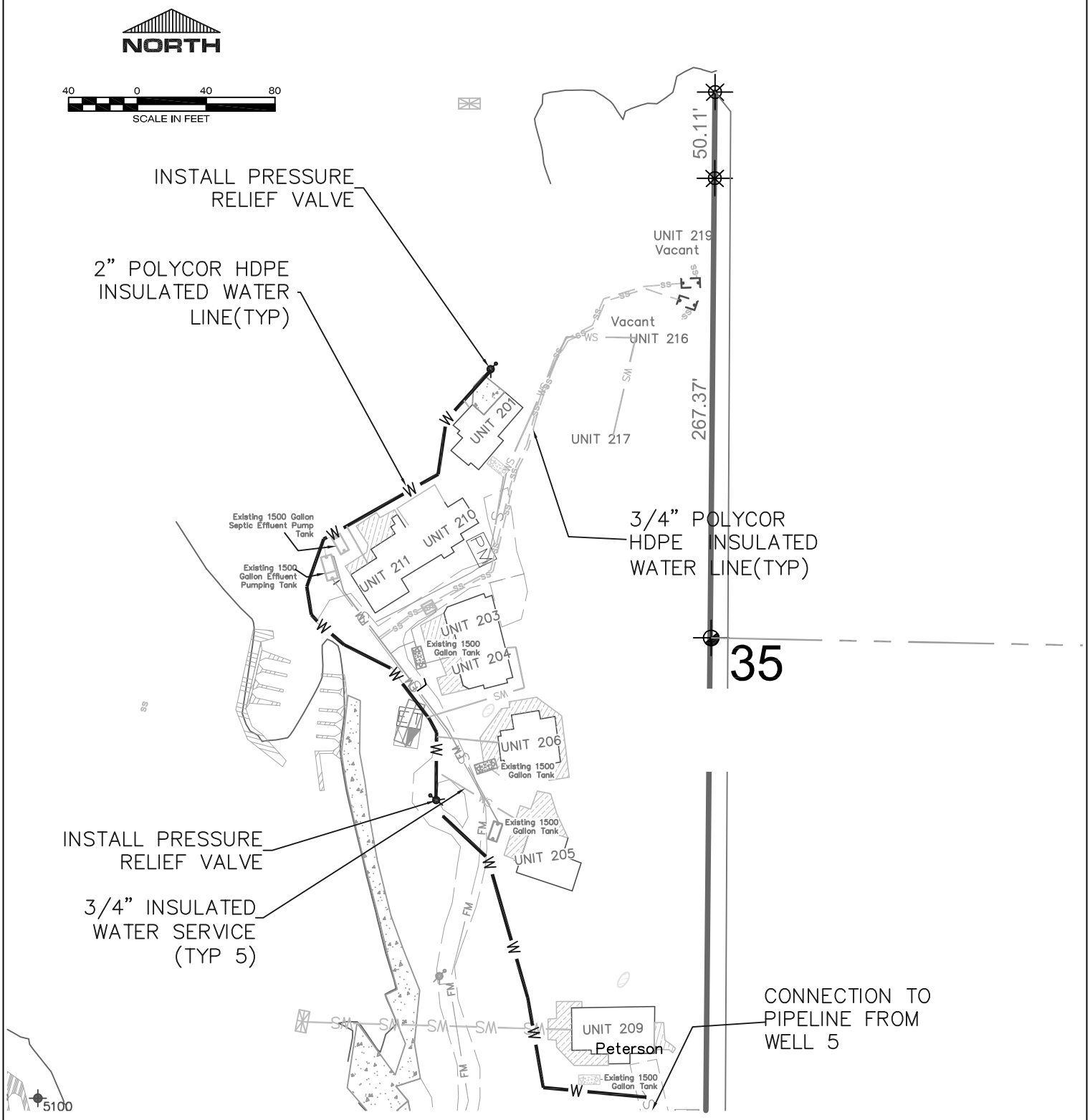
WELL 5 PIPELINE ROUTING

FOR

TIMBRSHOR HOA ANNUAL MEETING

SECTION 7
T23N, R 19W, PM, M., LAKE COUNTY, MONTANA

DATE:	PROJECT NUMBER:	SCALE:	SHEET:
JUNE 14, 2019	T.58.2	AS SHOWN	1 OF 2
FILE LOCATION: S:\LAND PRO...\T.58.2\DWG	DRAWN BY: KMH	APPROVED BY: KMH	



