RANCHVIEW WATER DISTRICT

2020 Preliminary Engineering Report

Water System Improvements

November 2020

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Prepared by:

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Ranchview County Water District Board of Directors

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GreatWest engineering ®

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1.0 EXECUTIVE SUMMARY

This Preliminary Engineering Report (PER) is authorized by and prepared for the Ranchview County Water District (District). It includes investigations and analyses of existing facilities for the Ranchview subdivision water system and recommendations for any future improvements. The study also meets all the requirements of the PER Outline within the Uniform Application Supplement for Montana Public Facility Projects adopted by the state and federal funding agencies that are members of the Montana Water, Wastewater, and Solid Waste Action Coordination Team (W2ASACT).

Funding for this PER consisted of a $15,000 planning grant from the Renewable Resources Grant and Loan (RRGL) program administered by the Montana Department of Natural Resources and Conservation (DNRC), a $15,000 planning grant from the Department of Commerce (DOC) Treasure State Endowment Program (TSEP) and $6,000 of local contribution from the District. The District contracted with Great West Engineering (GWE) to prepare a Preliminary Engineering Report (PER) in 2020 as needed to evaluate deficiencies and recommend solutions for improvements to the District's water system.

1.1 Introduction and Background

The Ranchview subdivision is located in the North Helena Valley of Lewis and Clark County on the immediate west side of Interstate-15 (I-15). The District maintains a public water system (DEQ PWS #MT0003782) under a County Water and Sewer District, a private irrigation supply system, and individual private sewer septic/drain field systems. The irrigation system is not regulated by the Montana Department of Environmental Quality (MDEQ or DEQ). The water system was originally held in private ownership as a private water Association. In 2018, the County water District was legally formed by the residents to allow for access to additional funding options including this PER, and potential future projects, if applicable.

The District currently serves 107 homes for the water system relating to an estimated population of about 257 people. The community is fully developed, and no new water extensions nor additional development will occur within the limits of service. The lots are mostly ½ acre in size, with some slightly larger parcels. The subdivision was developed in three phases starting in the early 1990s.

A stand-alone census-designated place (CDP) is not available for this specific subdivision. The DOC Community Development Division (CDD) has updated the U.S. Census Bureau's American Communities Survey (ACS) data set for the years of 2011-2015 to calculate local government target rates. The data for Lewis and Clark County is utilized in this analysis. According to ACS, the County has a median household income (MHI) of $56,197. Based on a cursory assessment of the community and also discussions with the District, the actual MHI of the subdivision boundary may be higher than the average County data. An updated MHI could be required by the DOC before any future construction grant applications, if applicable. However, for PER planning purposes, the 2015 County-wide MHI is used in this study.

The water base rate is $45.00/month/EDU for a flat rate charged by the District. The District does not have individual water meters. The current base rate is less than the DOC target rate of $65.56. The District does not currently have any outstanding debt.

1.2 Problem Definition

A summary of the observed and noted deficiencies for the potable and irrigation systems are listed below in no particular order of importance.

- Potable Well/Pump Performance – Potable well pump No. 2 is not providing the same capacity as pump No. 1 at the operating system pressures, and based on a pump flow test. Pump No. 1 alone appears to not meet the calculated peak instantaneous demands of the system. Also, the controls are not currently set to operate pump No. 2, nor are the controls configured as an alternating or lead/lag operating system.

  According to DEQ: *"The total developed groundwater source capacity for systems utilizing gravity storage or pumped storage, unless otherwise specified by MDEQ, must equal or exceed the design maximum day demand with the largest producing well out of service. The total developed groundwater source capacity for systems utilizing hydropneumatic storage tanks as the only storage facility must be sufficient to equal or exceed the peak instantaneous demand with the largest producing well out of service." (DEQ Circular-1, 3.2.1)* When the largest well/well pump (Well No. 1) is taken out of service, this standard is not met.

- Electrical and Controls - The controls are not currently set to operate potable pump No. 2, nor as an alternating or lead/lag operation; the pump control is currently in the “pump 2 off” position at the time of this study. The electrical system panels for the potable pumps are not equipped with surge arrestors and amperage overload protection. The District has experienced past pump failures due to amperage overloads, which have required numerous pump resets and operator attention. Underperforming controls, lack of surge arrestors, and some various outdated electrical components are a concern for a sustainable system.

- Reduced service pressures with increased/peak instantaneous demands - Users for both irrigation and potable systems have reported periodic reductions in service pressures at times. Per DEQ, the pressures in the potable system must be greater than 35 psi in all conditions (DEQ 8.2.1). Hydraulic modeling of the existing system conditions and field measurements show that the pipe sizes appear to be sufficient to limit head loss impacts. However, the lower pressures are likely experienced when the peak demands exceed the pump(s) output for both irrigation and potable system. It is also noted that the District could potentially reduce collective peak instantaneous irrigation demands by recommending irrigation nozzle replacements throughout the system. This has been conveyed to the community in mailers to residents.

- Flow Meters Beyond Useful Design Life – The existing flow meters are the original models installed in the early 1990s and are now approaching 30-years old. When flow meters age, they can tend to provide errors due to mechanical wear and tear. Newer flow meter models are generally more accurate. The main flow meters are a critical component of the infrastructure, as they are needed to confirm that the annual water usages are within the available water rights. Metering systems are also used to evaluate water usage for leakages and water consumption anomalies.

- Pump House Piping Concerns – The existing internal pump house piping is non-rigid glued PVC. The PVC piping is reported to have sheared, ruptured and filled the pump house with standing water during the last major (5.8 magnitude, Lincoln MT) earthquake in 2018. Replacement of the PVC pipe with a more rigid material such as Ductile Iron, Galvanized Steel, or Stainless Steel piping, and installing pipe supports and flexible couplers, should be considered as a future upgrade)

- Potable/Irrigation Service Cross Connections – There are reportedly up to three (3) or more, irrigation/potable cross-connections existing in the system. With this occurrence, homes irrigating from the potable system will create additional demands and reduce the pressures and level of service on a potable system for which it is not designed. Cross connections are out of compliance with DEQ standards as only the potable system is monitored for the spectrum of contaminants as part of state/federal drinking water regulations. Moreover, irrigation systems can be subject to backsiphonage, resulting in contamination concerns that can originate with irrigation-type system use, such as hoses sitting in standing water, chemicals, etc. Drinking water contamination from inflow, backflow, and infiltration are at risk to occur when static pressures are less than 20 psi in the distribution system. Potential contaminant sources include petroleum-contaminated soil or in soil, inorganic, and organic chemical contaminants, etc. Users are at risk of exposure to pathogenic microbes as well as exposure to heavy metals, endocrine disruptors, and other pharmaceutical products.

  Cross connections are addressed in DEQ-1 Section 8.10 (Cross Connections and Interconnections). Section 8.10.1 states: *"Unprotected cross-connections are not allowed between the distribution system and any pipes, pumps, hydrants, or tanks in which unsafe water or other contaminating materials may be discharged or drawn into the system. Cross-connections must be eliminated in conformity with ARM Title 17, chapter 38, subchapter 3."* Section 8.10.3 states: *"The approval of MDEQ must be obtained for interconnections"*

- Lack of Backup Power – DEQ-1, 3.2.1.3 states: *"When power failure would result in cessation of minimum essential service, sufficient power must be provided to meet average day demand*." Periodic power outages have occurred in the system in the past. Providing a backup power source is good practice by many systems (including those in the Helena Valley) that rely solely on pumped flows.

1.3 Alternatives Considered

The following alternatives were considered in the PER to address the documented problems:

Supply Alternatives

- Alt. S-1: Replace well pump No. 2 – This includes furnishing and installing a completely new well pump and motor in the existing well No. 2. Estimated Budgetary Cost = $5,000

- Alt. S-2: Replace the potable pump system controls and upgrade the electrical system components. This would include installing a more user-friendly pump operation system with pump lead/lag and alternating control operation. This also includes the option of installing necessary power surge suppression:

    - Alt. S-2A With Variable Frequency Drives (VFDs): This option includes installing new potable pump controllers with VFD operation. VFD's would allow the pressure on/off "window" to be maintained at a more constant pressure, with the pumps operating at variable speeds to meet system demands. With VFD's installed on the pumps, the District would not need to depend on the entire bank of pressure tanks. The disadvantage of this option is that the pump motor life could be diminished and the limited availability of specialized technicians dealing with VFD systems for any repairs. Estimated Budgetary Cost = $5,000

    - Alt. S-2B (Without VFDs): This option includes installing new potable pump controllers without the use of VFDs. The pumps would turn on/off based on pressure set points and the pumps would always run at full speed. One advantage of this option is that the pump motor life may be longer than with VFDs. The disadvantages of this option include the continued reliance on the existing bank of hydropneumatic tanks and the wide gap between on and off pressure set points and less consistent pressures. Estimated Budgetary Cost = $5,000

    - Option S-2C: Install Surge Suppressor/Overload Protection System. Estimated Budgetary Cost = $2,500

- Alt. S-3: Replace Flow Meters – This alternative includes replacing both the potable and irrigation in-line propeller flow meters with new flow meters. The new meter installation assumes the use of accurate magnetic flow meters that can report both instantaneous and totalized flows. This alternative also assumes the replacement of a nominal length of pipe on each side of the meter to provide the straight-run lengths of pipe needed for

proper meter operation. A data logger can also be retrofitted to the flow meters to record daily and peak flow data if desired, now or in the future. Moreover, If the District needs to add a chemical system in the future, a magnetic meter will provide an output to accurately flow-pace the chemical dosing pumps.

- S-3A: Replace 2-inch Potable Meter. Estimated Budgetary Cost = $2,500
- S-3B: Replace 3-inch Irrigation Meter. Estimated Budgetary Cost = $3,000

- Alt. S-4: Replace pump house piping and fittings - This alternative includes replacing both the potable and irrigation systems PVC piping with rigid metal piping such as galvanized piping and applying a protective coating. Flexible couplers can be added at each entry and exit points into the building to accommodate ground movements without pipe shearing.
  - Alt. S-4A: Replace potable pump house piping. Estimate Budgetary Cost = $8,000
  - Alt. S-4B: Replace irrigation pump house piping. Estimated Budgetary Cost = $10,000.

- Alt. S-5: Construct a new supply well – This alternative includes the construction of a new well north of the subdivision to help maintain pressures and flows during peak usage periods. The well would also serve as a redundant backup for the irrigation system and/or the potable water system. The well depth is estimated to be 100 to 130 feet at this location. The new well installation would also include construction of a new pumphouse building, directional drilling of a new transmission main through a private lot, 3-phase power extension from Montana Avenue, and a buried storage tank w/ intermediate pumps. Easements would be required through DNRC land and private lots. The sub-alternatives include:
  - Alt. S-5A: New North Well (Irrigation Only) – This alternative would install a new irrigation well on the north side of subdivision. DEQ approval is not required for this option, and the District is not eligible to use State Revolving Fund (SRF) loan funding for a non-potable well. Estimated Budgetary Cost = $322,000

- Alt. S-5B: New North Well (Irrigation, Backup Potable Well) – This alternative would include the construction of a new well meeting DEQ-1 well construction and development standards. This alternative would be eligible for SRF loan funding. Estimated Budgetary Cost = $383,000

- Alt. S-6: New Backup Generator – This alternative includes furnishing and installing a new backup generator for the water system. The generator can be sized for either just the potable system or both the potable and irrigation system generating capacity. Sub-alternatives include:

  - Alt. S-6A: Backup Generator for Potable System – This includes installing a generator and transfer switch sized for the two potable pumps only, which would require approximately 35 kW in generating capacity. Estimated Budgetary Cost = $29,000

  - Alt. S-6B: Backup Generator for Potable, Irrigation System, and Building - This includes installing a generator and transfer switch sized for all pumps, in addition to the entire building. This would require approximately 60 kW in generating capacity. Estimated Budgetary Cost = $42,000

Distribution Alternatives

- Alt. D-1 – Eliminate Cross Connected Piping – This alternative includes the work of a licensed plumber to eliminate the potable/irrigation piping connections at each of the three reported individual house entrances. The first step for this alternative is to identify each cross-connection location. Each individual home plumbing entry configurations may be different, and the associated plumbing work and fees for each home may vary. The District has opted to cover the costs of each reconnection at the private residences. For planning purposes, the Estimated Budgetary Cost = $500 per each connection. ($1,500 total)

1.4 Project Costs and Budget

The District expressed an interest in getting a thorough understanding of their water system's current operation, identifying system deficiencies and then modifying or upgrading the system to achieve the water system's optimal performance. A project priority list with estimated budgetary

costs has been completed to summarize appropriate capital improvement projects for planning and budgeting purposes. The District was presented a list of the potential upgrades at their board meeting held on September 9, 2020, and prioritized the projects accordingly.

Table 1-1 presents a prioritized list of recommended improvements with the assigned priority for each. The projects can be re-prioritized by the District and will be completed in the order assigned and as funding allows.

Table 1-1 -Recommended Improvement Program

Ranchview Water System Draft Improvement Program		
PRIORITY [1]	**ALTERNATIVE/DESCRIPTION**	**ESTIMATED CAPITAL COST (Nearest 100)**
1[2]	D-1: Reconnect Cross Connected Water Lines	$500/each ($1,500 total)
2	S-1: Install New Well Pump #2	$5,000
3	S-2A: Upgrade Potable System Pump Controls & Electrical (w/ VFDs)	$5,000
4	S-2C: Pump House Surge/Overload Protection (50,000 Amp Unit)	$2,500
5	S-3A: Replace Potable Flow Meter	$2,500
	S-3B: Replace Irrigation Flow Meter	$3,000
6	S-4A: Replace Irrigation Pump House Piping/Fittings	$8,000
	S-4B: Replace Potable Pump House Piping/Fittings	$10,000
7	S-6A: Potable Pump Backup Generator (35 kW)	$29,000
	S-6B: Potable plus Irrigation Backup Generator (60 kW)	$42,000
8[3]	S-5A: New North Irrigation Well Only	$322,000
	S-5b: New North Irrigation Well (Backup Potable)	$383,000
9[4]	D-2: Upsize 3” Irrigation Main to 6” (South Bndy to Lariat)	$207,400

Notes:

1. *The priorities were determined by the Board at the meeting held on September 9, 2020.*
2. *Addressing the cross connected water services is listed as the highest priority as it relates to a health and safety issue.*
3. *The District desires to see what the estimated cost would be to install a new well and verify the required infrastructure, easements, and other environmental impacts, to install a new well on the north side of the subdivision, if needed in the future.*
4. *Given the comments received at the Public Hearing on November 9, 2020, a cost to upsize the existing 3-inch irrigation pipe from the south boundary to Lariat is provided for District reference. (See Appendix Z)*

2.0 PROJECT PLANNING

2.1 Location

The planning and service area for this study is shown in Figure 2-1. The existing service area consists of the Ranchview County Water District boundary of the Ranchview Estates subdivision. The District is located within Lewis and Clark County, approximately eight miles north of the City of Helena. The subdivision is bordered by Montana Avenue to the west, I-15 to the east, the Helena Valley Canal to the south, and undeveloped state and private land to the north.

More specifically, the District is located at:

- Township/Range/Section: Township 11N, Range 3W, Section 17
- Average elevation: 3,800 ft

Topography in the planning area generally slopes to the southeast towards Lake Helena located approximately three miles southeast of Ranchview Estates. Elevations within the planning area range from 3812 at the northwestern corner of the subdivision to 3778 at the southern portion of the boundary. Figure 2-2 presents a topographic map of the planning area.

2.2 Environmental Resources Present

As part of any major construction project, the potential impacts on the surrounding environment must be considered and provisions made to mitigate any negative impacts. The Uniform Application streamlines the process by utilizing a standard procedure called the Uniform Environmental Checklist. A completed Uniform Environmental Checklist for the proposed water system improvements is included in Appendix A. No significant impacts resulting from the proposed improvements have been identified.

As part of quantifying the impacts to various environmental and historic resources, the Uniform Checklist process includes sending letters to pertinent local, state, and federal agencies, requesting comments on any potential environmental impacts as a result of proposed improvements. Letters and responses are included in Appendix B.

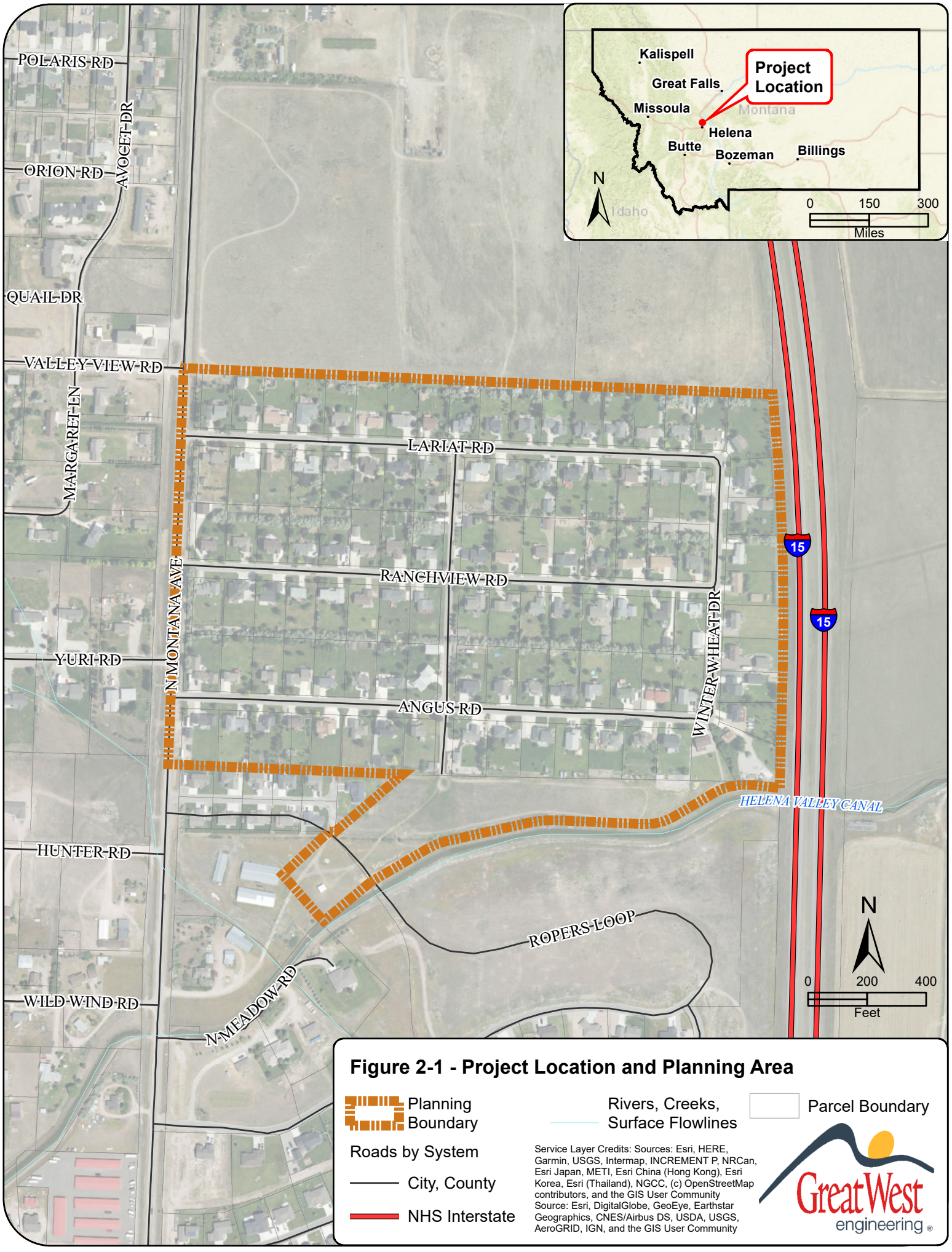


Figure 2-1 - Project Location and Planning Area

Planning Boundary

Roads by System

City, County

NHS Interstate

Rivers, Creeks, Surface Flowlines

Parcel Boundary

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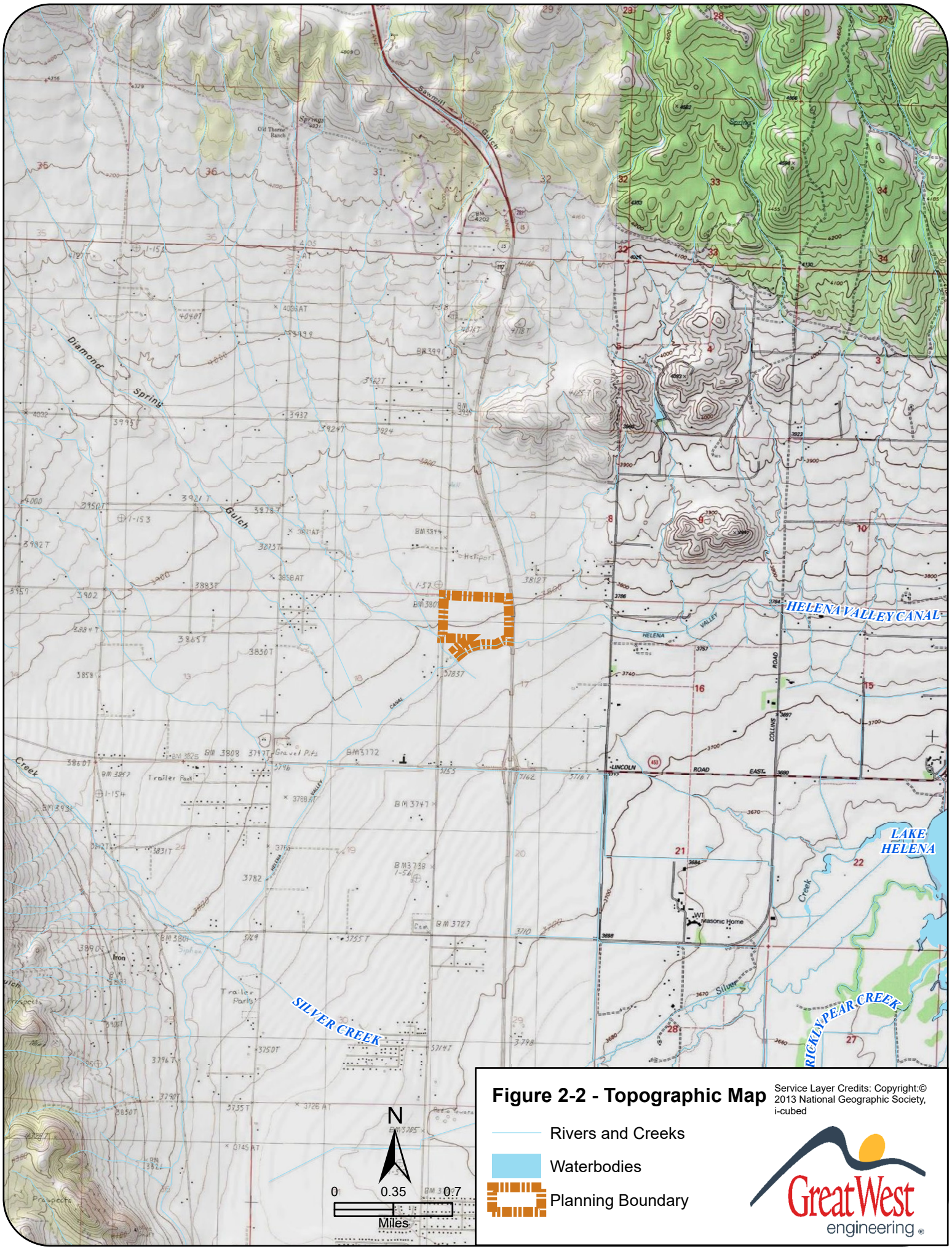


Figure 2-2 - Topographic Map

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- Rivers and Creeks
- Waterbodies
- Planning Boundary

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2.2.1 Land Resources

There are no vacant lots within the District planning area, leaving no room for future development within the Ranchview subdivision. The District does not plan to extend water service to other lots or subdivisions in the vicinity.

The Natural Heritage Program map viewer was used to determine land cover within the planning boundary and surrounding areas. This report is included in Appendix C. Land use within the District boundary is low density residential with grassland, cropland, and other residential areas, surrounding the District.

The proposed project area soils information for the subject area was obtained from the United States Department of Agriculture's (USDA) National Resources Conservation Service (NRCS) Web Soil Survey online database. Soils maps and reports of the area and information on soil characteristics from the Web Soil Survey area are found in Appendix D. The primary soil in the area is Musselshell-Crago complex, 2 to 8 percent slopes.

The project area is classified as farmland of local importance. If water system improvements are made, temporary disturbance will occur mostly in previously disturbed areas within the subdivision and existing water easements. Areas of disturbance will be restored to original conditions to the greatest extent possible upon completion of construction. A potential new water supply source could be developed on private and DNRC land north of the existing subdivision. Areas of disturbance will be restored to original conditions to the greatest extent possible upon completion of construction. Ultimately, the project will result in minimal to no changes in land use and minimal adverse impacts to land resources.

2.2.2 Biological Resources

Wildlife in the planning area and surrounding areas generally consists of deer, small mammals, a few reptiles, amphibians and fish, and numerous species of birds. A Natural Heritage Program search was conducted and revealed species of concern within Township 11N and Range 3W which comprises the project boundary. The search revealed 19 animal species of concern and one plant species of concern. The animal species include the black-tailed prairie dog, three species of bats, 14 species of birds, and the westslope cutthroat trout. The plant species of concern is the wedge-leaf saltbush. Because most of the proposed water system improvement

project construction will take place within previously disturbed areas, minimal adverse impacts are anticipated for the listed species of concern.

Any disturbance associated with water system improvements for a new supply source will be temporary in nature. All disturbed areas will be restored to existing conditions upon completion of construction. Minimal adverse impacts to biological resources are anticipated. The species of concern data can be found in Appendix E.

The planning area does not fall within sage grouse habitat, as defined by the Montana Sage Grouse Habitat Conservation Map found at: https://sagegrouse.mt.gov/ProgramMap.

2.2.3 Water Resources

Montana's Groundwater Information Center (GWIC) was used to collect information on groundwater in the planning area. Well information was acquired in spatial format through the Montana State Library. GWIC well locations within a quarter-mile in all directions of the planning area and accompanying well data is included in Appendix F. GWIC well locations are approximate and mapped locations do not always agree with field verified locations. Overall, well depths range from 40 to 500 feet with an average depth of approximately 125 feet. Average well yield is approximately 170 gpm. Most of these wells are domestic, with a few irrigation, monitoring, and stock water wells. Ranchview's water supply and irrigation wells are also included in the tabulation.

Ranchview Estates obtains potable water supply from two groundwater wells located south of the subdivision. The potable wells are approximately 100 to 120 feet deep and were each originally pump tested at 90 gpm. Ranchview Estates also has a separate non-potable water system used for lawn irrigation. The GWIC well search indicates the subdivision has two irrigation wells that were originally tested at 400-450 gpm each. The subdivision currently uses the two wells as a lead/lag operation. Site observations showed the most recent instantaneous flow rate at between 270-300 gpm with both pumps running. Appendix F summarizes available well log data for the public water and irrigation supplies.

If the District chooses to pursue a new well on the north side of the subdivision to provide a redundant irrigation and/or potable water supply from a detached and to maintain system pressures, available well log data from nearby wells is beneficial in estimating the well performance in this location. A potential north well is near the transition from the more

productive Helena Valley sand and gravel alluvium aquifer formation (south of the subdivision) to a generally fractured shale-rock aquifer extending north of the subdivision. A desktop evaluation of up to 15 nearby wells, within a half-mile immediately north and west of the potential well location, shows well depths in the range of 120-130 feet deep, with an average static water depth of about 60-feet, and a typical average tested flow rate of about 20-25 gpm. While there are some wells that have recorded a flow test above 50 gpm and higher with deeper well depths, the probability of acquiring a new well with this production is likely low. With a limited producing well yield of less than 25 gpm, a storage tank with a separate high service pump would be needed to buffer the difference between the peak demands and the actual well yield. If in the future, the District chooses to move forward with a new well on the north side, a test well with a hydrogeologic study is highly recommended to verify the well production before proceeding with the costly new full production well, pump, storage tank, and related piping project improvements.

The main surface water in the vicinity is the Helena Valley Irrigation Canal located south of the subdivision. Ranchview Estates does not utilize surface water for its public drinking water or irrigation systems.

2.2.4 Floodplains

The Ranchview Estates Subdivision is not located in or near the 100-year or 500-year floodplain. The Federal Emergency Management Agency (FEMA) has issued floodplain maps for Lewis and Clark County. The project site is in Zone D (areas of undetermined, but possible, flood hazards) as shown on the index map for Lewis and Clark County. Panel 30049C 2134E, which encompasses the project site, has not been printed by FEMA. This FIRM index map is included in Appendix G.

2.2.5 Wetlands

The U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory was used to determine mapped wetland areas in the vicinity of the planning area. Results of this search can be found in Appendix H. Riverine wetlands are mapped near the boundary of the Ranchview Estates subdivision, proximal to the Helena Valley irrigation canal. It is not anticipated that any existing wetlands will be disturbed during this project. In the event final design proposes any disruption to existing wetlands, all necessary permits and plans for mitigation will be completed prior to construction of any improvements.

2.2.6 Cultural Resources

Cultural resources include historic and prehistoric archaeological sites, historic architecture, engineering features and structures, and resources of significance to Native Americans. The Montana State Historic Preservation Office (SHPO) was contacted to determine whether there are significant historical and cultural resources within the project area. A copy of the correspondence with SHPO is included in Appendix B.

It is not anticipated that cultural properties will be impacted by this project, however, SHPO will be contacted immediately in the event any cultural materials are discovered during construction.

2.2.7 Socio-economic and Environmental Justice Issues

There are no socio-economic and environmental justice issues identified as a result of this project. The proposed improvements will affect the entire subdivision equally, will be beneficial to human health and safety, and will not adversely impact the environment. Temporary disproportionate effects could be perceived with construction activities depending upon final design. Some residents may have construction activity affect them differently.

2.3 Population Trends

Ranchview Estates subdivision is fully developed within the current District boundary. The only projections that can be looked at in this analysis are to identify whether or not surrounding subdivisions will be connected to the system in the future. The District is not considering extending water service beyond the District boundary. The alternatives analysis presented in this report will be based on the existing population of Ranchview Estates and will not consider future growth.

There are 107 total households in the subdivision. Assuming 2.4 persons per household, as determined from Lewis and Clark County census data, equates to an existing population estimate of approximately 257 people living in the planning area. Zero growth can be assumed for this subdivision. Census data for Lewis and Clark County is provided in Appendix I.

2.4 Community Engagement

Several meetings and work sessions were held with the District for the water PER planning efforts. Work sessions and public meetings will be ongoing throughout the PER finalization and

periodically until the completion of identified projects. A summary of meetings in which minutes and notes were compiled are summarized in this section. Board meetings dating back to late 2019 and early 2020 were attended by Great West Engineering to describe the PER and planning process prior to receiving state planning grants. This information was captured with the Ranchview Newsletters.

An initial work session was held with the District at their regular scheduled Board meeting on July 13, 2020. The work session served to present initial identified water system deficiencies and to present potential improvement alternatives. This was done so the District and public could be better informed on the scope of the potential projects. Additionally, initial water distribution system modeling results were presented, as well as summaries of existing water usage data and evaluations. The intent of this meeting was not to select a preferred alternative, but to provide information, assist the subdivision with informed decision making, and gain a more thorough understanding of the water system issues and concerns.

Follow up work sessions and progress update emails dealing with miscellaneous water PER related items were completed with the District and operation staff at every District meeting up to the date of completion of the study. These work sessions provided further detailed analysis and alternative costs as well as discussed funding options and related rate impacts. The District provided input regarding the overall project scope and project costs.

A public meeting was held remotely on November 9, 2020 due to the Covid-19 pandemic to solicit specific input and comments on the PER and Environmental Assessment. The meeting was advertised in the local newspaper (Independent Record) on October 28, and November 4th, 2020. The overall project cost of each of the project alternatives was presented to the public. Proposed funding strategies were also presented along with the potential impacts to user rates. In general, public response to the proposed improvement alternatives were well received. The District did reprioritize the projects and request to see the cost for upsizing the existing irrigation main from the south boundary to Lariat. The District concurred with the preferred alternatives presented in the PER. The District formally passed resolutions to accept the findings of the PER and EA.

A project website was also established for the project, http://ranchviewinfrastructure.com. The website provided project information, schedules, PER process information, available downloadable documents, funding information, and opportunity to comment.

Copies of the meeting minutes, community engagement documents, meeting notices, letters, and resolutions are all included in Appendix J.

3.0 EXISTING FACILITIES

This chapter describes each part of the Ranchview Estates existing water system and identifies any notable major and minor deficiencies and anomalies. Further evaluation for potential upgrades needed to improve the system are evaluated in subsequent sections of the report.

3.1 Location Map

The existing water system is shown in Figure 3-1. The water system consists of a separate potable system and non-potable (or more commonly referred to as the irrigation) system. All potable and irrigation wells are located south of the subdivision. The wells are pumped to a pump house building with several hydropneumatic tanks, mechanical piping, valves, gauges, ancillary equipment and electrical and control equipment. From the pump house building, potable water is directed through approximately 760 feet of 3-inch PVC transmission main before joining with a looped network of 2-inch PVC water distribution mains within the residential streets and along property lines within the subdivision. The irrigation system is similar to the potable system and is served by two wells and pumps. The irrigation wells pump to a similar piping configuration with a series of pressure tanks before supplying the subdivision through a 6-inch transmission main and a 3-inch looped distribution system. The overall system is described in more detail below.

3.2 History

Available record drawings indicate the water system was completed in phases starting in the early 1990s. No major distribution system upgrades or additions to the system have been completed for the water system since initial construction. The most recent upgrade work relates to new riser pipe sections installed in the potable wells in 2018/2019, and new submersible pumps at one potable well, along with a new irrigation well pump in 2019. A review of 7 years of operations history dating back to 2013 also found major irrigation well rehabilitation in 2016 and responses to such problematic items as low building temperature alarms, and power/pump outage situations. Copies of operations information is found in Appendix S.

The Montana Department of Environmental Quality (MDEQ) completed their most recent Sanitary Survey for the Ranchview Estates water system in November 2017, a copy of which is

LARIAT ROAD

RANCHVIEW ROAD

ANGUS ROAD

MONTANA AVE

I-15

DISTRICT BOUNDARY (TYP.)

