# TIMBRSHOR HOMEOWNERS ASSOCIATION
# WELL NO. 4 PUBLIC WATER SUPPLY DESIGN REPORT

**Lake County**
**Polson, MT 59860**

Prepared for:

**Timbrshor Homeowners Association**

Prepared by:

Gregory Lorenson, P.E. & Karl Kingery, P.E., CFM
**Hydrometrics, Inc.**
3020 Bozeman Avenue
Helena, MT 59601

DRAFT

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# TIMBRSHOR HOMEOWNERS ASSOCIATION
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## 1.0 INTRODUCTION

Hydrometrics, Inc. has prepared the following Public Water System Design Report to support an application to the Montana Department of Environmental Quality (DEQ) for a new proposed Public Water System (PWS) to serve the condominium subdivision referred to as Timbrshor, managed by the Timbrshor Homeowners Association (THOA). The proposed PWS, referred to as the Well No. 4 system, will service 20 condominium units within the Timbrshor subdivision. An additional 30 units within the Timbrshor subdivision will be serviced by separate Public Water Systems, submitted to and approved by the DEQ under separate covers.

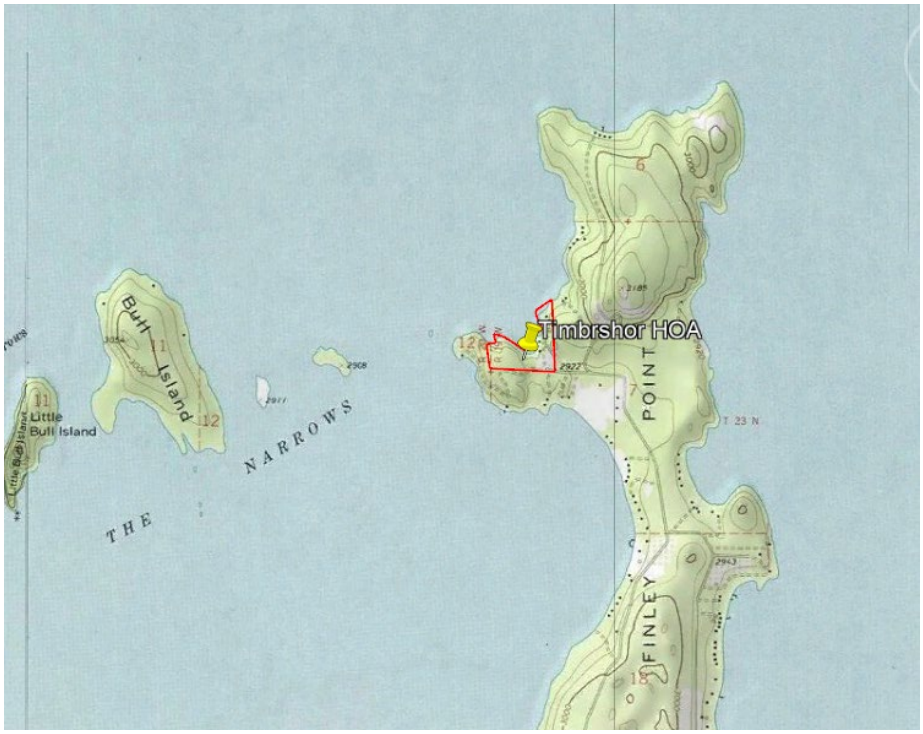
This Well No. 4 PWS system design report addresses the requirements of Circular DEQ 3 – Standards for Small Water Systems (MDEQ, 2018) and presents all the data required of the Circular DEQ 3 Design Report.

# 2.0 PROJECT BACKGROUND

## 2.1 LOCATION

The THOA is located in the SW ¼ of the NW ¼ of Section 7 of Township 23 N., Range 19 W. It is located on Finley Point, on the southeast side of Flathead Lake. The project is located within Lake County. The Property is described as the Borchers at Finley Point (Assessment Code 0000077777). It is located at approximately a latitude of 47.7702 N, longitude 114.0901 W. Figure 1 shows the Site Location.

**FIGURE 2-1. SITE LOCATION MAP**




## 2.2 BRIEF PROJECT HISTORY

A Certificate of Subdivision Approval (COSA) was issued on July 22, 1977 (Appendix A) for the Borchers of Finley Point project that included one 20-acre lot with 50 proposed lease residential building sites (units), to be served by community surface water systems and community sewer systems (#24-77-K902). The property also included 16 existing units and a lodge served by individual water and sewer systems that were exempt from subdivision approval because their development predated the Sanitation in Subdivisions Act. The 1977 COSA (Appendix A) required connection of proposed subdivision units to a community

surface water supply system; however, the original developer did not complete the permitting and develop the necessary water infrastructure according to approved documents and the approvals for both the community public water and sewer systems expired before the systems were constructed.

In June 2007, Lake County Environmental Health Department determined that the legal record for this subdivision needed to be corrected and that Borchers of Finley Point must revise its DEQ approval regarding water and wastewater systems (Appendix B). Based on the findings of non-compliance with the 1977 COSA, Lake County Environmental Health Department issued a building moratorium on the subdivision until such time that the community wastewater system and water system were approved by DEQ and an orderly plan for future water and wastewater infrastructure was provided. Lake County Planning Department issued a letter on June 11, 2009 (Appendix C), detailing the issues and necessary steps to resolve these issues, in order to bring the subdivision into compliance.

In 2016, Hafferman Engineering applied for a rewrite of the COSA on behalf of the THOA to address the wastewater treatment systems. In September 2016, COSA EQ#15-1971 was issued and superseded COSA #24-77-K902 for the wastewater treatment systems only, and stated that the original conditions not changed by this approval are still in effect and that the original July 27, 1977 community Water supply system approval (E.S. 77/K345) was not being modified as part of the scope of this wastewater re-write. The re-write added a proposed unit to the development (#317) that had been inadvertently omitted from the previous 1977 COSA, and exempted (established sanitary restrictions on) one of the previously approved units (#217) at the request of the owner. In addition, six of the previously approved units (#202, 319, 413, 420, 423 and 425) were restricted from development per the “Restriction on Development of Identified Lots”, agreed to by Lake County Commissioners on April 16, 2015. Under EQ#15-1971, proposed multi-user and public wastewater treatment systems were reviewed and approved to serve all the proposed or existing units in the development, including the 16 units and lodge that had previously been exempt from the 1977 COSA. All the approved wastewater

treatment systems have been constructed.