WELL 5 PIPELINE ROUTING NORTH HALF

HAFFERMAN ENGINEERING, INC.
P.O. BOX 1891
KALISPELL, MT 59901-1891
PHONE: 406-257-8708
FAX: 406-257-8710
EMAIL: info@billmayer.com
ONLINE: www.billmayer.com

DRAWING TITLE:

WELL 5 PIPELINE LOCATION

FOR

TIMBRSHOR HOA ANNUAL MEETING

SECTION 7
T23N, R 19W, PM, M., LAKE COUNTY, MONTANA

DATE:	PROJECT NUMBER:	SCALE:	SHEET:
JUNE 14, 2019	T.58.2	AS SHOWN	2 OF 2
FILE LOCATION: S:LAND PRO...\T.58.2\DWG	DRAWN BY: KMH	APPROVED BY: KMH	

APPENDIX 3

Well Assignment Spreadsheet

HAFFERMAN ENGINEERING, INC.

Project: Timbrshor
Project #: T.58.1
File: S:/…/Water Rights/DEQ 2018
Assignment Hafferman

Revision Date
4/11/2019
6/10/2019

DEQ Key
COSA Compliant COM
Not COSA Compliant NCOM

Water System Complaince

Unit#	Owner	Status D=developed-#bdrms ND = not developed	DEQ Water Supply Status	TWP Assignment
401	Johnson	DEVELOPED	COM	4
402	Manning	DEVELOPED	COM	4
406	Armstrong	DEVELOPED	NCOM	4
408	Caraway,Dasinger	NOT DEVELOPED	NCOM	4
409	Roy	DEVELOPED	NCOM	4
410	Sand	NOT DEVELOPED	NCOM	4
411	Mead	DEVELOPED	NCOM	4
412	Cox	DEVELOPED	NCOM	4
416	Manning	NOT DEVELOPED	NCOM	4
417	Manning	NOT DEVELOPED	NCOM	4
421	Johnson	NOT DEVELOPED	NCOM	4
422	Johnson	NOT DEVELOPED	NCOM	4
424	Johnson	NOT DEVELOPED	NCOM	4
426	Borchers, B	NOT DEVELOPED	NCOM	4
427	Maxwell	NOT DEVELOPED	NCOM	**4**
428	Rys-Sikora	DEVELOPED	NCOM	4
429	Manning	NOT DEVELOPED	NCOM	4
430	Rys-Sikora	NOT DEVELOPED	NCOM	4
403/404	Cobb	NOT DEVELOPED	NCOM	4
418/419	Cobb	DEVELOPED	NCOM	4
209	Peterson	DEVELOPED	NCOM	5 and 9
306	Nichols (Trustee Selvig 4-plex)	DEVELOPED	COM	5 and 9
307	Payson (4-plex)	DEVELOPED	COM	5 and 9
308	Cole (4-plex)	DEVELOPED	COM	5 and 9
309	Cole (4-plex)	DEVELOPED	COM	5 and 9
Lodge	Rose	DEVELOPED	COM	5 and 9
201	Rose	DEVELOPED	NCOM	5 and 9
203	Acher	DEVELOPED	COM	5 and 9
204	Swindlehurst	DEVELOPED	COM	5 and 9
205	Rotondi	DEVELOPED	COM	5 and 9
206	Walters	DEVELOPED	NCOM	5 and 9
210	Schwank	DEVELOPED	COM	5 and 9
211	Fordahl	DEVELOPED	COM	5 and 9
216	Rotondi, M	NOT DEVELOPED	NCOM	5 and 9
219	Borchers-Michione	NOT DEVELOPED	NCOM	5 and 9
301	Karpstein	DEVELOPED	NCOM	5 and 9
302	Rountree	DEVELOPED	NCOM	5 and 9
305	Estvold	DEVELOPED	NCOM	5 and 9
311	Tillinghast	DEVELOPED	COM	5 and 9
312	Novinski	DEVELOPED	COM	5 and 9
314	Brooke-Lewis	DEVELOPED	COM	5 and 9
315	Feieraband Partnership	DEVELOPED	COM	5 and 9
316	Ammons	DEVELOPED	COM	5 and 9
317	McCarthy	DEVELOPED	NCOM	McCarthy
318	McCarthy	NOT DEVELOPED	NCOM	McCarthy
320	McCarthy	NOT DEVELOPED	NCOM	McCarthy
414	McCarthy	NOT DEVELOPED	NCOM	McCarthy