EXISTING 6" IRRIGATION LINE (TO SUBDIVISION)

IRRIGATION WELL

POTABLE WELL #2

POTABLE WELL #1

EXISTING PUMP HOUSE

BACKUP IRRIGATION WELL

NOTES:

1. ALL POTABLE WATER PIPING WITHIN SUBDIVISION IS 2" PVC. ALL IRRIGATION PIPING WITHIN SUBDIVISION IS 3" PVC
2. ALL WATER PIPING IS WITHIN A 30 FT WATER EASEMENT

LEGEND

- W — POTABLE WATER
- NPW — IRRIGATION SYSTEM
- POTABLE WELLS
- IRRIGATION WELLS

0 125 250

SCALE IN FEET

NORTH

GreatWest engineering®

Figure 3-1
Existing Water System

RANCHVIEW ESTATES WATER PER

F:\1-19148-Ranchview Estates Water District\CADD 1-19148\Exhibits\1-19148-Existing Water Lines.dwg

included in Appendix K. The survey can be referenced for photographs of the water system facilities.

Currently there are no significant distribution failures within the system although Ranchview water users have reported experiencing low pressures during times of peak demand within both the potable and irrigation systems. Other identified issues include aging and problematic electronics and control systems within the pump house, reversed or cross-connected potable/irrigation system services on up to three reported properties, and no back-up power source available. The District has also expressed an interest in potentially developing a new irrigation well on the north side of the subdivision to maintain service pressures and provide for additional redundancy in their supply.

The District does not have a history of any DEQ violations of regulatory compliance over the last five years and the District routinely meets federal and state drinking water standards for community system public water quality.

3.3 Condition of Existing Facilities

This section presents a more detailed evaluation of each of the major components of the District's water system.

3.3.1 Supply

The District's potable water supply consists two primary wells. Both are located to the south of the subdivision, and immediately northwest of the existing pump house building. The potable wells are spaced 75-feet apart. The irrigation system is completely separate and is supplied by two irrigation wells located northeast and southwest of the pump house. Table 3-1 summarizes the current data for Ranchview's water sources and well pumps. Information is summarized from available well logs, original design reports on file with DEQ, water right abstracts, and operator knowledge. The Montana Bureau of Mines and Geology (MBMG) Groundwater Information Center (GWIC) search indicates that the four wells are owned by the Ranchview Estates Water Users Association. Original design information and as-built drawings are included in Appendix L.

Water from each of the potable wells is manifolded above-ground into a single pipe upon entering the pump house. A bank of eight hydropneumatic pressure tanks are located within the

pump house and are used to buffer the peak usages for the potable system. Several of the pressure tanks have been replaced over the years. The pressure tanks also allow the well pumps to mitigate surges, and allow for some very limited storage for high use. The potable submersible well pumps are activated using pressure switches on the piping within the well house. There is also a pressure gauge and flow meter installed on the piping just prior to leaving the well house. The flow meters are Badger Recordall II Turbo model meters which record total flows but not instantaneous flow rate. These flow meters are part of the original installation of the system and are now operating beyond the typical useful design life of 20-years. Accurate flow measurements are critical to the water system. When flow meters age, the accuracy can be compromised due to mechanical wear and tear.

The potable pumping system was designed to operate in a lead/lag arrangement where the lead pump is the first to turn on followed by the lag pump. The lead/lag pumps were set to operate based on adjustable pressure settings. The original lead/lag pressure set points from the 1993 design information is presented in Table 3-1. The pressure settings have been adjusted over the years; however, the minimum pressure setting must not be allowed to drop too low in order to account for additional headloss in the system due to flow demands and the rise in ground elevation. The potable pumps have across-the-line starters.

Site visits to the pump house were completed in July of 2020 to assess the pump and control operation. The site visits were completed with assistance from the District personnel and some District board members. One of the site visits was completed in assistance with Jon Nash of Nash Electric to investigate and troubleshoot the electrical and control systems. The site assessments showed that the potable system is operating solely with pump No. 1. At this time, pump No. 2 is completely turned off and not part of any lead/lag or alternating control operation. A cursory pump flow rate check was completed for both the potable and irrigation pumps. The flow rates were checked by releasing water pressure from the system to below the low set points, and then allowing each pump to run (by adjusting each pump control to the manual “run” position) until the pressures increased to meet the system operation pressure. This method of operating the pumps in the closed system, showed a disparity between the potable pump production flow rates (pump No. 1 at about 15-20 gpm, and pump No. 2 at about 5-10 gpm.)

The District’s operator subsequently assisted with a pump flow test of each potable pump by directing flow out of the building using the bypass piping and also completed the closed system pump test again, as described above. Given that the building blow out assembly bypasses the

flow meter, the building blow out piping installed temporary a flow meter and fire hose for the test. Pressures were read from the piping pressure gauge. The results were:

- Pump #1: 58 gpm at 12 psi, and 12-15 gpm at 55 psi
- Pump #2: 75 gpm at 20 psi, and 6-8 gpm at 55 psi

This shows that each pump is operating at a slightly different curve and confirms that pump No. 1 produces lesser flow at the higher operating system pressures. A copy of the most recently installed pump No. 1 curve is found in Appendix U.

Table 3-1 - Water Supply Source Information

Ranchview Estates Water Supply Source and Pump Information				
Description	**Well 1 (Potable)**	**Well 2 (Potable)**	**Irrigation Well 2**	**Irrigation Well 1**
Well Log Information				
GWIC ID	134632	134635	64824	209291
DNRC Water Right	88721	88721	89787/88721	89787/88721
Well Completion Date	1993	1993	1973	2003
Total Depth (ft.)	100	120	115	183
Static Water Level (ft.)	53	52	38.5	47
Original Pumping Rate (gpm)	91	94	450	400
Original Design Files and Water Rights Information				
Pump Make and Model	Series S McDonald 7 ½ hp 21750 S – 24 Stage	Series S McDonald 7 ½ hp 21750 S – 24 Stage	Goulds Model 7CLC 350 gpm	Grundfos Model: 150S200-11,
Pump Controls	Lead Pump Pressure Range: 65-85 psi Lag Pump Pressure Range: 50-70 psi		75 psi	
Maximum Design Pumping Rate (gpm)	60-70	60-70	290	290 per water right
Operator Knowledge and Verified Conditions				
Current Pump Flow Rate (gpm)	15-20[1]	5-10[1]	275 gpm[2]	
Static Water Levels (ft.) (June 2020)	48.7	48.5	Not measured	Not measured
VFDs Installed	No		Yes	
Other Information	New pump and motor installed in June 2019: Grundfos Model 35S50-19[3]	Pump 2 is currently not in use	2 pumps (reported to be 20 hp) installed using a lead/lag configuration. Well No. 1 in 2019[3], pump no. 2 was replaced in 2015 [4]	

Note:

1. *The preliminary assessment shows a disparity of the two potable pump output flow rates at service pressures.*
2. *The flow rate of 270 was observed with both irrigation pumps operating in (lead+lag) mode with the VFD's indicating 45-50 Hz each. At full speed the pumps could theoretically pump another 20-30 gpm.*
3. *Pump model curves can be referenced in Appendix U.*
4. *See Appendix S for a summary of major irrigation well No. 2 rehabilitation work done.*

As shown in Table 3-1, the potable system wells original tested well/aquifer test pumping rate was approximately 90 gpm each and the original pumps were designed for maximum flows of 60 to 70 gpm each. The current setup shows that the pumps discharge much less at the operating pressures as observed; pump 1 showed a flow rate of 15-20 gpm and a pump 2 flow of only 5-10+/- gpm measured at the operating pressures. The pump assessment for the irrigation system showed that the irrigation pumps provided up to 275 gpm at 75 psi (at 45-50 Hz each pump). As described previously, potable pump 2 is currently not in use during normal operation and does not operate in the lead/lag configuration. Improvements are needed within the pump house to remedy the aging and problematic electronic and control systems including troubleshooting the VFDs, lead/lag pump controls, electronic surge arrestors, and pressure switches. There has been a history of power issues resulting in pump resets. Given the demonstrated flow rates and the age, a new pump may be needed for potable well No. 2.

The irrigation system is served by a completely separate source, piping, and pressure control system but is housed in the same pump house building as the potable system. The irrigation system is configured very similarly to the potable system with pressure control provided through pressure tanks, pressure switches, and two submersible well pumps in a lead/lag configuration. The original design report specified a maximum pump flow rate of 290 gpm for the irrigation system. Recent field testing indicates the irrigation pump flow rates are in the range of 250-275 gpm. The irrigation system includes VFDs with a constant discharge pressure set point of 75 psi. The irrigation pumps are currently operating with the lead/lag setup with separate VFD panels located on the north and south internal walls.

Static water levels measured in 2020 show only a slight (4-5 ft.)reduction is the static water levels which is to be expected given the growth and development in the area since the original installation. The supply wells appear to be a reliable source of quality water for the Ranchview water system, however, there are currently concerns with the potable pumping and pressure control systems within the pump house and the concern of only a single potable pump in operation. It does not appear the potable system is operating as designed, as evidenced by current operation low pump flow rates and problematic pressure switches and controls. The irrigation system operation appears to be reliable, however, low system pressures have been reported within the subdivision at locations for both the potable and irrigation systems. The District has expressed interest in exploring and potentially developing a new source well supply in a new location north of the subdivision to offer additional redundancy in the system at a

disconnected aquifer location, and to maintain service pressure. This alternative will be discussed in more detail in subsequent chapters.

Water Demand

The pumped source water is metered in the well pump house before being supplied to the distribution system, and relies on the accuracy of the nearly 30-year old flow meters. The District does not use individual water meters on its system. Source water use data given by the operator is provided in Appendix M.

Historical Water Demands

The calculation of average daily demand is community specific and dependent on the information available for the system. Additionally, the District's lack of individual water meters and only monthly recordings necessitates more broad approximation of usage and demands. Table 3-2 represents a summary of the historical average monthly potable source water flows for the past year encompassing a portion of 2019 and a portion of 2020. Table 3-3 summarizes the historical irrigation source water flows. A year of monthly recordings was provided. However, three years of daily flow data is preferred.

Table 3-2 - Potable System Source Average Monthly Flows

Ranchview Estates Potable System Source Average Monthly Flows		
Month	**Average Source Flow/Month (gallons per day)**	**Average Per Capita Use (gpcd)[1]**
July 19	11,863	46
August 19	17,953	70
September 19	16,643	65
October 19	14,793	58
November 19	15,687	61
December 19	13,470	52
January 20	14,267	56
February 20	15,480	60
March 20	15,310	60
April 20	15,273	59
May 20	17,827	69
June 20	16,953	66
Average	**15,460**	**60**
[1]Based on existing service population of 257		

The average day per capita potable water use in Ranchview Estates is 60 gallons per capita per day (gpcd). This is a representative per capita flow for a system without irrigation. The per capita flow value also stays relatively constant throughout the year as would be expected in a system without outside lawn irrigation. The source flow data indicates a maximum day use of 70 gpcd (based on a maximum source flow month of August). The average day flow of the maximum month divided by the average day per capita use is 1.16. The definition of maximum day demand is the highest volume of water consumed on any day in a year. Daily flow records are not available for the District so a true maximum day peaking factor cannot be derived with the given data and must be done with text book factor. Typical maximum day to average day peaking factors range from 1.5 to 3.5 based on guidance from AWWA. Since the Ranchview Estates water system serves a relatively small population, it can be assumed that peaking factors would be more extreme since there is less of a dampening effect occurring in the system. Therefore, a maximum day to average day peaking factor of 3.5 was used to estimate current maximum day demand.

Peak instantaneous flow (or sometimes referred to as the peak hourly flow) sometimes uses a peaking factor of 2x peak day flow. In lieu of detailed records, excerpts from the original 1993 design report for the subdivision DEQ approval indicate peak water flows were estimated using the “fixture unit” method. The fixture unit method is used by determining the number of toilets, sinks, etc. in a dwelling and applying a fixture unit value to each. The fixture unit values are converted to peak flows using a Hunter curve graph. Utilizing this method, the 1993 design report specified a peak potable water system flow of 98 gpm at full build out of the community. An evaluation of actual peak day or peak hour flows would require increased flow recording or a continuous flow data logger.

Table 3-3 portrays the monthly irrigation flows since July of 2019. The irrigation usage is also conveyed in gallons per month, gallons per capita day (gpcd) and a more relatable gallons per month.

Table 3-3 - Irrigation System Source Average Monthly Flows

Ranchview Estates Irrigation System Source Average Monthly Flows			
Month	**Average Source Flow/Month (gallons per day)**	**Average Per Capita Use**	**Average Per Lot Use**
		(gpcd)[1]	**(gal/lot)[2]**
19-Jul	226,947	884	2121.0
19-Aug	247,460	964	2312.7
19-Sep	165,137	643	1543.3
19-Oct	2,597	10	24.3
19-Nov	90	0.35	0.8
19-Dec	27	0.1	0.3
20-Jan	30	0.12	0.3
20-Feb	33	0.13	0.3
20-Mar	210	0.82	2.0
20-Apr	21,383	83	199.8
20-May	187,153	729	1749.1
20-Jun	207,680	809	1940.9
Average (May-Sept.)	**206,875**	**806**	1933.4
[1]Based on existing service population of 257			
[2]Based on 107 lots			

The average day per capita irrigation water use in Ranchview Estates is determined to be 806 gallons per capita per day (gpcd) or also reported as 1,933 gal/lot-day which is based on an average of flows during the typical irrigation months of May through September. The irrigation per capita flows are high as compared to similar unmetered systems. This is likely due to the larger irrigated lot sizes (i.e. 0.5 acre avg.). For example, the Ten Mile Creek Estates/Pleasant Valley Water and Sewer District combined potable/non-potable system peak summer month demand is approximately 500 to 700 gpcd for an unmetered system The Ten Mile/Pleasant Valley subdivisions have 0.25-0.30 acre lots. The Ranchview Estates water system does implement irrigation watering rules which consists of homes watering on their specified even or odd days of the month and at specified times throughout the day. Watering rules will serve to reduce the peak demands. According to the Ranchview Estates latest summer 2020 newsletter, there are four watering times described as:

1. 6am to noon: Lariat Drive only (subject to even/odd watering)

2. 6pm to 12am (midnight): Ranchview Drive only (subject to even/odd watering)
3. 12am (midnight) to 6am: Angus Drive only (subject to even/odd watering)
4. 1:30pm to 4:30pm: Gardens and Shrubs (drip systems encouraged)

Based on the watering rules, it appears that at any given time, only a portion of the daily demand (approximately 1/6 of the daily demand) is occurring. The watering rules serve to limit the peak demands which can result in the demands outpacing the well pump supply and reducing the level of service pressures.

The irrigation source flow data indicates a maximum day use of 964 gpcd or over 2,300 gal/lot-day (based on a maximum source flow month of August). The average day flow of the maximum month divided by the average day per capita use is 1.20. Again, similar to the potable system, daily flow records are not available for the District so a true maximum day peaking factor cannot be derived from the data. Excerpts from the original 1990's design report for the subdivision indicate that the irrigation system well pump is designed to produce up to 290 gpm.

Pump house pressure and flow assessments completed on July 20, 2020 and July 23, 2020 showed that the irrigation pumps in the (lead + lag) operation were producing between 200 to 275 gpm. These demands are representative of the Lariat Drive only (Watering Time #1) watering timeframe for even and odd days. Different demands and pressures may be observed tor the other watering times. Watering time 1 is considered the worst case for pressures given the higher elevations. The irrigation pressures measured along Lariat ranged between 52 to 60 psi. However, the most westerly homeowner volunteering for this exercise was the residence located at 1280 Lariat Drive. Pressures may be lower for homes closer to Montana Avenue. The same exercise as above was completed for the potable water system and showed that the well pump No. 1 operated at about 16 gpm and the pressures measured ranged between 40 to 52 psi along Lariat. Pressures closer to Montana Ave, if they were measured, may actually be less.

As shown in Table 3-3, there is some irrigation water being used during the winter months as the District does not turn off the irrigation system pumps in the winter. Discussions with the District indicate the winter non-potable flows are due to some hose bib uses and also up to three potential properties that have reversed potable and irrigation services. This is considered a cross connection and not in compliance with DEQ standards as the irrigation system is not

monitoring for state and federal drinking water requirements and are also subject to back siphonage and contamination concerns. These services should be identified, and the plumbing connections adjusted so that no properties utilize irrigation water for potable use.

The Ranchview Estates estimated water demands for potable and irrigation systems are summarized below in Table 3-4.

Table 3-4 - Water System Demand Summary

Ranchview Estates Water System Demand Summary		
Water Demand	**Potable Water System**	**Irrigation Water System**
Average Day	15,460 gpd	206,875 gpd
	11 gpm	144 gpm
Maximum Day	54,110 gpd	247,460 gpd
	38 gpm	172 gpm
Peak Instantaneous	98 gpm[1]	290 gpm

Note:

1. *Peak demand is derived from the original design capacity calculation as filed with the DEQ. More accurate peak usage factors can be verified with increased flow meter recordings.*

Water Supply

As noted previously, the Ranchview Estates water system currently relies on two groundwater wells for potable supply although well No. 2 is currently not in use. Circular DEQ-1 (3.2.1) requires a minimum of two groundwater sources be provided and states *"the total developed groundwater source capacity for systems utilizing hydropneumatic storage tanks as the only storage facility must be sufficient to equal or exceed the peak instantaneous demand with the largest producing well out of service."* Peak instantaneous demand could be close to 90-100 gpm as previously estimated using the fixture unit method. This initially estimated subdivision design peak demand may be high and can be better verified by conducting increased frequencies of flow monitoring using more frequent operator monitoring or a data-logger system. The District could implement a digital flow meter installation that records and data logs daily flows as a project upgrade consideration or consider periods of increased site visit monitoring. According to the well data presented previously in Table 3-1, the total current pumping rate of the potable well system is 25 gpm if both wells were to be in concurrent operation. The current supply is not sufficient to meet anticipated peak instantaneous demands. As indicated previously, modifications need to be made to the well and pumping system to increase flows. A

new well could be drilled to provide a second source of supply amd/or a new well pump installed.

Backup power is not currently provided for the water system. A backup generator is recommended to increase reliability and maintain service during power outages. DEQ-1 (3.2.1.3) states: "*When power failure would result in cessation of minimum essential service, sufficient power must be provided to meet average day demand."* While the District is not required to install backup power, it is good practice and the standard care of the industry implemented by many systems (including those in the Helena Valley) that provide solely pumped flows.

Water Quality

Public water systems must conduct routine monitoring for contaminants in accordance with Federal Safe Drinking Water Act (SWDA) requirements. Water quality for Ranchview's groundwater sources meets National Drinking Water Standards as well as those required for the State of Montana. According to DEQ records, all of the monitored contaminants are below the required Maximum Contaminant Level (MCL). Appendix N includes the most recent Consumer Confidence report for the Ranchview Estates water system as well as sample monitoring schedules and violation history. Water quality tests from the potable water supply is in good standing and no violations other than those related to reporting have occurred in recent years. No major taste or odor concerns have been raised by the District. It is noted that the water quality monitoring applies to the potable system only. The irrigation system is not monitored according to drinking water requirements.

The most recent sanitary survey was conducted in 2017. (Appendix K) No major issues were identified other than reported holes in the screened vents on the underside of the well caps. It appears the deficiencies were repaired in a timely manner.

Water Rights

Appendix O includes documentation of the District's water rights for its groundwater sources. Table 3-5 summarizes pertinent water rights data. In total, the District's water rights include 420 gpm and 193.75 acre-feet for its groundwater sources for the combined potable and irrigation uses.

Water right 41I 88721-00 is associated with the District's two potable wells. The water right abstract for these wells indicates a total water right of 110 acre-feet per year but indicates the right is further subdivided into 25 acre-feet for domestic use and 85 acre-feet for lawn and garden use. Wells 1 and 2 (associated with the water right) are currently only used for potable use. The average day use for Ranchview Estates was estimated at 15,460 gallons per day as shown in Table 3-4. This equates to 17 acre-feet per year, which is demonstrated to be below the maximum allowed volume of 25 acre-feet for domestic use and indicates the existing domestic water rights are adequate for the potable demands in Ranchview Estates. The potable demands are not anticipated to increase given that no growth or system add-ons are expected.

Water right 41I 89787-00 applies to the District's irrigation system only. Moreover, the water right abstract for this well indicates a water right of 83.75 acre-feet per year. The average day irrigation use for Ranchview Estates was estimated at 206,875 gallons per day as shown in Table 3-4. This equates to 116 acre-feet per year, which is above the maximum allowed volume of 83.75 acre-feet for irrigation use of this right. However, the water rights 41I 88721-00 and 41I 89787-00 are tied together for use at Ranchview Estates. **Therefore, the combined potable and irrigation average day use equates to approximately 133 acre-feet per year which is below the total volume of 193.75 acre-feet specified in Table 3-5.**

Table 3-5 - Water Rights Summary

Ranchview Estates Water Rights Summary					
Water Right #	**Priority Date**	**Purpose/Use**	**Diversion Means**	**Maximum Flow Rate (gpm)**	**Maximum Volume (ac-ft)**
41I 88721-00	1994	Multiple Domestic	Wells	130	25
		Lawn and Garden			85
41I 89787-00	1994	Lawn and Garden	Wells	290	83.75
			Total	**420**	**193.75**

Based on the available water rights information, it appears the District could work within their existing rights to develop a new supply source, if so desired. This is with the understanding that demands would remain the same for both systems. A water right change process could be initiated with the intent to add additional points of diversion or change the purpose of use of an existing water right. The change process would include a historical use analysis where any new

use would essentially be limited to historic use. For example, if the District chooses to develop a new well for irrigation use, flow would be limited to what has been historically used, and not necessarily to what is listed on the water right. This would need to be verified with DNRC and/or a water rights specialist before proceeding.

The Helena Valley lies within the Upper Missouri River Basin Legislative Closure Area and there is a Closed Groundwater Area on the edge of East Helena, and not part of any compact closures. Drilling a new well would require an Application for Beneficial Water Use Permit to secure additional water rights if the District is not able to work within their existing rights. The applicant must demonstrate that water being taken out of the aquifer is mitigated through an aquifer recharge plan. Finding mitigation water can be difficult and the application process can be lengthy. The process to acquire additional water rights for Ranchview Estates would involve an initial hydrogeologic study to locate potential well locations, research of possible mitigation water sources, evaluation of impacts to existing water rights, drilling, pump testing, and preparation of a new beneficial use application. If a new point of diversion is needed as a new well, then an application would be prepared and submitted to DNRC.

Considering that the District demands would not be increased and the water would be used from the nearby aquifer, a Redundant Well Construction Notice (Form 635) is typically all that needs to be filed if the project meets the requirements listed under MCA 85-2-402. However, according to Russ Gates, water resource specialist with DNRC:

> *"Based on the definition for public water supply in 75-6-102(14), the redundant well form would only work for the drinking water supply wells. 85-2-402(16) also states that the redundant well must be required by a state or federal agency, and that only 1 well may be used at a time, so I'm not sure if the scenarios you described would qualify. If the proposed well does not meet the requirements for a redundant well, they would have to apply for a change to add an additional point of diversion. The primary application would be a Form 606, plus the relevant addendums as required. The change process does not allow for any expansion of a water right, such as increased flow rate or volume, but it sounds like that is not anticipated from your description." (Appendix V)*

The District may decide to develop a new well for the purpose of maintaining system pressures in the upper elevations of the subdivision, and/or act as a backup/redundant well supply from a detached aquifer location. The new well could be constructed as either an irrigation only,

potable only, or as an irrigation well for primary use yet designed and constructed as emergency backup potable well. The latter option would require the specific design and construction of the well to DEQ-1 well supply standards, and would also need check valves and special O&M procedures to prevent irrigation system to potable system backflow. This combined-use well option may offer the benefit of using Drinking Water State Revolving (DWSRF or SRF) loan funds. An irrigation only well could not be converted to a potable well in the future without verification of meeting DEQ-1 well standards. The irrigation only well and supporting infrastructure, while likely less expensive to develop (given DEQ requirements are not applicable), would have to be privately funded. This will be discussed and evaluated in more detail in later sections of the report.

Source Water Protection

A Source Water Delineation and Assessment Report (SWDAR) was completed in 2003 for the Ranchview Estates Public Water Supply and is included in Appendix P. The potable wells are located within the northern portion of the regional unconfined Helena Valley Alluvial Aquifer. Groundwater flow in the Ranchview Estates subdivision is generally to the south and the aquifer is recharged by stream losses in the Helena Valley Irrigation Canal and other nearby surface waters, discharge of bedrock aquifers, and from precipitation. The aquifer in the vicinity of Ranchview Estates consists of alluvium over granitic bedrock or shales of the Helena North Hills. Depth to groundwater varies but typically ranges from 40 to 60 feet below the surface. The aquifer on the north side of the subdivision transitions to fractured shale and rock.

Hydrogeologic modeling and inventory of potential contamination sources were conducted as part of the SWDAR. Per the SWDAR, the Ranchview Estates water system has high to very high susceptibility to contamination from pathogens and nitrates from septic systems, roadway chemical spills, and spills or leaks from fuels stored in locations such as the West Valley Fire Department and DNRC North Hills Facility. The SWDAR identified moderate susceptibility from pesticide use on agricultural land. Recommendations for management include emergency response planning, increased monitoring and leak detection, and agricultural best management practices. The District should become familiar with the SWDAR and provide updates as necessary. DEQ may require an update of the SWDAR with the construction of a new well, if completed.

3.3.2 Treatment

The Ranchview Estates subdivision does not currently disinfect their potable water, nor provide any other chemical additives, although the as-built drawings show a “future disinfection room” if needed. The District routinely meets federal and state standards for quality and routinely complies with total coliform tests.

As previously discussed, there are reportedly up to three homes that have reversed potable/irrigation system services. While the overall irrigation system is similar in makeup, it is from a non-public well supply system that is not currently monitored for potential acute and chronic drinking water contaminants. The plumbing on affected properties should be remedied to assure safe drinking water for all residents within the District. A plan and budget to remedy these cross connections should be completed. This is discussed in later sections of the report.

3.3.3 Storage

Water storage is not provided within the system other than with the series of pressure tanks that are located within the pump house building. The pressure tanks help limit pump cycling and can be used to meet short periods of peak demand. However, the hydropneumatics tanks do not offer significant storage credit. The existing pressure tanks are in reasonably good condition and are replaced periodically per the noted ages of the equipment marked in the pump house. According to DEQ-1 (7.2), it is recommended that systems serving more than 50 units should consider the use ground or elevated storage instead of hydropneumatic tanks. Also *“fire flow storage*” is not provided by a system using hydropneumatic tanks.

For systems providing fire capacity, DEQ standards require a minimum storage capacity equal to the average day flow volume plus fire demand. The existing average day demand is approximately 15,460 gallons. The recommended fire flow for a residential area is 1,000 gpm for 2 hours or 120,000 gallons. To provide water storage for both average day demand and fire flow, approximately 150,000 gallons of storage would be required. In order to provide fire flows of 1,000 gpm, distribution system piping would also need to be upsized and larger pumps (i.e. booster pumps from the storage tank(s) would need to be installed to pump water from the storage tank to the distribution system.

The original 1993 design information specified that fire protection for the subdivision would be provided by a tanker truck fill site that can supply 600 gpm on demand. The fill site is from an

existing converted cropland irrigation system. The nearest fire station is very close and located just across Montana Avenue from the subdivision.

3.3.4 Pumping Stations

The Ranchview Estates water systems do not include any pumping stations other than the well pumps. The groundwater well submersible turbine pumps were discussed in Section 3.3.1.

3.3.5 Distribution System

The existing Ranchview Estates potable distribution system consists of approximately 760 lineal feet of 3-inch PVC from the pump house to the subdivision and then through the 2-inch looped PVC distribution mains throughout the subdivision. As noted on the record drawings, the piping is placed within designated easement and right of ways (ROWs). The irrigation system piping layout is adjacent to the potable system with the extension of a 6-inch PVC main from the pump house to the subdivision and 3-inch looped PVC mains within the subdivision. A general layout of the community's existing water system is depicted previously on Figure 3-1. Table 3-6 summarizes pipe diameter and lengths within the Ranchview distribution systems. The District reports having 1-inch and 1.5-inch individual polyethylene (PE) water services from curb stops into each home for the potable and irrigation systems, respectively.

Table 3-6 - Distribution System Summary

Ranchview Estates Distribution System Summary	
Potable Water System PVC	**Length**
2" Diameter	9,171 LF
3" Diameter	763 LF
Subtotal	**9,934 LF**
Irrigation Water System PVC	
3" Diameter	9,310 LF
6" Diameter	766 LF
Subtotal	**10,076 LF**
TOTAL	**20,010 LF**

The PVC pipe was installed in the 1990's and no major leaks or rupture trends have been reported. Both potable and irrigation systems are experiencing periodic low pressures,

specifically along Lariat Road which is at the upper elevations of the subdivision. Circular DEQ 1 (8.2.2) requires *"the minimum size of water main for providing fire protection and serving fire hydrants must be six-inch diameter".* The water system piping in Ranchview Estates is currently too small to provide fire flows. DEQ-1 (8.2.2) also states that for systems not providing fire flow, the minimum diameter of 3-inches should be justified by hydraulic analysis. Hydraulic analysis using modeling is described below.

Distribution System Modeling

A water model was constructed to evaluate hydraulics of the potable and irrigation systems using the WaterCAD computer modeling package provided by Bentley systems. The computer model is used to identify any specific problem areas and to assist in determining the most effective modifications to improve the system. The WaterCAD program uses an iterative computational procedure, similar to the Hardy Cross calculation method. The model uses standard loop equations to arrive at solutions for pipe network hydraulics and determines resulting pressures at the system nodes (pipe junctions) using the relationship between flow and headloss defined by the Hazen-Williams equation. The Hazen-Williams equation uses a coefficient "C", which is based on the roughness of the pipe interior. Standard values can be assumed and assigned for different types of materials based on years of pipe service and associated resistance and supported by actual conditions.

The potable system model consists of the subdivision 3-inch and 2-inch piping network in addition to a "reservoir" at the pump house which is used to represent the supply source. Model junctions are located throughout the piping network and used to specify water demands and display resulting calculated pressures. The water surface elevation of the reservoir sets the initial hydraulic grade of the system which would equate to the pressure range established by the pressure switch minimum and maximum pressure settings. The model inputs can be adjusted to model different pressure tank set points and demands can be adjusted at the model junctions to reflect different demand conditions (average day, maximum day, etc.).

Actual working pressures were observed and recorded at several residences within the subdivision (by local residents and board members) and flows and pressures were recorded at the pump house during two different dates in July of 2020 for the purposes of comparing pressure data to the hydraulic model. The potable system model was set up to match initial pressure and flow conditions on the day of monitoring. The model closely replicated field

pressure conditions for three of the four residence monitoring locations indicating the model is generally reconciled with field conditions. Note that the model does not consider additional headloss through plumbing from the main to the house which could be one reason for some discrepancies between field observed/measured and modeled nodal pressures.

Demand scenarios were established for the water demands shown in Table 3-4 in order to analyze the hydraulic response of the system. Circular DEQ 1 (8.2.1) requires that "*the system must be designed to maintain a minimum normal working pressure of 35 psi and minimum pressure under all conditions of flow (e.g. fire flows, hydrant testing, and water main flushing) must be 20 psi".* The current system is not designed to provide fire flows, so the modeling is limited to results for normal domestic demand and pressure of 35 psi. The reason for the low pressure is to limit backflow concerns.

The maximum ground elevation within the subdivision is approximately 3812 feet and the ground elevation at the pump house is 3778 feet. Hydraulic calculations indicate that in order to accommodate the change in ground elevation, the minimum set point was 50 psi. The potable system was modeled under average day, maximum day, and peak instantaneous demand assuming a starting pressure set point of 50 psi. Resulting pressures are above 35 psi within the subdivision under average day and maximum day demands. The hydraulic model shows that the system cannot meet the peak instantaneous demand with the current pipe sizes and pressure setting of 50 psi. Resulting minimum system pressure under peak instantaneous demand is 25 psi. Modeling results show the minimum pressure switch setting needs to be at least 60 psi with the current pipe sizes in order to meet peak instantaneous demand within acceptable pressure tolerances. Another option to increase pressures would be to upsize pipes. Pipe velocities are approaching five feet per second in the 3-inch supply main and first 2-inch pipe segment within the subdivision. Increasing diameters will result in lower velocities with the increase in pressure.

In summary, pipe size does not begin to limit the potable system hydraulics until demands increase over maximum day flow scenario. Based on information presented previously in Table 3-1, the current pump rate of well 1 is 20 gpm and well pump No. 2 is less and is not currently being operated. It is highly probable that the system is experiencing low pressures due to the periodic potable demands exceeding the pump output rates. As demand begins to exceed the pump capacity, the available drawdown storage in the pressure tanks will deplete and the system will be running off of the supply pumps of the wells. If the current potable supply is only

20 gpm, pressure will decrease as the pump is unable keep up with demand. Increasing the pump output by increasing the flow of well pump No. 2 and bringing it back on-line is recommended.

A similar procedure was followed to model the irrigation system. The irrigation system model consists of the subdivision 6-inch and 3-inch piping network in addition to a “reservoir” at the pump house used to represent the supply source. As described previously, actual field pressures were obtained and compared to the irrigation model. The model closely replicated field pressure conditions for three of the five residence monitoring locations indicating the model is generally reconciled with field conditions.

Demand scenarios were established for the water demands shown in Table 3-4 in order to analyze the hydraulic response of the system. The irrigation system was modeled assuming a starting pressure set point of 75 psi. According to the water system operator, the irrigation system pumps are operated using VFD’s with a constant discharge pressure set point of 75 psi, and both irrigation wells are set to operate in lead+lag scenario to maintain the set point. Resulting model pressures are above 51 psi under all demand conditions. Irrigation system pressures appear to be adequate with the current pipe sizing and pressure set point, although the irrigation system has reportedly experienced recent low pressures. If demands increase such that the pump can no longer maintain the discharge pressure setting, discharge pressures will continue to decrease as the pumps operating at full speed (60 Hz) cannot keep up with the full demand. Additionally, as demands increase beyond the estimated peak instantaneous demand, the model indicates that headloss in the 3-inch pipe begins to become substantial.

Computer model results and figures are included in Appendix Q.

Water Valves and Fire Hydrants

The District’s distribution system has a sufficient number of gate valves located on the distribution system to isolate major areas and blocks, and it is reported that the District’s operator takes care to regularly exercise valves. The Ranchview Estates subdivision does not have fire hydrants but does include blow-offs for flushing in both systems. The blow off hydrants as fire suppression is not provided are located throughout the system as shown on the record drawings. Site investigation confirms that these are located in accessible vaults with threaded fittings. It is noted that both the irrigation and potable systems should be “blown off” at least

annually to clean and flush the systems. It is unclear if this has been performed regularly in recent history.