Unfortunately, since the approval for the water supply systems had expired in 1980 and the approval of COSA EQ#15-1971 superseded COSA #24-77-K902 for the wastewater treatment systems only, the subdivision was left without an approved water supply. The THOA received a letter from MDEQ on January 9, 2018 (Appendix D), which listed unit compliance/ non-compliance with the 1977 COSA and provided three options for the non-compliant units to become complaint. Table 2-1 provides a list of the units, their compliance/ non-compliance status, and whether they have been developed. Of the 48 units that currently exist, 17 units are listed in the 1977 COSA as exempt and in the January 9, 2018 MDEQ letter as compliant; while the remaining 31 units are listed in the January 9, 2018 MDEQ letter as non-compliant. As stated in the January 9, 2018 MDEQ letter, Units 203, 204, 205, 210, 211, 306, 307, 308, 309, 311, 312, 314, 315, 316, 401, 402 and the lodge were outlined as having individual water systems that predated the 24-77-K902 Borchers at Finley Point Water Certificate of Subdivision Approval (dated July 22, 1977); therefore, these lots may remain served by individual water systems in lieu of connection to the proposed PWS systems. Of the 31 non-compliant units, 12 of them are currently developed. The three options for the non-compliant units provided by the MDEQ in the January 9, 2018 (Appendix D) letter were as follows:

1. Leave the 1977 COSA pertaining to water in place and obtain approval from DEQ of a community public water supply system, served by either groundwater or surface water. If the community PWS system is designed for domestic use only, groundwater wells that pump less than 35gpm and 10 acre-feet of volume per year could be used for supply.
2. Rewrite the 1977 COSA to allow for individual, shared, or multi-user water systems that could be served by groundwater wells that pump less than 35gpm and 10 acre-feet of volume per year.
3. Rewrite the 1977 COSA for individual or shared cisterns.

Since 2018, new water supply system plans were prepared by Hafferman Engineering, Inc. (HEI) and submitted to DEQ for review and approval as a community public water supply system. The DEQ issued conditional approval for the groundwater well locations on April 15,

2020 (Appendix E).

Based on a documents prepared by HEI, the following project criteria have been documented and have guided the design and decision making process:

- Option #2 (above) from the DEQ 01/9/2018 letter would be followed, the DEQ rules will allow for multi-user wells with less than fifteen (15) connections and PWS wells for more than fifteen (15) connections, and the 1977 COSA would be re-written to allow for multiple multi-user and PWS systems.
- All of the water supply systems within the Timbrshor Subdivision are Transient non-community (TNC) public water supply systems because they do not regularly serve at least 25 of the same persons for at least 6 months a year. Timbrshor is seasonally occupied from approximately June 1st to September 1st by 33 units, while two units are occupied year round.
- The TNC system design shall supply domestic water, via groundwater wells, that supply less than 35 gallons per minute (gpm) and use less than 10 acre feet of water per year. These wells will hopefully secure a protected water right. Only one well is required for each TNC system; however, more than one well may be provided.
- When the number of connections needs to be expanded beyond the well yield, assuming the DEQ peak design flow requirement for a minimum of three (3) gpm average daily flow rate per unit, storage tanks will be installed between the well and the units. Storage will allow the well to pump less than 35 gpm, while achieving peak demand through larger pumps in the storage tanks.
- Although there are 17 existing units that do not require system upgrades, a majority have advised the THOA that they would like the option to receive a connection from the TNC groundwater system but understand that connection to the system is not a requirement.

Since the Lake County Planning Department issued a letter on June 11, 2009 (Appendix C), detailing the issues and necessary steps to resolve these issues, the THOA has been working towards accomplishing these subdivision corrections. The THOA has taken on the responsibility of developing the master plan for the entire subdivision water system, completing the system engineering, and re-writing the COSA, in an effort to get the building moratorium removed. As part of this process, the THOA has created Well Groups (Table 2-1) and has drafted Well User Agreements (Appendix F), with each group being responsible to build, operate and pay for their respective water system.

Units have been assigned to one of three well groups. Each well group will be a different PWS and will provide water service to a different service area. Between the three separate well

groups, water service will be provided to the entire Timbrshor property. Water service was separated into three well groups, rather than combining them under a single PWS, due to the physical constraints of the site and the economic limitations of combining the systems. Further discussion of this separation into three separate well groups is provided in Section **Error! Reference source not found.**. The well groups are follows:

- The eastern Well Group will service areas along Borchers Ln, Coot Ln, and Woodpecker Ln will be served by two wells, Wells No. 5 & Wells No. 9. The PWS servicing this Well Group has been named the Well 5/9 PWS.
- The central Well Group will service an area at the eastern end of Osprey Ln and will be served by one existing well, the McCarthy Well. The PWS servicing this Well Group has been named the McCarthy Well PWS.
- The western Well Group will service an area on the Osprey Ln loop and at the end of Snowberry Ln. The western Well Group will be serviced by one well, Well No. 4. The PWS servicing this Well group has been named the Well No. 4 PWS.

# 3.0 WELL NO. 4 PUBLIC WATER SYSTEM

## 3.1 OWNERSHIP

The Well No. 4 water system will be owned by the Well No. 4 Well Group and operated by the Timbrshor Homeowners Association. Their mailing address is:

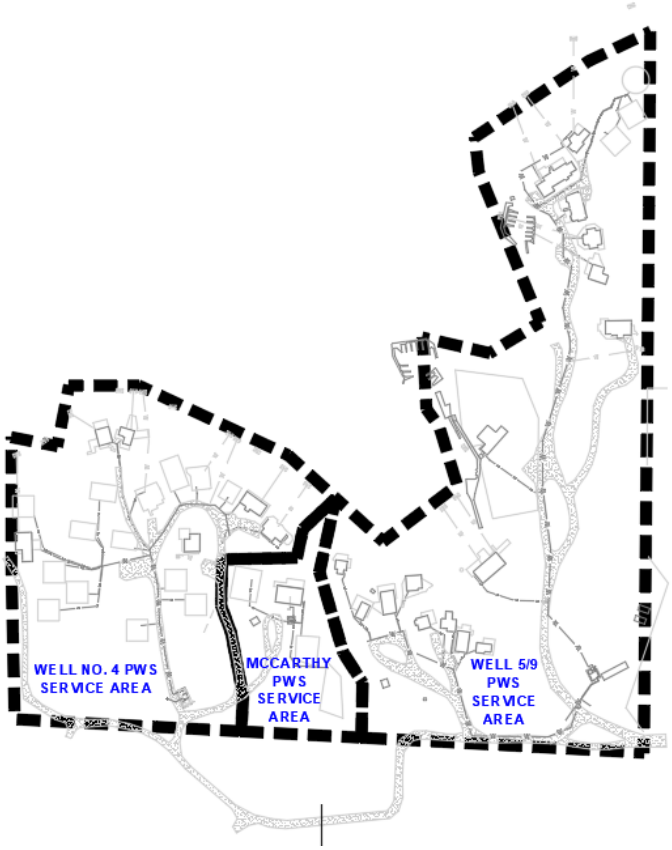
Timbrshor Homeowners Association Well No. 4 Well Group
Timbrshor Lake County Water and Sewer District Entity 102414
C/o Blake Johnson Chairman
30371 Osprey Lane
Polson, Montana 59860

## 3.2 SYSTEM BOUNDARIES

The Timbrshor subdivision is approximately 20 acres in size and is classified as a Condominium Subdivision based on Chapter VI of the Lake County Subdivision Regulations. The THOA and Timbrshor subdivision boundary is shown on Figure 2.

The service area for the Well No. 4 PWS is shown on Sheet 2 of the Plans (Appendix G). The service areas for the Well 5/9 System and the McCarthy Well System are also shown on Sheets 3 and 4 of the Plans. The service areas are also shown on Figure 3-1. Water service will be provided to all lots that have an existing structure by one of these three water systems. Additionally, service line connections will be made to undeveloped lots at the time of their construction. The service line connection locations for undeveloped lots may need to be relocated by the owner at the time of construction. The proposed locations of the service line connections for both developed and undeveloped lots are shown on Sheet 2 of the Plans (Appendix G). There are no proposed or existing units within the THOA boundary that will not be served by one of these three water systems.