APPENDIX 4

Well 5 and Well 9 Combined-Preliminary Cost Analysis

HAFFERMAN ENGINEERING, INC.

Client Name: Timbrshor HOA
HEI Job File No.: T.58.2
Project Type: Water System Design
Date: 10-Jun-19
Subject: Well # 5 and Well # 9 Water System Development Costs

Well #5		Units =	15		
Item	Unit	Quantity	$/Unit	Cost	Comment
Trench and Backfill	LF	1011	$ 5.00	$ 5,055	Excavation and Backfill
Bedding Sand	CY	20	$ 48.00	$ 960	In place PolyCor pipe bedding
2" PolyCor Piping	LF	1011	$ 34.00	$ 34,374	Water Distribution Pipe
Rock Excavation	LF	120	$ 30.00	$ 3,600	
Storage Tanks 4 total	EA	4	$ 4,900.00	$ 19,600	Tanks, piping, controls, floats alarms, Excavation backfill and 2-pumps
Storage Tank Excavtion and Burial	CY	75	$ 45.00	$ 3,375	
Pump, pump controls and Installation	EA	2	$ 11,303.00	$ 22,606	25 gpm pump installed at 300 ft. btc with controls, wiring and plumbing
3/4"Water Service	EA	15	$ 425.00	$ 6,375	Corpstop at each connect
1" water service	EA	1	$ 475.00	$ 475	Corpstop at well for frost free hydrant
Frost Free Hydrant	EA	1	$ 375.00	$ 375	Blow off
Pump, pump controls and Installation	EA	1	$ 11,428.00	$ 11,428	25 gpm pump installed at 200 ft. btc with controls, wiring and plumbing
Well X-Troll 350 tank installed	EA	5	$ 950.00	$ 4,750	Pressure tanks
Pump House	EA	1	$ 15,600.00	$ 15,600	Exterior Pump House
8-inch well developed in bedrock to 400 ft, bgs	EA	1	$ 14,139.00	$ 14,139	8-inch casing with 6-inch PVC liner
			Subtotal	$ 142,712	
			10% Contingency	$ 14,271	
			Total Project Costs	$ 156,983	

Well #9		Units =	8		
Item	Unit	Quantity	$/Unit	Cost	Comment
Trench and Backfill	LF	395	$ 5.00	$ 1,975	Excavation and Backfill
Bedding Sand	CY	22	$ 48.00	$ 1,056	In place PolyCor pipe bedding
Rock Excavation	LF	120	$ 30.00	$ 3,600	Excavtion near Peteron_Rotondi
2" PolyCor Piping	LF	395	$ 34.00	$ 13,430	Water Distribution Pipe
3/4"Water Service	EA	8	$ 425.00	$ 3,400	Corpstop at each connect
1" water service	EA	1	$ 475.00	$ 475	Corpstop at well for frost free hydrant
Frost Free Hydrant	EA	2	$ 375.00	$ 750	Blow off
Pump, pump controls and Installation	EA	1	$ 11,428.00	$ 11,428	25 gpm pump installed at 200 ft. btc with controls, wiring and plumbing
8-inch well developed in bedrock to 400 ft, bgs	EA	1	$ 14,139.00	$ 14,139	8-inch casing with 6-inch PVC liner
			Subtotal	$ 50,253	
			10% Contingency	$ 5,025	
			Total Project Costs	$ 55,278	

Total Projects Costs Well #5 and Well #9 Combined	$	212,262
Cost Per Unit	$	9,229

APPENDIX 5

Well 5 and Well 9 Cost Phasing Analysis

HAFFERMAN ENGINEERING, INC.