Water Meters

The District does not use individual water meters. In general, the District has been made aware of the conservation and measurement benefits of installing individual water meters. However, currently no action is being made by the District to transition to meters for use and/or billing purposes. The pump house contains original main flow meters that could be upgraded to more state of the art (magnetic or ultrasonic) and accurate instantaneous and totalizing flow meters.

3.4 Operational and Management Practices and Capabilities

The most recent DEQ Sanitary Survey, completed in 2017, indicates the system is adequately maintained and appears to be well managed and operated with the District's contract operator. Beyond the general minimum O&M and DEQ reporting tasks, more efforts in housekeeping and related maintenance efforts could be increased as the District O&M budget allows. Past deficiencies have been promptly addressed, operators have shown to meet certification requirements, and are committed to maintaining the system. The most recent Sanitary Survey can be found in Appendix K.

3.5 Financial Status of any Existing Facilities

A summary of the water system operating expenses and revenue for the past three years is included in Table 3-7. Detailed revenue and expense reports are included in Appendix R. Nearly all of the District's revenue comes from water utility base rates. The District's major expenses include water well management, electricity, accounting fees, insurance, and water testing. The District does not currently have any debt service related to the water system. The District currently charges a water base rate of $45/residence/month.

The Historical financial reports for the past three years shows that the District is able to steadily build a reserve in the range of at least $12,000 to $28,000 per year.

Table 3-7 - Summary of Revenues and Operating Expenses

Ranchview Estates Summary of Revenues and Operating Expenses			
Description	**2017**	**2018**	**2019**
Revenues			
Water Revenues	$56,296	$55,754	$52,796
Other Revenues	$3,829	$2,858	$1,391
Total Revenues	**$60,124**	**$58,612**	**$54,186**
Expenses			
Accounting Fees	$4,325	$4,450	$4,800
Advertising and Promotion	$0	$85	$0
Bank Fees (ACH)	$67	$62	$170
Bank Fees (Credit Card)	$738	$908	$888
Business Licenses and Permits	$20	$35	$0
Charity	$50	$25	$0
Computer and Internet Expenses	$172	$172	$0
Insurance Expense	$2,477	$2,479	$2,567
Office Supplies	$16	$124	$451
Postage and Delivery	$308	$474	$313
Printing and Copying	$774	$411	$445
Professional Fees	$0	$1,242	$278
Property Management Fees	$30	$0	$0
Reconciliation Discrepancies	$0	-$1,508	$1,625
Testing (Water)	$3,431	$470	$444
Utilities (Electricity)	$10,086	$12,027	$9,930
Utilities (Telephone)	$663	$555	$569
Water Well Management	$8,087	$11,502	$18,895
Total Expenses	**$31,246**	**$33,513**	**$41,373**
Net Revenue	**$28,879**	**$25,099**	**$12,813**

3.6 Equipment Replacement and Disaster Recovery Reserves

This section describes the method used by the District in evaluating a suitable reserve fund. The section was completed in consultation and input from the District Board.

In 2016, the District inventoried major components of the water supply system and estimated the cost of replacing those components. This effort sought to establish a framework the governing board could use to determine the amount of reserve funds needed to pay for

replacement and repair for normal wear of equipment and to be able to respond to damage caused by natural disaster.

The inventory study estimated the cost of replacing or repairing the entire system to be $1,435,305. To establish 2020 values, the 2016 cost of replacing and repairing the system is inflated by 3.5 percent per year. The adjusted 2020 water system value therefore is estimated to be $1,647,046 .

This system value can be used by the District to establish the monthly water fees to pay for annual operating costs and reserve fund goals. On an annual basis, the governing board could calculate the amount of monthly fees necessary to pay for annual operating costs and the amount that would be deposited to the reserve fund to meet the reserve fund goal set by the board.

The reserve fund goal can be set by simply taking a percentage of total system costs. For example, if the board set the reserve fund goal at 20 percent of total system costs, the reserve fund goal would be approximately $329,000. If the money in the current reserve fund account were hypothetically $290,000, then there would be about a $39,000 shortfall. Under these circumstances, the board could decide to fund this shortfall over a period of years from year-end surplus money from the current $45 water fees and another portion from temporarily increasing water fees. Thus, if a 5-year period were chosen to fully fund the 20% reserve fund, approximately $7,800 of revenue per year would be needed. If half of this money were anticipated to be available from surplus money from current water fees each year, then about $3,900 per year would be needed from increased fees. This would require about a $3 per month increase in water fees for the 5-year period to reach the 20 percent set aside in the reserve fund.

The district may want to consider this methodology in establishing its annual budget for operating funds and the reserve fund.

3.7 Water/Energy/Waste Audits

No water, energy, or waste audits have been conducted for the District’s water system.

4.0 NEED FOR PROJECT

4.1 Health, Sanitation, and Security

The health and safety of the public is the most important concern for a community water system. The District's existing water system is deficient to some extent in several areas, including issues with the supply, storage, and distribution. The District water system is also not compliant with all current MDEQ regulations and as a result, the condition of the system is a concern for public health and safety.

With regard to deficiencies identified with the water supply system in the District, the DEQ requires *"the total developed groundwater source capacity for systems utilizing hydropneumatic storage tanks as the only storage facility must be sufficient to equal or exceed the peak instantaneous demand with the largest producing well out of service".* DEQ-1 Chapter 3 discusses water demands and demonstrates the District's existing supply sources are not currently capable of meeting this requirement. The current maximum potable pump flow rates are less than as originally designed. Additionally, there are numerous other issues within the pump house that affect the integrity and reliability of the District's supply sources. The existing electronic and control systems do not operate properly. The controls are not currently set to operate pump 2, nor as an alternating or lead/lag operation; the pump control is currently in the "pump 2 off" position at the time of this study. The electrical system and panels for the potable pumps are also not equipped with sufficient surge arrestors and amperage overload protection. The District has experienced recurring past pump failures due to amperage overloads. Underperforming controls, surge arrestors, and some various outdated electrical components are a concern for a sustainable system. The non-functioning operational controls increase maintenance and monitoring required by the operator. Ongoing manual adjustments are impractical and inefficient and the problematic control systems are contributing to the lack of supply during times of peak demand in the water system. The low flows and control issues at the pump house increase the chances the subdivision could be without water.

The District does also not have back-up power on its supply sources. DEQ-1, 3.2.1.3 states: *"When power failure would result in cessation of minimum essential service, sufficient power must be provided to meet average day demand."* It is a good practice and the standard care of the industry to provide backup power by many water systems (including those in the Helena Valley) that provide solely pumped flows.

A serious deficiency exists in the distribution system that affects public health and safety in regard to the potential reversed potable and irrigation system services on three residences within the subdivision. The irrigation system is not public and is not monitored regularly for acute and chronic contaminants per state and federal regulations. The connection of irrigation water to the potable water system in these residences has the potential to cause illness if contaminants exist. An irrigation system can be subject to back siphonage and contamination concerns that can originate with this type of system use (i.e. hoses in standing water, etc.). Drinking water contamination from inflow, backflow, and infiltration are at risk to occur when static pressures are < 20 psi. Potential contaminant sources include petroleum-contaminated soil, pesticides in soil, etc. Cross connections with home plumbing can also result in inorganic and organic chemical contamination. Users are at risk of exposure to pathogenic microbes as well as exposure to heavy metals and other pharmaceutical products. The affected cross-connected properties need to be investigated and retrofitted to assure safe drinking water for all residents within the District.

Low pressures have been reported in the distribution system which is a potential public health and safety issue, as it can increase the potential for backflow and contamination of the water system. Low pressures are the result of inefficiencies and controls within the pump house and peak demands that are greater than the pump capacities that cause low pressures. As stated earlier, the distribution system is not large enough to provide fire flows. Circular DEQ 1 *states "the minimum size of water main for providing fire protection and serving fire hydrants must be six-inch diameter".* The lack of a fire flow system also creates a potential safety hazard for the District.

The subdivision does not have water storage other than the minimal storage provided with the series of pressure tanks located within the pump house. The Montana DEQ recommends ground storage in place of hydropneumatic tanks for systems that serve more than 50 connections. The Ranchview Estates water system serves 107 residences and could benefit from additional storage. The existing water system is not currently designed to provide fire protection. Adding ground level storage would be a key component of installing a fire flow system for the subdivision and ensuring sufficient fire flow availability to be able to better control a fire, improve safety, and increase the ability to save lives. The additional storage would also be able to supply the water system in the event of an emergency or power outage and would allow the system to better respond during times of peak demand.

Regulatory Requirements

The Safe Drinking Water Act (SDWA) was enacted by Congress in 1974 to provide a standard by which all persons in the United States could be provided safe drinking water through public water supplies. The Act was later amended in 1986 and 1996.

The State of Montana's regulatory role in drinking water systems is twofold; regulate the SDWA by meeting primacy requirements established by the EPA and ensure the satisfaction of state established design criteria for the construction of public water systems. The State has defined public water systems as systems serving ten or more homes, or 25 or more persons. The State has satisfied the primacy requirements of the federal government by passing a state law that is equally as stringent as the SDWA. Accordingly, the EPA has granted the State, via the DEQ, the right to enforce the SDWA. Some of the SDWA rules that apply to the District are discussed below.

National Primary Drinking Water Regulations

The National Primary Drinking Water Regulations are enforceable standards that apply to public water systems. Primary standards protect public health by limiting the levels of contaminants in drinking water. The MDEQ has been given primacy for enforcing the primary maximum contaminant levels (MCLs). Because of the numerous contaminants with MCLs, the list is not included as part of this PER but is available on the EPA's website (http://www.epa.gov).

The District's existing water supply meets all primary drinking water standards.

National Secondary Drinking Water Regulations

The National Secondary Drinking Water Regulations are non-enforceable guidelines regulating contaminants that may cause cosmetic or aesthetic effects in drinking water. EPA recommends secondary standards to water systems but does not require systems to comply, though; states may choose to adopt them as enforceable standards. At this time, the secondary contaminants are limited to aluminum, chloride, color, copper, corrosivity, fluoride, foaming agents, iron, manganese, odor, pH, silver, sulfate, total dissolved solids, and zinc. Please note, some constituents listed on the Secondary MCLs also have MCLs if the concentrations reach an elevated level. Because of the numerous contaminants with secondary MCLs, the list is not included as part of this PER but is available on the EPA's website (http://www.epa.gov).

The District's existing water supply meets secondary drinking water regulations.

Montana Department of Environmental Quality Circular DEQ 1

The state also established a detailed set of design and construction standards for public water systems that must be satisfied in the design and construction of new water facilities. These standards are described in Circular DEQ 1. State review and approval of the design is necessary prior to the construction of any public water system. The alternative and recommended improvements evaluated in this preliminary engineering report will ensure compliance with all the state design standards specified in DEQ 1.

Arsenic Rule

The Arsenic Rule became effective in 2001 for the primary purpose of improving public health by reducing exposure to arsenic in drinking water. Studies have shown that arsenic can be linked to causing skin damage, problems with the circulatory system, and increased risks of cancer. As a result, the new rule changed the arsenic MCL from 50 µg/l to 10 µg/l and the MCLG to 0. In addition, the rule also requires monitoring for arsenic for new systems and new drinking water sources as well as clarifies the procedures for determining compliance with the MCLs for IOCs, SOCs, and VOCs.

The EPA estimates that implementation of the rule may avoid 16 to 26 non-fatal bladder and lung cancers per year; avoid 21 to 30 fatal bladder and lung cancers per year; and reduce the frequency of non-carcinogenic diseases. The actual implementation of the MCL became effective on January 23, 2006.

The District's existing water supply meets the arsenic standard.

Lead and Copper Rule

The Lead and Copper Rule became effective in 1991 for the primary purpose of protecting public health by minimizing lead (Pb) and copper (Cu) levels in drinking water, primarily by reducing water corrosivity. Lead and copper enter drinking water mainly from corrosion of plumbing materials containing lead and copper (i.e. pipes and/or joints).

The rule established action levels (AL) of 0.015 mg/l for lead and 1.3 mg/l for copper based on 90th percentile level of tap water samples. An action level exceedance is not a violation of the

rule but can trigger other requirements that include water quality parameter monitoring, corrosion control treatment, source water monitoring/treatment, public education, and lead service line replacement.

To date, the District has not exceeded the action level for lead and copper. Thus, outside of monitoring for lead and copper, no further action has been required.

Radionuclides Rule

The Radionuclides Rule went into effect in 2000 for the primary purpose of reducing the exposure to radionuclides in drinking water to reduce the risk of cancer. The rule is also intended to improve public health protection by reducing exposure to all radionuclide. The EPA estimates that implementation of the rule will reduce uranium exposure for 620,000 persons and provide protection from toxic kidney effects of uranium as well as a reduced risk of cancer.

The rule retains the existing MCLs for combined radium-226 and radium-228 (5 pCi/l), gross alpha particle radioactivity (15 pCi/l), and beta particle and photon activity (4 mrem/yr.) but regulates uranium for the first time. The new MCL for uranium under this rule was set as 30 µg/l. Systems were required to begin initial monitoring in December 2003.

The District's existing water supply meets the Radionuclides Rule.

Total Coliform Rule (TCR)

The Total Coliform Rule (TCR) went into effect in 1989 for the primary purpose of improving public health protection by reducing fecal pathogens to minimal levels through control of total coliform bacteria, including fecal coliforms and Escherichia coli (E-coli). The rule establishes a maximum contaminant level based on the presence or absence of total coliforms; modifies monitoring requirements including testing for fecal coliforms or E-coli; requires use of a sample siting plan; and also requires sanitary surveys for systems collecting fewer than five samples per month. Implementation of the rule has resulted in reduction in the risk of illness from disease causing organisms associated with sewage or animal wastes, of which disease symptoms may include diarrhea, cramps, nausea, and possibly jaundice, and associated headaches and fatigue.

The actual number of samples required per month under the TCR is dependent upon population size. Because the District's population is less than 1,000, one sample per month is required. If a

routine sample tests positive for the presence of total coliforms it must be tested for the presence of fecal coliforms or E. coli and three repeat samples per positive routine sample must be collected and analyzed within 24 hours for total coliform. One of the repeat samples must be collected from the original sample site, one within five service connections upstream, and one within five service connections downstream. If any repeat sample is total coliform positive, then the system must analyze the positive sample for fecal coliforms or E-coli. The system must also collect another set of repeat samples, as before, unless the MCL has been violated and the system has notified the State. A positive routine or repeat total coliform result requires a minimum of five routine samples be collected the following month unless otherwise waived by the State.

The results of routine and repeat samples are used to compute compliance with the TCR. For the District, a monthly MCL violation is triggered if one routine/repeat sample is total coliform positive. An acute MCL violation is triggered if the system has any fecal coliform or Ecoli positive repeat sample or has a fecal coliform or E-coli positive routine sample followed by a total coliform positive repeat sample.

The District has routinely met the requirements of the Total Coliform Rule.

4.2 Aging Infrastructure

One of the most immediate public health and safety needs in the District's water system is associated initial construction issues and quality control in regard to the reversed potable/irrigation service plumbing. The other public health and safety needs are associated with reported low pressures and with an aging pumping and control system as well as outdated technologies.

4.3 Reasonable Growth

Ranchview Estates is fully developed within their current boundary. The only projections that can be looked at in this analysis are to identify whether or not surrounding subdivisions will be connected to the system in the future. The District Board is not presently considering extending water service beyond the District boundary.

5.0 ALTERNATIVES CONSIDERED

5.1 Alternative Screening

Various alternatives were developed to address the deficiencies that have been identified in the District's water system. Some alternatives may not be viable because of technical feasibility, regulatory compliance, or capital/operation and maintenance costs. This section contains a description of all the alternatives that were considered in planning for the various solutions to meet the identified needs. The alternatives considered for further analysis in the subsequent sections were conceptually described and evaluated to determine the estimated probable project costs and environmental impacts.

Supply

The following alternatives are considered for upgrading the District's existing wells and pump house to optimize the system operation and increase dependability.

- Do nothing – No Action. This option can always be considered for a cost-savings approach. However, doing nothing does not provide the needed pump house repairs for the long-term, continuous, and dependable operation.

- Replace well pump No. 2 – This includes furnishing and installing a completely new well potable pump and motor in the existing well No. 2 to achieve the peak demands. A new pump would be selected to better fit the system curve for higher production output. This is a viable alternative and considered further.

- Replace potable pump system controls and upgrade the electrical system components. - This would include installing a more user-friendly pump operation system with needed lead/lag and alternating control operation. This alternative includes upgrades done with or without the use of Variable Frequency Drives (VFDs) as described below:

    - With VFDs. The advantages to this option is the District would no longer need to depend on the full bank of hydropneumatic pressure tanks, and the pressure (on/off) "window" can be maintained at a more consistent system pressure. The

disadvantage for this option includes potential diminished life of the pump motors as compared to across-the-line started pumps.

- Without VFDs. (Across-the-line starters) One advantage to this option is the pump motor life for each pump may be extended longer than pumps with VFDs. Disadvantages for this option is the continued reliance on all of the existing hydropneumatic pressure tanks and the cycling of the pumps at high/low pressures. Another disadvantage is the limited available pool of specialized electrical/control technicians for any VFD repairs.

- Given the importance of keeping a constant pressure "window" and the fact that actual measured pressures in the system in the north region the subdivision may see periods of less than 35 psi, pumps with VFDs are more favorable to adjust pressures, and this alternative is considered further.

- Electrical Protection – Given the system's susceptibility to surges and amperage overloads, installing a Surge Suppressor/Overload Protection system is a viable alternative considered further.

- Flow Meters - The potential alternatives available for flow meter installation include propeller, magnetic, and ultrasonic meters. Given the extensive use, accuracy and limited upstream/downstream pipe lengths for retrofit installations, magnetic meters are commonly used are considered for improvements.

- Rigid Piping - The potential rigid metallic pipe types that can be considered for the 2-inch to 3-inch size include stainless steel, galvanized or copper. Galvanized pipe that is coated is commonly used and considered the least expensive and most robust product for this application.

- Backup Generator - For the alternative of installing a new backup generator, the options include installing a new generator for the potable pump system only or for the entire pump house including the irrigation pumps. Also, the common fuel options include diesel, natural gas and propane. The type of fuel chosen depends on owner preference site specific considerations such as the proximity of natural gas. The costs compare closely and the type to be chosen can be made at the time of design, if implemented.

The following alternatives are considered for constructing a new north well to maintain water pressures and act as a redundant/backup water supply for the irrigation system and/or potable water supply:

- Do nothing – No Action: This option is favorable for a cost-savings approach, yet would not provide the District with an alternate backup supply system in a separate aquifer location. The system would continue to rely on the existing wells currently located in a close proximity. A new north well would offer a groundwater source from a separate aquifer location if needed should the existing south wells (only 75-ft. apart) became compromised in either quality or quantity or other extreme event. Two options are considered for a new well on the north side as listed below.
  - New North Well (Irrigation only) - A new north well as an irrigation-only system would not require DEQ review and associated standards. Overall project costs will be less, but the project would have to be privately financed.
  - New North Well (Irrigation and potable backup) - An irrigation well, built to DEQ-1 standards, could be used as a backup well. A new potable well could also be financed by SRF low interest loans.
  - Both well options are evaluated per the direction of the District and to allow for an informed decision should this alternative be considered now or in the future.

Distribution Alternatives

- Do nothing – No Action: This option is favorable for a cost-savings approach, yet does not provide for a compliant distribution system that protects all users.

- The options for remedying the potable/irrigation cross connections are to either complete or not complete these improvements. Overall, this alternative includes the use of a licensed plumber to swap the potable/irrigation piping connections at each individual house entrance. The first step for this alternative is to identify each cross connection location.

5.2 Supply Alternatives

5.2.1 Alt. S-1: Replace well pump No. 2

Description

This alternative includes installing a new well pump in well No. 2 that would offer a higher production rate at the potable water service pressures (55 to 60 psi). Records show that a new pump has been installed in well No. 1 in recent history, but not well No. 2. The new well pump should at least meet or exceed the hydraulic conditions of the new well No. 1 pump. The pump curve for well pump No. 1 from the supplier is found in Appendix U. The work would include lifting the riser pipe and reconnecting the piping and wiring and is recommended to be completed by a qualified technician or well driller.

Design Criteria

All design criteria presented in Circular DEQ-1 is applicable to each alternative considered, specifically the requirements in Chapter 3 – Source Development. All electrical work will comply with the National Electric Code (NEC).

Map

The work will take place in the existing well No. 2, located immediately adjacent to the pump house. The location of well No. 2 is shown on Figure 3-1.

Environmental impacts

Only very temporary environmental impacts are anticipated with this alternative related to accessing, pulling and replacing the well pump exclusively at the well No. 2. A service utility truck will access the well for nor more than a day or two.

Land Requirements

No additional land is required.

Potential Construction Problems

Well pump replacement is a standard procedure completed by well service technicians such as system's operator or drilling company representative using a boom truck. No construction problems are anticipated. The system will only be able to run off of well No. 1 only for a period when the new well No. 2 pump is installed. (Note that the system is currently only running off of well No. 1)

Sustainability Considerations

Construction of a new water supply well pump is considered a sustainable utility management practice that would aid in creating a resilient utility for the community. The existing well No. 2 pump is not reliable and a new well pump would provide an economic and social benefit because it would improve the system's peak demand conditions.

Water and Energy Efficiency

The pump would likely be similar in size (5 horsepower) to well pump No. 1 and the existing well No. 2 pump, yet the new pump would likely be slightly more efficient.

Green Infrastructure

Not applicable. The overall foot-print impacted is very small, and the work is very temporary.

Cost Estimates

The estimated budgetary cost is $5,000 for this operation based on the past cost records for well pump No. 1 and feedback from the District's water operator for this work. A detailed quotation can be obtained prior to starting work.

5.2.2 Alt. S-2: Upgrade Potable System Pump Controls and Electrical

Description

This alternative includes replacing the potable pump system controls and upgrading the electrical system components. This would include installing a more user-friendly pump operation system with lead/lag and alternating control operation. This alternative also includes installing

necessary surge suppression and amperage overload protection. The sub alternatives are as summarized below:

- Option S-2A (With VFDs): This option includes installing new potable pump controllers with VFD operation. VFD's would allow the pressure on/off "window" to be maintained at a more constant pressure, with the pumps operating at variable speeds to meet system demands. The pumps would run longer with less cycling. With VFD's installed on the pumps, the District would not need to depend on the entire bank of pressure tanks. The disadvantage of this option is that the pump life could be diminished.

- Option S-2B (Without VFDs): This option includes installing new potable pump controllers without the use of VFDs. One advantage to this option includes a longer pump life than if VFDs are utilized. Disadvantages for this option include the continued reliance on the existing hydropneumatics tanks and the limited availability of specialized technicians for any repairs, and less efficiency.

- Option S-2C: Install Surge Suppressor/Overload Protection System.

As determined in the alternatives screening section, Alternatives S-2A and S-2C are considered for the project to provide a consistent water service pressure and increased operational control.

Overall, the project would include the installation of two new VFDs and associated panels placed along the walls. Controls would allow for adjusting of setpoints and programming. The existing outdated and unused panels would be removed from the east facing wall as part of this scope of work.

The pressure setpoints will be adjustable and the operation of the pump controls will be set so that the lead pumps will alternate between pump No. 1 and pump No. 2 to balance the run times between each pump. It is recommended that Alternative S-1 be completed before S-2 to appropriately run and test the new controls and VFDs with the new well pump.

Design Criteria

All electrical work will comply with the National Electric Code (NEC).

Map

The work will take place in the existing pump house entirely as shown on Figure 3-1.

Environmental impacts

Little to no impacts will occur as all the work will take place inside the building.

Land Requirements

No additional land is required.

Potential Construction Problems

Electrical work will need to be done by a licensed and experienced electrical contractor. The potable water system may be down for temporary periods while the new components are installed. The downtime can be limited by installing the new panels and wiring before turning off the pumps and switching over the controls.

Sustainability Considerations

Construction of new electrical and control systems is considered a sustainable utility management practice that would aid in creating a resilient and dependable utility for the community. The existing electrical and controls system is not reliable and periodic outages occur due to the lack of overload protection. The new controls would help balance the run hours of the pumps and maximize the pump usage and life of each pump.

Water and Energy Efficiency

Installing new controls with VFD operation will help the system balance the pump wear between the two potable pumps. The use of VFDs will help to reduce electrical demands as the pumps will be able operate at less than 100% speed (Hertz/Frequency) to achieve the desired pressures.

Green Infrastructure

Not applicable. The overall foot-print impacted is very small and the work is very temporary.

Cost Estimates

The estimated budgetary cost is $7,500 (S-2a: $5,000, S-2c: $2,500) for this installation based on a quote provided by Nash Electric. See Appendix T

5.2.3 Alt. S-3: Replace Flow Meters

Description

This alternative includes replacing the existing original potable and irrigation service flow meters in the pump house with new magnetic flow meters. The alternatives are described as:

- S-3A: Replace 2-inch potable supply meter
- S-3B: Replace 3-inch irrigation supply meter

The meter installation will require some minor plumbing work to replace the piping and install the meters with the appropriate manufacturer recommended upstream and downstream straight-run pipe lengths. The new meters will also require a new single phase power connection. Each flow meter will come with a display panel that can either be kept in-line at the meter location or placed on available wall space.

Design Criteria

All plumbing and electrical work will comply DEQ-1 standards and the National Electric Code (NEC).

Map

The work will take place in the existing pump house entirely as shown on Figure 3-1.

Environmental impacts

Little to no impacts will occur as all the work will take place inside the building.

Land Requirements

No additional land is required.

Potential Construction Problems

Electrical work will need to be done by a licensed and experienced electrical contractor. A qualified contractor or plumber should complete the plumbing work. The potable water may be down for temporary periods while the new components are installed. The downtime can be limited by timing the work to be done concurrently with other work requiring a shut-down.

Sustainability Considerations

Installation of accurate flow meters is considered a sustainable utility and water resource management practice that would aid in operating the system, tracking accurate total and instantaneous flow measurements, and assisting in troubleshooting pump operation.

Water and Energy Efficiency

The accurate measurement of the main water flows can assist the District in tracking typical and non-typical water usage, leaks, peak flows, and lead to better management and conservation of the system's groundwater supply.

Green Infrastructure

Not applicable. The overall foot-print impacted is very small, and the work is very temporary.

Cost Estimates

The estimated budgetary cost is $5,500 (S-3A: $2,500, S-3A: $3,000) for this installation based on past project experience for similar work. A more detailed quote can be obtained from an installing contractor.

5.2.4 Alt. S-4: Replace Pump House Pipe and Fittings

Description

This alternative includes replacing the existing potable and irrigation pump house piping and ancillary fittings, bends, valves, etc.

- S-4A: Replace potable pump house piping
- S-4B: Replace irrigation pump house piping

Design Criteria

All piping shall conform to DEQ-1 and NSF drinking water standards.

Map

The work will take place in the existing pump house entirely as shown on Figure 3-1.

Environmental impacts

Little to no impacts will occur as all the work will take place inside the building.

Land Requirements

No additional land is required.

Potential Construction Problems

The potable water may be down for temporary periods while the new piping is installed. The downtime can be limited by timing the work to be done concurrently with other work requiring a shut-down. The irrigation system can be done in the winter months when there is minimal irrigation water demands.

Sustainability Considerations

Construction of rigid metallic piping is considered the standard care of the industry and is a sustainable utility management practice that protects against pressure spikes, ruptures, and also pipe shear forces caused by earthquakes movements that have occurred in the past.

Water and Energy Efficiency

Ultimately, the installation of rigid pipe will provide a more robust system that is less susceptible to leaks and ruptures.

Green Infrastructure

Not applicable. The overall foot-print impacted is very small, and the work is very temporary.

Cost Estimates

The estimated budgetary cost is $18,000 (S-4A: $8,000 S-4B: $10,000) for this operation based on past project experience for similar work. A more detailed quote can be obtained from an installing contractor at a later date.

5.2.5 Alt. S-5: Install New North Well

Description

The following alternatives are considered for constructing a new north well to maintain water pressures and act as redundant/backup water supply for the irrigation system and/or potable water supply:

- Alt. S-5A: New North Well (Irrigation only). A new north well as an irrigation-only system would not require DEQ review and associated design and construction standards. The transmission main would directly connect to the irrigation main in Lariat Road from the new well.

- Alt. S-5B: New North Well (Irrigation and potable backup). An irrigation well, built to DEQ-1 standards, could be used as a backup well. The well could either be completed and connected into both the potable and irrigation system piping with appropriate check valves for backflow protection to act as an immediate backup potable pump, or the well piping could connected to the irrigation system and plumbed into the potable system at a future date.

Based on the desktop evaluation of the potential north well site location using available GWIC data, a new well (for either option) would likely be constructed within the fractured shale aquifer. It is estimated that well depths in the typical range of 120-130 feet deep, producing an approximate well yield flow rate of about 20-25 gpm, may be expected. Higher yields have been encountered with a few nearby local wells within the fractured shale. However, the probability of a well producing over 50 gpm is assumed to be low within this aquifer zone. This alternative assumes that a test well and a hydrogeologic study would need to be completed to verify the well yield before proceeding with more costly piping, well and pump house improvements. Given the development of a well producing less than 25 gpm, a storage tank with a separate high service pump would be needed to buffer the difference between the peak demands and the actual well yield. For planning purposes of this evaluation, a 100 gpm high service pump from a

25,000 gallon underground storage tank is assumed, in addition to the 25 gpm well pump. It is assumed that the new well pump (for either option) would only serve as a backup and cycle only when pressures are below 40 psi (or other desired set points) in the northern portion of the subdivision. If a higher-yielding well is encountered during a test well phase, then the storage tank size could potentially be reduced or omitted. A 100 gpm high service pump located in the tank would be able to supplement irrigation demands at peak flows (eliminating low pressures) and also be able to exceed peak potable demands if used as a potable supply. The pump can be placed on VFD controls to maintain pressure set points and supply on-demand.

Land acquisition and easement costs for a future well for site are also required. Easements would be needed for access to the well from Montana Avenue through the DNRC parcel and also through private land for a new transmission main to the Lariat connection point(s). An easement or a land purchase would be required for the well, pump house and tank site. An acre of land is typically sufficient for well sites.

Andy Burgoyne, Trust Land Program Manager (Central Land Office) of Montana DNRC was contacted for input on this alternative and provided the following feedback: (See Appendix V)

- *"Before accepting or approving any application or proposal, the proponent would be required to demonstrate they have obtained permits and/or authorization from all the appropriate agencies or necessary parties regarding the project.*
- *The proponent may apply for a Land Use License for temporary access for construction purposes, but the decision to grant the license is dependent on favorable unit review which includes MEPA (environmental analysis). As such, a decision to grant the license regarding the project is not a certainty.*
- *The DNRC does not issue easements for access to entities that do not hold fee title to the land served by the easement, nor do we grant access easements for the intended purpose disclosed.*
- *The application for a Land Use License could also include access for maintenance and operation, but again favorable unit review is necessary and not guaranteed. Also, this license would be on a 10-year license term. Renewals would be subject to the discretion of DNRC and are also not guaranteed.*
- *Utility companies could apply for an easement corridor, typically less than 20-foot in width, for the sole purpose of laying buried utilities to the proposed facility, however this requires unit review, MEPA, and Montana Board of Land Commissioners approval. This is also not guaranteed. Valuation for an easement is based on the full fair market land value (per acre) x the acres to be encumbered.*

- *Valuation for the Land Use License would be derived through our valuation process. See below:*
    - *Application Fees Application fees are required per 36.2.1003 for all new licenses, renewing licenses, and assignments of licenses.*
    - *Application fees are non-refundable. $50 Application fee for navigable waterway use or $25 Application fee for all other uses*
    - *Minimum Fees-Under no circumstance should a license be issued for less than the minimum fee: $150 annual fee for navigable waterway use or $200 one-time fee - other uses*
    - *Fee structure methods include: Land Value Rate, Market Base Rate, Fee Schedule or Percentage of Gross determination.*
    - *If it is determined there is a competitive market for the land use, a competitive bid process can be used to capture the full market value of the land."*

For this alternative evaluation, it is assumed that a buried storage tank constructed of fiberglass would be installed near the well house. Past project planning documents have demonstrated that this storage tank type and configuration is the most cost-effective for small tanks and therefore is a reasonable assumption at this stage in the planning process for the PER. For comparison, in the previously completed Bynum Water PER (completed in 2006), three 20,000-gallon water storage tank alternatives were considered. A buried concrete tank, buried fiberglass tank and an above-grade steel tank were compared. The buried fiberglass tank had the lowest capital and O&M cost and, therefore the lowest present worth cost. The ranking process conducted in Bynum selected the buried fiberglass tank. The Bynum alternatives analysis is presented in Appendix W for reference and, while a few years old, presents a good comparison of the relative costs of these tank alternatives. Past projects at Lewis and Clark Caverns and Bynum and discussions with suppliers support a construction cost of $40,000 - $50,000 for a buried fiberglass tank built to NSF drinking water standards. Other costs related to the tank, such as electrical, mobilization, appurtenances, site work, land acquisition, engineering, etc. are integrated into the overall cost estimate presented later in this section. Other storage tank alternatives (concrete, fiberglass, etc.) can be considered in more detail in the design phase of the project.

A pump house building housing hydropneumatic tanks, well and distribution valving and piping, and the control system is proposed. The building would be sized to provide space for potential future disinfection equipment. A pitless adapter unit will be provided for the well along with the

necessary piping from the well to the well house building. The cost for these features are included in the piping and appurtenances item of the cost estimate table.

Considering that the District's water usage would not be increased and the water would be used from the nearby aquifer, a Redundant Well Construction Notice (Form 635) typically needs to be filed if the project meets the requirements listed under MCA 85-2-402. However, according to Russ Gates, water resource specialist with DNRC:

> *Based on the definition for public water supply in 75-6-102(14), the redundant well form would only work for the drinking water supply wells. 85-2-402(16) also states that the redundant well must be required by a state or federal agency, and that only one well may be used at a time, so I'm not sure if the scenarios you described would qualify. If the proposed well does not meet the requirements for a redundant well, they would have to apply for a change to add an additional point of diversion. The primary application would be a Form 606, plus the relevant addendums as required. The change process does not allow for any expansion of a water right, such as increased flow rate or volume, but it sounds like that is not anticipated from your description. (Appendix V)*

Design Criteria

For a new irrigation only well, DEQ review and approval is not required. However, all water system improvements applicable to a new potable well will comply with those requirements set forth in Circular DEQ 1. In particular, these design standards require the wells and the separate distribution system pumps (from storage tank) be designed so that the maximum day demand can be supplied with the largest pump out of service. All proposed improvements for potable use would receive MDEQ review and approval prior to the commencement of any construction activity.