**FIGURE 3-1. SERVICE AREAS**




There are no plans to provide water service to facilities outside of the THOA boundary. Additionally, there are no plans for future development of the lot that could increase or change water demands beyond the development of the 48 units described in the COSA EQ#15-1971.

## 3.3 WATER SYSTEM CLASSIFICATION

All of the units within the THOA are seasonally used by its residents, with the exception of two units. At this point in time, the remainder of the units are primarily used between May and September each year intermittently. Within the Well No. 4 system, none of the units currently experience year-round usage.

As a result, the Well No. 4 water system does not meet the requirements for classification as a community water system, since it does not regularly serve at least 25 of the same persons for

more than 6-months a year or have 15 service connections used by year-round residents. Additionally, since the primary use of the units is seasonal and owners do not occupy the units for more than 6-months out of the year, the system meets the definition of a Transient Non-Community (TNC) Public Water System.

While not anticipated, if use were to change such that 25 of the same persons lived in the units year-round, or 15 or more of the units had year-round residents, then the PWS would need to be reclassified as a Community water system. If reclassification of the PWS were to occur, water quality data would need to be evaluated to determine if the system meets the DEQ requirements and treatment may be necessary if certain parameters are not in compliance. Additional requirements including the need to hire a Certified Water Operator to run the system and conduct more stringent testing and reporting would also be required.

## 3.4 EXISTING FACILITIES

### 3.4.1 Units

There are currently 48 units that are within the THOA boundary. The Well No. 4 system will have 20 service connections, servicing 20 units. Table 2-1 shows the units and service connections that are included in the Well No. 4 system.

There are no plans to expand the THOA to beyond 48 units as a whole (43 service connections) or for the Well No. 4 system to service more than 20 units (20 service connections).

# TABLE 2-1. UNIT CONSTRUCTION AND SERVICE SUMMARY

| Unit | PWS | Developed Pre-COSA & Compliant? | Currently Developed? |
|---|---|---|---|
| 408 | Well No. 4 | - | - |
| 417 | | - | - |
| 416 | | - | - |
| 429 | | - | - |
| 426 | | - | - |
| 427 | | - | - |
| 428 | | - | Yes |
| 430 | | - | - |
| 422 | | - | - |
| 421 | | - | - |
| 401 | | Yes | Yes |
| 402 | | Yes | Yes |
| 424 | | - | - |
| 418/419 | | - | Yes |
| 403/404 | | - | - |
| 406 | | - | Yes |
| 410 | | - | - |
| 411 | | - | Yes |
| 412 | | - | Yes |
| 409 | | - | Yes |
| 414 | McCarthy Well | - | - |
| 317 | | Pre-COSA* | Yes |
| 318 | | - | - |
| 320 | | - | - |
| 316 | Well 5/9 | Yes | Yes |
| 315 | | Yes | Yes |
| 314 | | Yes | Yes |
| 312 | | Yes | Yes |
| 311 | | Yes | Yes |
| 301 | | - | Yes |
| 305 | | - | Yes |
| 302 | | - | Yes |
| 306 | | Yes | Yes |
| 307 | | | |
| 308 | | | |
| 309 | | | |
| Lodge | | Yes | Yes |
| 209 | | - | Yes |
| 205 | | Yes | Yes |
| 206 | | - | Yes |
| 203 | | Yes | Yes |
| 204 | | | |
| 211 | | Yes | Yes |
| 210 | | | |
| 201 | | - | Yes |
| 217 | | - | - |
| 216 | | - | - |
| 219 | | - | - |

*Inadvertently left off Water COSA, but included in Wastewater COSA. Water system not Compliant.

### 3.4.2 Potable Water Facilities

Currently, there is not a centralized water distribution system and the separate lots that have been constructed have individual intakes that draw water from Flathead Lake. The existing intakes and the service lines are shown on Figure 1-1. The units that have currently been developed are listed in Table3-1-1. Several of these units were identified in the 1977 COSA as being compliant. These units are also listed in Table3-1-1. The units that are compliant have the ability and authority to continue to use their existing water systems and have the ability to elect not to connect to the proposed PWS. Existing water systems will not be able to be connected into the new PWS and shall remain physically separate.

### 3.4.3 Sanitary Sewer Facilities

The existing sanitary sewer facilities were recently improved upon in 2018. This work was required as part of the 1977 COSA (COSA #24-77-K902), which was superseded in September 2016 by COSA EQ#15-1971. As a result of those improvements, several leach fields were constructed and a sanitary sewer system collection system map was developed. The sanitary sewer collection system map includes both the existing sanitary sewer facilities as well as proposed connections for the units that have not yet been developed. The existing and proposed sanitary sewer facilities in the Well No. 4 service area are shown on Figure 3-3. Unit 217 currently has sanitary restrictions placed on it, which are in the process of being resolved, so that these restrictions can be removed and this Unit can be developed.

## 3.5 SITE CONDITIONS

The Well No. 4 system is located in an area with very shallow bedrock. The bedrock is located at an approximate depth of 0-4 feet below the ground surface. There are many locations where the bedrock is exposed at the surface. The water mains will be largely constructed in trenches excavated from the bedrock. Building foundations will likely be constructed so their foundations will be on bedrock. There are no proposed subsurface structures due the shallow bedrock conditions.

## 3.6 ALTERNATE PLANS

### 3.6.1 Public Water System Configuration

The construction of a single PWS that would connect all three service areas was considered as part of the overall water system planning effort. However, the cost of connecting these separate water systems is significant, due to the following:

- High cost of bedrock excavation,
- Large distance and change in elevation between systems,
- Interconnection of the systems would require a water main to run on adjacent property, not owned by THOA.

As part of the Well Location selection process and approval, it was determined by the THOA and DEQ that it was not economically feasible to make a connection between the McCarthy system, the Well 5/9 system or the Well No. 4 systems.

Additionally, the McCarthy system is existing and would require minimal current capital costs to continue its operations. Therefore, it was determined that a more cost-effective solution would be to provide three separate water systems.

### 3.6.2 Well Locations

During the course of investigating locations for a PWS well, several well locations were identified within the THOA boundary. The property has a large number of existing septic systems and associated leach fields and pipes. As a result, there are very few locations on property that are less than 100-feet away from a sanitary sewer pipe, septic tank, or leach field. Hafferman Engineering, Inc investigated multiple locations prior to requesting approval for the current Well No. 4, Well No. 5 and Well No. 9 locations. These well locations are shown in Figure 3-2.