Client Name: Timbrshor HOA
HEI Job File No.: T.58.2
Project Type: Water System Design
Date: 14-Dec-18
Subject: Well # 5 and Well # 9 Water System Development Phase 1 Costs

Well #5 Phase 1 **Units =** 12

Item	Unit	Quantity	$/Unit	Cost	Comment
Trench and Backfill	LF	1011	$ 5.00	$ 5,055	Excavation and Backfill
Bedding Sand	CY	20	$ 48.00	$ 960	In place PolyCor pipe bedding
2" PolyCor Piping	LF	1011	$ 34.00	$ 34,374	Water Distribution Pipe
Rock Excavation	LF	120	$ 30.00	$ 3,600	
Storage Tanks 4 total	EA	2	$ 4,900.00	$ 9,800	Tanks, piping, controls, floats alarms, Excavation backfill and 2-pumps
Storage Tank Excavtion and Burial	CY	35	$ 45.00	$ 1,575	
Storage Tank pump, pump controls and Installation	EA	1	$ 11,303.00	$ 11,303	25 gpm pump installed at 300 ft. btc with controls, wiring and plumbing
3/4"Water Service	EA	15	$ 425.00	$ 6,375	Corpstop at each connect
1" water service	EA	1	$ 475.00	$ 475	Corpstop at well for frost free hydrant
Frost Free Hydrant	EA	1	$ 375.00	$ 375	Blow off
Well pump, pump controls and Installation	EA	1	$ 11,428.00	$ 11,428	25 gpm pump installed at 300 ft. btc with controls, wiring and plumbing
Well X-Troll 350 tank installed	EA	3	$ 950.00	$ 2,850	Pressure tanks
Pump House	EA	1	$ 15,600.00	$ 15,600	Exterior Pump House
8-inch well developed in bedrock to 400 ft, bgs	EA	1	$ 14,139.00	$ 14,139	8-inch casing with 6-inch PVC liner
			Subtotal	$ 117,909	
			10% Contingency	$ 11,791	
			Total Project Costs	$ 129,700	

Well #9 Phase 1 **Units =** 0

Item	Unit	Quantity	$/Unit	Cost	Comment
Trench and Backfill	LF	0	$ 5.00	$ -	Excavation and Backfill
Bedding Sand	CY	0	$ 48.00	$ -	In place PolyCor pipe bedding
Rock Excavation	LF	0	$ 30.00	$ -	Excavtion near Peteron_Rotondi
2" PolyCor Piping	LF	0	$ 34.00	$ -	Water Distribution Pipe
3/4"Water Service	EA	0	$ 425.00	$ -	Corpstop at each connect
1" water service	EA	0	$ 475.00	$ -	Corpstop at well for frost free hydrant
Frost Free Hydrant	EA	0	$ 375.00	$ -	Blow off
Pump, pump controls and Installation	EA	0	$ 11,428.00	$ -	25 gpm pump installed at 200 ft. btc with controls, wiring and plumbing
8-inch well developed in bedrock to 400 ft, bgs	EA	0	$ 14,139.00	$ -	8-inch casing with 6-inch PVC liner
			Subtotal	$ -	
			10% Contingency	$ -	
			Total Project Costs	$ -	