A deviation will be required for Alt. S-5B with cross a connection between the irrigation/potable system. Cross connections are addressed in DEQ-1 Section 8.10 (Cross Connections and Interconnections). 8.10.1 states: *"Unprotected cross-connections are not allowed between the distribution system and any pipes, pumps, hydrants, or tanks in which unsafe water or other contaminating materials may be discharged or drawn into the system. Cross-connections must be eliminated in conformity with ARM Title 17, chapter 38, subchapter 3."* Section 8.10.3 states: *"The approval of MDEQ must be obtained for interconnections".* The deviation may be obtained

for the cross connections by the use of DEQ approved backflow device that is well maintained and also verification of the quality of the irrigation system is very similar to the potable system

Map

Figure 5-1 provides a conceptual layout of the proposed north well irrigation only well alternative and Figure 5-2 presents the layout for a new north irrigation well that can act as a backup potable well. Both options show the use of a buried underground storage tank.

Environmental impacts

There are no expected impacts on floodplains, wetlands, other important land resources, endangered species, or historic properties that would result from the implementation of this alternative. This alternative would not generate residuals or wastes that would have to be managed.

Land Requirements

The new water supply well would be constructed at a new site, and additional land acquisition or easements would be required. Easements will be needed through the DNRC parcel for well access and through a private lot for a new transmission main. Land acquisition costs are included in the cost estimates. The process for obtaining easements and access through the DNRC property is described above.

Potential Construction Problems

It is anticipated that the new well would be drilled in fractured shale aquifer. The depth of most of the other wells in the area varies from 100 ft to 140 ft and most wells are successful with yields less than 25 gpm. (See GWIC and well log data in Appendix F) This aquifer formation is somewhat discontinuous and there have been a few drilling attempts in the area (specifically for the nearby North Star Development) that resulted in dry holes. A couple of wells that are completed to over 300-ft. in depth as those drilled in the North Start Subdivision produced more quantity. To address this concern, the budget estimate assumes test well work.

Sustainability Considerations

Construction of new water supply wells is considered a sustainable utility management practice that would aid in creating a resilient utility and redundant water supply for the community. The

WELL ACCESS ROAD (EASEMENT NEEDED THROUGH DNRC)

DISTRICT BOUNDARY (TYP.)

NEW WELL AND PUMP HOUSE (SEE NOTE 1)

NEW BURIED STORAGE TANK

HORIZONTAL DIRECTION DRILL NEW MAIN AND CONNECT INTO EXISTING IRRIGATION MAIN

LARIAT ROAD

RANCHVIEW ROAD

MONTANA AVE

I-15

NOTES:

1. WELL DOES NOT NEED TO MEET DEQ STANDARDS (IRRIGATION). EASEMENT OR PRVT. LAND ACQUISITION NEEDED.

LEGEND

- W — POTABLE WATER
- NPW — IRRIGATION SYSTEM
- NPW — PROPOSED IRRIGATION
- W — IRRIGATION WELLS

0 75 150
SCALE IN FEET

NORTH

GreatWest engineering®

Figure 5-1
Alternative S-5A:
New North Irrigation Well

RANCHVIEW ESTATES WATER PER

F:\1-19148-Ranchview Estates Water District\CADD 1-19148\Exhibits\1-19148-Figure 5-1 Alternative S-5A.dwg



NOTES:

1. WELL NEEDS TO MEET DEQ STANDARDS (POTABLE).
2. EASEMENT OR PRVT. LAND ACQUISITION NEEDED.

LEGEND

- W — POTABLE WATER
- NPW — IRRIGATION SYSTEM
- W — PROPOSED POTABLE WATER
- (W) — POTABLE WELLS

NORTH

0 75 150
SCALE IN FEET

GreatWest engineering®

Figure 5-2
Alternative S-5B:
New North Irrigation Well
(Backup Potable)

RANCHVIEW ESTATES WATER PER

F:\1-19148-Ranchview Estates Water District\CADD 1-19148\Exhibits\1-19148-Figure 5-2 Alternative S-5B.dwg

existing wells on the south side are all within a close proximity to the pump house, and should the local aquifer be compromised for water quality or quantity, for some unforeseen reason, a backup well will be able to help maintain service.

Water and Energy Efficiency

The proposed system will add distribution storage tanks and distribution pumps which would increase the overall power demand due to the need to pump the water twice. Energy costs for pumping and for a new building will be additive to the system.

Green Infrastructure

Stormwater management during the project will include temporary erosion and sediment control measures, including the installation and maintenance of temporary structural control measures to reduce or eliminate the erosion of soils and transport of sediment offsite as a result of construction activities. The overall foot-print impacted is very small (1-2 acres).

Other Considerations

The construction of a well and utilizing distribution storage tanks with a pressure control and VFD controlled pumps is a commonly used water supply technology for small communities, second only to the wide use of hydropneumatic tanks for community and private homes. Accordingly, local rural suppliers are familiar with such systems and supplies are readily available. In addition, rural service providers are also familiar with such systems and readily available to assist District operators. Supplies and services a distribution tank would be readily available, but to a lesser degree than other components of the proposed system. Similarly, state, federal and private agencies provide an abundance of training on well water supply technologies.

Cost Estimates

Table 5-1 presents an estimated opinion of probable cost for constructing a new north irrigation only well with the associated distribution storage tank, and distribution pump. Table 5-2 addresses costs related to the additional operation and maintenance (O&M) of the improvements. Table 5-3 presents the estimated opinion of probable cost for constructing a new north irrigation well with potable backup capability and Table 5-4 shows the O&M costs for

this option. The estimates are derived with the consideration of past bid tabulations for similar wells in the area. (See Appendix X)

Table 5-1 - Opinion of Probable Cost Alternative S-5A: New North Irrigation Well

Opinion of Probable Cost Ranchview Water System Improvements Alternative: S5A New North Irrigation Well					
#	**BID ITEM**	**QTY**	**UNITS**	**UNIT PRICE [1]**	**TOTAL**
1	Drill Well	120	LF	$ 75.00	$ 9,000
2	Temporary Surface Casing	1	EA	$ 10,000.00	$ 10,000
3	Steel Well Casing	110	LF	$ 35.00	$ 3,850
4	Telescopic Well Screen and Riser Pipe	40	LF	$ 50.00	$ 2,000
5	Well Development/Well Pump Test/Aquifer Test	4	HR	$ 400.00	$ 1,600
6	Well Completion	1	EA	$ 25,000.00	$ 25,000
7	New Pumphouse Building	1	LS	$ 30,000.00	$ 30,000
8	Pumphouse Electrical & Controls	1	LS	$ 10,000.00	$ 10,000
9	Site Work and Access Road	1	LS	$ 5,000.00	$ 5,000
10	Mechanical Piping & Fittings	1	LS	$ 15,000.00	$ 15,000
11	4" Transmission Main (Open Cut)	75	LF	$ 50.00	$ 3,750
12	Buried Storage Tank w/ pump	1	LS	$ 40,000.00	$ 40,000
13	Connection to Existing Main	1	LS	$ 5,000.00	$ 5,000
14	Horizontal Directional Drill HDPE Transmission Main Through Private Lot	180	LF	$ 150.00	$ 27,000
15	3-Phase Power Extension	1	LS	$ 30,000.00	$ 30,000
16	DNRC Access Easement (10'x 1300')	1	LS	$ 3,000.00	$ 3,000
17	Transmission Main Easement (15'x180')	1	LS	$ 1,000.00	$ 1,000
18	Well Site Land Acquisition (1 Acre)	1	LS	$ 11,000.00	$ 11,000
	Direct Construction Subtotal				**$ 232,000**
	Mobilization		10%		$ 23,000
	Contingency		10%		$ 23,000
	Construction Subtotal				**$ 278,000**
	Engineering		10%		$ 28,000
	Test Well and Hydrogeologic Evaluation				$ 10,000
	Legal & Administrative		2%		$ 6,000
	TOTAL				**$ 322,000**

1 Estimated unit costs are based upon estimates from suppliers and bid tabs for similar projects throughout Montana.

Table 5-2 - Opinion of Probable Annual Operation & Maintenance Costs-Alternative S-5A: New North Irrigation Well

Opinion Of Probable Annual Operation & Maintenance Costs Ranchview System Improvements Alternative :S5A New North Irrigation Well					
#	**ITEM**	**QTY**	**UNITS**	**UNIT PRICE**	**TOTAL**
1	Labor	20	HR	$ 50.00	$ 1,000.00
2	Spare Parts/Repair/Maintenance	1	LS	$ 1,000.00	$ 1,000.00
3	Administration/Office Supplies	1	LS	$ 250.00	$ 250.00
4	Laboratory Testing Fees	0	LS	$ -	$ -
5	Power	19,710	KW-HR	$ 0.12	$ 2,365.20
6	Office Expenses/Training	1	LS	$ 200.00	$ 200.00
7	Reserve	1	LS	$ 500.00	$ 500.00
	TOTAL				**$ 5,300.00**

Table 5-3 - Opinion of Probable Cost Alternative S-5B: New North Irrigation Well (Backup Potable)

Opinion of Probable Cost Ranchview Water System Improvements Alternative :S5B New North Irrigation Well (Backup Potable Well)					
#	**BID ITEM**	**QTY**	**UNITS**	**UNIT PRICE [1]**	**TOTAL**
1	Drill Well	120	LF	$ 75.00	$ 9,000
2	Temporary Surface Casing	1	EA	$ 10,000.00	$ 10,000
3	Steel Well Casing	110	LF	$ 35.00	$ 3,850
4	Telescopic Well Screen and Riser Pipe	40	LF	$ 50.00	$ 2,000
5	Well Development/Well Pump Test/Aquifer Test	30	HR	$ 400.00	$ 12,000
6	Well Completion	1	EA	$ 25,000.00	$ 25,000
7	New Pumphouse Building	1	LS	$ 30,000.00	$ 30,000
8	Pumphouse Electrical & Controls	1	LS	$ 10,000.00	$ 10,000
9	Site Work and Access Road	1	LS	$ 5,000.00	$ 5,000
10	Mechanical Piping & Fittings	1	LS	$ 15,000.00	$ 15,000
11	4" Transmission Main (Open Cut)	75	LF	$ 50.00	$ 3,750
12	Buried Storage Tank w/ submersible pump	1	LS	$ 40,000.00	$ 40,000
13	Connection to Existing Mains	1	LS	$ 8,000.00	$ 8,000
14	Backflow Assembly & Vault	1	LS	$ 12,000.00	$ 12,000
15	Horizontal Directional Drill Transmission Through Private Lot HDPE	180	LF	$ 150.00	$ 27,000
16	3-Phase Power Extension	1	LS	$ 30,000.00	$ 30,000
16	DNRC Access Easement (10'x 1300')	1	LS	$ 3,000.00	$ 3,000
17	Transmission Main Easement (15'x180')	1	LS	$ 1,000.00	$ 1,000
18	Well Site Land Acquisition (1 Acre)	1	LS	$ 11,000.00	$ 11,000
	Direct Construction Subtotal				**$ 258,000**
	Mobilization		10%		$ 26,000
	Contingency		10%		$ 26,000
	Construction Subtotal				**$ 310,000**
	Engineering		15%		$ 47,000
	Test Well and Hydrogeologic Evaluation				$ 10,000
	Legal & Administrative		5%		$ 16,000
	TOTAL				**$ 383,000**

1 Estimated unit costs are based upon estimates from suppliers and bid tabs for similar projects throughout Montana.

Table 5-4 - Opinion of Probable Annual Operation & Maintenance Costs-Alternative S-5B: New North Irrigation Well (Backup Potable)

Opinion of Probable Annual Operation & Maintenance Costs Ranchview Water System Improvements					
Alternative 5B: New North Irrigation Well (Backup Potable)					
#	ITEM	QTY	UNITS	UNIT PRICE	TOTAL
1	Labor	20	HR	$ 50.00	$ 1,000.00
2	Spare Parts/Repair/Maintenance	1	LS	$ 1,000.00	$ 1,000.00
3	Administration/Office Supplies	1	LS	$ 250.00	$ 300.00
4	Laboratory Testing Fees	1	LS	$ 300.00	$ 300.00
5	Power	19,710	KW-HR	$ 0.12	$ 2,400.00
6	Office Expenses/Training	1	LS	$ 200.00	$ 200.00
7	Reserve	1	LS	$ 500.00	$ 500.00
	TOTAL				**$ 5,700.00**

5.2.6 Alt. S-6: Backup Generator

Description

This alternative includes furnishing and installing a new backup generator for the water system. The generator can be sized for either just the potable system or both the potable and irrigation system power requirements. The subalternates considered include:

- S-6A: Backup Generator for Potable System - Furnishing and installing a generator and transfer switch sized for the two potable pumps which would require an estimated 35 kW generator.
- S-6B: Backup Generator for Potable and Irrigation System. This includes the furnishing and installing a generator and transfer switch sized for all potable and irrigation pumps, which would require an estimated 60 kW generator.

These options are considered “either/or” whereas the larger generator would be sized to handle the entire building and all pumps. Backup generators can be natural gas, diesel or propane driven and the costs are very similar if a natural gas service is nearby.

Design Criteria

All electrical work will comply DEQ-1 Section 6.6.6-Standby Power, and the National Electric Code (NEC) requirements.

Map

The work will take place in the existing pump house entirely as shown on Figure 3-1.

Environmental impacts

Little to no impacts will occur as all the work will take place immediately adjacent to the building.

Land Requirements

No additional land is required.

Potential Construction Problems

Construction problems are not anticipated if the electrical work is done by a qualified licensed and experienced electrical contractor.

Sustainability Considerations

The installation of a backup generator for a completely pumped water system is considered a sustainable infrastructure investment to mitigate power failures that will result in cessation of essential water service.

Cost Estimates

The estimated budgetary costs are $29,000 and $42,000 for Alternatives S-6A and S-6B, respectively, based on a quote from a local electrical contractor. A detailed quote is referenced in Appendix T.

An additional cost for a new natural gas service contract would be needed from Northwestern Energy if this fuel option is pursued and is found to be available.

5.3 Distribution System Alternatives

5.3.1 Alt. D-1: Reconfigure Plumbing for Cross Connected Piping

Description

This alternative would include the work of a plumber to reconfigure the potable/irrigation piping cross-connections at each individual house piping entrance. The first step for this alternative is to identify the location and quantity of each cross-connection. Each individual setup and the associated plumbing work and fee may vary. The District has agreed to cover the cost of each reconnection.

Design Criteria

The work on the water systems within the homes must comply with the latest adopted Plumbing Code and DEQ-1 standards.

Map

The location of each affected home can be determined by temporarily shutting off the irrigation system and receiving notifications from owners. The identification of the affected homes relies on the owners being home. A notice was sent to each residence for a planned 2-hour shut-down which was completed on October 10, 2020. (See Appendix J for a copy of the letter) The District did not receive any calls yet and will attempt a longer-duration shut down in the future. There is the possibility that there are no cross-connections, yet it is worth the efforts of the District to fully vet this out in the system.

Environmental impacts

No environmental impacts are anticipated given the work is anticipated to be completed indoors.

Land Requirements

No land acquisition or easements are needed.

Potential Construction Problems

No problems are identified at this time, considering that the service piping is assumed to be accessible in each home. The pipe can be accessed without the need to uncover buried piping or impact the yards or other surfaces.

Sustainability Considerations

Addressing cross-connections will help to create a dependable and safe water system. Users potentially irrigating from the potable system will create additional demands. This will reduce pressures and the level of service for a system that it was not designed to use. Fixing this issue will also reduce demands on the potable pumps.

Cost Estimates

For planning purposes, the estimated plumber cost is $500 per each connection. The final costs will be determined by site specific conditions and a quote from a plumber. The fees will be covered by the District.

6.0 SELECTION OF AN ALTERNATIVE

Typically, this section of a PER would examine advantages and disadvantages of each of the alternatives in terms of life cycle costs, operational and maintenance considerations, permitting concerns, social impacts, environmental impacts, and other non-monetary considerations. A comparative analysis between alternatives would then be completed and a preferred alternative selected to address the deficiencies identified in each part of the water system. However, with the alternatives narrowed after the screening process, the available water system improvement options are simply to either make the improvements or not. In summary, the alternatives described above, with the exception of the two new north well alternatives, are stand-alone, and do not warrant a detailed comparative analysis. The new north well alternatives are presented to the District individually for information and for consideration of a future project.

The feedback received from the District work session meeting held on September 9, 2020, and public hearing on November 9, 2020 indicated the approval of the proposed improvement projects as prioritized in Table 1-1.

6.1 Life Cycle Cost Analysis

The life cycle costs for the alternatives are completed for this PER. To complete the life cycle cost analysis, the anticipated annual increase to O&M costs, and estimated salvage value of any improvements are converted to present day dollars using the “real” discount rate of 3% for 20 years. The net present value (NPV) is determined for each alternative by adding the estimated capital cost and present worth of the increased O&M, and then subtracting the present worth of the calculated salvage value.

Table 6-1 summarizes the life cycle cost analysis of the alternatives, where applicable. Each alternative is stand-alone, and the costs shown are for an economic reference, and not for comparison. The majority of the supply improvements are centered at the pump house and are per quoted or estimated budgetary fees that do not warrant a detailed analysis of the O&M and salvage value estimates.

Table 6-1 - Life Cycle Cost Analysis

Life Cycle Cost Analysis						
Alternative	**Capital Cost**	**Annual Increase to O&M**	**Present Worth of O&M Increase**	**20-year Salvage Value**	**Present Worth of Salvage**	**Net Present Value**
Supply						
S-1: Well No. Pump	$ 5,000	$ NA	$ NA	$ NA	$ NA	**$ 5,000**
S-2: Replace Potable Electrical/Controls	$ 7,500	$ NA	$ NA	$ NA	$ NA	**$ 7,500**
S-3: Replace Flow Meters	$ 5,500	$ NA	$ NA	$ NA	$ NA	**$ 5,500**
S:4 Replace Pump House Pipe and Fittings	$ 18,000	$ NA	$ NA	$ NA	$ NA	**$ 18,000**
S-5A: Install New North Well (Irrigation Only)	$ 322,000	$ 5,300	$ 78,900	$ 95,000	$ 69,200	**$ 331,700**
S-5B: Install New North Well (Irrigation, Potable Backup)	$ 383,000	$ 5,600	$ 83,400	$ 105,000	$ 76,500	**$ 389,900**
S:6A Backup Generator (Potable Pumps)	$ 29,000	$ NA	$ NA	$ NA	$ NA	**$ 29,000**
S:6B Backup Generator (Building, Potable Pumps and Irrigation Pumps)	$ 42,000	$ NA	$ NA	$ NA	$ NA	**$ 42,000**
Distribution						
D-1: Reconfigure Cross-Connected Plumbing	$ 1,500	$ NA	$ NA	$ NA	$ NA	**$ 1,500**

7.0 PROPOSED PROJECT

Chapters 5 and 6 provided an analysis of all feasible alternatives and the selection of the preferred alternatives. The following subsections are presented to provide a more detailed discussion of the alternatives in consolidated project description.

7.1 Preliminary Project Design

7.1.1 Water Supply

The supply alternatives considered for the project as outlined in earlier sections include the following alternatives which are considered to be completed in the near future timeframe (i.e. 2020/2021):

- Alt. S-1: Installing a new well pump in well No. 2 that will allow for a higher production rate at the potable water service pressures (55 to 60 psi). Records show that a new well pump has been installed in well No. 1 in recent history, but not in well No. 2. The new well pump should at least meet or exceed the hydraulic conditions of the new well No. 1 pump. The District is also considering contracting with a local drilling company to pull the pump and troubleshoot the flow rates.

- Alt. S-2: Installing a more user-friendly pump operation system with lead/lag and alternating control operation. This also includes installing a voltage surge and amperage overload suppression system. This option includes installing new pump potable pump controllers with VFD operation. The District will not need to depend on the pressure tanks and the pressure “window” can be maintained at a more constant pressure. Overall, the project would include the installation of two new VFDs; one for each potable pump, each with adjustable and programmable set points, and a new master control panel would be installed. The existing outdated panels will also be removed from the east facing wall.

- Alt. S-3: This alternative includes replacing the existing potable and irrigation service flow meters in the pump house with new magnetic flow meters. The meter installation will require some minor plumbing work to replace the PVC piping and install the meters with the appropriate manufacturer recommended upstream and downstream straight-run

pipe lengths. The new meters will require a new single phase power connection to the flow meter display panels.

The following alternatives are considered lower priorities and saved for future projects, and as District funding allows:

- Alt. S-4: Replace Pump House Pipe and Fittings
- Alt. S-5: New North Well
- Alt. S-6: Backup Generator

The estimated costs will need to be updated for inflation for construction at a future installation date.

7.1.2 Distribution System

This alternative would include the work of a plumber to swap the potable/irrigation piping cross-connections at each individual house entrance. As discussed earlier, the identification of the affected homes relies on the owners being home. A notice was sent to each residence for a planned 2-hour shut-down which was completed on October 10, 2020. The District did not receive any calls, yet will attempt a longer-duration shut down in the future.

7.2 Project Schedule

All work described above, with the exception of Alternatives S-4, S-5 and S-6, is planned to be installed in the Fall/Winter of 2020/2021 timeframe.

7.3 Permit Requirements

Alternative S-5: New North Well, would require notification to DNRC for updating the water rights for the completion of new/redundant water supply well. Only Alternative S-5B: New North Irrigation Well (Backup Potable) would require DEQ review and approval.

Completion of plumbing work for re-plumbing the cross-connections would require the use of a licensed plumber and be completed to the latest plumbing codes. All other alternatives are centered at the pump house and would not require special permits.

7.3.1 Water and Energy Efficiency

A new potable well pump would be of a similar horsepower size and hydraulics to well pump No. 1. However, the new pump replacement would likely be more efficient than the existing pump.

Installing new flow meters will assist the system in tracking usages, leaks, peak flows, and will lead to better management and conservation of the system's groundwater supply. The accurate measurement of the main water supply flows can assist the system in tracking typical and non-typical water usage, leaks, peak flows, and lead to better management and conservation of the system's groundwater supply.

Installing new controls with proper alternation and lead/lag operation will help the system balance the pump wear between the two potable pumps. The use of VFDs will reduce electrical demands as the pumps will be able operate at less than 100% speed (Hertz/Frequency) much of the time.

If and when the District moves forward with completing a new north well, the proposed system will likely need to add distribution storage tanks and secondary distribution pumps. This would increase the overall power demand due to the need to pump the water twice. Energy costs for pumping and also for a new building will be additive to the current system.

7.3.2 Green Infrastructure

For work limited to the pump house building this is not applicable. The overall foot-print impacted is very small and the work is very temporary.

If and when a new north well, transmission piping and access road improvements are completed, stormwater management during the project will include temporary erosion and sediment control measures, including the installation and maintenance of temporary structural control measures to reduce or eliminate the erosion of soils and transport of sediment offsite as a result of construction activities. The overall foot-print impacted is very small (1-2 acres or less).

7.4 Total Project Cost Estimate

Detailed cost estimates for Alternative S-5A and S-5B are found in Section 5.2.5.

A project priority list with a summary of the estimated budgetary costs has been completed for appropriate capital improvement planning and budgeting purposes. The District was presented a list of potential upgrades at their board meeting held in September 2020, and prioritized the projects accordingly.

Table 7-1 presents a prioritized list of recommended improvements with the assigned priority for each.

Table 7-1 - Recommended Improvement Program

Ranchview Water System Draft Improvement Program		
PRIORITY	**ALTERNATIVE/DESCRIPTION**	**ESTIMATED CAPITAL COST (Nearest 100)**
1	D-1: Reconnect Cross Connected Water Lines	$500/each ($1,500 total)
2	S-1: Install New Well Pump #2	$5,000
3	S-2A: Upgrade Potable System Pump Controls & Electrical (w/ VFDs)	$5,000
4	S-2C: Pump House Surge/Overload Protection (50,000 Amp Unit)	$2,500
5	S-3A: Replace Potable Flow Meter	$2,500
	S-3B: Replace Irrigation Flow Meter	$3,000
6	S-4A: Replace Irrigation Pump House Piping/Fittings	$8,000
	S-4B: Replace Potable Pump House Piping/Fittings	$10,000
7	S-6A: Potable Pump Backup Generator (35 kW)	$29,000
	S-6B: Potable plus Irrigation Backup Generator (60 kW)	$42,000
8	S-5A: New North Irrigation Well Only	$322,000
	S-5b: New North Irrigation Well (Backup Potable)	$383,000
9	D-2: Upsize 3” Irrigation Main to 6” (South Bndy to Lariat)	$207,400

As described in Table 1-1, given the comments received at the Public Hearing on November 9, 2020, a cost to upsize the existing 3-inch irrigation pipe from the south boundary to Lariat is provided for District reference. (See Appendix Z)

7.5 Annual Operating Budget

Table 7-2 presents the District’s estimated annual operating budget accounting for the additional costs and loan debt service requirements included with a potential new North Well project that

would be financed with an SRF loan and constructed to DEQ-1 standards. All other projects would not result in additional O&M cost or debt service. A preliminary loan analysis indicates that the water rates would not have to be increased if the District acquired a $233,000 SRF or less loan with a corresponding $15,000+/- annual loan payment, and contributed $150,000 of District reserves to the project.

Table 7-2 - Estimated Annual Water Operating Budget (After A Well Project)

Projected Water System Annual Operating Budget	
Revenues	**Amount Budgeted**
Estimated Revenues	$57,800
Total Revenues	**$57,800**
Expenses	**Amount Budgeted**
Estimated New Loan Payments	$ 15,300
Existing Debt Payments	None
Existing Water System O&M Costs	$ 35,000
Additional Operator Time	$ 1,000
Spare Parts & Reserve	$ 1,500
Admin, Lab, Office	$ 800
Additional Pump and Building Power	$ 2,400
Total Expenses	**$56,000**

7.5.1 Income

Income for the District is simply acquired from the $45/mo. water utility base rate. The District does not have meters to charge usage.

7.5.2 Annual O&M Costs

An increase to annual operation and maintenance costs would be anticipated for a new Well building, pump, equipment, and chemical systems. Annual O&M costs would not increase for other such items and could possibly decrease with potentially more efficient equipment and also protective electrical equipment. Additional O&M costs due to the proposed improvements would be approximately $5,700. The total new water system O&M expenses annual O&M costs would be about $56,000 and within the operating budget if a new well project is completed.

7.5.3 Debt Repayments

The District does not currently owe on any outstanding loans for the water system.

The potential funding scenario for a new Irrigation (backup potable) well project would require a $233,000 loan, with a 20-year term loan through SRF. The estimated annual debt service for this loan would be approximately $15,300.

7.5.4 Reserves

Debt Service Reserve

Recommended funding scenarios would likely include low-interest loans from the Montana State Revolving Fund (SRF). SRF requires a 10% reserve be maintained on loan funds

Short-Lived Asset Reserve

Short-lived assets were included as part of the estimated O&M costs. Therefore, no additional reserves are required to be included in the project costs.

8.0 CONCLUSIONS AND RECOMMENDATIONS

8.1 Funding

8.1.1 Funding Sources

The following sections provide a brief description of the potential funding sources and whether or not the District would be eligible for those funds.

Treasure State Endowment Program (TSEP)

TSEP is a state funded grant program, which is administered by the Montana Department of Commerce (MDOC). TSEP provides financial assistance to local governments for infrastructure improvements. Grants can be obtained from TSEP for up to $500,000 if the projected user rates are less than 125% of the target rate, for up to $625,000 if projected user rates are between 125% and 150% of the target rate, and for up to $750,000 if the projected user rates are over 150% of the target rate. TSEP grant recipients are required to match the grant dollar for dollar, but the match may come from a variety of sources including other grants, loans, or cash contributions.

The current water rate at $45/mo. is less than the target rate at $65.56 for the County. The District would need to raise rates to at least the target rate to be even considered eligible for TSEP funding. In addition, the project would need to be a competitive application that demonstrates a high health and safety need.

Renewable Resource Grant and Loan Program (RRGL)

RRGL is a state program that is funded through interest accrues on the Resource Indemnity Trust Fund and the sale or Coal Severance Tax Bonds and is administered by the Montana Department of Natural Resources and Conservation (DNRC). The primary purpose of the RRGL is to enhance Montana's renewable resources. For public facilities projects that conserve, manage, develop, or protect renewable resources, grants of up $125,000 are available.

The District is eligible for a DNRC-RRGL grant and the project falls within the criteria of developing a water source. However, applications in recent years have become extremely competitive and are also ranked against a long list of sewer and irrigation district projects.

Community Development Block Grant (CDBG)

CDBG is a federally funded program that is also administered by the Montana Department of Commerce (MDOC). The primary purpose of CDBG funds is to benefit low to moderate income (LMI) families. Hence, a municipality must have an LMI of 51% or greater. This is usually determined by the current Census. However, under certain circumstances, the MDOC may allow an income survey to be completed (such as there have been major economic changes since the Census or if a community is only slightly under the required LMI percentage).

The CDBG grant funds can be applied for in an amount of up to $450,000 with a limit of $15,000 per LMI household, so a community needs 30 LMI households to apply for the maximum grant funds. The use of CDBG funds requires a 25% local match that can be provided through cash funds, loans, or a combination thereof.

Using the County LMI data, the District does not qualify for a CDBG grant.

State Revolving Fund (SRF)

The SRF program is administered by the Montana Department of Environmental Quality. The SRF program provides low-interest loan funds for both water and wastewater projects through the Drinking Water State Revolving Fund (DWSRF) and the Water Pollution Control State Revolving Fund (WPCSRF), respectively. Current loan terms include an interest rate of 2.5% for a 20-year period. The SRF program has also provided grants referred to as “loan principal forgiveness” on some projects in the last couple of years. The amount of loan forgiveness varies year-to-year and may not be granted depending on the availability of state and federal funds. The amount of loan forgiveness is also based on the financial need of the community determined by SRF. Recent DWSRF projects have received a 50% loan forgiveness for communities that have a demonstrated financial and project implementation need.

This District is eligible for an SRF loan for all work pertaining to their potable system. All projects planning to use SRF funds must be on the SRF Intended Use Plan (IUP), which is found at http://deq.mt.gov/Water/SurfaceWater/DesignApprovals. To get a project on the IUP, a SRF priority list survey form must be submitted. Completing the priority list does not obligate District to proceed with SRF funding. See Appendix V for a copy of the latest priority list form.

USDA Rural Development (RD)

RD provides grant and loan funding to municipalities for water and wastewater projects that improve the quality of life and promote economic development in rural America. Municipalities with a population of less than 10,000 are eligible to apply, though; priority is given to those with a population of less than 5,500.

Grant eligibility and loan interest rates are based on the community's median household income (MHI) and user rates. If the area to be served has a MHI of $38,205 or lower and the project is necessary to alleviate a health and/or sanitation concern, up to 75% of the project costs are grant eligible. Up to 45% of the project costs are grant eligible if the planning area has an MHI between $38,205 and $47,757. The loan rates at the time of this study are 2.125% if the MHI is above $47,757, 1.75% intermediate rate if the MHI is between $38,305 and $47,757, and 1.25% for poverty rate if the MHI is under $38,205. All loans are for a 40-year term.

The District would only qualify for the 2.125% market loan. While this market rate is more favorable than an SRF loan, RD program requirements are generally more stringent and the term is extended to 40-years.

Montana Coal Board

The Coal Board provides grant funding to municipalities to adequately provide for the expansion of public services or facilities needed as a direct consequence of coal development activities. There is no maximum limit to the amount the Coal Board can fund, but available funding is very limited so it can be difficult to receive any funds from the Coal Board, especially large sums.

The District is not eligible for this program.

Economic Development Administration (EDA)

EDA provides grant funding for projects that are demonstrated to be needed for the placement of a new business. The amount of grant is dependent on the number of jobs created.

The District is only residential and does not meet the requirements of this program

INTERCAP

INTERCAP provides loan funds at a low cost and with a variable interest rate to local governments. INTERCAP is administered by the Montana Board of Investments and is very flexible in the variety of funding, which would include both water and wastewater projects. There is no funding cycle (funds are always available), however, the maximum loan term is ten years. This program is often used for interim funding when RD funding is used.

The District is eligible, yet does not need an INTERCAP loan for this project.

8.1.2 Funding Strategy

Work sessions with the District Board and public indicate that the community is only interested in the most feasible alternative that provides the least impact to user. All projects, with the exception of a new north well project can be completed with available District reserve funds.

Table 8-1 shows the funding scenarios for an SRF funded project for Alternative S-5A: New North Irrigation Well (Potable Backup). Typically, to receive loan forgiveness, a demonstrated financial (i.e. high current water rates) and/or project need (i.e. DEQ orders, health and safety issues, etc.) is required. The District does not fit this criteria when constructing a redundant well. The District could move forward with an SRF loan funded project with the current $45/month rate by contributing up to $150,000 of District reserves in addition to a $233,000 SRF loan to fund a potential project.

Using the preferred Scenario #2 as a basis on Table 8-1, a detailed project budget is presented in Table 8-2 which provides an estimated breakdown of each of the individual budget line items. Note that bond counsel is required for implementing an SRF loan. Scenario #3 with SRF loan forgiveness is provided as a reference. However, the District would need to be at target rate ($65.56) or higher to pursue this option.