## FIGURE 3-2. CONSIDERED WELL LOCATIONS

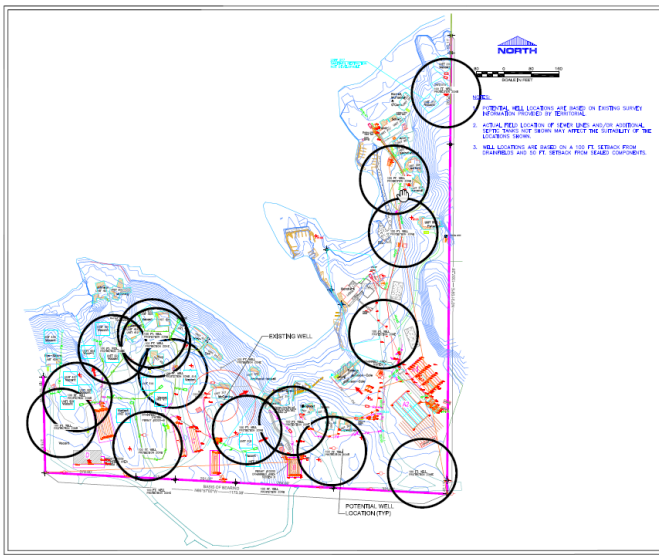
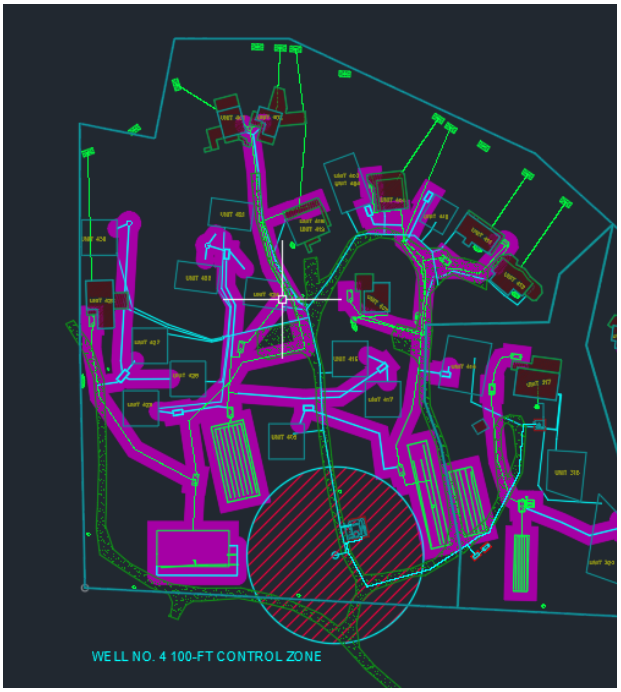



Figure 3-3 shows the existing and proposed sanitary sewer facilities highlighted in purple.

## FIGURE 3-3. PROPOSED WELL LOCATION




Following this investigation, only one location was identified as a suitable location for a well to serve the Well No. 4 PWS. This location is shown in Figure 3-2. Since only one well location

was selected, Section 7.1 requests a deviation from Section 3.2.1.2 of DEQ Circular 1, which requires a PWS to have multiple sources. Only one location was identified as a suitable location to serve the McCarthy Well PWS and only two locations were identified as suitable locations to serve the Well 5/9 PWS. The locations of those 4 wells were approved by DEQ on April 15, 2020. That approval is included in this report as Appendix E.

### 3.7 PROPOSED WELL NO. 4

The Timbrshor Subdivision lies within the boundaries of the Confederated Salish and Kootenai Tribal (CSKT) reservation. In order to be able to construct a water supply system that would not require issuance of a State of Montana or CSKT permit, the THOA determined that a water supply system needed to be designed to supply domestic water and served by groundwater wells that will pump less than 35 gallons a minute (gpm) and use less than 10-acre feet of water per year. At this point in time, it is our understanding that each Well Group could obtain a protected right in the use of the water by each of them filing a Montana Department of Natural Resources and Conservation (DNRC) Notice of Completion of Groundwater Development for each well.

The Proposed Well No. 4 is located at approximately latitude 47.7697 N, longitude 114.0903 W. It was conditionally approved by the DEQ on April 15, 2020. This conditional approval (EQ#20-1440) is attached as Appendix E. The Proposed Well No. 4 has not been drilled. As a result, Well No. 4 has not yet had an aquifer test or water quality sampling on it at this time. Prior to placing Well No. 4 into service, this will be performed and submitted to DEQ, alongside the other conditions listed in the April 15, 2020 conditional approval letter (Appendix E).

Based on the production capacity of other wells in the same area and aquifer, it is assumed at this time that the well be able to produce 15 gpm of water during peak demand periods. If through aquifer testing, the well is not able to produce this flow rate of water or has additional capacity, the proposed design will need to be revised.

### 3.8 SERVICE AREA POPULATION

### 3.8.1 Unit Descriptions and Population

The THOA currently has 31 developed units in 25 separate buildings. 9 of those units and 8 of those buildings are within the Well No. 4 service area boundary. None of those buildings currently have a service connection, as there is not currently a central water system. Each building will, under the PWS, have a service connection unless the owner of a currently compliant unit and/or building elects not to participate in the PWS. Two of the units within the Well No. 4 service area were constructed before the 1977 COSA and are considered to be compliant. Table 2-1 lists all of the units within the THOA property boundary and whether or not they are considered to be compliant.

A development moratorium has been placed on the THOA until water and sanitary sewer services can be provided to the units within the HOA that were constructed after the signing of the 1977 COSA. Additionally, the development moratorium will be continued by Lake County until the COSA can be updated with the State of Montana.

Once the development moratorium is lifted, the THOA may add an additional 13 units (12 service connections) within the Well No. 4 service area. The development of those 13 units will require the construction of 12 buildings, each with its own service connection. A summary of all of the units is included in Table 2-1.

Full buildout of the Well No. 4 system would result in 22 units and 20 service connections within the Well No. 4 service area.

For purposes of calculating both existing and proposed water demands, it is estimated that each unit has approximately 2.6 persons living in it, on average, when in use. Use of the units within the THOA boundary is both seasonal and intermittent, with the most usage occurring during the summer months between May and September. This pattern of usage is not expected to change as additional lots are developed since most of these units are second homes or vacation homes for the owners.

Within the Well No. 4 PWS service area, none of the existing units currently experience year-

round usage. It is anticipated that following full buildout, the use pattern will not change and that none of the additional 13 units (12 service connections) within the Well No. 4 PWS service area will experience year-round usage.

## 3.9 WATER DEMAND

### 3.9.1 Existing Water Demand

#### 3.9.1.1 Background

Currently each individual unit within the Well No. 4 service area boundary has an unmetered water service line and intake that extends into Flathead Lake. There is no existing water usage data.

#### 3.9.1.2 Average Day

Because there is no existing water use data for this system, an average demand of 100 gallons per capita per day (gpcd) has been used to calculate the average daily demand per DEQ-3 Section 3.2.1.2.a. Existing Average Day water demands have been calculated assuming full occupancy of each unit with 2.6 persons per unit (US Census Bureau). This calculation represents the approximate average demand during full occupancy periods and is a conservatively high estimate of the existing water demand for the system.

#### 3.9.1.3 Maximum Day

Existing Maximum Day demands have been calculated using a peaking factor of 1.5 times the Average Day Demand. Given the intermittent and seasonal use of the THOA alongside the conservative assumption that all units are simultaneously occupied, this is an appropriate peaking factor for calculating the Maximum Day demand.

#### 3.9.1.4 Peak Hour

The existing Peak Hour demand has been calculated using methods provided for in Chapter 5 of the AWWA Water System Design Manual. Calculations are attached to this report as Appendix H.

#### 3.9.1.5 Fire Protection Demand

The THOA is located within the FPFD service area. There is not currently a water storage and distribution system provided for firefighting purposes within the THOA boundary, however Flathead Lake is adjacent to the property and the water in the lake has historically been used as a water source for firefighting purposes for the area within the Finley Point/Yellow Bay Fire Department (FPFD) service area.