Total Projects Costs for Phase 1	$ 129,700
Cost Per Unit	$ 10,808

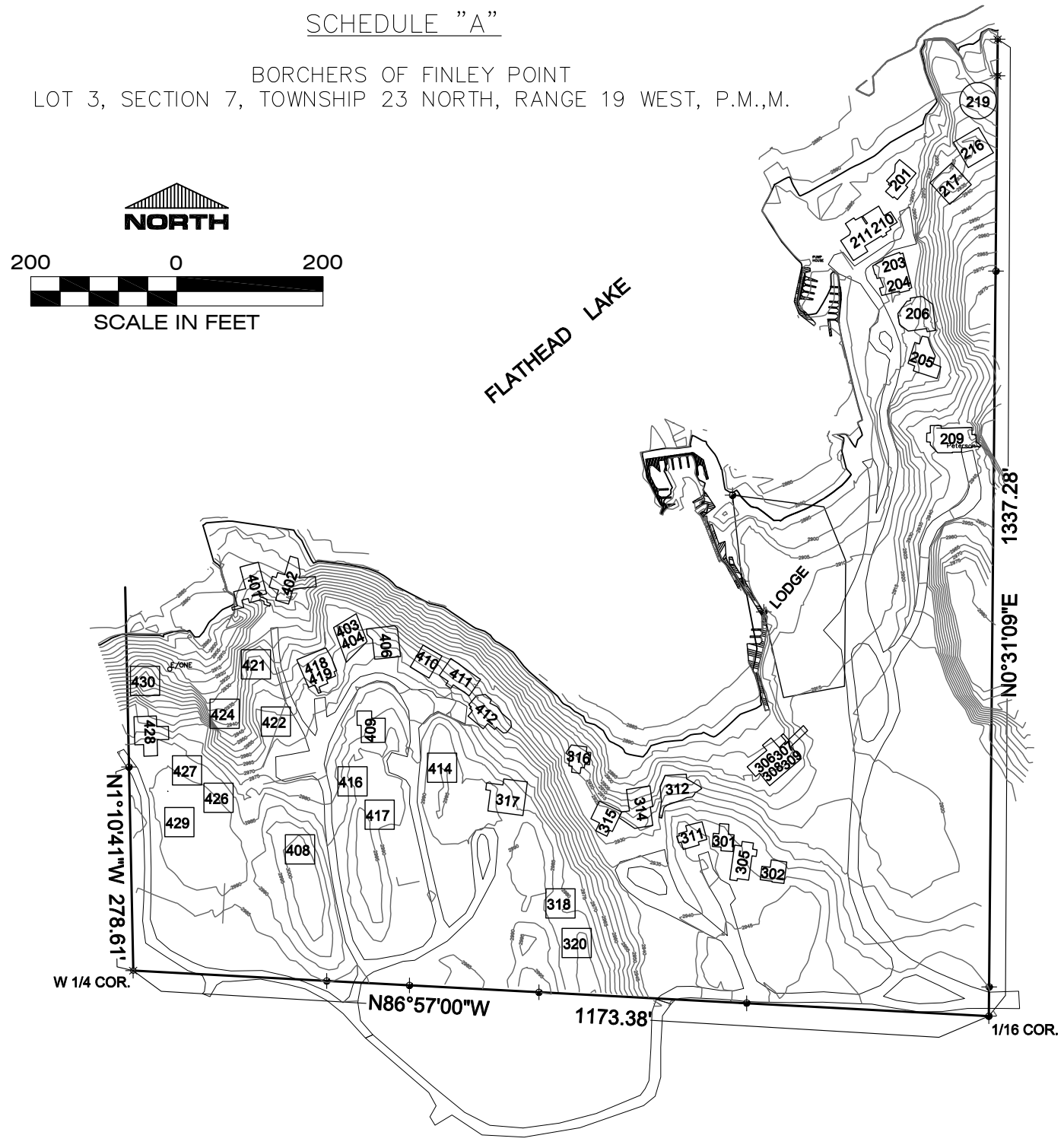
Well 5 and Well 9 Total development cost	$ 212,262
Well 5 and Well 9 Phase 1 Costs	$ 129,700
Recovery Cost	$ 82,562
Recovery Cost Per Unit (11)	$ 7,506

APPENDIX 6

Plat submitted to the County in 2016

SCHEDULE "A"

BORCHERS OF FINLEY POINT
LOT 3, SECTION 7, TOWNSHIP 23 NORTH, RANGE 19 WEST, P.M.,M.



HAFFERMAN ENGINEERING, INC.
35 SOUTH MAIN, SUITE B
KALISPELL, MT. 59901
PHONE: (406) 257-8708
FAX: (406) 257-8710
EMAIL: info@billmayer.com
ONLINE: http://www.billmayer.com

DRAWING TITLE:

UNIT LAYOUT

FOR

TIMBRSHOR HOMEOWNERS ASSOCIATION

SECTION 7
T. 23N., R. 19W., P.M., M., LAKE COUNTY, MONTANA