Table 8-1 - Funding Scenarios (Alternative S-5B: New North Well (Potable Backup))

Funding Options for Ranchview New North Well			
	SCENARIO #1	**SCENARIO #X2**	**SCENARIO #3**
ITEM	**SRF Loan (2.5% for 20 years)**	**SRF Loan (2.5% for 20 years) w/ District $150k Contribution**	**SRF (2.5% for 20 years) w/ 50% loan principle forgiveness**
Alternative S-5B: New North Irrigation Well (Potable Backup)	$383,000	$383,000	$383,000
Rounded Total	**$383,000**	**$383,000**	**$383,000**
TSEP Grant	$0	$0	$0
DNRC Grant	$0	$0	$0
Local District Contribution	$0	$150,000	$0
RD Grant	$0	$0	$0
SRF Principal Forgiveness	$0	$0	$191,500
SRF Loan	$383,000	$233,000	$191,500
RD Loan	$0	$0	$0
Total Project Funds	**$383,000**	**$383,000**	**$383,000**
SRF Bond Reserve (1/2 year payment)	$12,294	$5,569	$6,147
Total Loan Amount	**$395,294**	**$238,569**	**$197,647**
Annual Loan Payment	$25,380	$15,320	$12,690
Total Loan Payments Over Life of Loan	$507,600	$306,400	$253,800
Total Interest Paid Over Life of Loan	**$112,306**	**$67,831**	**$56,153**
Annual Loan Coverage	$2,538	$1,532	$1,269
TOTAL ANNUAL CAPITAL DEBT SERVICE COST	**$27,918**	**$16,852**	**$13,959**
User Capital Cost/Month	**$21.74**	**$13.12**	**$10.87**
Current Annual O&M [1]	$35,000	$35,000	$35,000
Current Annual Debt Service	$0	$0	$0
Additional O&M Due To Project	$5,700	$5,700	$5,700
TOTAL ANNUAL O&M COSTS to USERS	**$40,700**	**$40,700**	**$40,700**
New User O&M Cost/Month	***$31.70***	***$31.70***	***$31.70***
USER COST/MONTH FOR PROJECT	**$53.44**	**$44.82**	**$42.57**
Existing Water System Cost/Month/EDU	$45.00	$45.00	$45.00
COST/MONTH INCREASE/EDU	**$8.44**	**-$0.18 (zero increase)**	**-$2.43 (zero increase)**
Total Proposed Water Cost/Month	$53.36	$44.82	$42.57
Water Only Target Rate	$65.56	$65.56	$65.56
PERCENT OF COMBINED TARGET RATE	**81.5%**	**68.4%**	**64.9%**

[1] Based on 107 water connections

Table 8-2 - Detailed Project Budget (Alternative S-5B Only)

Completed by: Great West Engineering	Completed for: Ranchview Water District		Date: Oct 2020
ADMINISTRATIVE/FINANCIAL COSTS	**Source: SRF Loan**	**Source: District Funds**	**Total**
Personnel Costs	$0	$0	$0
Office Costs	$200	$0	$200
Professional Services	$3,500	$3,500	$7,000
Legal Costs	$1,000	$0	$1,000
Travel & Training	$300	$0	$300
Bond Counsel and Related Costs	$7,500	$0	$7,500
TOTAL ADMINISTRATIVE/FINANCIAL/PRE-DEVELOPMENT COSTS	**$12,500**	**$3,500**	**$16,000**
ACTIVITY COSTS:			
Test Well & Hydrogeologic Evaluation	$0	$10,000	**$10,000**
Access Easements/Land	$0	$15,000	**$15,000**
Engineering Basic Services – Includes Design, Bidding, Construction Management, Post Construction	$20,000	$15,000	**$35,000**
Construction	$181,500	$87,500	**$269,000**
Inspection Services	$6,000	$6,000	**$12,000**
Contingency*	$13,000	$13,000	**$26,000**
TOTAL ACTIVITY COSTS	**$220,500**	**$146,500**	**$367,000**
TOTAL PROJECT COSTS	**$233,000**	**$150,000**	**$383,000**

8.2 Implementation

Before implementation of a publicly funded project, all funding must be secured. As noted earlier, the potential funding package for the District would use an SRF loan. SRF funding, unlike the state DNRC and TSEP grant programs which are tied to the biannual legislative sessions, is open cycle and an application can be completed at any time.

Table 8-3 shows an implementation schedule for the combined projects.

Table 8-3 - Implementation Schedule (Separate Projects)

Action	Date
Draft PER Complete	November 11, 2020
Public Hearing on Draft PER & EA	November 11, 2020
Resolutions to Adopt EA and PER	November 11, 2020
Complete/Submit Final PER to DNRC/TSEP for Draws	December, 2020
Complete Alternatives: S-1, S-2, S-3, D-1	November 2020 – February 2021
Apply for SRF Loan	May, 2021
The schedule below is only hypothetical to show the milestones for a potential well project	
Begin Design	June, 2021
Test Well/Hydrogeologic Study	July – August 2021
Design Basis Report/Cost Estimates to the District	August - September, 2021
Land Acquisition: Private and DNRC	September - October, 2021
Submit Design Plans and Specifications to MDEQ	November, 2021
MDEQ Review & Approval	December - January, 2022
Advertise and Open Bids	February, 2022
Finalize Financing and SRF Loan Close	March, 2022
Start Construction	April, 2022
Complete Well Project	July, 2022

9.0 REFERENCES

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Montana State Resolving Fund, Mark Smith, Drinking Water SRF, Email Correspondence regarding potential new well and program eligibility, marks@mt.gov

Department of Natural Resources Conservation, Russ Gates, Water Rights Specialist, Email Correspondence, RGates@mt.gov

Department of Natural Resources Conservation, Andy Burgoyne, Trust Land Program Manager, regarding land acquisition/easements, JBurgoyne@mt.gov

Nash Electric, Jon Nash, Owner/Operator, General Coordination and Quotes

Appendix A

Uniform Environmental Checklist

Montana Department of Commerce
Treasure State Endowment Program
Environmental Assessment

RANCHVIEW WATER SYSTEM PER

LEWIS AND CLARK COUNTY, MONTANA

Proposed Action:

The is considering the following alternatives to improve the water system.

- Alt. S-1: Replace well pump No. 2 – This includes furnishing and installing a completely new well pump and motor in the existing well No. 2.

- Alt. S-2: Replace potable pump system controls and upgrade the electrical system components. This would include installing a more user-friendly pump operation system with pump lead/lag and alternating control operation. This also includes the option of installing necessary power surge suppression. Install Surge Suppressor/Overload Protection System.

- Alt. S-3: Replace Flow Meters – This alternative includes replacing both the potable and irrigation in-line propeller flow meters with new flow meters. The new meter installation assumes the use of accurate magnetic flow meters that can report both instantaneous and totalized flows. This alternative also assumes the replacement of a nominal length of pipe on each side of the meter to achieve at least 2x and 3x pipe diameter straight-lengths as recommended by the manufacturers.

    - S-3A: Replace 2-inch Potable Meter.

    - S-3B: Replace 3-inch Irrigation Meter.

- Alt. S-4: Replace pump house piping and fittings. This alternative includes replacing both the potable and irrigation systems PVC piping with rigid metal piping such as galvanized piping and applying a protective coating. Flexible couplers can be added at each entry point into the building to accommodate ground movements without pipe shearing.

    - Alt. S-4A: Replace potable pump house piping.

    - Alt. S-4B: Replace irrigation pump house piping.

- Alt. S-5: Install a new well north of the subdivision to provide to maintain pressures and flows during peak usage periods. The well would also serve as a redundant backup for the irrigation system and/or the potable water system. The well depth is estimated to be 100 to 130 feet in depth in this location. The new well installation would include Drilling/Testing/Producing Wells/Riser pipes, Pumphouse building, directional drill a new main through a private lot, 3-phase power extension from Montana, Easements through DNRC and private lots, submersible pumps/electrical, and a buried storage tank w/ intermediate pumps.
- Alt. S-6: New Backup Generator – This alternative includes furnishing and installing a new backup generator for the water system. The generator can be sized for either the potable or the potable plus irrigation system generating capacity.
- Alt. D-1 – Reconnect Plumbing for Cross Connected Piping – This alternative includes the work of a licensed plumber to reverse and correct the potable/irrigation piping connections at each identified individual house entrance. The first step for this alternative is to identify each cross-connection. Each individual home plumbing entry configurations, and the associated plumbing work and fees for each home may vary. The District has opted to cover the costs of each reconnection.

As the Engineer that prepared the preliminary engineering report, I Matt Mudd, PE have reviewed the information presented in this checklist and believe that it accurately identifies the environmental resources in the area and the potential impacts that the project could have on those resources. In addition, the required state and federal agencies were provided with the required information about the project and requested to provide comments on the proposed public facility project. Their comments have been incorporated into and attached to the Preliminary Engineering Report.

Engineer's Signature: _____

ENVIRONMENTAL REVIEW CHECKLIST

NAME OF PROJECT:	Ranchview Water District
PROPOSED ACTION:	Pump House Improvements, Potential New North Well
LOCATION:	Lewis and Clark County, Montana

Key Letter:		
N: No Impact; **B:** Potentially Beneficial; **A:** Potentially Adverse; **P:** Approval/Permits Required; **M:** Mitigation Required		
PHYSICAL ENVIRONMENT		
KEY	1	**Soil Suitability, Topographic and/or Geologic Constraints (e.g., soil slump, steep slopes, subsidence, seismic activity)**
		Response and source of information:
N		There are no identified topographical or geological constraints. Prior to construction, a Geotechnical analysis by a professional geotechnical engineer will be undertaken to verify subsurface conditions at the new construction locations and determine specific recommendations for piping and/or building improvements that would require digging. - Matt Mudd P.E. - USDA National Cooperative Soil Survey
KEY	2	**Hazardous Facilities (e.g., power lines, EPA hazardous waste sites, acceptable distance from explosive and flammable hazards including chemical/petrochemical storage tanks, underground fuel storage tanks, and related facilities such as natural gas storage facilities & propane storage tanks)**
N		*Response and source of information:*
		The Montana DEQ Leaking Underground Tank database (http://deq.mt.gov/Land/lust/lustsites) does not list any tanks in the vicinity of the project areas. - Matt Mudd, P.E. - The Montana DEQ Leaking Underground Tank database
KEY	3	**Effects of Project on Surrounding Air Quality or Any Kind of Effects of Existing Air Quality on Project (e.g., dust, odors, emissions)**
N		*Response and source of information:*
		The only impacts on air quality may be temporary dust during excavation work. Reasonable efforts will be taken during construction to minimize these temporary impacts. - Matt Mudd, P.E.
KEY	4	**Groundwater Resources & Aquifers (e.g., quantity, quality, distribution, depth to groundwater, sole source aquifers)**

Key Letter:		
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M		Response and source of information:
		The groundwater depth is an average of 50-60 below ground surface (bgs) to the static water elevation. The aquifer on the south side of the subdivision is comprised of sand and gravel, and the aquifer on the north side is fractured shale. If a new well is pursued, then a test well and hydrogeologic study will be completed to understand the yield and impacts. Work at the pump house will not impact the aquifer on the south side. A new well pump in well no. 2 will not exceed the capacity of the well. - Matt Mudd, P.E. - Montana Groundwater Information Center (GWIC)
KEY	**5**	**Surface Water/Water Quality, Quantity & Distribution (e.g., streams, lakes, storm runoff, irrigation systems, canals)**
N		*Response and source of information:*
		No long term impacts to surface water will result from the project. - Matt Mudd, P.E.

Key Letter:		
N: No Impact; **B:** Potentially Beneficial; **A:** Potentially Adverse; **P:** Approval/Permits Required; **M:** Mitigation Required		
KEY	**6**	**Floodplains & Floodplain Management (Identify any floodplains within one mile of the boundary of the project.)**
N		*Response and source of information:*
		No floodplains are impacted with the project - Matt Mudd, P.E. - Lewis and Clark County Flood Plain Administrator - FEMA Flood Map Service Center
KEY	**7**	**Wetlands Protection (Identify any wetlands within one mile of the boundary of the project.)**
N		*Response and source of information:*
		No Wetlands are impacted with the project. - Matt Mudd, P.E. - USFWS National Wetlands Inventory

Key Letter:		
N: No Impact; **B:** Potentially Beneficial; **A:** Potentially Adverse; **P:** Approval/Permits Required; **M:** Mitigation Required		
KEY	8	**Agricultural Lands, Production, & Farmland Protection (e.g., grazing, forestry, cropland, prime or unique agricultural lands) (Identify any prime or important farm ground or forest lands within one mile of the boundary of the project.)**
N		*Response and source of information:*
		There are no areas in the project area classified as farmland of statewide or local importance and prime farmland if irrigated. - Matt Mudd, P.E. - USDA, NRCS Soil Survey
KEY	9	**Vegetation & Wildlife Species & Habitats, Including Fish and Sage Grouse (e.g., terrestrial, avian and aquatic life and habitats)**
N		*Response and source of information:*
		Because the majority of the work would take place within existing right of ways, minimal adverse impacts to biological resources are anticipated. - Matt Mudd, P.E. - Montana Natural Heritage Program - Montana Sage Grouse Habitat Conservation Program
KEY	10	**Unique, Endangered, Fragile, or Limited Environmental Resources, Including Endangered Species (e.g., plants, fish or wildlife)**
N		*Response and source of information:*
		The Unites States Fish and Wildlife Service was contacted for comment and responded that they *do not anticipate it a project implementation would result in adverse effects to listed, proposed or candidate threatened or endangered species.* - Matt Mudd, P.E. - USFWS - Montana Natural Heritage Program
KEY	11	**Unique Natural Features (e.g., geologic features)**
N		*Response and source of information:*
		There are no unique, natural features located in the vicinity of the proposed project. The project will take place in previously impacted lands. *- Matt Mudd P.E.*
KEY	12	**Access to, and Quality of, Recreational & Wilderness Activities, Public Lands and Waterways and Public Open Space**
N		*Response and source of information:*

Key Letter:		
N: No Impact; **B:** Potentially Beneficial; **A:** Potentially Adverse; **P:** Approval/Permits Required; **M:** Mitigation Required		
		The improvements will stay within District owned lands and right of ways and would not limit any access to any recreational waters. - Matt Mudd, P.E.
HUMAN POPULATION		
KEY	1	**Visual Quality – Coherence, Diversity, Compatibility of Use and Scale, Aesthetics**
N		*Response and source of information:*
		The project is not anticipated to adversely impact the visual quality of the area. - Matt Mudd, P.E.
KEY	2	**Nuisances (e.g., glare, fumes)**
N		*Response and source of information:*
		The proposed project may cause temporary nuisances such as dust, noise and exhaust fumes from construction equipment and excavation processes. No long-term impacts have been identified, and efforts will be made to minimize nuisances and address specific problems as they occur. - Matt Mudd, P.E.
KEY	3	**Noise - suitable separation between noise sensitive activities (such as residential areas) and major noise sources (aircraft, highways & railroads).**
N		*Response and source of information:*
		The proposed project may cause temporary from construction equipment and excavation processes. - Matt Mudd, P.E.
KEY	4	**Historic Properties, Cultural, and Archaeological Resources**
N		*Response and source of information:*
		The Montana State Historic Preservation Offices (SHPO) was contacted to determine whether there are significant historical and cultural resources within the project area. In summary, the response from SHPO is as follows: *"As long as there will be no disturbance or alteration to structures over fifty years of age, we feel that there is a low likelihood cultural properties will be impacted. We, therefore, feel that a recommendation for a cultural resource inventory is unwarranted at this time. However, should structures need to be altered or if cultural materials be inadvertently discovered during this project we would ask that our office be contacted, and the site investigated."* - Matt Mudd, P.E. - State Historical Preservation Office

Key Letter:		
N: No Impact; **B:** Potentially Beneficial; **A:** Potentially Adverse; **P:** Approval/Permits Required; **M:** Mitigation Required		
KEY	5	**Changes in Demographic (population) Characteristics (e.g., quantity, distribution, density)**
N		*Response and source of information:*
		The proposed improvements are unlikely to have a negative impact on the demographic characteristics of the District. - Matt Mudd, P.E
KEY	6	**Environmental Justice – (Does the project avoid placing lower income households in areas where environmental degradation has occurred, such as adjacent to brownfield sites?)**
N		*Response and source of information:*
		No residents will be relocated as part of this project. - Matt Mudd, P.E.
KEY	7	**General Housing Conditions - Quality, Quantity, Affordability**
N		*Response and source of information:*
		The proposed improvements are unlikely to have a negative impact on the housing conditions. - Matt Mudd, P.E.
KEY	8	**Displacement or Relocation of Businesses or Residents**
N		*Response and source of information:*
		No business or residents will be relocated as a result of the project. - Matt Mudd, P.E.
KEY	9	**Public Health and Safety**
B		*Response and source of information:*
		The water system improvements will benefit public health and safety by providing a reliable water system.. - Matt Mudd, P.E.

Key Letter:		
N: No Impact; **B:** Potentially Beneficial; **A:** Potentially Adverse; **P:** Approval/Permits Required; **M:** Mitigation Required		
KEY	**10**	**Lead Based Paint and/or Asbestos**
N		*Response and source of information:*
		Not applicable to this project. - Matt Mudd, P.E.
KEY	**11**	**Local Employment & Income Patterns – Quantity and Distribution of Employment, Economic Impact**
N		*Response and source of information:*
		The project will result in no long-term adverse impacts to the local economy. - Matt Mudd, P.E.
KEY	**12**	**Local & State Tax Base & Revenues**
N		*Response and source of information:*
		The project will result in no adverse impacts to taxes. - Matt Mudd, P.E.
KEY	**13**	**Educational Facilities - Schools, Colleges, Universities**
N		*Response and source of information:*
		The project will not have any adverse impacts on the educational system- - Matt Mudd P.E.
KEY	**14**	**Commercial and Industrial Facilities - Production & Activity, Growth or Decline**
N		*Response and source of information:*
		The project will result in no long-term adverse impacts to commercial and industrial facilities. - Matt Mudd, P.E.
KEY	**15**	**Health Care – Medical Services**
N		*Response and source of information:*
		The project will not have any adverse impacts on healthcare facilities. - Matt Mudd, P.E.

Key Letter:		
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KEY	**16**	**Social Services – Governmental Services (e.g., demand on)**
N		*Response and source of information:*
		The project will not likely to have any adverse impacts on social services. - Matt Mudd, P.E.
KEY	**17**	**Social Structures & Mores (Standards of Social Conduct/Social Conventions)**
N		*Response and source of information:*
		The project is not likely to have any adverse impacts on social services. - Matt Mudd, P.E.
KEY	**18**	**Land Use Compatibility (e.g., growth, land use change, development activity, adjacent land uses and potential conflicts)**
		Response and source of information:
		Some easements or land acquisition may be required if the District if the new north well project is completed. All owners, including the DNRC will be included in the decision making process and offered fair market value for the lands. - Matt Mudd, P.E.
KEY	**19**	**Energy Resources - Consumption and Conservation**
A		*Response and source of information:*
		The proposed project will require a nominal additional amount of power and new power source to operate a new pump building. - Matt Mudd P.E.
KEY	**20**	**Solid Waste Management**
N		*Response and source of information:*
		It is not anticipated that improvements will have an effect on solid waste management. - Matt Mudd P.E.

Key Letter:		
N: No Impact; **B:** Potentially Beneficial; **A:** Potentially Adverse; **P:** Approval/Permits Required; **M:** Mitigation Required		
KEY	**21**	**Wastewater Treatment - Sewage System**
N		*Response and source of information:*
		The project will have no adverse impacts to the community wastewater system. - Matt Mudd, P.E.
KEY	**22**	**Storm Water – Surface Drainage**
M		*Response and source of information:*
		The project will take BMP's into account. Where practicable, construction will incorporate features to direct storm water (which may contain sediment, salt, or other contaminants) away from State Waters. - Matt Mudd, P.E.
KEY	**23**	**Community Water Supply**
B		*Response and source of information:*
		The project will have a beneficial impact for the community to provide a new backup/redundant supply. Moreover, the users will have a more reliable water transmission line and limit potential outages. - Matt Mudd, P.E.
KEY	**24**	**Public Safety – Police**
N		*Response and source of information:*
		Public Safety will not be adversely impacted by the project. - Matt Mudd, P.E.
KEY	**25**	**Fire Protection – Hazards**
N		*Response and source of information:*
		The District does not have fire suppression and this project does not change the system. - Matt Mudd, P.E.
KEY	**26**	**Emergency Medical Services**
N		*Response and source of information:*
		Emergency Medical Services will not be adversely impacted by the project. - Matt Mudd, P.E.

Key Letter:		
N: No Impact; **B:** Potentially Beneficial; **A:** Potentially Adverse; **P:** Approval/Permits Required; **M:** Mitigation Required		
KEY	**27**	**Parks, Playgrounds, & Open Space**
N		*Response and source of information:*
		No adverse effects to parks, playgrounds, and open space are anticipated by the project. - Matt Mudd, P.E.
KEY	**28**	**Cultural Facilities, Cultural Uniqueness & Diversity**
N		*Response and source of information:*
		Cultural facilities, uniqueness and diversity are not adversely impacted by the project. - Matt Mudd, P.E.
KEY	**29**	**Transportation Networks and Traffic Flow Conflicts (e.g., rail; auto including local traffic; airport runway clear zones - avoidance of incompatible land use in airport runway clear zones)**
N		*Response and source of information:*
		Highways and roads would not be impacted by the proposed project actions. - Matt Mudd, P.E.
KEY	**30**	**Consistency with Local Ordinances, Resolutions, or Plans (e.g., conformance with local comprehensive plans, zoning, or capital improvement plans)**
B		*Response and source of information:*
		The project meets the objectives of the District, with respect to their need to operate and maintain a properly-functioning water system. - Matt Mudd, P.E.
KEY	**31**	**Is there a Regulatory Action on Private Property Rights as a Result of this Project? (Consider options that reduce, minimize, or eliminate the regulation of private property rights.)**
N		*Response and source of information:*
		The proposed project should not have any impact on private property rights. - Matt Mudd, P.E.

ENVIRONMENTAL REVIEW FORM

On a separate piece of paper, please answer the following as they apply to your proposed project:

1. **Alternatives:** Describe reasonable alternatives to the project.

Various alternatives exist to address the deficiencies that have been identified in the District's water system. Some alternatives are not viable because of technical feasibility, regulatory compliance, or capital/operation and maintenance costs. The alternatives that were considered for further analysis are explained below.

All alternatives considered for further analysis were conceptually designed and evaluated to determine the estimated probable project costs.

Supply

The following alternatives are considered for upgrading the District's existing wells and pump house to optimize the system operation and increase dependability.

- Do nothing – No Action. This option can always be considered for a cost-savings approach. However, doing nothing does not provide the needed pump house repairs for the long-term, continuous, and dependable operation.

- Replace well pump No. 2 – This includes furnishing and installing a completely new well potable pump and motor in the existing well No. 2 to achieve the peak demands and better fit the system curve for higher production output. This is a viable alternative and considered further.

- Replace potable pump system controls and upgrade the electrical system components. - This would include installing a more user-friendly pump operation system with needed lead/lag and alternating control operation. This alternative includes upgrades done with or without the use of Variable Frequency Drives (VFDs) as described below:

    - With VFDs. The advantages to this option is the District would no longer need to depend on the full bank of hydropneumatic pressure tanks, and the pressure (on/off) "window" can be maintained at a more consistent system pressure. The disadvantage for this option includes diminished pump life of the pump motors as compared to across-the-line started pumps.

- Without VFDs. (Across-the-line starters) One advantage to this option is the pump motor life for each pump may be extended longer than pumps with VFDs. One disadvantage for this option is the continued reliance on all of the existing hydropneumatic pressure tanks. Another disadvantage is the limited available pool of specialized electrical/control technicians for any VFD repairs.

- Given the importance of keeping a constant pressure "window" and the fact that actual measured pressures in the system in the north region the subdivision may see periods of less than 35 psi, pumps with VFDs are more favorable to adjust pressures, and this alternative is considered further.

- Electrical Protection – Given the system's susceptibility to surges and amperage overloads, installing a Surge Suppressor/Overload Protection system is a viable alternative considered further.

- Flow Meters - The potential alternatives available for flow meter installation include propeller, magnetic, and ultrasonic meters. Given the extensive use, accuracy and limited upstream/downstream pipe lengths for retrofit installations, magnetic meters are considered for improvements.

- Rigid Piping - The potential rigid metallic pipe types that can be considered for the 2-inch to 3-inch size include stainless steel, galvanized or copper. Galvanized pipe that is coated is considered the least expensive and most robust product for this application.

- Backup Generator - For the alternative of installing a new backup generator, the options include installing a new generator for the potable pump system only or for the entire pump house including the irrigation pumps. Also, the common fuel options include diesel, natural gas and propane. The type of fuel chosen depends on owner preference site specific considerations such as the proximity of natural gas. The costs compare closely and the type to be chosen can be made at the time of design, if implemented.

The following alternatives are considered for constructing a new north well to maintain water pressures and act as a redundant/backup water supply for the irrigation system and/or potable water supply:

- Do nothing – No Action: This option is favorable for a cost-savings approach, yet would not provide the District with an alternate backup supply system in a separate aquifer location. The system would continue to rely on the existing wells currently located in a close proximity. A new north well would offer a groundwater source from a separate aquifer location if needed should the existing south wells became compromised in either quality or quantity or other extreme event. Two options are considered for a new well on the north side as listed below.
  - New North Well (Irrigation only) - A new north well as an irrigation-only system would not require DEQ review and associated standards. Overall project costs will be less, but the project would have to be privately financed.
  - New North Well (Irrigation and potable backup) - An irrigation well, built to DEQ-1 standards, could be used as a backup well. A new potable well could also be financed by SRF.
  - Both well options are evaluated per the direction of the District and to allow for an informed decision should this be considered.

2. **Mitigation:** Identify any enforceable measures necessary to reduce any impacts to an insignificant level.

   Contract documents for construction will require contractors to follow the requirements of the permits, any specified construction window, necessary utility location and adhere to Best Management Practices (BMP's) and the completion of a Storm Water Pollution Prevention Plan (SWPPP) during construction to protect natural stream and aquatic resources.

3. **Is an EA or Environmental Impact Statement (EIS) required?** Describe if an EA or EIS is required, and explain in detail why or why not.

   Based on our analysis, the EA is an adequate level of environmental review. An EIS is not required.

4. **Public Involvement:** Describe the process followed to involve the public in the proposed project and its potential environmental impacts. Identify the public meetings – where and when -- the project was considered and discussed, and when the applicant approved the final environmental assessment.

Several meetings and work sessions were held with the District for the water PER planning efforts. Work sessions and public meetings will be ongoing throughout the PER finalization and periodically until the completion of identified projects. A summary of meetings in which minutes and notes were compiled are summarized in this section.

Board meetings dating back to late 2019 and early 2020 were attended by Great West Engineering to describe the PER and planning process prior to receiving state planning grants. This information was captured with the Ranchview Newsletters.

An initial work session was held with the District at their regular scheduled Board meeting on July 13, 2020. The work session served to present initial identified water system deficiencies and to present potential improvement alternatives. This was done so the District and public could be better informed on the scope of the potential projects. Additionally, initial water distribution system modeling results were presented, as well as summaries of existing water usage data and evaluation. The intent of this meeting was not to select a preferred alternative, but to provide information, assist the subdivision with informed decision making, and gain a more thorough understanding of the water system issues and concerns.

Follow up work sessions and progress update emails dealing with miscellaneous water PER related items were completed with the District and operation staff at every District meeting up to the date of completion of the study. These work sessions provided further detailed analysis and alternative costs as well as discussed funding options and related rate impacts. The District provided input regarding the overall project scope and project costs.

A public meeting was held virtually on November 9, 2020 to solicit specific input and comments on the PER and Environmental Assessment. The meeting was advertised in the local newspaper (Independent Record) on October 28, 2020, and November 4, 2020. The overall project cost of each of the project alternatives was presented to the public. Proposed funding strategies were also presented along with the potential impacts to user rates.

A project website was also established for the project, http://ranchviewinfrastructure.com. The website provided project information, schedules, PER process information, available downloadable documents, funding information, and opportunity to comment.

5. **Person(s) Responsible for Preparing:** Identify the person(s) responsible for preparation of this checklist.

   Matt Mudd, P.E. – Great West Engineering

6. **Other Agencies:** List any state, local, or federal agencies that have over-lapping or additional jurisdiction or environmental review responsibility for the proposed action and the permits, licenses, and other authorizations required; and list any agencies or groups that were contacted or contributed information to this Environmental Assessment (EA).
   The following agencies have been contacted by letter to contribute additional information to this EA:
   - Department of Commerce, Census and Economic Information Center,
   - Department of Environmental Quality, Permitting and Compliance Division,
   - Department of Fish, Wildlife and Parks,

- Department of Labor and Industry,
- Department of Natural Resources and Conservation,
- Department of Natural Resources and Conservation, Sage Grouse Program,
- Department of Transportation,
- Choteau County;
- US Environmental Protection Agency
- State Historic Preservation Office,
- Bureau of Indian Affairs,
- Bureau of Land Management,
- Federal Aviation Administration,
- National Park Service,
- Natural Resource Conservation Service,
- Occupational Safety and Health Administration,
- U.S. Army Corps of Engineers,
- U.S. Department of Transportation,
- U.S. Fish and Wildlife Service, Ecological Services
- U.S. Forest Service

Authorized Representative (Great West Engineering) on behalf of District.

10/25/20
Date

Concurrence by: Thomas Stockton, District President

Appendix B

Agency Correspondence

Matthew Mudd

From: Bradley, Kevin P <Kevin.Bradley@bia.gov>
Sent: Tuesday, August 4, 2020 1:27 PM
To: Matthew Mudd
Cc: Martin, Dolores
Subject: Ranchview Estates: BIA letter
Attachments: BIA reviewed GWE 8-4.pdf

Matt,

We have reviewed your project and have no issues at this time.

Thank you for your letter

Kevin Bradley, P.E.
U.S. Department of Interior
Bureau of Indian Affairs (BIA)
Rocky Mtn. Region
Water Resources Department
2021 Fourth Avenue North
Billings, MT 59101

(Direct) Phone: (406) 247-7861

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www.greatwesteng.com

July 20, 2020

Bureau of Indian Affairs
2021 4th Ave N.
Billings MT 59101

Re: Ranchview Estates Subdivision, Water System Preliminary Engineering Report

To Whom it May Concern:

We are requesting your review of potential environmental impacts from water system improvements planned for the Ranchview Estates Subdivision, north of Helena Montana.

The Ranchview Estates Subdivision was built in the 1990's and is comprised of 107 residential lots located approximately eight miles north of the City of Helena, within Lewis and Clark County. The subdivision is bordered by I-15 on the east, Montana Avenue on the west, the Helena Valley Canal to the south, and by undeveloped state and private land to the north. The District owns and operates a public potable water system and a separate non-potable irrigation system. The District is currently in the process of completing a Preliminary Engineering Report (PER) to evaluate their existing water system and evaluate potential water system upgrades. A layout of the existing system and the proposed project areas is attached to this letter.

In summary, the following improvements are being considered:

- Pump house rehabilitation and upgrades:
  - Replace aging and problematic electronics and VFD systems
  - Pump station upgrades
  - New backup generator
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  - Remedy plumbing for up to three reported properties that have reversed potable/irrigation system services.
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- New irrigation well (or well capable of being a backup potable supply) located on DNRC public land to the north.
- New buried storage tank near the existing pump house.

BILLINGS
6780 Trade Center Ave.
Billings, MT 59101
406.652.5000
Fax 406.248.1363

BOISE
3050 N. Lakeharbor Ln.
Suite 201
Boise, ID 83703
208.576.6646

GREAT FALLS
702 2nd Street South #2
Great Falls, MT 59405
406.952.1109

SPOKANE
9221 N. Division St.,
Suite F
Spokane, WA 99218
509.413.1430

We respectfully request that you review the site and the proposed facility improvements. Please provide a written response detailing any comments you may have regarding the project and any potential environmental impacts that should be considered in the project design, avoidance, or mitigation measures.

The District is not expected to decide on the final improvement alternatives as part of the PER until the Fall of 2020. Public comments will also be considered with the proposed improvements. All improvements will be designed by licensed engineers and appropriate approval and permits will be obtained prior to proceeding with improvements. Depending on the funding package and selected improvements, the earliest the construction is likely to take place would be 2022.

If you have no comment on this project please check the box below and countersign the bottom of this letter and return the entire letter to Great West Engineering, Inc. at the address listed above.

Please return your written comments to Matt Mudd, PE, Project Manager , mmudd@greatwesteng.com or to the following address:

Great West Engineering, Inc.
PO Box 4817
Helena, MT 59604

Please contact me at (406) 495-6196.if you need any further information or wish to discuss the project.

Sincerely,

Great West Engineering, Inc.

Matt Mudd, PE
Project Manager

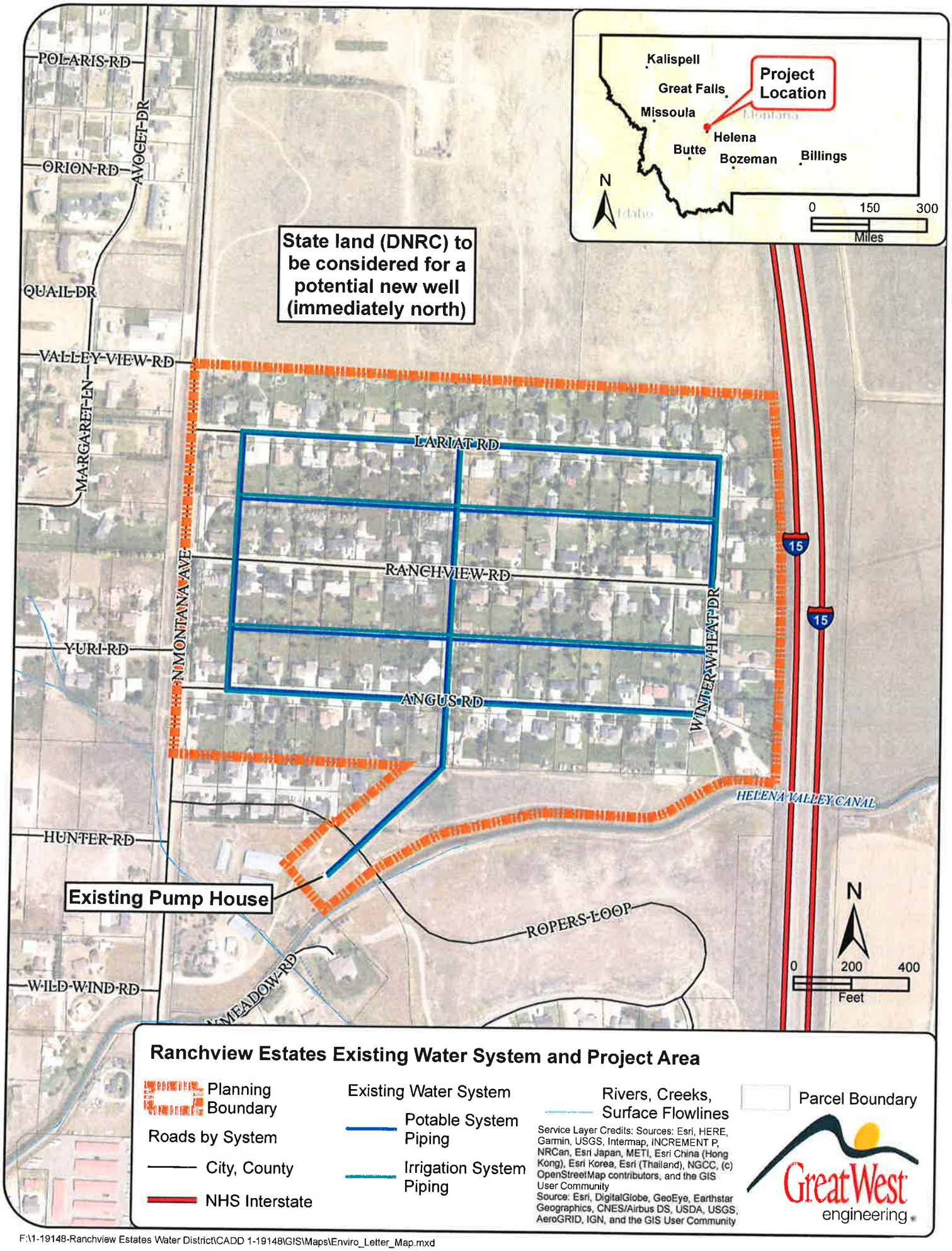
Attachment: Figure

[X] Bureau of Indian Affairs has reviewed the enclosed proposal and has no comments.