#### 3.9.1.6 Summary

Table3-1 shows the calculated existing water system Average Day, Maximum Day and Peak Hour demands for the units currently present within the Well No. 4 service area.

**TABLE3-1. WELL NO. 4 SERVICE AREA WATER DEMANDS**

| | Existing* | Full Buildout | Units |
|---|---|---|---|
| Average Day Demand | 2096 | 5240 | (gpd) |
| Maximum Day Demand | 3144 | 7860 | (gpd) |
| Peak Hour Demand | 25 | 34 | (gpm) |

(*) Existing system is not metered and is not a single connected system. Values shown are estimates of usage during full occupancy conditions within service area boundaries.

### 3.9.2 Proposed Water Demand

#### 3.9.2.1 Fire Protection and Other Uses

Based on discussions with the local fire chief at FPFD, fire flow is not required to be provided as part of the potable water system and emergency fire water can be provided through the use of a dry hydrant with a suction hose that terminates in Flathead Lake. Water storage for firefighting purposes could also be provided in cisterns separate from the water system. Therefore, there is not a fire flow demand included in the proposed water system, since water demands associated with firefighting activities will be provided for separately.

The system will not be used for commercial or industrial purposes and the water system will not be used for lawn watering or irrigation purposes.

#### 3.9.2.2 Average Day

For water system planning purposes, it was assumed that all of the units are occupied and that

there are 2.6 persons in each unit. It was also assumed that all of the buildings within the Well No. 4 service area were constructed and that they are all served from the Well No. 4 PWS. Because there is no existing water use data for this system, an average demand of 100 gallons per capita per day (gpcd) has been used to calculate the average daily demand per DEQ-3 Section 3.2.1.2.a. It has also been assumed that there will be simultaneous use of all of the units (full occupancy). Given the intermittent and seasonal use of the THOA units, this is a conservative assumption and will result in calculated demands that are likely high.

#### 3.9.2.3 Maximum Day

Proposed Maximum Day demands have been calculated using a peaking factor of 1.5 times the Average Day Demand. Given the intermittent and seasonal use of the THOA alongside the conservative assumption that all units are simultaneously occupied, this is an appropriate peaking factor for calculating the Maximum Day demand.

#### 3.9.2.4 Peak Hour

The proposed Peak Hour Demand has been calculated using methods provided for in Chapter 5 of the AWWA Water System Design Manual. Calculations are attached to this report as Appendix H.

#### 3.9.2.5 Summary

Table3-1 shows the calculated proposed water system average daily, maximum day and peak hour demands for the proposed Well No. 4 system.

## 3.10 ESTIMATED SUPPLY YIELD

### 3.10.1 Existing

There is no current well as part of the Well No. 4 system.

The McCarthy well, which is inside of the THOA boundary is not currently metered. At the time of well testing, the McCarthy well was able to produce a flow rate of 15 gpm during the pumping test. This test was performed in 1985 and is believed to be a reasonable estimate of the production capacity of the existing and proposed wells. The Well Log Report for the

McCarthy well is provided in Appendix I.

### 3.10.2 Proposed

The proposed Well No. 4 is estimated to be able to provide 15 gpm during peak demand periods. The existing supply is limited by the DNRC and the CSKT to 35 gpm and 10 acre-feet per year. It is not anticipated that the Well No. 4 system will exceed the flow rate limit of 35 gpm or the volume limit of 10 acre-feet per year. It is estimated that due to the seasonal and intermittent usage of the system, approximately 1.2 acre-feet of water will be used each year after the full buildout of the development and that the well will be able to supply that volume of water. This calculation is provided in Appendix H.

The anticipated production rate of 15 gallons per minute will be sufficient to meet the Maximum Day demand. As shown in Table3-1, the Maximum Day demand of the proposed Well No. 4 system is 7,860 gpd. If the well is pumping continuously at a rate of 15 gpm, it will be able to produce more than 21,000 gallons during a day. This volume of likely production capacity exceeds the required Maximum Day demand. It is possible that the production rate of the well could be less than 15 gpd. If this occurs, then the production of the well could be as low as 6 gpm and still be able to meet Maximum Day Demands. It is not anticipated that the production capacity of the well will be less than 6 gpm.

During Peak Hour demands, the system demand will be greater than the production capacity of the well. To prevent the system from running out of water, the system will draw water from storage while the well is pumping into the storage tanks. In order to meet these demands, 6,000 gallons of storage will be provided as part of the Well No. 4 system. This storage will be provided in the Pumphouse #4 building. It will be provided in two 3,000 gallon above-ground polyethylene water storage tanks.

## 3.11 OPERATION

The Well No. 4 water system will be operated by the Timbrshor Homeowners Association or their designated representative.

## 3.12 PLANS AND SPECIFICATIONS

Plans for the proposed Well No. 4 PWS are attached as Appendix G.

Specifications for the proposed Well No. 4 PWS are attached as Appendix J.

## 3.13 TECHNICAL, MANAGERIAL AND FINANCIAL CAPACITY

### 3.13.1 Technical Capacity

The physical infrastructure is described in the attached plans and specifications as well as this report and its appendices.

The source water adequacy is described in the Source Water Delineation and Assessment Report prepared by Hofferman Engineers. This document is included as Appendix K to this report.

An Operations and Maintenance Manual (O&M) manual will be provided following construction of the system.

### 3.13.2 Managerial Capacity

The Well No. 4 PWS will be owned by the THOA Well No. 4 Well Group. The owner's address is:

Timbrshor Homeowners Association
Timbrshor Lake County Water and Sewer District Entity 102414
C/o Blake Johnson Chairman
30371 Osprey Lane
Polson, Montana 59860

The PWS will be staffed and operated by the THOA Well No. 4 Well Group. The THOA will assign one of its board members the responsibility to manage, operate and maintain the system. This person will be responsible for obtaining, coordinating and submitting all required water quality samples, including those for nitrates, nitrites, total dissolved solids, and *E. coli*.

The operator of the system will be the Well No. 4 Well Group, as a certified water operator is not needed for a transient non-community system. The board may assign additional or alternate persons to serve as the operator or back-up operator depending on whether those persons will

be on-site.

Records will be maintained by the Secretary of the THOA and will be stored on-site in Pumphouse #4 . These records include records of operation, service maintenance, and repairs, plans and specifications for construction, as-built drawings, O&M manuals, and compliance information. This information will be accessible to the operators, managers and owners of the system.

In the event that the Well No. 4 Well Group becomes insolvent, then the system will be maintained by the THOA.

### 3.13.3 Financial Capacity

The capital cost of the project will be paid for by the Well No. 4 Well Group. The Well No. 4 Well Group will receive funds from the owners of the properties within the THOA who will pay dues and assessment fees for capital and maintenance costs of the system.

## 4.0 WATER SOURCES

### 4.1 WELL NO. 4 LOCATION

The Well No. 4 Location was selected following a review of the locations of the existing sanitary sewer facilities. The selected location was the only location within the service area that had access and which had 100-feet of setback from leach fields, sanitary sewer mains and septic tanks. There are no other locations in the Well No. 4 service area that are more than 100-feet away from both septic tanks and leach fields and which also have the potential to be accessed. This is further discussed in Section 3.6.2.