Kevin Bradley

Signature

\\hlnsrv11\Projects\1-19148-Ranchview Estates Water District\Project\Reports\PER\EA Letter\Rancheview-EnviroLtr_2020.doc



F:\1-19148-Ranchview Estates Water District\CADD 1-19148\GIS\Maps\Enviro_Letter_Map.mxd

Matthew Mudd

From: Bruner, Heidy (FHWA) <heidy.bruner@dot.gov>
Sent: Tuesday, August 18, 2020 10:45 AM
To: Matthew Mudd
Cc: JSKINNER
Subject: Ranchview Estates Subdivision Water System
Attachments: Scanned from a Xerox Multifunction Printer.pdf

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Dear Matt Mudd,

Thank you for your July 20, 2020 correspondence, which notified us of the proposed Water System Improvements Project for the Ranchview Estates Subdivision. The Federal Highway Administration appreciates the opportunity to review the proposed project and offer comment.

After reviewing the proposal and the defined boundaries of the project, it appears unlikely that the proposed project, would impact highway infrastructure and/or right of way. If that understanding is incorrect or if the proposed project changes, approvals from FHWA and Montana Department of Transportation (MDT) may be required. Please coordinate your efforts with the MDT, as appropriate. As needed, MDT will coordinate with our office.

Since MDT is a large organization, I have copied Jim Skinner, Chief of the MDT Policy, Program & Performance Analysis Bureau so that you will have his contact information. That MDT Bureau coordinates the Systems Impact Analysis Process (SIAP) reviews of facilities impacting state roadways and non–MDT–initiated environmental review processes. (For Jim's benefit I have attached your original correspondence.)

Thank you again for the opportunity to provide comment on this proposed project. Please contact me at (406) 441-3914 or Heidy.Bruner@dot.gov, if you wish to discuss these comments or if you have additional questions or concerns.

Kindly,
Heidy Bruner, P.E.
Environmental Engineer
Federal Highway Administration – Montana Division

HELENA
PO Box 4817 ▪ 2501 Belt View Drive
Helena, MT 59604
406.449.8627 ▪ Fax 406.449.8631
www.greatwesteng.com

GreatWest engineering

RECEIVED
JUL 23 2020
FHWA
MONTANA DIVISION

July 20, 2020

US Department of Transportation
585 Shephard Way
Helena MT 59601

Re: Ranchview Estates Subdivision, Water System Preliminary Engineering Report

To Whom it May Concern:

We are requesting your review of potential environmental impacts from water system improvements planned for the Ranchview Estates Subdivision, north of Helena Montana.

The Ranchview Estates Subdivision was built in the 1990's and is comprised of 107 residential lots located approximately eight miles north of the City of Helena, within Lewis and Clark County. The subdivision is bordered by I-15 on the east, Montana Avenue on the west, the Helena Valley Canal to the south, and by undeveloped state and private land to the north. The District owns and operates a public potable water system and a separate non-potable irrigation system. The District is currently in the process of completing a Preliminary Engineering Report (PER) to evaluate their existing water system and evaluate potential water system upgrades. A layout of the existing system and the proposed project areas is attached to this letter.

In summary, the following improvements are being considered:

- Pump house rehabilitation and upgrades:
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We respectfully request that you review the site and the proposed facility improvements. Please provide a written response detailing any comments you may have regarding the project and any potential environmental impacts that should be considered in the project design, avoidance, or mitigation measures.

The District is not expected to decide on the final improvement alternatives as part of the PER until the Fall of 2020. Public comments will also be considered with the proposed improvements. All improvements will be designed by licensed engineers and appropriate approval and permits will be obtained prior to proceeding with improvements. Depending on the funding package and selected improvements, the earliest the construction is likely to take place would be 2022.

If you have no comment on this project please check the box below and countersign the bottom of this letter and return the entire letter to Great West Engineering, Inc. at the address listed above.

Please return your written comments to Matt Mudd, PE, Project Manager , mmudd@greatwesteng.com or to the following address:

Great West Engineering, Inc.
PO Box 4817
Helena, MT 59604

Please contact me at (406) 495-6196.if you need any further information or wish to discuss the project.

Sincerely,

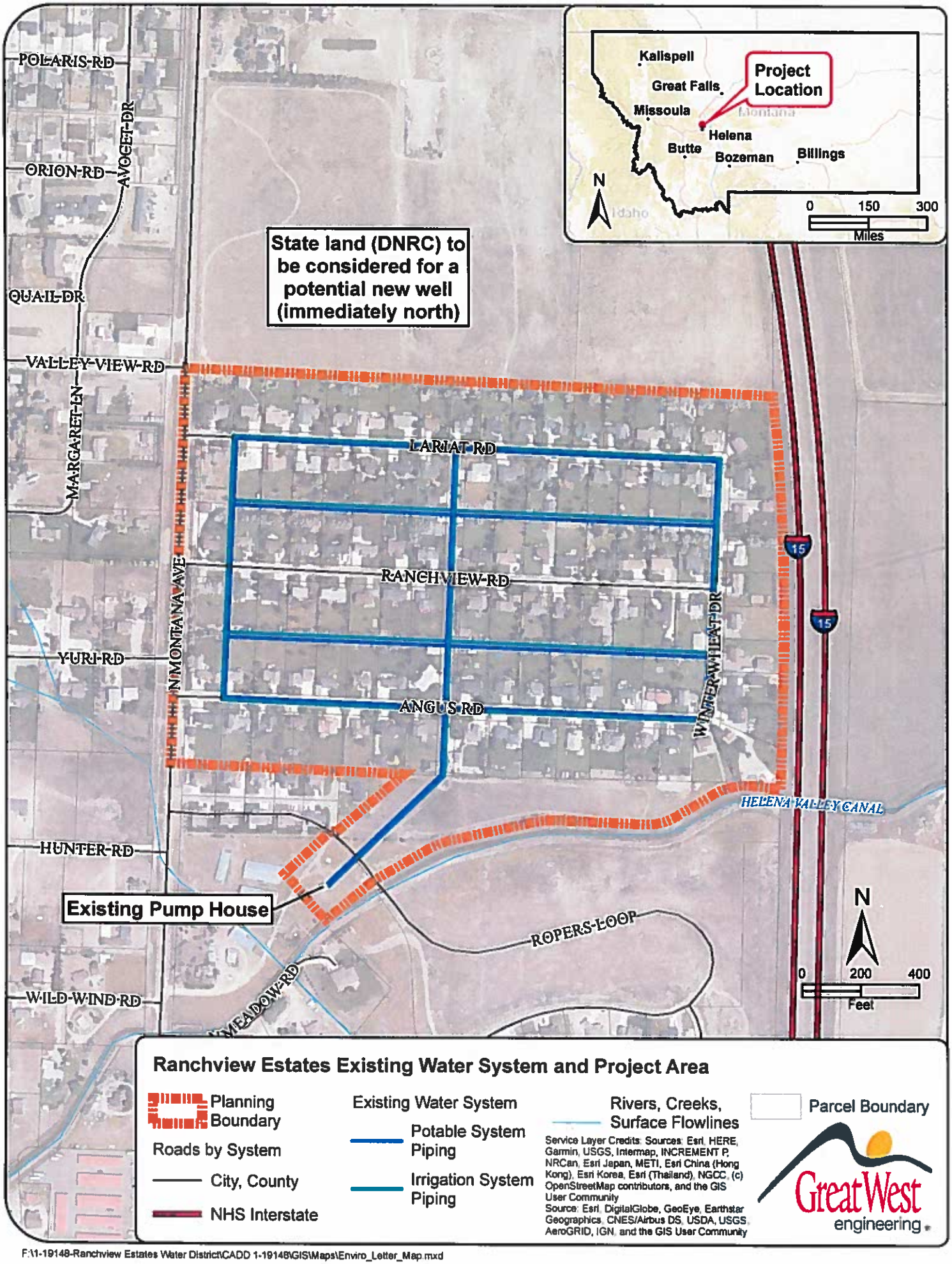
Great West Engineering, Inc.

Matt Mudd, PE
Project Manager

Attachment: Figure

[ ] US Department of Transportation has reviewed the enclosed proposal and has no comments.

_____
Signature



F:\1-19148-Ranchview Estates Water District\CADD 1-19148\GIS\Maps\Enviro_Letter_Map.mxd

Matthew Mudd

From: Throop, Nicole <Nicole.Throop@mt.gov>
Sent: Tuesday, August 25, 2020 11:01 AM
To: Matthew Mudd
Subject: Ranchview Estates Subdivision FWP Comment Letter
Attachments: Ranchview Estates Subdivision.docx

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Hi there, Matt!

I have attached MTFWP's official comment letter. We have no comments on this project at this time.

Please feel free to reach out if you have any further questions or concerns.

Have a great day!

Nicole Throop
Administrative Assistant
406-577-7862
Region 3- Bozeman
1400 S. 19th Avenue

MT Fish, Wildlife & Parks
Region 3 Headquarters
1400 S 19th Avenue
Bozeman, MT 59718

August 25, 2020

Great West Engineering
2501 Belt View Drive
Helena, MT 59604

RE: Ranchview Estates Subdivision, Water System Preliminary Engineering Report

Dear Mr. Mudd,

Montana Fish, Wildlife & Parks has no comment currently regarding the proposed Ranchview Estates Subdivision. Thank you for the opportunity to comment.

Sincerely,

Montana Fish Wildlife and Parks
Region 3
406-577-7900

Matthew Mudd

From: Boe, Chris <CBoe@mt.gov>
Sent: Thursday, July 23, 2020 9:24 AM
To: Matthew Mudd
Subject: Ranchview Estates
Attachments: GW_ENGR_chris_boe.pdf

Hi Matt-

I am in receipt of your attached letter in regards to Ranchview Estates' planed improvement to their water system. Please confirm whether or not the proposed project will result in a discharge of pollutants to state waters. If so, please provide additional information on this. If not, the discharge permitting programs will not be performing an environmental analysis on your proposed project. Rather, please talk to our DEQ engineering programs to determine their level of review for environmental impacts.

Please let me know if you have any questions-

Chris Boe
Ground Water Discharge Permitting Program
Montana DEQ/Water Protection Bureau

HELENA
PO Box 4817 ▪ 2501 Belt View Drive
Helena, MT 59604
406.449.8627 ▪ Fax 406.449.8631
www.greatwesteng.com

GreatWest engineering ®

RECEIVED
JUL 22 2020
DEQ WATER QUALITY DIVISION

July 20, 2020

Department of Environmental Quality
Groundwater Discharge Permitting Program
1520 E. 6th Ave.
PO Box 200901
Helena MT 59620-0901

Re: Ranchview Estates Subdivision, Water System Preliminary Engineering Report

Chris Boe:

We are requesting your review of potential environmental impacts from water system improvements planned for the Ranchview Estates Subdivision, north of Helena Montana.

The Ranchview Estates Subdivision was built in the 1990's and is comprised of 107 residential lots located approximately eight miles north of the City of Helena, within Lewis and Clark County. The subdivision is bordered by I-15 on the east, Montana Avenue on the west, the Helena Valley Canal to the south, and by undeveloped state and private land to the north. The District owns and operates a public potable water system and a separate non-potable irrigation system. The District is currently in the process of completing a Preliminary Engineering Report (PER) to evaluate their existing water system and evaluate potential water system upgrades. A layout of the existing system and the proposed project areas is attached to this letter.

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Please return your written comments to Matt Mudd, PE, Project Manager , mmudd@greatwesteng.com or to the following address:

Great West Engineering, Inc.
PO Box 4817
Helena, MT 59604

Please contact me at (406) 495-6196.if you need any further information or wish to discuss the project.

Sincerely,

Great West Engineering, Inc.

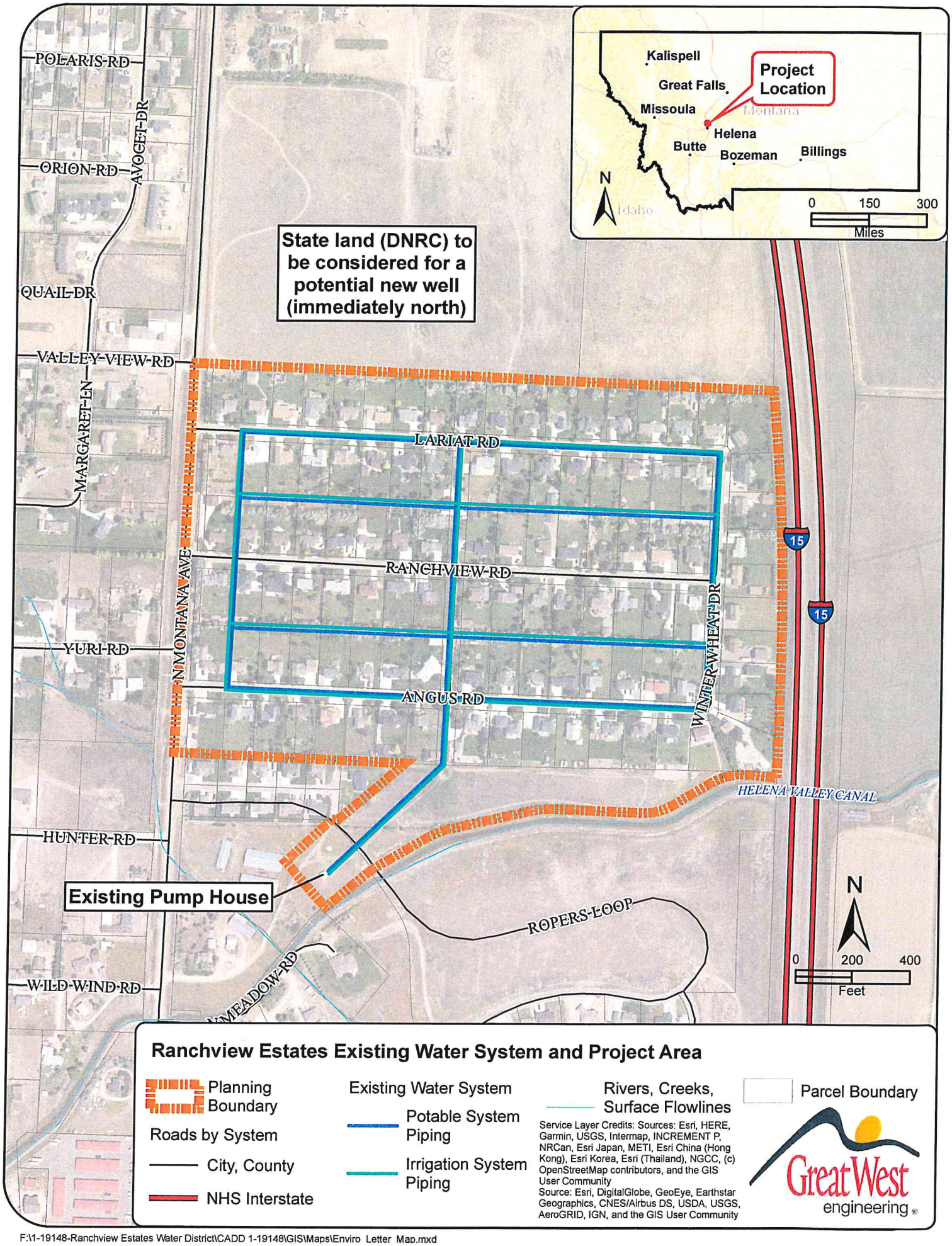
Matt Mudd, PE
Project Manager

Attachment: Figure

RECEIVED
JUL 22 2020
DEQ WATER QUALITY DIVISION

[ ] Department of Environmental Quality has reviewed the enclosed proposal and has no comments.

_____
Signature



F:\1-19148-Ranchview Estates Water District\CADD 1-19148\GIS\Maps\Enviro Letter Map.mxd

Lewis and Clark County
Community Development and Planning
316 N. Park Ave. Room 230
Helena, MT 59623
Phone: 406-447-8374
Fax: 406-447-8398
E-mail: planning@lccountymt.gov



August 11, 2020

Matt Mudd, PE
Great West Engineering
PO Box 4817
Helena, MT 59604

Dear mATT,

As requested in the letter dated from July 20, 2020, Lewis and Clark County is responding to the proposed development at the Ranchview Estates Subdivision.

1. Ranchview Estates is located within Lewis and Clark County and associated with FEAM Map Panel 30049C2134E. This panel was not printed.
2. Since the map panel was not printed there would not be a requirement for a floodplain development permit for the proposed work.
3. The flood risk for that area is unknown and it is advised that Great West Engineering take as many precautions to avoid any potential flood risk for the Ranchview Estates Subdivision.
4. Please keep Lewis and Clark County Floodplain Manager updated with any changes to the proposed development or timetable.

Please let me know if you have any more questions.

Sincerely,

Worby McNamee, CFM
Floodplain Manager/Planner II
Lewis and Clark County Community Development and Planning Department
316 North Park Avenue, Room 230
Helena, MT 59623
Phone: 1 (406) 447-8375
Fax: 1 (406) 447-8398
wmcnamee@lccountymt.gov

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
HELENA REGULATORY OFFICE
10 WEST 15TH STREET, SUITE 2200
HELENA, MONTANA 59626

REPLY TO
ATTENTION OF

August 6, 2020

Regulatory Branch
Montana State Program
Corps No. **NWO-2020-01423-MTH**

Subject: Ranchview Estates - Water System Improvements

Matt Mudd
Great West Engineering
P.O. Box 4817
Helena, Montana 59604

Dear Mr. Mudd:

We are responding to your request for Department of the Army (DA) comment regarding the above-referenced project. Specifically, you are proposing improvements to the water system for Ranchview Estates in Helena, Montana. Improvements include: pump house rehabilitation and upgrades, replacement of aging and problematic electronics and VFD systems, installation of a new backup generator and distribution system improvements and replacement of undersized supply and distribution piping. The exact location and street/block sections are yet to be determined based on further evaluation of the most problematic areas. The piping improvements will include replacing water services to the property lines. All proposed water piping replacement work would stay within the existing road right-of-ways and designated water easements. The project is located at approximately Latitude 46.717°, Longitude -112.017°, within Section 17, Township 11 N, Range 3 W, Meridian, Lewis and Clark County, Montana.

The mission of the U.S. Army Corps of Engineers (Corps) Regulatory Program is to protect the Nation's aquatic resources while allowing reasonable development through fair, flexible and balanced permit decisions. In particular, under Section 404 of the Clean Water Act, we work to protect the biological, physical, and chemical integrity of the Nation's aquatic resources. Projects are evaluated on a case-by-case basis to determine the potential benefits and detriments that may occur as a result of the proposal. In all cases an applicant must avoid and minimize impacts to aquatic resources to the greatest extent practicable.

Under the authority of Section 404 of the Clean Water Act (CWA), DA permits are required for the discharge of fill material into waters of the U.S. Waters of the U.S. include the area below the ordinary high water mark of stream channels and lakes or ponds connected to the tributary system, and wetlands adjacent to these waters. Isolated waters and wetlands, as well as man-made channels, may be waters of the U.S. in certain circumstances, which must be determined on a case-by-case basis.

Printed on Recycled Paper

Based on the information provided in your submittal, we are unable to ascertain if regulated activities are proposed or if jurisdictional waters of the U.S. are present within the project area. If your final design includes the placement of fill material in any jurisdictional area described above, or otherwise requires authorization by a DA permit, please submit a Montana Joint Permit Application to this office prior to starting any work. After a review of the materials submitted we will determine what type of permit, if any, will be required. You can obtain a Montana Joint Permit Application Form at the following address: http://www.dnrc.mt.gov/licenses-and-permits/stream-permitting. If you do not have internet access please contact our office at the address below to obtain more information.

Note that this letter is not a DA authorization to proceed. It only informs you of your need to obtain a DA permit if waters of the U.S. will be affected. If waters of the U.S. will not be affected by a jurisdictional activity a DA permit will not be required for the project.

Please refer to identification number NWO-2020-01423-MTH in any correspondence concerning this project. If you have any questions, please contact Jade Metzler at 10 W 15th Street, Suite 2200, Helena, MT, 59626, by email at jade.m.metzler@usace.army.mil, or telephone at (406) 441-1365.

Sincerely,

Jade M. Metzler
Regulatory Project Manager

Printed on Recycled Paper

Matthew Mudd

From: Murdo, Damon <dmurdo@mt.gov>
Sent: Wednesday, July 29, 2020 1:41 PM
To: Matthew Mudd
Cc: Rennie, Patrick
Subject: RANCHVIEW ESTATES SUBDIVISION WATER SYSTEM IMPROVEMENTS PER
Attachments: 2020072903.pdf; Reports.pdf; Sites.pdf

Big Sky. Big Land. Big History.
Montana
Historical Society

July 29, 2020

Matt Mudd
Great West Engineering
PO Box 4817
Helena MT 59604

RE: RANCHVIEW ESTATES SUBDIVISION WATER SYSTEM IMPROVEMENTS PER. SHPO Project #: 2020072903

Dear Mr. Mudd:

I have conducted a cultural resource file search for the above-cited project located in Section 17, T11N R3W. According to our records there have been a few previously recorded sites within the designated search locale. In addition to the sites there have been a few previously conducted cultural resource inventories done in the areas. I've attached a list of these sites and reports. If you would like any further information regarding these sites or reports, you may contact me at the number listed below.

It is SHPO's position that any structure over fifty years of age is considered historic and is potentially eligible for listing on the National Register of Historic Places. Site 24LC1062 is the historic Helena Valley Irrigation District Canal and has been previously determined ineligible.

We feel that there is a low likelihood cultural properties will be impacted within the existing subdivision area. However, we did not run a search for the portion of the project that may be located on DNRC Land to the north. If DNRC land will be used for a new irrigation well we would ask that you contact the DNRC Trust Lands Archaeologist, Patrick Rennie, for any concerns that he may have regarding the project. He may be reached at prennie@mt.gov, or 406-444-2882.

If you have any further questions or comments, you may contact me at (406) 444-7767 or by e-mail at dmurdo@mt.gov. I have attached an invoice for the file search. Thank you for consulting with us.

Sincerely,

Damon Murdo
Cultural Records Manager
State Historic Preservation Office

File: DEQ/AWW/2020

STATE HISTORIC PRESERVATION OFFICE
Montana Cultural Resource Database
CRABS Township,Range,Section Results
Report Date:7/29/2020

Township:11 N Range:3 W Section: 17

BROWNELL JOAN, ET AL.

7/1/1994 HELENA CITY GATE/EAST HELENA GAS LINE

CRABS Document Number: LC 6 16161 Agency Document Number: HV-94-24

Township:11 N Range:3 W Section: 17

WALKER-KUNTZ SUNDAY A. AND PATRICK KUNTZ

6/28/2001 G.M. SELBY CELL TOWERS: CULTURAL RESOURCE INVENTORY, MONTANA

CRABS Document Number: ZZ 6 23724 Agency Document Number:

Township:11 N Range:3 W Section: 17

MCKAY KATHRYN L., ET AL.

10/15/2002 I-15 CORRIDOR (MONTANA CITY TO LINCOLN ROAD) EIS
IN LEWIS AND CLARK COUNTY MONTANA

CRABS Document Number: LC 4 25273 Agency Document Number: NH15-4(65)196

Township:11 N Range:3 W Section: 17

FANDRICH BLAINE

8/1/2016 LINCOLN ROAD AT I-15 CLASS III CULTURAL RESOURCE INVENTORY NORTH OF HELENA

CRABS Document Number: LC 4 38702 Agency Document Number:

STATE HISTORIC PRESERVATION OFFICE
Cultural Resource Information Systems
CRIS Township, Range, Section Report
Report Date:7/29/2020

Site #	Twp	Rng	Sec	Qs	Site Type 1	Site Type 2	Time Period	Owner	NR Status
24LC1062	11N	3W	17	comb	Historic Irrigation System		1950-1959	Combination	Ineligible
24LC1784	11N	3W	17	SW	Historic Log Structure		Historic More Than One Decade	Private	Eligible
24LC2455	11N	3W	17	SE	Historic Homestead/Farmstead		Historic More Than One Decade	Private	Ineligible

Matthew Mudd

From: Martin, Jacob <jacob_martin@fws.gov>
Sent: Tuesday, July 28, 2020 9:53 AM
To: Matthew Mudd
Subject: Ranchview Estates Subdivision Water System

Dear Mr. Mudd:

Thank you for your July 20, 2020, letter requesting U.S. Fish and Wildlife Service comment on the proposed subject project in Helena, Montana.

The U.S. Fish and Wildlife Service reviewed your letter. Based on the information provided, we have no comments regarding federally-listed or proposed threatened or endangered species or other trust species. Additional information regarding listed species that may occur within the project footprint may be obtained using the IPaC project-planning tool, which streamlines the USFWS environmental review process at https://ecos.fws.gov/ipac/.

Thank you for the opportunity to comment. If you have any questions or comments about this correspondence please contact me via reply email or at the address or phone number, below.

Sincerely,

Jacob M. (Jake) Martin
Assistant Field Supervisor
Montana Ecological Services Office
585 Shephard Way, Suite 1
Helena, Montana 59601
(406) 449-5225x215
jacob_martin@fws.gov

Matthew Mudd

From: Metzler, Jade M CIV USARMY CENWO (USA) <jade.m.metzler@usace.army.mil>
Sent: Thursday, August 6, 2020 12:00 PM
To: Matthew Mudd
Subject: NWO-2020-01423-MTH - Ranchview Estates (UNCLASSIFIED)
Attachments: NWO-2020-01423-MTH_Comment.pdf

CLASSIFICATION: UNCLASSIFIED

Matt,

Attached is you Department of the Army (DA) comment letter regarding the proposed water system improvements in Ranchview Estates, Lewis and Clark County, Helena, Montana. Feel free to contact if you have any questions or concerns or if you would like a hard copy mailed to you. Please keep a copy of this email and letter for your records.

Sincerely,
Jade

Jade Metzler
Regulatory Project Manager
U.S. Army Corps of Engineers
10 West 15th Street, Suite 2200
Helena, Montana 59626-9705
Office: (406) 441.1365
Cell: (406) 946.2234

The Montana Regulatory Office is now accepting digital submittals! Effective immediately, please submit new requests in digital form to Montana.Reg@usace.army.mil for initial in-processing. (NOTE: Emails including attachments cannot exceed 40Mb). Further information and instructions regarding submitting requests electronically can be found at: https://www.nwo.usace.army.mil/Missions/Regulatory-Program/Montana/

Regulatory Customer Service Survey: http://corpsmapu.usace.army.mil/cm_apex/f?p=136:4:0

CLASSIFICATION: UNCLASSIFIED

Appendix C

National Heritage Program Land Cover Classifications

MONTANA Natural Heritage Program

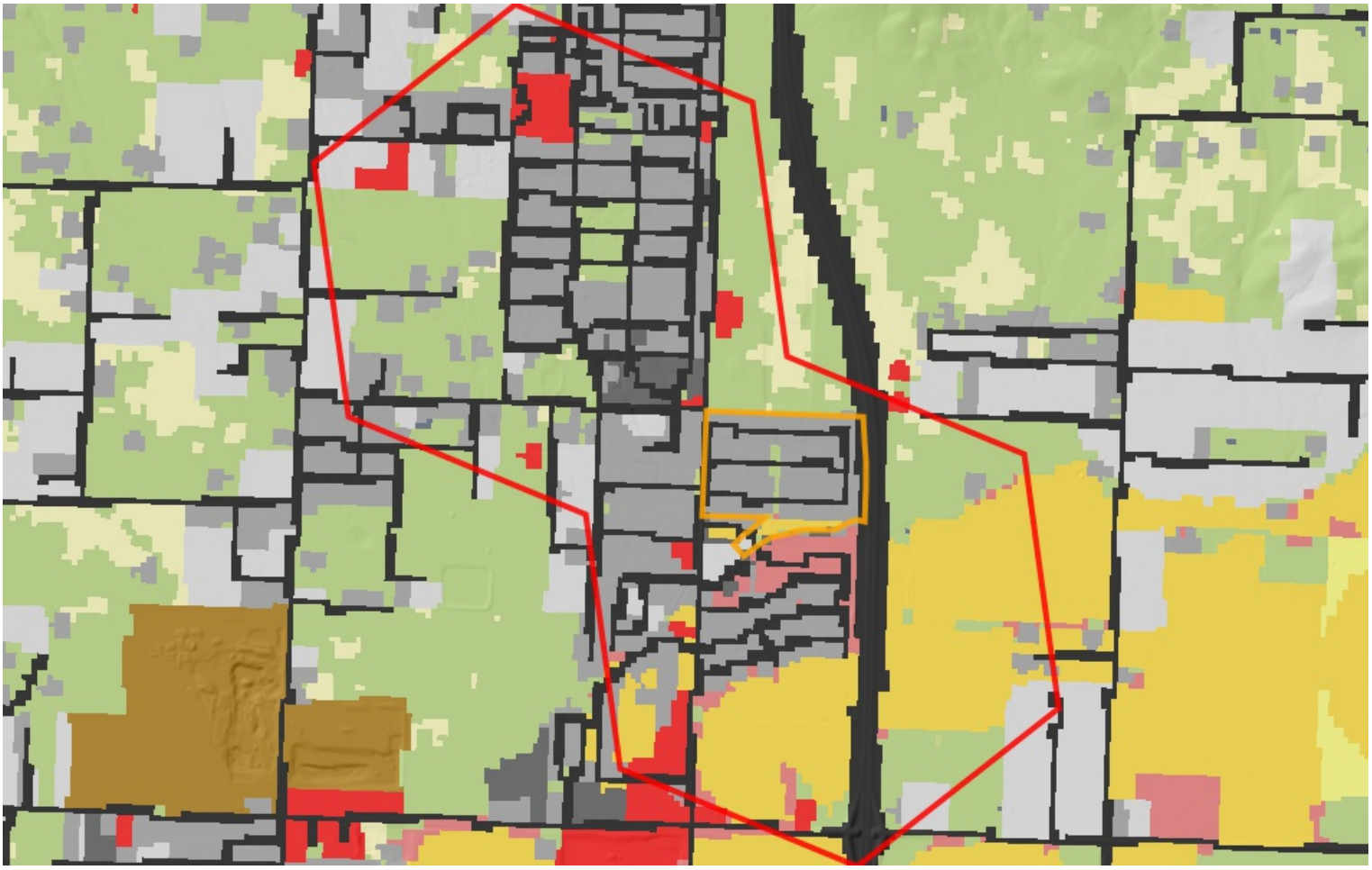
A program of the **Montana State Library's Natural Resource Information System** operated by the **University of Montana**.



Latitude	Longitude
46.70266	-112.00353
46.73368	-112.04001

Land Cover

Summarized by: *(Custom Area of Interest)*





26% (*337 Acres*)

Human Land Use

Developed

Low Intensity Residential

Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20-50% of total cover. These areas most commonly include single-family housing units in rural and suburban areas. Paved roadways may be classified into this category.



23% (290 Acres)

Grassland Systems
Montane Grassland
Rocky Mountain Lower Montane, Foothill, and Valley Grassland

This grassland system of the northern Rocky Mountains is found at lower montane to foothill elevations in mountains and valleys throughout Montana. These grasslands are floristically similar to Big Sagebrush Steppe but are defined by shorter summers, colder winters, and young soils derived from recent glacial and alluvial material. They are found at elevations from 548 - 1,650 meters (1,800-5,413 feet). In the lower montane zone, they range from small meadows to large open parks surrounded by conifers; below the lower treeline, they occur as extensive foothill and valley grasslands. Soils are relatively deep, fine-textured, often with coarse fragments, and non-saline. Microphytic crust may be present in high-quality occurrences. This system is typified by cool-season perennial bunch grasses and forbs (>25%) cover, with a sparse shrub cover (<10%). Rough fescue (*Festuca campestris*) is dominant in the northwestern portion of the state and Idaho fescue (*Festuca idahoensis*) is dominant or co-dominant throughout the range of the system. Bluebunch wheatgrass (*Pseudoroegneria spicata*) occurs as a co-dominant throughout the range as well, especially on xeric sites. Western wheatgrass (*Pascopyrum smithii*) is consistently present, often with appreciable coverage (>10%) in lower elevation occurrences in western Montana and virtually always present, with relatively high coverages (>25%), on the edge of the Northwestern Great Plains region. Species diversity ranges from a high of more than 50 per 400 square meter plot on mesic sites to 15 (or fewer) on xeric and disturbed sites. Most occurrences have at least 25 vascular species present. Farmland conversion, noxious species invasion, fire suppression, heavy grazing and oil and gas development are major threats to this system.

No Image

17% (212 Acres)

Human Land Use
Developed
Other Roads

County, city and or rural roads generally open to motor vehicles.



16% (207 Acres)

Human Land Use
Agriculture
Cultivated Crops

These areas used for the production of crops, such as corn, soybeans, small grains, sunflowers, vegetables, and cotton, typically on an annual cycle. Agricultural plant cover is variable depending on season and type of farming. Other areas include more stable land cover of orchards and vineyards.



6% (71 Acres)

Human Land Use
Developed
Developed, Open Space

Vegetation (primarily grasses) planted in developed settings for recreation, erosion control, or aesthetic purposes. Impervious surfaces account for less than 20% of total cover. This category often includes highway and railway rights of way and graveled rural roads.

No Image

4% (54 Acres)

Human Land Use
Developed
Interstate

National Highway System (NHS) limited access highways and their shoulders and rights of way.

No Image

3% (42 Acres)

Human Land Use
Developed
Commercial / Industrial

Businesses, industrial parks, hospitals, airports; utilities in commercial/industrial areas.



2% (27 Acres)

Recently Disturbed or Modified
Introduced Vegetation
Introduced Upland Vegetation - Annual and Biennial Forbland

Land cover is significantly altered/disturbed by introduced annual and biennial forbs. Natural vegetation types are no longer recognizable. Typical species that dominate these areas are knapweed, oxeye daisy, Canada thistle, leafy spurge, pepperweed, and yellow sweetclover.



2% (*20 Acres*)

Shrubland, Steppe and Savanna Systems
Sagebrush Steppe

Big Sagebrush Steppe

This widespread ecological system occurs throughout much of central Montana, and north and east onto the western fringe of the Great Plains. In central Montana, where this system occurs on both glaciated and non-glaciated landscapes, it differs slightly, with more summer rain than winter precipitation and more precipitation annually. Throughout its distribution, soils are typically deep and non-saline, often with a microphytic crust. This shrub-steppe is dominated by perennial grasses and forbs with greater than 25% cover. Overall shrub cover is less than 10 percent. In Montana and Wyoming, stands are more mesic, with more biomass of grass, and have less shrub diversity than stands farther to the west, and 50 to 90% of the occurrences are dominated by Wyoming big sagebrush with western wheatgrass (*Pascopyrum smithii*). Japanese brome (*Bromus japonicus*) and cheatgrass (*Bromus tectorum*) are indicators of disturbance, but cheatgrassis typically not as abundant as in the Intermountain West, possibly due to a colder climate. The natural fire regime of this ecological system maintains a patchy distribution of shrubs, preserving the steppe character. Shrubs may increase following heavy grazing and/or with fire suppression. In central and eastern Montana, complexes of prairie dog towns are common in this ecological system.

Additional Limited Land Cover

1% (*17 Acres*) High Intensity Residential

<1% (*2 Acres*) Major Roads

<1% (*1 Acres*) Northern Rocky Mountain Lower Montane Riparian Woodland and Shrubland

<1% (*1 Acres*) Rocky Mountain Subalpine-Montane Mesic Meadow

Introduction to Land Cover

Land Use/Land Cover is one of 15 Montana Spatial Data Infrastructure framework layers considered vital for making statewide maps of Montana and understanding its geography. The layer records all Montana natural vegetation, land cover and land use, classified from satellite and aerial imagery, mapped at a scale of 1:100000, and interpreted with supporting ground-level data. The baseline map is adapted from the Northwest ReGAP (NWGAP) project land cover classification, which used 30m resolution multi-spectral Landsat imagery acquired between 1999 and 2001. Vegetation classes were drawn from the Ecological System Classification developed by NatureServe (Comer et al. 2003). The land cover classes were developed by Anderson et al. (1976). The NWGAP effort encompasses 12 map zones. Montana overlaps seven of these zones. The two NWGAP teams responsible for the initial land cover mapping effort in Montana were Sanborn and NWGAP at the University of Idaho. Both Sanborn and NWGAP employed a similar modeling approach in which Classification and Regression Tree (CART) models were applied to Landsat ETM+ scenes. The Spatial Analysis Lab within the Montana Natural Heritage Program was responsible for developing a seamless Montana land cover map with a consistent statewide legend from these two separate products. Additionally, the Montana land cover layer incorporates several other land cover and land use products (e.g., MSDI Structures and Transportation themes and the Montana Department of Revenue Final Land Unit classification) and reclassifications based on plot-level data and the latest NAIP imagery to improve accuracy and enhance the usability of the theme. Updates are done as partner support and funding allow, or when other MSDI datasets can be incorporated. Recent updates include fire perimeters and agricultural land use (annually), energy developments such as wind, oil and gas installations (2014), roads, structures and other impervious surfaces (various years): and local updates/improvements to specific ecological systems (e.g., central Montana grassland and sagebrush ecosystems). Current and previous versions of the Land Use/Land Cover layer with full metadata are available for download at the Montana State Library's Geographic Information Clearinghouse.

Within the report area you have requested, land cover is summarized by acres of Level 1, Level 2, and Level 3 Ecological Systems.

Literature Cited

Anderson, J.R. E.E. Hardy, J.T. Roach, and R.E. Witmer. 1976. A land use and land cover classification system for use with remote sensor data. U.S. Geological Survey Professional Paper 964.

Comer, P., D. Faber-Langendoen, R. Evans, S. Gawler, C. Josse, G. Kittel, S. Menard, M. Pyne, M. Reid, K. Schulz, K. Snow, and J. Teague. 2003. Ecological systems of the United States: A working classification of U.S. terrestrial systems. NatureServe, Arlington, VA.

Appendix D

NRCS Soils Report

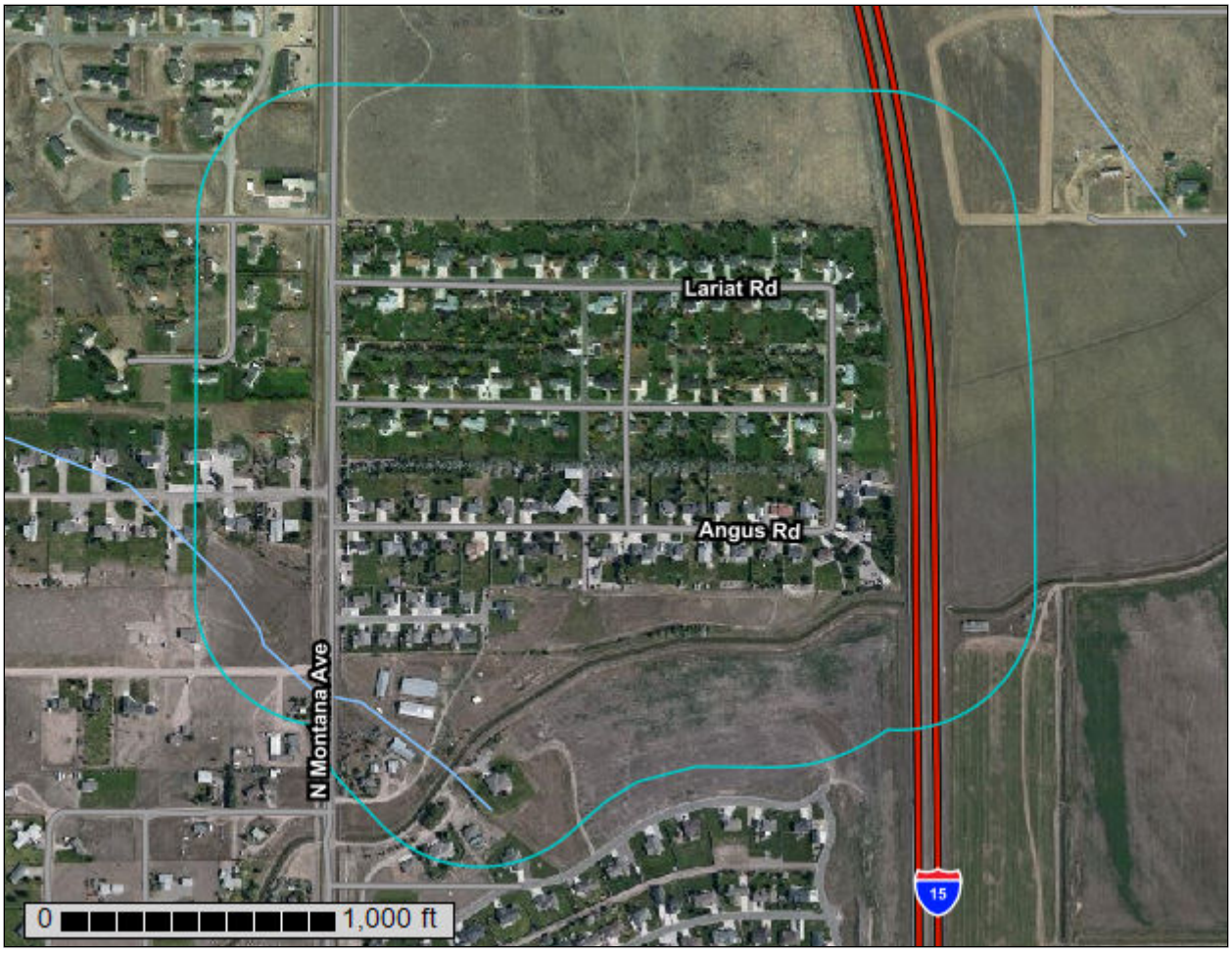
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Lewis and Clark County Area, Montana



July 16, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lewis and Clark County Area, Montana
Survey Area Data: Version 15, Jun 4, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 4, 2013—Jul 27, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1B	Aridic Ustifluvents, channeled, 0 to 4 percent slopes	4.2	2.5%
137B	Musselshell-Crago complex, 2 to 8 percent slopes	159.9	93.3%
309A	Thess-Scravo complex, 0 to 2 percent slopes	5.7	3.3%
406A	Nippt gravelly loam, 0 to 2 percent slopes	1.7	1.0%
Totals for Area of Interest		**171.4**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Lewis and Clark County Area, Montana

1B—Aridic Ustifluvents, channeled, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: 4yql
Elevation: 3,500 to 4,500 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 37 to 45 degrees F
Frost-free period: 90 to 120 days
Farmland classification: Not prime farmland

Map Unit Composition

Aridic ustifluvents, channeled, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Aridic Ustifluvents, Channeled

Setting

Landform: Flood-plain steps, flood plains, drainageways
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 5 inches: loam
C1 - 5 to 25 inches: stratified gravelly sandy loam to loam
2C2 - 25 to 60 inches: extremely gravelly loamy sand

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: Bottomland (R043BP801MT)
Hydric soil rating: No

Minor Components

Rivra

Percent of map unit: 4 percent
Landform: Flood plains
Down-slope shape: Linear

Across-slope shape: Linear
Ecological site: Gravel (Gr) 10-14" p.z. (R044XC447MT)
Hydric soil rating: No

Ryell

Percent of map unit: 4 percent
Landform: Flood plains, drainageways, flood-plain steps
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) 10-14" p.z. (R044XC455MT)
Hydric soil rating: No

Fairway

Percent of map unit: 2 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty (Si) 10-14" p.z. (R044XC455MT)
Hydric soil rating: No

137B—Musselshell-Crago complex, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: 4yph
Elevation: 3,600 to 4,500 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 37 to 45 degrees F
Frost-free period: 105 to 120 days
Farmland classification: Farmland of local importance

Map Unit Composition

Musselshell and similar soils: 70 percent
Crago and similar soils: 25 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Musselshell

Setting

Landform: Alluvial fans, hillsides, plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy alluvium derived from limestone; coarse-loamy slope alluvium derived from limestone

Typical profile

A - 0 to 4 inches: loam
Bk1 - 4 to 34 inches: gravelly loam
Bk2 - 34 to 60 inches: very gravelly sandy loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 60 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: Limy (Ly) LRU 44B-A (R044BA030MT)
Hydric soil rating: No

Description of Crago

Setting

Landform: Alluvial fans, hillsides, escarpments, plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Gravelly alluvium derived from limestone; gravelly colluvium derived from limestone; gravelly slope alluvium derived from limestone

Typical profile

A - 0 to 4 inches: gravelly loam
Bk1 - 4 to 32 inches: very gravelly clay loam
Bk2 - 32 to 60 inches: extremely gravelly loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 70 percent
Available water storage in profile: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: Limy (Ly) LRU 44B-A (R044BA030MT)
Hydric soil rating: No

Minor Components

Amesha

Percent of map unit: 2 percent
Landform: Hillsides, plains, knolls, alluvial fans
Landform position (two-dimensional): Footslope, toeslope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty-Limy (SiLy) 10-14" p.z. (R044XC457MT)
Hydric soil rating: No

Crago, cobbly

Percent of map unit: 2 percent
Landform: Alluvial fans, hillsides, escarpments, plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty-Limy (SiLy) 10-14" p.z. (R044XC457MT)
Hydric soil rating: No

Delpoint

Percent of map unit: 1 percent
Landform: Escarpments, hills, knolls
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Draft Silty (Si) RRU 46-N 13-19" p.z. (R046XN252MT)
Hydric soil rating: No

309A—Thess-Scravo complex, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 4ys7
Elevation: 3,600 to 4,500 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 37 to 45 degrees F
Frost-free period: 105 to 120 days
Farmland classification: Farmland of local importance

Map Unit Composition

Thess and similar soils: 50 percent
Scravo and similar soils: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Thess

Setting

Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear

Parent material: Alluvium

Typical profile

A - 0 to 4 inches: loam
Bk1 - 4 to 25 inches: loam
2Bk2 - 25 to 60 inches: extremely gravelly sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: Limy (Ly) LRU 44B-A (R044BA030MT)
Hydric soil rating: No

Description of Scravo

Setting

Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 6 inches: gravelly loam
Bk1 - 6 to 17 inches: extremely gravelly sandy loam
2Bk2 - 17 to 60 inches: extremely gravelly sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very low (about 2.8 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: B
Ecological site: Shallow to Gravel (SwGr) LRU 44B-A (R044BA134MT)
Hydric soil rating: No

Minor Components

Scravo
Percent of map unit: 5 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Shallow to Gravel (SwGr) 10-14" p.z. (R044XC454MT)
Hydric soil rating: No

Nippt
Percent of map unit: 5 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Shallow to Gravel (SwGr) 10-14" p.z. (R044XC454MT)
Hydric soil rating: No

406A—Nippt gravelly loam, 0 to 2 percent slopes

Map Unit Setting
National map unit symbol: 4yt0
Elevation: 3,600 to 4,500 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 37 to 45 degrees F
Frost-free period: 105 to 120 days
Farmland classification: Not prime farmland

Map Unit Composition
Nippt and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nippt

Setting
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Gravelly alluvium over sandy and gravelly alluvium

Typical profile
E - 0 to 3 inches: gravelly loam
Bt - 3 to 9 inches: very gravelly clay loam
Bk1 - 9 to 15 inches: very gravelly sandy loam
2Bk2 - 15 to 60 inches: very gravelly sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Very low (about 2.3 inches)

Interpretive groups

Land capability classification (irrigated): 6s
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: Shallow to Gravel (SwGr) LRU 44B-A (R044BA134MT)
Hydric soil rating: No

Minor Components

Scravo

Percent of map unit: 2 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Shallow to Gravel (SwGr) 10-14" p.z. (R044XC454MT)
Hydric soil rating: No

Thess

Percent of map unit: 2 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Silty-Limy (SiLy) 10-14" p.z. (R044XC457MT)
Hydric soil rating: No

Nippt, greater slope

Percent of map unit: 1 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Shallow to Gravel (SwGr) 10-14" p.z. (R044XC454MT)
Hydric soil rating: No

Soil Information for All Uses

Suitabilities and Limitations for Use

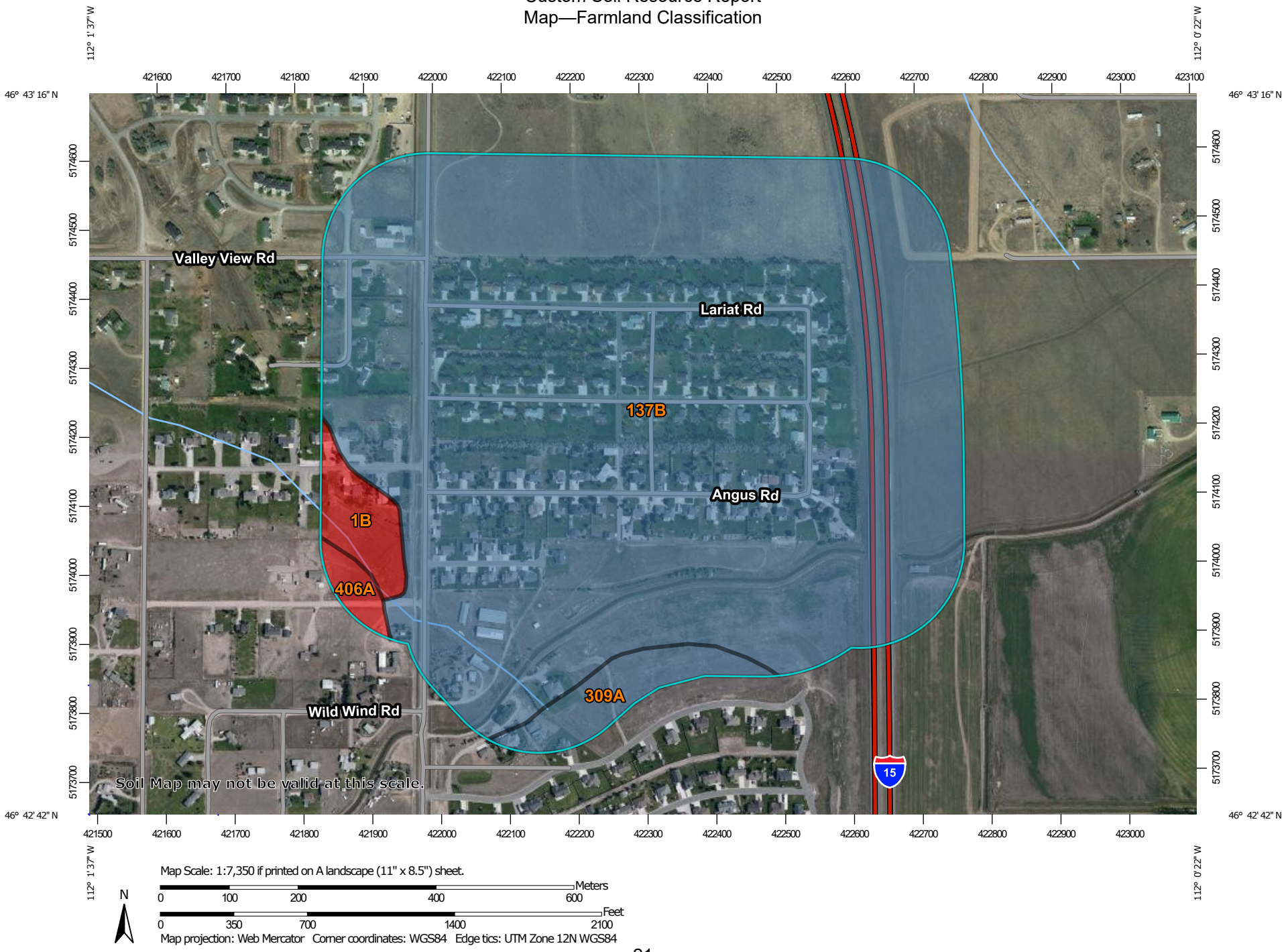
The Suitabilities and Limitations for Use section includes various soil interpretations displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation.

Land Classifications

Land Classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

Farmland Classification

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.


112° 1' 37" W
112° 0' 22" W
46° 43' 16" N
46° 42' 42" N
421600
421700
421800
421900
422000
422100
422200
422300
422400
422500
422600
422700
422800
422900
423000
423100
421500
5174600
5174500
5174400
5174300
5174200
5174100
5174000
5173900
5173800
5173700
Valley View Rd
Lariat Rd
137B
Angus Rd
1B
406A
309A
Wild Wind Rd
15
Soil Map may not be valid at this scale.
Map Scale: 1:7,350 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0
100
200
400
600
Feet
0
350
700
1400
2100
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

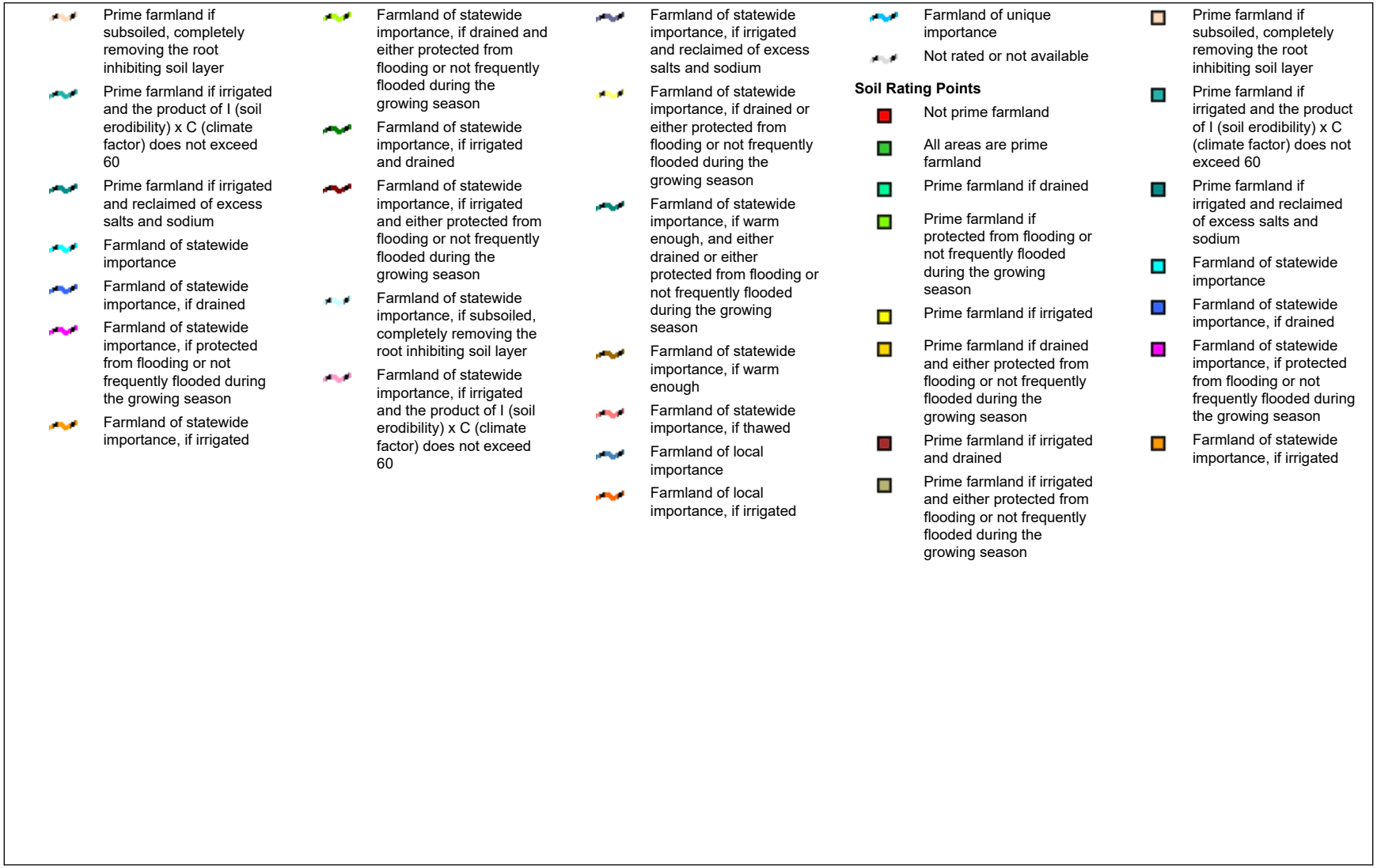
Soils

Soil Rating Polygons

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of statewide importance, if drained
- Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated
- Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated and drained
- Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
- Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough
- Farmland of statewide importance, if thawed
- Farmland of local importance
- Farmland of local importance, if irrigated
- Farmland of unique importance
- Not rated or not available

Soil Rating Lines

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season


Prime farmland if subsoiled, completely removing the root inhibiting soil layer
Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Prime farmland if irrigated and reclaimed of excess salts and sodium
Farmland of statewide importance
Farmland of statewide importance, if drained
Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if irrigated
Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if irrigated and drained
Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if warm enough
Farmland of statewide importance, if thawed
Farmland of local importance
Farmland of local importance, if irrigated
Farmland of unique importance
Not rated or not available
Soil Rating Points
Not prime farmland
All areas are prime farmland
Prime farmland if drained
Prime farmland if protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated
Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated and drained
Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
Prime farmland if subsoiled, completely removing the root inhibiting soil layer
Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Prime farmland if irrigated and reclaimed of excess salts and sodium
Farmland of statewide importance
Farmland of statewide importance, if drained
Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if irrigated

- Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated and drained
- Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
- Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough
- Farmland of statewide importance, if thawed
- Farmland of local importance
- Farmland of local importance, if irrigated
- Farmland of unique importance
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lewis and Clark County Area, Montana
Survey Area Data: Version 15, Jun 4, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 4, 2013—Jul 27, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Farmland Classification

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1B	Aridic Ustifluvents, channeled, 0 to 4 percent slopes	Not prime farmland	4.2	2.5%
137B	Musselshell-Crago complex, 2 to 8 percent slopes	Farmland of local importance	159.9	93.3%
309A	Thess-Scravo complex, 0 to 2 percent slopes	Farmland of local importance	5.7	3.3%
406A	Nippt gravelly loam, 0 to 2 percent slopes	Not prime farmland	1.7	1.0%
Totals for Area of Interest			**171.4**	**100.0%**

Rating Options—Farmland Classification

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

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Appendix E

Natural Heritage Program Species of Concern

Montana Natural Heritage - SOC Report Vshflhv#Olw#Odvw#Xsgdwhg#**04/16/2020**

Animal Species of Concern

Info:#Fdfn#%Vxep lw%#wr#dsso|#ilowhuv

MONTANA Natural Heritage Program

A program of the Montana State Library's Natural Resource Information System operated by the University of Montana.

19#Vshflhv#ri#Frqfhuq
1#Vshflfd#Wdwxv#Vshflhv
Filtered by the following criteria:
Wrz qvkls#@#344Q336Z # +edvhg#rq#p dsshg#Vshflhv#Rffxuhqfhv,

Expand All | Collapse All

Introduction

Species of Concern

Species of Concern
19 Species
Filtered by the following criteria:
Wrz qvkls#@#344Q336Z # +edvhg#rq#p dsshg#**Species Occurrences**,

MAMMALS (MAMMALIA)

TOWNSHIP = 011N003W (based on mapp

SCIENTIFIC NAME COMMON NAME TAXA SORT	FAMILY (SCIENTIFIC) FAMILY (COMMON)	GLOBAL RANK	STATE RANK	USFWS	USFS	BLM	FWP SWAP	% OF GLOBAL BREEDING RANGE IN MT	% OF MT THAT IS BREEDING RANGE
Cynomys ludovicianus Black-tailed Prairie Dog	**Sciuridae** Squirrels	G4	S3		Sensitive - Known on Forests (CG)	SENSITIVE	SGCN3	15%	71%
		Species Occurrences verified in these Counties: Big Horn, Blaine, Carbon, Carter, Cascade, Chouteau, Custer, Fallon, Fergus, Garfield, Golden Valley, Hill, Jeffe Clark, Liberty, Mccone, Musselshell, Petroleum, Phillips, Powder River, Prairie, Richland, Rosebud, Stillwater, Sweet Grass, Toole, Treasure, Valley, Wheatland, Yell **State Rank Reason:** Across much of eastern Montana this species occurs in areas with suitable soil and topography. However sylvatic plague has caused the specie colony size and dynamics. Ongoing threats from disease and persecution due to perceived competition with grazing make long-term status of this species uncertai							
Euderma maculatum Spotted Bat	**Vespertilionidae** Bats	G4	S3		Sensitive - Known on Forests (BD, CG)	SENSITIVE	SGCN3, SGIN	5%	27%
		Species Occurrences verified in these Counties: Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Cascade, Chouteau, Dawson, Fergus, Gallatin, Jefferson, Ju Madison, Musselshell, Phillips, Powder River, Richland, Rosebud, Silver Bow, Stillwater, Treasure, Yellowstone **State Rank Reason:** Little is known about this species in Montana. Although widely distributed, the species is quite rare in almost all of its range. Little is known a abundance or occupancy, or life history.							
Lasiurus cinereus Hoary Bat	**Vespertilionidae** Bats	G3G4	S3			SENSITIVE	SGCN3	2%	100%
		Species Occurrences verified in these Counties: Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Daniels, Dawson, Deer L Flathead, Gallatin, Garfield, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Mccone, Meagher, Mine Park, Petroleum, Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Silver Bow, Stillwater, Sweet Grass, Te Wheatland, Wibaux, Yellowstone							
Myotis lucifugus Little Brown Myotis	**Vespertilionidae** Bats	G3	S3				SGCN3	3%	100%
		Species Occurrences verified in these Counties: Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Daniels, Dawson, Deer L Flathead, Gallatin, Garfield, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Lincoln, Madison, Mccone, Meagher, Mineral, Mis Petroleum, Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Silver Bow, Stillwater, Sweet Grass, Teton, T Wheatland, Wibaux, Yellowstone **State Rank Reason:** Species is common and widespread, but under significant threat of catastrophic declines due to White-Nose Syndrome, a fungal disease respo populations of this species in the eastern US.							

BIRDS (AVES)

TOWNSHIP = 011N003W (based on mapp

SCIENTIFIC NAME COMMON NAME TAXA SORT	FAMILY (SCIENTIFIC) FAMILY (COMMON)	GLOBAL RANK	STATE RANK	USFWS	USFS	BLM	FWP SWAP	% OF GLOBAL BREEDING RANGE IN MT	% OF MT THAT IS BREEDING RANGE
Aechmophorus clarkii Clark's Grebe	**Podicipedidae** Grebes	G5	S3B	MBTA			SGCN3	1%	2%
		Species Occurrences verified in these Counties: Lake, Lewis and Clark, Phillips, Teton							
Ardea herodias Great Blue Heron	**Ardeidae** Bitterns / Egrets / Herons / Night-Herons	G5	S3	MBTA			SGCN3	3%	100%
		Species Occurrences verified in these Counties: Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Dawson, Deer Lodge, Fal Gallatin, Garfield, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Mccone, Meagher, Mineral, Misso Petroleum, Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Silver Bow, Stillwater, Sweet Grass, Teton, T Wibaux, Yellowstone **State Rank Reason:** Small breeding population size, evidence of recent declines, and declining regeneration of riparian cottonwood forests due to altered hydrolo							
Catharus fuscescens Veery	**Turdidae** Thrushes	G5	S3B	MBTA		SENSITIVE	SGCN3	6%	100%
		Species Occurrences verified in these Counties: Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Cascade, Chouteau, Custer, Deer Lodge, Fergus, Flathead, G Jefferson, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Mccone, Meagher, Mineral, Missoula, Musselshell, Park, Petroleum, Phillips, Pondera, Powder River, Po Roosevelt, Rosebud, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Wheatland, Yellowstone							
Coccothraustes vespertinus Evening Grosbeak	**Fringillidae** Finches	G5	S3	MBTA			SGCN3	3%	100%
		Species Occurrences verified in these Counties: Beaverhead, Broadwater, Carbon, Carter, Cascade, Chouteau, Fergus, Flathead, Gallatin, Glacier, Golden Valley, Basin, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Musselshell, Park, Pondera, Powder River, Powell, Ravalli, Sanders, Silver Bow, Stillwat Wheatland **State Rank Reason:** Populations in Montana and across North America have experienced rangewide declines, although the causes of these declines are unclear (Bo							
Dolichonyx oryzivorus Bobolink	**Icteridae** Blackbirds	G5	S3B	MBTA			SGCN3	9%	100%
		Species Occurrences verified in these Counties: Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Daniels, Dawson, Fallon, Garfield, Glacier, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Madison, Mccone, Meagher, Missoula, Musselshell, Park, Petroleum, Phillips Prairie, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Stillwater, Sweet Grass, Teton, Valley, Wheatland, Wibaux, Yellowstone **State Rank Reason:** Species has undergone recent large population declines in Montana and a patchwork of declines and increases have been documented in surro							
Gymnorhinus cyanocephalus Pinyon Jay	**Corvidae** Jays / Crows / Magpies	G3	S3	MBTA; BCC17			SGCN3	5%	55%
		Species Occurrences verified in these Counties: Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Fergus, Gallatin, Garfield, Golden Val Clark, Musselshell, Park, Petroleum, Phillips, Powder River, Rosebud, Stillwater, Sweet Grass, Wheatland, Yellowstone							

Haemorhous cassinii Cassin's Finch	**Fringillidae** Finches	G5	S3	MBTA; BCC10			SGCN3	11%	62%
		Species Occurrences verified in these Counties: Beaverhead, Big Horn, Broadwater, Carbon, Cascade, Chouteau, Custer, Deer Lodge, Fergus, Flathead, Gallatin, Granite, Jefferson, Judith Basin, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Musselshell, Park, Petroleum, Phillips, Powder River, Powell Silver Bow, Stillwater, Sweet Grass, Teton, Wheatland, Yellowstone **State Rank Reason:** Data show recent short-term declines in population for this species						
Himantopus mexicanus Black-necked Stilt	**Recurvirostridae** Avocets	G5	S3B	MBTA			SGCN3	1%	8%
		Species Occurrences verified in these Counties: Cascade, Chouteau, Gallatin, Glacier, Golden Valley, Lake, Lewis and Clark, Missoula, Phillips, Ravalli, Stillwater							
Melanerpes lewis Lewis's Woodpecker	**Picidae** Woodpeckers	G4	S2B	MBTA; BCC10; BCC17		SENSITIVE	SGCN2	8%	78%
		Species Occurrences verified in these Counties: Big Horn, Carter, Cascade, Deer Lodge, Flathead, Granite, Jefferson, Lake, Lewis and Clark, Lincoln, Missoula, M Powell, Ravalli, Rosebud, Sanders, Sweet Grass, Yellowstone							
Nucifraga columbiana Clark's Nutcracker	**Corvidae** Jays / Crows / Magpies	G5	S3	MBTA	Species of Conservation Concern on Forests (FLAT)		SGCN3	9%	84%
		Species Occurrences verified in these Counties: Beaverhead, Big Horn, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Deer Lodge, Fergus, Flathead, G Valley, Granite, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Meagher, Mineral, Missoula, Musselshell, Park, Petroleum, Phillips, Ponde Ravalli, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Wheatland, Yellowstone							
Numenius americanus Long-billed Curlew	**Scolopacidae** Sandpipers	G5	S3B	MBTA; BCC10; BCC11; BCC17		SENSITIVE	SGCN3	19%	100%
		Species Occurrences verified in these Counties: Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Cascade, Chouteau, Custer, Daniels, Dawson, Deer L Flathead, Gallatin, Garfield, Glacier, Golden Valley, Granite, Hill, Jefferson, Judith Basin, Lake, Lewis and Clark, Liberty, Madison, Mccone, Meagher, Missoula, Mu Phillips, Pondera, Powder River, Powell, Prairie, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, V Yellowstone							
Pipilo chlorurus Green-tailed Towhee	**Passerellidae** New World Sparrows	G5	S3B	MBTA			SGCN3	3%	60%
		Species Occurrences verified in these Counties: Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Chouteau, Custer, Deer Lodge, Fergus, Gallatin, Garfield, Gr Basin, Lewis and Clark, Madison, Meagher, Musselshell, Park, Petroleum, Phillips, Powder River, Silver Bow, Stillwater, Sweet Grass, Valley, Wheatland, Yellowstone **State Rank Reason:** Populations in Montana and across the Northern Rockies have undergone recent declines.							
Spizella breweri Brewer's Sparrow	**Passerellidae** New World Sparrows	G5	S3B	MBTA; BCC10; BCC17		SENSITIVE	SGCN3	12%	100%
		Species Occurrences verified in these Counties: Beaverhead, Big Horn, Blaine, Broadwater, Carbon, Carter, Chouteau, Custer, Dawson, Deer Lodge, Fallon, Fergu Garfield, Glacier, Golden Valley, Granite, Hill, Jefferson, Lake, Lewis and Clark, Liberty, Lincoln, Madison, Mccone, Meagher, Missoula, Musselshell, Park, Petroleu River, Powell, Prairie, Ravalli, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Silver Bow, Stillwater, Sweet Grass, Teton, Toole, Treasure, Valley, Wheatland, Wit **State Rank Reason:** Species faces threats from loss of sagebrush habitats it is dependent on as a result of habitat conversion for agriculture and increased frequer encroachment and drought.							
Sterna forsteri Forster's Tern	**Laridae** Gulls / Terns	G5	S3B	MBTA		SENSITIVE	SGCN3	1%	59%
		Species Occurrences verified in these Counties: Beaverhead, Blaine, Cascade, Chouteau, Hill, Lake, Lewis and Clark, Petroleum, Phillips, Powell, Roosevelt, She							

FISH (ACTINOPTERYGII)

TOWNSHIP = 011N003W (based on mapp

SCIENTIFIC NAME COMMON NAME TAXA SORT	FAMILY (SCIENTIFIC) FAMILY (COMMON)	GLOBAL RANK	STATE RANK	USFWS	USFS	BLM	FWP SWAP	% OF GLOBAL BREEDING RANGE IN MT	% OF MT THAT IS BREEDING RANGE
Oncorhynchus clarkii lewisi Westslope Cutthroat Trout	**Salmonidae** Trout	G5T4	S2		Sensitive - Known on Forests (BD, BRT, CG, HLC, KOOT, LOLO)	SENSITIVE	SGCN2		34%
		Species Occurrences verified in these Counties: Beaverhead, Broadwater, Cascade, Chouteau, Deer Lodge, Fergus, Flathead, Gallatin, Glacier, Granite, Jefferso and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Pondera, Powell, Ravalli, Sanders, Silver Bow, Teton, Wheatland **State Rank Reason:** The Westslope Cutthroat trout is currently ranked "S2" in Montana because it is at risk due to very limited and/or potentially declining popula habitat, making it vulnerable to extirpation in the state.							