The proposed Well No. 4 location is more than 100-feet away from both septic tanks and leach fields, is located near a road, is located near power and is also located in a relatively central location for the Well No. 4 service area. Additionally, the well location was approved by the DEQ on April 15, 2020. This approval is included in this report as part of Appendix E.

The well is proposed to be approximately 400-feet deep through the Belt Supergroup

formation. The closest well is the McCormick Well, which is approximately 280 feet way from the proposed location of Well No. 4. The McCarthy Well was completed to a depth of 403-feet and would be in the same formation as the proposed Well No. 4. It is not expected that pumping Well No. 4 will create a significant enough cone of depression that the output from the McCarthy well will be impacted. Additionally, both the McCarthy well and Well No. 4 will be approximately the same depth.

The Montana Groundwater Assessment Atlas 2 states that that

> *Bedrock underlies all of the surficial deposits and is the primary aquifer in the Flathead Lake perimeter; almost 80 percent of all wells are completed in bedrock. The bedrock aquifer is relatively evenly developed on the east and west sides of the lake; about 1,100 wells have been drilled on the west and about 400 wells on the east (the east side of the lake has about half of the shoreline miles as the west side). The bedrock aquifer produces water from fracture permeability. The occurrence of saturated fractures is variable, causing some wells to be deeper than 1,000 ft, although the overall median depth is 240 ft. Wells are generally deeper on the west side of the lake (median depth 255 ft) than on the east side (median depth 200 ft). ….Yields from the bedrock are not as high as those from the alluvial aquifers but are generally adequate for domestic uses; the maximum reported yield is 850 gpm, and the median is 20 gpm……Despite the difference in median well depths in the bedrock aquifer on either side of the lake, there is little difference in median well yields.*

There has been no source exploration at the proposed location of Well No. 4. The well log for the McCarthy Well, which is approximately 280 feet away from the proposed Well No. 4 location is included in Appendix I.

The proposed Well No. 4 will be constructed of a 10-inch borehole to a depth of 30 feet, which will have a bentonite grout seal injected into it. The well casing will be a 4.5-inch PVC casing with perforations near the base of the well. The extent of the perforated interval will be determined during construction. The well casing will also extend 3-feet above ground.

Appendix l includes the detail for the construction of Well No. 4. This detail was submitted in March, 2020 and approved on April 15, 2020.

Following construction, the well will be step tested to determine its production capacity. The pumping rates will be determined in the field but will not exceed 35 gallons per minute. Following the pumping test, water quality samples will be taken and analyzed for *E. coli*, nitrates & nitrites.

All sanitary sewer facilities are located more than 100-feet away from the proposed well site. There are no other know sources of potential contamination. Future construction of sanitary sewer facilities including sanitary sewers, septic tanks and leach fields, will be prohibited within the 100-foot well isolation zone. This isolation zone will be protected through an administrative rule passed by the THOA board.

Since the proposed Well No. 4 is approximately 400-feet deep, it is not anticipated that it will under the direct influence of surface water. The nearest major waterbody is Flathead Lake, which is approximately 500-feet away from the proposed well location. Flathead Lake is approximately 240 feet deep in the nearby area. Therefore, the well will be deeper than Flathead Lake is in the region.

A Preliminary Assessment of the potential for the well to be Under the Direct Influence of Surface Water was completed based on the best available information at this time. Since the well has not yet been drilled, this assessment should be re-evaluated after construction of the well and submitted to DEQ as part of the project file. At this time, it is not expected that the well will be Under the Direct Influence of Surface Water. This assessment is included in Appendix M.

Additional information regarding the anticipated characteristics of the well can be found in the Source Water Delineation and Assessment Report prepared by Hofferman Engineers in 2019. This document is attached to this Report as Appendix K.

# 5.0 TREATMENT PROCESSES

There is no treatment proposed as part of the public water supply system. There is no history of groundwater contamination in this area and the system will be a Transient, Non-Community public water system. Per the Administrative Rules of Montana (ARM) 17.38.229, disinfection is not required for this type of system. If it is determined following construction and testing of the well that the water is contaminated or at risk of contamination, or if there are risks associated with the distribution system, then disinfection will be provided.

The well is not Groundwater Under the Direct Influence of Surface Water. Therefore, filtration is not required.

While a water quality analysis of the well has not at this time been performed, it is not believed that there will be any pollutants in the water at concentrations over the Primary Drinking Water Standards. Therefore, no advanced treatment of the water is anticipated to be required at this time. If sampling and testing of the water determines that there are pollutants in the water that would result in exceedances of the Primary Drinking Water Standards, then this will be re-evaluated.

There is no sanitary sewer system associated with the proposed PWS facilities. The sanitary sewer system associated with the THOA units is shown on Figure 3-3. While there are several sanitary sewer crossings of the proposed water main, there are no areas where contamination of the water system is likely to occur. A standard detail of a typical sanitary sewer crossing is provided in Sheet 5 of the plans.

There are no proposed waste products associated with the PWS facilities.

# 6.0 SUMMARY OF DESIGN CRITERIA

## 6.1 OPERATIONS

### 6.1.1 Automation

The proposed water system will be designed to operate using water stored in the water storage tanks and then distributed to the distribution system based on water system pressures. This

system will require minimal day-to-day system operation by the operator. Because the THOA has very limited use for most of the year, it is important that this system be able to operate without full-time staff.

To summarize the operations, the pump will be turned on when the water level in the storage tanks drops to approximately 85% of the full storage volume. The booster pumps will be operated based on the pressure in the water system. When the pressure in the water system drops below 60 psi, the pumps will turn on to provide pressure to the distribution system.

## 6.2 POWER SUPPLY

### 6.2.1 Main Power Supply

The power supply for the Project area is the Mission Valley Power utility system. The Finley point area has one substation that feeds the Project area. The Project area is serviced by a single-phase 110/220 Volt service line. This service line has seen relatively infrequent power outages. Power outages usually occur as a result of weather events such as high winds and fires. Winter storms have also resulted in short duration power outages for the area. For example, in 2021, there was a 10-hour outage as a result of strong northeast winds that blew down mature trees that pulled down power lines and broke poles. According to Mission Valley Power, this was an uncommon event and typical power outages average 2 hours and 15 minutes long across their system.

### 6.2.2 Backup Power Supply

Due to the risk of pipes freezing during a power outage, since power is required to heat the heat trace tape, backup power will be supplied to the Well No. 4 system. Backup power will be in the form of a 20-kilowatt liquid propane fueled generator fueled by a 500-gallon propane tank. The 500-gallon propane tank will be able to provide at least 5-days of backup power at peak usage and longer if peak power demand is not used. The backup power supply system will be located approximately 125 feet east of the Pumphouse #4 and is shown on Figure 2. This backup power supply provides a backup power supply for the Well No. 4 Public Water System.

### 6.2.3 Fire Protection Considerations

The fire protection system is separate from the public water system. Therefore, the capacity of the fire protection system will not be diminished by a power failure.

## 6.3 HEAT TRACE

### 6.3.1 Water Main Freeze Protection

Due to the shallow bedrock, a direct burial of the pipe with sufficient depth to avoid freezing is impractical for most of the system. As a result, providing insulated pipe and a heat trace wire has been included in the design plans. The main pipes will have a 2-inch diameter butt joint welded HDPE DF11 center pipe with 2-inches of insulation around the pipe inside of an HDPE jacket. The HDPE jacket is pressure tested for watertightness. An integral heat trace channel with heat trace cable will be installed between the insulation and the main service pipe. This heat trace cable will be a 4 Watt/FT constant wattage heat trace cable. The heat trace cable will be controlled via a controller located in Pumphouse #4 and via temperature sensors. When the temperature sensor indicates that the temperature of the pipe is dropping below 37-degrees Fahrenheit, the controller will turn on the heat trace. When the temperature of the pipe exceeds 39-degrees Fahrenheit, the controller will turn off the heat trace. A secondary temperature sensor will also be provided to ensure that the heat within the heat trace channel does not exceed the maximum allowable temperature of the pipe of 149-degrees Fahrenheit. Calculations regarding the necessary power requirements for the heat trace cable are provided in Appendix H.

In the event that there is a power outage, and that the back-up power generator either fails, or runs out of fuel, calculations indicate that the pipes will take approximately 2.5 days to freeze completely. This 2.5-day period provides the operator & power company some additional time to repair and replace missing/broken parts, or to put more propane in the tank feeding the back-up generator. Calculations for this time of freezing are provided in Appendix H.

The Well #4 Raw Water Pipe from the Well No. 4 to the Pumphouse #4 will be buried a minimum of 6-feet in depth to prevent freezing. The approximate length of this pipe is 25-feet.

### 6.3.2 Service Line Freeze Protection

Each unit that will be serviced by the PWS will be required to install their own individual heat trace systems, a minimum of 6-feet burial depth or other freeze protection system for their service line pipes. The heat trace for the water mains will end at the curbstop and the service line heat trace will start on the service line side of the curbstop.

## 6.4 SEPERATION OF SANITARY SEWER PIPE AND WATER MAINS

### 6.4.1 Sanitary Sewer Line Crossings

Due to the location of existing wastewater facilities, there are several locations where it will be necessary for the water mains to cross either existing or proposed sanitary sewer pipes. The locations of these crossings are shown in Figure 6-1. The risk for cross-contamination of the water mains will be mitigated through several redundant methods. These methods are shown on Sheet 5 of the Plans and are also described below:

- The insulated HDPE pipe will have a pressure tested, watertight HDPE jacket around the insulation. This jacket will act as a carrier pipe for the main water main.
- The contractor will attempt on providing a minimum of 18-inches of separation between the potable water pipe and the sanitary sewer pipe if possible.
    - If that is not possible, a second 8-inch diameter PVC Sch. 40 Carrier pipe will be sleeved over the water main for at least 10-feet on either side of the crossing.
- The Contractor will install the potable water pipe above the sanitary sewer pipe if possible.
    - If that is not possible, 6-inches of flowable fill will be installed around the sanitary sewer pipe for at least 10-feet on either side of the crossing.
- The Contractor will orient the potable water pipe as close to 90-degrees to the sanitary sewer pipe as possible and will also attempt to locate the potable water pipe at the mid-point between sanitary sewer joints.

Note that According to ARM 17.36.323 (9) “Unless a waiver is granted by the department pursuant to ARM 17.36.601, sewer mains that cross water mains must be laid with a minimum vertical separation distance of 18 inches between the mains.” Due to the nature of the bedrock

onsite, and the existing sanitary sewer system, it may not be possible to maintain 18-inches of vertical separation between the mains. A deviation waiver has been requested to allow for less than 18-inches of separation, in accordance with Section 8.4.2 of DEQ Circular 3, and a deviation waiver request is described in Section 7.0 of this report.

**FIGURE 6-1. PWS SANITARY SEWER CROSSINGS**


### 6.4.2 Sanitary Sewer Line Separation

There are no areas in the Well No. 4 PWS where the sanitary sewer will need to run parallel to and be within 10 feet of the water mains.

## 6.5 PUMPHOUSE #4 AND EQUIPMENT

### 6.5.1 Storage Tanks

The water storage in the Pumphouse #4 will total 6,000 gallons. The 6,000 gallons of water storage will be comprised of two 3,000-gallon above-ground polyethylene potable water storage tanks. Flow into these tanks will be from Well No. 4. Both water storage tanks will be provided with overflow pipes and drain pipes. Both overflow and drain pipes will convey water outside of the building. The discharge location of the overflow and drain pipes is shown on Sheet 2 of the plans. Any discharge will be of unchlorinated water. The tanks will be 8'-0" in height and the overflows will be set at 7.5 feet. The piping configuration is designed so that water from the well will be able to fill either water storage tank individually, or both tanks simultaneously.

The level in the tanks will control the Well No. 4 pump. When water levels reach a depth of 6.0 feet, the well pump will be turned on. When water levels reach a depth of 7.0 feet, the pump will be turned off. The level will be controlled using a liquid level probe installed on the outside of one of the tanks. The liquid level probe will monitor the water level of the tank(s) in service. There will only be one liquid level probe for both tanks. If one tank is taken offline (by closing the discharge and inlet valves), the liquid level probe will measure the water level in the other tank. If both tanks are online, then the tank water levels will equilibrate and the liquid level probe will measure the water level of both tanks. The liquid level probe housing will be constructed of clear schedule 40 PVC, so that the water level in the tanks and the set points of the probe are clearly visible to the operator.

### 6.5.2 Booster Pumps

The water storage tanks will gravity feed to the booster pumps. There will be two booster pumps installed. The booster pumps will be designed to operate in a lead-lag functionality

based on the pressure downstream of the hydropneumatic pressure tank. The booster pumps will be controlled using a Variable Frequency Drive (VFD).

### 6.5.3 Hydropneumatic Pressure Tank

Downstream of the booster pumps will be a minimum 400-gallon Hydropneumatic Pressure Tank. The hydropneumatic pressure tank will reduce the number of pump starts to at most 4 times per hour. Calculations are included in Appendix H.

### 6.5.4 Backflow Preventer

Prior to distribution, the water will pass through a double check valve backflow preventer. This will prevent water from flowing back into the water treatment plant from the distribution system.

### 6.5.5 Sampling and Monitoring

A sample taps will be provided on the raw water line from Well No. 4 prior to the water storage tank, for well water quality monitoring. A sample tap will also be provided immediately prior to distribution.

Sampling will be performed by the operator, will be tested by a certified laboratory, reported to DEQ and kept in the water system records in accordance with ARM 17.38.215, ARM 17.38.217, ARM 17.38.234[1]. The compliance point for the system will be the distribution sample tap marked on Sheet 6 of the drawings. This sample tap is the sample tap immediately prior to distribution.

## 6.6 HYDRAULIC DESIGN

### 6.6.1 General

The lowest service point for the Well No. 4 system is at an approximate elevation of 2,900 feet. This point is approximately 65 feet below the lowest point in the water mains, which is at

[1] Per ARM17.38.216, sampling and reporting requirements for chemical and radiological quality samples is not required for a transient, non-community public water supply system.

an approximate elevation of 2965 feet. The highest point in the distribution system is at the Pumphouse #4 at approximately 2,990 feet.

The longest continuous run of service main pipe is approximately 500-feet in length from the Pumphouse #4 to the end of the water main.

### 6.6.2 Well No. 4

The well design is based on a design pumping rate of 15 gpm and the other operation parameters of the Well No. 4 PWS system. These include the following:

| | | |
|---|---|---|
| Static Water Level: | 100'* | Below ground surface (bgs) at well head |
| Pumping Water Level: | 350' | bgs (assumed to be pump intake) |
| Well Ground Surface Elevation | 2991.0' | Ground surface elevation |
| Tank Elevation: | 2995.5' | High Water Level of Storage Tank (7'-0" above F.G) |
| Operating Pressure: | 0 psi | Lift is to top of Water Storage Tanks |
| Major & Minor Losses: | 6.5' | (assumes 2" drop pipe and 2" raw water pipe) |
| **Total Dynamic Head:** | **361'** | |

*Based on McCarthy Well Log, well not yet drilled

The theoretical horsepower requirement for this system is 2 HP, assuming a 75% motor/pump system efficiency rating. Therefore, a 2 HP submersible pump should be capable of handling these operational requirements.

The pipe velocities at 15 gpm in a 2-inch nominal diameter drop and supply line is < 5 feet per second (fps). The proposed supply line from Well No. 4 to Pumphouse #4 is a 2-inch diameter PVC pipe, so these pipe velocities are acceptable.

The 6-inch diameter well and perforations created by the 5/16" Holte Perforator will create entrance velocities of < 1 fps through the pipe and the vertical velocity in the 6-inch well is approximately 0.17 fps.

### 6.6.3 Maximum Distribution System Pressure

The maximum steady-state pressure within the distribution system's water mains, assuming 0 flow (no head loss) and 65 psi at Pumphouse #4 is 76 psi at the end of Water Main #2. To avoid over pressurizing the distribution system during pump start-up or shut-down, pressure relief valves will be located in Pumphouse #4 on the discharge side of each pump.

Several units are located at elevations below the water mains. Some of these service connections will be as much as 65-feet below the water main. As a result, some of these service lines may experience steady-state pressures of 105-psi and pressure spikes when pumps turn on or off. For these service connection points, the owner(s) may benefit from installation of a pressure reducing valve on their service line(s). The design of the service lines will be the responsibility of the owners of the units. Units 401 and 402 are most likely to experience these conditions.

Depending on how many units are connected to the system at one time, water system demands, and actual pressure readings in the system, the operator may change the maximum distribution pressure at Pumphouse #4. For example, the operator may determine that it is appropriate to reduce the maximum distribution pressure during low-use periods since there will be less head loss in the system. Calculations for the hydropneumatic pressure tank, as described in Appendix H and Section 6.5.3, are based on a maximum distribution pressure of 65 psi at Pumphouse #4 and all units within the service area having been developed and in-use.

The Pumphouse #4 booster pumps will be designed to be able to be able to provide a flow rate of 34 gpm at a design pressure of 65 psi at Pumphouse #4. This is a total dynamic head for the booster pumps of 150-feet.

### 6.6.4 Minimum Distribution System Pressure

The minimum pressure within the water mains, assuming 65 psi at Pumphouse #4, and a peak hour demand of 25 gpm is anticipated to be 65 psi. During peak demand, the pressure at the

end of the distribution system will be approximately 70 psi (4 psi lost through friction and 9 psi of additional elevation head gained).

One unit is located at an elevation of 3,000 feet. This is the highest unit in the service area. This unit may experience pressures as low as 45 psi, if the pressure at Pumphouse #4 drops to 50 psi.

Depending on how many units are connected to the system at one time, system demands, and actual pressure readings in the system, the operator may change the minimum distribution pressure at Pumphouse #4. For example, the operator may determine that it is appropriate to increase the minimum distribution pressure during low-use periods so that users have a lower variation in pressure at their service line connections. Calculations for the Hydropneumatic pressure tank, as described in Appendix H and Section 6.5.3, are based on a minimum distribution pressure of 50 psi at Pumphouse #4 and all units within the service area having been developed and in-use.

### 6.6.5 Pressure Zones

Due to the low variation in elevation and the small amount of head loss within the distribution system, there will only need to be one pressure zone for the Well No. 4 system.

### 6.6.6 Distribution System Velocities

Following full development of the units within the Well No. 4 PWS service area, the maximum pipe velocities that will be experienced in the distribution system are 3.5 fps. This velocity will occur at the point of distribution in Pumphouse #4. All water service mains will be 2-inch nominal diameter PVC pipes and the Peak Hour Demand at full buildout of the Well No. 4 system is 34 gpm. The calculations for the Peak Hour Demand is presented in Section 3.9.2.4 and in Appendix H.

Individual service lines will be 1-inch in diameter. If a unit using 3 gallons per minute, then the velocity in its service line will be 1.2 fps.

# 7.0 DEVIATION WAIVER REQUESTS

## 7.1 NUMBER OF SOURCES

Per Circular DEQ 1 Section 3.2.1.2, a minimum of two sources of ground water must be provided. Due to the location of existing sanitary sewer facilities, as described in Section 3.6.2, there is not a suitable secondary location for a well within the Well No. 4 service area. A deviation request to allow the Well No. 4 system to operate with only 1 groundwater source is included in Appendix N.

In the event that the Well No. 4 system needs to be taken offline for maintenance or for other reasons and is not able to provide suitable water for distribution, then water may be hauled from another public water supply system to meet demand. Other nearby Public Water Supply Systems include the McCarthy Well PWS and the Well No. 5/9 PWS. Due to the seasonal and intermittent use of the existing units within the Well No. 4 PWS, water demands during more than 8-months of the year are low and high demand periods are infrequent. Providing an adequate volume of water for the system during these shutdown periods is feasible using hauled water from either the McCarthy Well PWS or the Well No. 5/9 PWS. Additionally, backup parts for the well and the water system will be stored within the THOA boundary to minimize a potential shutdown period.

## 7.2 VERTICAL SEPARATION OF SANITARY SEWER AND POTABLE WATER PIPE AT CROSSINGS

According to ARM 17.36.323 (9) “Unless a waiver is granted by the department pursuant to ARM 17.36.601, sewer mains that cross water mains must be laid with a minimum vertical separation distance of 18 inches between the mains.” Maintaining a minimum of 18-inches between the existing sanitary sewer pipe and the proposed potable water pipe may not be possible at all locations of the system. This may not be possible for the following reasons:

- The existing orientation and depth of the existing sanitary sewer system is shown on Sheet 2 of the Plans (Appendix G) based on the best currently available information. However, the exact orientation and depth of every sanitary sewer pipe is not known at this time. The locations of sanitary sewer crossings are shown in Figure 6-1.
- Several crossings may be located in such a configuration that excavating or blasting the

bedrock around the sewer pipes would be necessary to create more than 18-inches of separation and the proposed water mains could create damage to the existing sanitary sewer system.

Due to the nature of the bedrock onsite, and the existing sanitary sewer system, it may not be possible to maintain 18-inches of vertical separation between the potable water main and the sanitary sewer. However, Sheet 5 of the Plans (Appendix G) provides a design detail to prevent contamination of the proposed water mains with leakage from the sanitary sewer mains if 18-inches of separation cannot be obtained.

A deviation waiver has been requested to allow for less than 18-inches of separation for the above reason, in accordance with Section 8.4.2 of DEQ Circular 3 and is included in Appendix N to this report.