Potential Species of Concern

Special Status Species

Additions To Statewide List

Species Removed From Statewide List

Species of Greatest Inventory Need

Citation for data on this website:
Montana Animal Species of Concern Report. Montana Natural Heritage Program and Montana Fish, Wildlife and Parks. Retrieved on 6/24/2020, from http://mtnhp.org/SpeciesOfConcern/?AorP=a

Montana Natural Heritage - SOC Report

Plant Species of Concern

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Expand All | Collapse All

Introduction

Species of Concern

Species of Concern

1 Species

Filtered by the following criteria:

Wrz qvkls#@ #344Q336Z # +edvhg#cq#p dsshg#**Species Occurrences**,

FLOWERING PLANTS - DICOTS (MAGNOLIOPSIDA)

TOWNSHIP = 011N003W (based on mapp

SCIENTIFIC NAME COMMON NAME TAXA SORT	OTHER NAMES	FAMILY (SCIENTIFIC) FAMILY (COMMON)	GLOBAL RANK	STATE RANK	USFWS	USFS	BLM	MNPS THREAT CATEGORY
Atriplex truncata Wedge-leaf Saltbush		Amaranthaceae Amaranth (Pigweed) Family	G5	S3				3
			Species Occurrences verified in these Counties: Beaverhead, Deer Lodge, Jefferson, Lake, Lewis and Clark, Madison, Park, Po **State Rank Reason:** Known from two extent occurrences; one in the Centennial Valley and the other near Warm Springs. Also, k collections in the western half of the state. Additional population and trend data are needed to better evaluate the species' vul					

Potential Species of Concern

Special Status Species

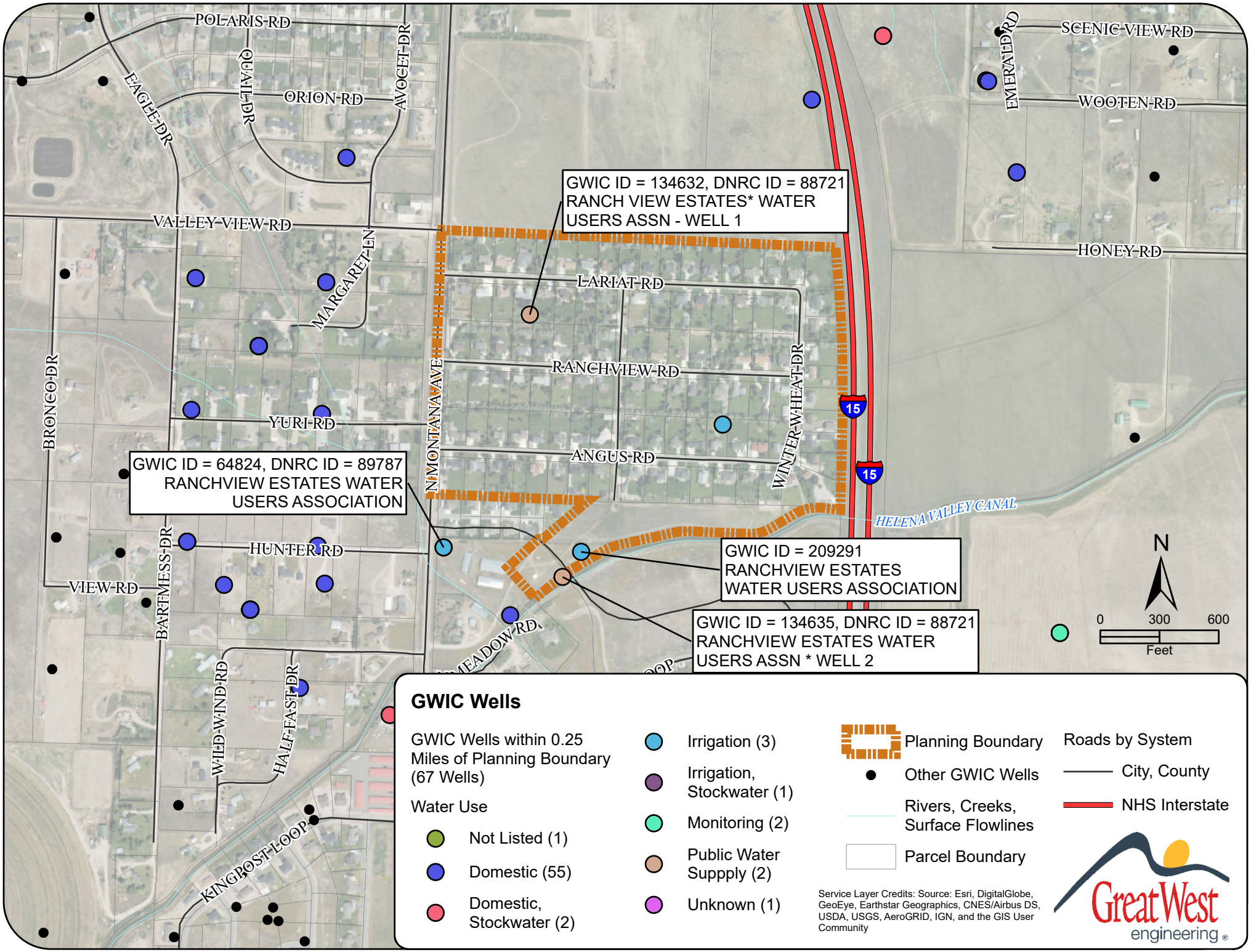
Additions To Statewide List

Species Removed From Statewide List

Citation for data on this website:
Montana Plant Species of Concern Report. Montana Natural Heritage Program. Retrieved on 6/24/2020, from http://mtnhp.org/SpeciesOfConcern/?AorP=p

Appendix F

Ground Water Information Center Summary of Area Wells



F:\1-19148-Ranchview Estates Water District\CADD 1-19148\GIS\Maps\Wells.mxd

GWICID	SITE_NAME	LATITUDE	LONGITUDE	GEOMETHOD	DATUM_LATL	DATE_LATLO	ALTITUDE	METHOD_ALT	DATUM_ALTI	DATE_ALTIT	TOWNSHIP	RANGE	SECTION	QSECTION	COUNTY	STATE	DRAINAGE_B	ADDITION_S	BLOCK	LOT
5836	JAKOVAC JOE * HELENA MT	46.7127	-112.0225	MAP	NAD27		3783				11N	03W	18	ADDA	LEWIS AND CLARK	MT	BA			
64738	WEST HELENA FIRE DEPARTMENT.	46.720039	-112.022736	TRS-SEC	NAD83	20040608	3895				11N	03W	7	DDD	LEWIS AND CLARK	MT	BA			
64740	SKILLMAN, DAN AND LOLA	46.7214083	-112.0098769	SUR-GPS	WGS84	20110418	3812.49	SUR-GPS	NAVD88	20110418	11N	03W	8	DCBB	LEWIS AND CLARK	MT	BA	WOOTEN FIRST ADD		13
64758	FARR ARTHUR	46.72013486	-112.009189	TRS-SEC	NAD83	20100308	3805				11N	03W	8	DCC	LEWIS AND CLARK	MT	BA			
64768	WOOTEN CARL	46.72013486	-112.009189	TRS-SEC	NAD83	20100308	3810				11N	03W	8	DCC	LEWIS AND CLARK	MT	BA			
64819	WIRTH PHILIP R.	46.714658	-112.02052	TRS-SEC	NAD83	20040608	0				11N	03W	17	BCB	LEWIS AND CLARK	MT	BA			
64823	DOUBECK JOHN	46.713741	-112.019131	TRS-SEC	NAD83		3780				11N	03W	17	BC	LEWIS AND CLARK	MT	BA			
64824	RANCHVIEW ESTATES WATER USERS ASSOCIATION	46.714658	-112.02052	TRS-SEC	NAD83	20040301	3760				11N	03W	17	BCB	LEWIS AND CLARK	MT	BA	RANCH VIEW ESTATES		
64846	FOLSOM D./GUNLOCK G.	46.717378	-112.024386	TRS-SEC	NAD83		0				11N	03W	18	AA	LEWIS AND CLARK	MT	BA			
64849	RUSHFORD CONST	46.713703	-112.024386	TRS-SEC	NAD83		0				11N	03W	18	AD	LEWIS AND CLARK	MT	BA			
64850	MCNEIL DWAYNE	46.7141	-112.0241	UNKNOWN	NAD27		3800				11N	03W	18	ADBC	LEWIS AND CLARK	MT	BA			
64879	JAKOVAC JERRY	46.7123	-112.0215	SUR-GPS	NAD83	20040809	3780.73			20040809	11N	03W	18	ADD	LEWIS AND CLARK	MT	BA			
65329	MCNEAL S P	46.71462193	-112.0230656	TRS-SEC	NAD83	20191001	0				11N	03W	18	ADA	LEWIS AND CLARK	MT	BA	POLARIS		12
105599	BARTMESS BOB	46.717378	-112.024386	TRS-SEC	NAD83		0				11N	03W	18	AA	LEWIS AND CLARK	MT	BA			
121816	TERRIAULT D/TAYLOR C	46.713703	-112.024386	TRS-SEC	NAD83		0				11N	03W	18	AD	LEWIS AND CLARK	MT	BA			
122373	PRICE LYLE & CHRISTINE	46.713741	-112.008019	TRS-SEC	NAD83		0				11N	03W	17	AC	LEWIS AND CLARK	MT	BA			
134632	RANCH VIEW ESTATES* WATER USERS ASSN - WELL 1	46.718	-112.0181	MAP	NAD27		0				11N	03W	17	BBB	LEWIS AND CLARK	MT	BA	RANCH VIEW EST.		
134635	RANCHVIEW ESTATES WATER USERS ASSN * WELL 2	46.7143	-112.0181	NAV-GPS	NAD83	20050729	0				11N	03W	17	BBB	LEWIS AND CLARK	MT	BA	RANCH VIEW EST		
135307	BARTMESS BOB	46.718296	-112.025706	TRS-SEC	NAD83		0				11N	03W	18	AAB	LEWIS AND CLARK	MT	BA	951		A&B
154703	HUSEBY DARLENE	46.717378	-112.024386	TRS-SEC	NAD83		0				11N	03W	18	AA	LEWIS AND CLARK	MT	BA	BARTESS NO 3 MINOR		3
154816	SMITH RAY	46.721055	-112.013374	TRS-SEC	NAD83		0				11N	03W	8	CD	LEWIS AND CLARK	MT	BA	WOOTEN MINOR		
158489	GOW ROBERT	46.717378	-112.024386	TRS-SEC	NAD83		0				11N	03W	18	AA	LEWIS AND CLARK	MT	BA	HALLIDAY MINOR		1
158490	GOW ROBERT	46.717378	-112.024386	TRS-SEC	NAD83		0				11N	03W	18	AA	LEWIS AND CLARK	MT	BA	HALLIDAY MINOR		2
158491	GOW ROBERT	46.717378	-112.024386	TRS-SEC	NAD83		0				11N	03W	18	AA	LEWIS AND CLARK	MT	BA	HALLIDAY MINOR		3
158492	ROTH NORBERT & SCYPHERS JOSEPH	46.713703	-112.024386	TRS-SEC	NAD83		0				11N	03W	18	AD	LEWIS AND CLARK	MT	BA			3
168333	BERTELLOTTI GARY AND CRYSTAL	46.718296	-112.025706	TRS-SEC	NAD83	20030714	0				11N	03W	18	AAB	LEWIS AND CLARK	MT	BA	HALLIDAY MAJOR NO.2		5C
170215	STEYAERT THOMAS G AND RENA K	46.718296	-112.023066	TRS-SEC	NAD83	20050829	0				11N	03W	18	AAA	LEWIS AND CLARK	MT	BA	HALLIDAY MAJOR #2		5E
170216	LANNING IKE	46.713703	-112.024386	TRS-SEC	NAD83		0				11N	03W	18	AD	LEWIS AND CLARK	MT	BA			
175985	REICHE CHARLES	46.713703	-112.024386	TRS-SEC	NAD83		0				11N	03W	18	AD	LEWIS AND CLARK	MT	BA	HOOPER MINOR		2
187345	CLARK DANIEL P AND SHARON R	46.718296	-112.023066	TRS-SEC	NAD83	20091105	0				11N	03W	18	AAA	LEWIS AND CLARK	MT	BA			5A2
189398	HENDRIX RICHARD A AND DEBORAH	46.716459	-112.023066	TRS-SEC	NAD83	20041006	0				11N	03W	18	AAD	LEWIS AND CLARK	MT	BA	LONE WOLF MAJOR		A-1D
189402	HOVING/ HORIZON HOMES	46.7173778	-112.0243858	TRS-SEC	NAD83	20140609	0				11N	03W	18	AA	LEWIS AND CLARK	MT	BA	LONE WOLF MAJOR		A-1E
193717	WADSWORTH TERRY D	46.717378	-112.024386	TRS-SEC	NAD83	20031023	0				11N	03W	18	AA	LEWIS AND CLARK	MT	BA	LONE WOLF MAJOR		A-1K
193718	DILLARD WILLIAM E AND SANDY R	46.717378	-112.024386	TRS-SEC	NAD83	20040609	0				11N	03W	18	AA	LEWIS AND CLARK	MT	BA	LONE WOLF MAJOR		A-1L
193719	MANN MARCUS E AND TITIA	46.717378	-112.024386	TRS-SEC	NAD83	20040609	0				11N	03W	18	AA	LEWIS AND CLARK	MT	BA	LONE WOLF MAJOR		A-1A
193720	HORIZON CUSTOM HOMES INC	46.717378	-112.024386	TRS-SEC	NAD83	20040609	0				11N	03W	18	AA	LEWIS AND CLARK	MT	BA	LONE WOLF MAJOR		A-1
193721	HORIZON CUSTOM HOMES INC	46.717378	-112.024386	TRS-SEC	NAD83	20040609	0				11N	03W	18	AA	LEWIS AND CLARK	MT	BA	LONE WOLF MAJOR		A-1N
193722	MCMILLIAN TODD A AND JENNIFER L	46.716459	-112.025706	TRS-SEC	NAD83	20080208	0				11N	03W	18	AAC	LEWIS AND CLARK	MT	BA	LONE WOLF MAJOR		A-1J
193723	LEWIS KURT AND LINNIE M	46.717378	-112.024386	TRS-SEC	NAD83	20040609	0				11N	03W	18	AA	LEWIS AND CLARK	MT	BA	LONE WOLF MAJOR		A-1M
193724	KROPP JIM AND GINA	46.717378	-112.024386	TRS-SEC	NAD83	20040609	0				11N	03W	18	AA	LEWIS AND CLARK	MT	BA	LONE WOLF MAJOR		A-1E
193725	HORIZON CUSTOM HOMES INC	46.717378	-112.024386	TRS-SEC	NAD83	20031022	0				11N	03W	18	AA	LEWIS AND CLARK	MT	BA	LONE WOLF MAJOR		A-1B
193726	DOCKUM FLOYD AND CONNIE	46.717378	-112.024386	TRS-SEC	NAD83	20031022	0				11N	03W	18	AA	LEWIS AND CLARK	MT	BA	LONE WOLF MAJOR		A-1C
193727	PAYNE CANDACE AND DAVID	46.717378	-112.024386	TRS-SEC	NAD83	20040609	0				11N	03W	18	AA	LEWIS AND CLARK	MT	BA	LONE WOLF MAJOR		A-1G
201027	FOLSOM DAVID	46.717378	-112.024386	TRS-SEC	NAD83	20030303	0				11N	03W	18	AA	LEWIS AND CLARK	MT	BA			
207290	SKILLMAN DAN AND LOLA	46.7213962	-112.0098375	SUR-GPS	WGS84	20110418	3812.32	SUR-GPS	NAVD88	20110418	11N	03W	8	DCBC	LEWIS AND CLARK	MT	BA	WOOTEN FIRST ADD		13
207596	HAMLIN CONSTRUCTION *MW-C	46.713741	-112.013575	TRS-SEC	NAD83	20040106	0				11N	03W	17	BD	LEWIS AND CLARK	MT	BA	BRIDGE CREEK		
207597	HAMLIN CONSTRUCTION *MW-B	46.713741	-112.013575	TRS-SEC	NAD83	20040106	0				11N	03W	17	BD	LEWIS AND CLARK	MT	BA	BRIDGE CREEK		
209291	RANCHVIEW ESTATES WATER USERS ASSOCIATION	46.714658	-112.017742	TRS-SEC	NAD83	20040312	0				11N	03W	17	BCA	LEWIS AND CLARK	MT	BA			
216639	MCNEIL DWAYNE W. & C. YVONNE	46.714622	-112.023066	TRS-SEC	NAD83	20050413	0				11N	03W	18	ADA	LEWIS AND CLARK	MT	BA	POLARIS		14
216643	MCNEIL DWAYNE W. & C. YVONNE	46.7141	-112.0229	MAP	NAD83	20050315	3797			20050315	11N	03W	18	AD	LEWIS AND CLARK	MT	BA	POLARIS		12
219993	WENE DANIEL F AND M KATHLEEN	46.716459	-112.023066	TRS-SEC	NAD83	20060809	0				11N	03W	18	AAD	LEWIS AND CLARK	MT	BA	LONE WOLF MAJOR		B2
228369	SIMMONS W AND JENNIFER L	46.714622	-112.025706	TRS-SEC	NAD83	20070316	0				11N	03W	18	ADB	LEWIS AND CLARK	MT	BA			6
228370	MCQUILLIAN GEORGE C & JOLENE M	46.714622	-112.025706	TRS-SEC	NAD83	20080208	0				11N	03W	18	ADB	LEWIS AND CLARK	MT	BA			8
228873	LARSON RICHARD	46.713703	-112.024386	TRS-SEC	NAD83	20060921	0				11N	03W	18	AD	LEWIS AND CLARK	MT	BA			
234537	BERGAN SETH M AND BREANNE M	46.713703	-112.024386	TRS-SEC	NAD83	20080208	0				11N	03W	18	AD	LEWIS AND CLARK	MT	BA	WILDWIND MINOR		2
234867	HEPPNER ESTHER	46.713703	-112.024386	TRS-SEC	NAD83	20070326	0				11N	03W	18	AD	LEWIS AND CLARK	MT	BA	WILDWIND MINOR		1
248703	BRIDGE CREEK ESTATES	46.713741	-112.008019	TRS-SEC	NAD83	20090129	0				11N	03W	17	AC	LEWIS AND CLARK	MT	BA	BRIDGE CREEK ESTATES - MONITORING WELL #1		
248707	BRIDGE CREEK ESTATES	46.713741	-112.008019	TRS-SEC	NAD83	20090129	0				11N	03W	17	AC	LEWIS AND CLARK	MT	BA	BRIDGE CREEK ESTATES MONITORING WELL #2		
276550	GRUB STAKE RESTAURANT & LOUNGE	46.71649226	-112.014964	TRS-SEC	NAD83	20140204	0				11N	03W	17	BAC	LEWIS AND CLARK	MT	BA			
285983	FRONTIER BUILDERS	46.713703	-112.024386	TRS-SEC	NAD83	20160203	0				11N	03W	18	AD	LEWIS AND CLARK	MT		TIMBERWORKS ESTATES PH IV		60
285984	FRONTIER BUILDERS	46.713703	-112.024386	TRS-SEC	NAD83	20160203	0				11N	03W	18	AD	LEWIS AND CLARK	MT		TIMBERWORKS ESTATES PH IV		61
285996	AFFILIATED CONSTRUCTION GROUP	46.713703	-112.024386	TRS-SEC	NAD83	20160208	0				11N	03W	18	AD	LEWIS AND CLARK	MT		TIMBERWORKS ESTATES PH IV		94
287197	MCNEIL, KEN	46.713703	-112.024386	TRS-SEC	NAD83	20160526	0				11N	03W	18	AD	LEWIS AND CLARK	MT		POLARIS		10
290486	MCNEIL, DWAYNE	46.71462193	-112.0257061	TRS-SEC	NAD83	20200403	0				11N	03W	18	ADB	LEWIS AND CLARK	MT	BA	POLARIS		9
290699	MCNEIL, DWAYNE	46.7137033	-112.0243858	TRS-SEC	NAD83	20161230	0				11N	03W	18	AD	LEWIS AND CLARK	MT	BA	POLARIS		11
301435	MADE IT HOME RANCH LLC	46.72197536	-112.0119792	TRS-SEC	NAD83	20190528	0				11N	03W	8	CDA	LEWIS AND CLARK	MT	BA			
302124	MADE-IT-HOME RANCH LLC	46.72197536	-112.0119792	TRS-SEC	NAD83	20191125	0				11N	03W	8	CDA	LEWIS AND CLARK	MT	BA			

GWICID	CERTOFSURV	PARCEL	ASSESSORTR	GEOCODE	SITE_TYPE	TOTAL_DEPT	SWL	DATE_COMPL	HOW_DRILLE	DRILLING_C	DRILLER_NA	DRILLER_LI	DRILLER_00	DRILLER_FI	VERIFIED_T	ABANDONED_	DATE_ABAND	STATUS	FLOWING	DEPTH_WATE	AQUIFER	PRIORITY
5836					WELL	0	0						0					NEW WELL		0	110ALVM	1
64738					WELL	88	34	19760101	CABLE	WELCH		WWC	100		40909			NEW WELL		44	400SPKN	1
64740				05199508403010000	WELL	220	70	19770302	AIR ROTARY	LINDSAY DRILLING CO INC	TERRY LINDSAY	WWC	253		40914			NEW WELL		180	400SPKN	1
64758				05199508401020000	WELL	238.5	45	19781004	CABLE	JOHNSON		WWC	273		40922			NEW WELL		238	400SPKN	1
64768				05199508401010000	WELL	265	45	19780309	CABLE	JOHNSON		WWC	273		40931			NEW WELL		264	400SPKN	1
64819					WELL	150	20	19731214	CABLE	LINDSAY DRILLING CO INC	WESLEY LINDSAY	WWC	38		40954			NEW WELL		50		0
64823					WELL	72	44	19720525	CHURN	MAHLUM DRILLING	LEONARD C. MAHLUM	WWC	225		40955			NEW WELL		62	110ALVM	1
64824					WELL	115	38.5	19730804	CHURN	MAHLUM DRILLING	LEONARD C. MAHLUM	WWC	225	Â	40956			NEW WELL	Â	90	110ALVM	1
64846					WELL	111	71	19890501	CABLE	WELCH		WWC	100		57423			NEW WELL		111		0
64849					WELL	70	40	19791022	FORWARD ROTARY	JEROME AND OKEEFE DRILLING CO		WWC	249	885	40978			NEW WELL		70		0
64850					WELL	89	49	19861017		WELCH		WWC	100		31251			NEW WELL		79		0
64879					WELL	100	26	20031020	ROTARY	TREASURE STATE DRILLING		WWC	522		39701			DEEPENED		71	110ALVM	1
65329					WELL	77	48	19770110	CABLE	LINDSAY DRILLING CO INC		WWC	38		41264			NEW WELL		76	110ALVM	1
105599					WELL	158	50	19920317	CABLE	WELCH		WWC	100		87841			NEW WELL		138		0
121816					WELL	112	40	19901130	AIR ROTARY	LINDSAY DRILLING CO INC		WWC	7		79467			NEW WELL		80		0
122373					WELL	150	40	19910307	AIR ROTARY	LINDSAY DRILLING CO INC	TERRY LINDSAY	WWC	253		80083			NEW WELL		100		0
134632					WELL	100	53	19930427	ROTARY	H & L DRILLING INC	SHAWN TONEY	WWC	447		96197			NEW WELL		70		0
134635					WELL	120	52	19930428	ROTARY	H & L DRILLING INC	SHAWN TONEY	WWC	447	Â	96198			NEW WELL	Â	70	120SNGR	1
135307					WELL	117	87	19861101					0		97705			NEW WELL		102		0
154703					WELL	100	60	19950718	ROTARY	TREASURE STATE DRILLING	RICK L. MURRAY	WWC	351		116222			NEW WELL		60		0
154816			D		WELL	74	52	19951027	ROTARY	H & L DRILLING INC		WWC	447		116264			NEW WELL		54		0
158489					WELL	140	80	19960904	ROTARY	TREASURE STATE DRILLING	RICK L. MURRAY	WWC	351		119699			NEW WELL		80		0
158490					WELL	120	75	19960905	ROTARY	TREASURE STATE DRILLING	RICK L. MURRAY	WWC	351		119700			NEW WELL		60		0
158491					WELL	120	75	19960905	ROTARY	TREASURE STATE DRILLING	RICK L. MURRAY	WWC	351		119701			NEW WELL		60		0
158492			B		WELL	94	60	19960926	CABLE	WELCH		WWC	100		119702			NEW WELL		94		0
168333					WELL	100	60	19980701	ROTARY	TREASURE STATE DRILLING	RICK L. MURRAY	WWC	351		168242			NEW WELL		60		0
170215					WELL	120	80	19981112	ROTARY	TREASURE STATE DRILLING	RICK L. MURRAY	WWC	351		132221			NEW WELL		60		0
170216					WELL	130	65	19980512	AIR ROTARY	LINDSAY DRILLING CO INC		WWC	253		132222			NEW WELL		70		0
175985	551956\E				WELL	115	52	19990310	ROTARY	TREASURE STATE DRILLING	RICK L. MURRAY	WWC	351		135036			NEW WELL		80		0
187345					WELL	80	39	20001124	ROTARY	TREASURE STATE DRILLING		WWC	606					NEW WELL		60		0
189398					WELL	120	73	20010321	ROTARY	TREASURE STATE DRILLING		WWC	606					NEW WELL		100		0
189402	625340			05-1995-18-1-05-21-0000	WELL	120	72	20010321	ROTARY	TREASURE STATE DRILLING	GERALD HAUSER	WWC	606					NEW WELL		100		0
193717					WELL	118	68	20010831	ROTARY	TREASURE STATE DRILLING		WWC	611					NEW WELL		98		0
193718					WELL	116	65	20011002	ROTARY	TREASURE STATE DRILLING		WWC	611					NEW WELL		96		0
193719					WELL	115	70	20011003	ROTARY	TREASURE STATE DRILLING		WWC	611					NEW WELL		95		0
193720					WELL	118	71	20011003	ROTARY	TREASURE STATE DRILLING		WWC	611					NEW WELL		98		0
193721					WELL	116	62	20011003	ROTARY	TREASURE STATE DRILLING		WWC	611					NEW WELL		96		0
193722					WELL	117	69	20011003	ROTARY	TREASURE STATE DRILLING		WWC	611					NEW WELL		97		0
193723					WELL	117	64	20011003	ROTARY	TREASURE STATE DRILLING		WWC	611					NEW WELL		97		0
193724					WELL	117	63	20011004	ROTARY	TREASURE STATE DRILLING		WWC	611					NEW WELL		97		0
193725					WELL	117	67	20011004	ROTARY	TREASURE STATE DRILLING		WWC	611					NEW WELL		97		0
193726					WELL	117	67	20011004	ROTARY	TREASURE STATE DRILLING		WWC	611					NEW WELL		97		0
193727					WELL	117	65	20011005	ROTARY	TREASURE STATE DRILLING		WWC	611					NEW WELL		97		0
201027					WELL	82.8	0	19720520		FOLSOM		WWC	225					NEW WELL		72		0
207290				05199508403010000	WELL	535	50	20030729	ROTARY	LINDSAY DRILLING CO INC	TERRY LINDSAY	WWC	253					NEW WELL		450	120SDMS	1
207596					WELL	68	40.66	20031005	ROTARY	H & L DRILLING INC	SHAWN TONEY	WWC	447					NEW WELL		48		0
207597					WELL	58	40.66	20031006	ROTARY	H & L DRILLING INC	SHAWN TONEY	WWC	447					NEW WELL		38		0
209291					WELL	183	47	20031020	ROTARY	H & L DRILLING INC	SHAWN TONEY	WWC	447					NEW WELL		152		0
216639					WELL	120	57.33	20041119	ROTARY	H & L DRILLING INC		WWC	447					NEW WELL		100		0
216643					WELL	120	55	20041119	ROTARY	H & L DRILLING INC		WWC	447					NEW WELL		100		0
219993					WELL	140	65	20050629	ROTARY	TREASURE STATE DRILLING		WWC	522					NEW WELL		118		0
228369					WELL	117	65	20060825	ROTARY	A-10 DRILLING		WWC	611					NEW WELL		97		0
228370					WELL	118	64	20060825	ROTARY	A-10 DRILLING		WWC	611					NEW WELL		98		0
228873					WELL	118	64	20060908	ROTARY	A-10 DRILLING		WWC	611					NEW WELL		98		0
234537					WELL	120	60	20070220	ROTARY	TREASURE STATE DRILLING	GREG LAMPHIER	WWC	155					NEW WELL		100		0
234867					WELL	130	65	20070226	ROTARY	TREASURE STATE DRILLING	TERRY RAPRAGER	WWD	151					NEW WELL		110		0
248703					WELL	57	29	20081205	ROTARY		SHAWN TONEY	MWC	97					NEW WELL		29		0
248707					WELL	72	29	20081205	ROTARY		SHAWN TONEY	MWC	97					NEW WELL		57		0
276550					WELL	100	17	20130829	ROTARY	H & L DRILLING INC	SHAWN TONEY	WWC	447					NEW WELL		80		0
285983					WELL	131	41	20000107	ROTARY	H & L DRILLING INC	SHAWN TONEY	WWC	447					NEW WELL		111		0
285984					WELL	130	42	20160107	ROTARY	H & L DRILLING INC	SHAWN TONEY	WWC	447					NEW WELL		110		0
285996					WELL	131	48	20160105	ROTARY	H & L DRILLING INC	SHAWN TONEY	WWC	447					NEW WELL		111		0
287197					WELL	110	70	20160524	ROTARY	LINDSAY DRILLING CO INC	BRITT LINDSAY	WWC	570					NEW WELL		80		0
290486					WELL	110	65	20161202	ROTARY	LINDSAY DRILLING CO INC	BRITT LINDSAY	WWC	570					NEW WELL		78		0
290699					WELL	110	65	20161221	ROTARY	LINDSAY DRILLING CO INC	BRITT LINDSAY	WWC	570					NEW WELL		78		0
301435	3099093				WELL	38.5	0	20180807	ROTARY	WESTERN WATER WELLS	JACK CLARK	WWC	697					NEW WELL		38.5		0
302124					WELL	422	203	20190627	ROTARY	H & L DRILLING INC	SHAWN TONEY	WWC	447					NEW WELL		302		0

GWICID	WELL_USE	WELLUSE_PR	CALC_LOC	VER_LOC	NETWORK	FIELD_VISI	SWL_MEAS	SAMPLES	REPORT_LIN	ALL_WATER_	YIELD_GPM	PUMPING_WA	DNRC_WATER
5836		0	NO	YES		1	0	1	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=5836&reqby=M&	DOMESTIC			
64738		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=64738&reqby=M&	DOMESTIC	15.00 (BAILER)	88.00 (BAILER)	10977
64740		0	NO	YES		0	32	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=64740&reqby=M&	DOMESTIC	12.00 (AIR)	200.00 (AIR)	91553
64758		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=64758&reqby=M&	DOMESTIC	14.00 (BAILER)	213.00 (BAILER)	21583
64768		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=64768&reqby=M&	DOMESTIC	15.00 (BAILER)	200.00 (BAILER)	18477
64819		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=64819&reqby=M&	IRRIGATION, STOCKWATER	500.00 (AIR)	80.00 (AIR)	1169
64823		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=64823&reqby=M&	DOMESTIC	30.00 (BAILER)	60.00 (BAILER)	
64824		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=64824&reqby=M&	IRRIGATION	450.00 (AIR)		89787
64846		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=64846&reqby=M&	DOMESTIC	75.00 (BAILER)		
64849		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=64849&reqby=M&	DOMESTIC	20.00 (AIR)	50.00 (AIR)	
64850		0	NO	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=64850&reqby=M&	DOMESTIC	35.00 (BAILER)	89.00 (BAILER)	
64879		0	NO	YES		1	12	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=64879&reqby=M&	DOMESTIC, STOCKWATER	20.00 (AIR)		88773
65329		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=65329&reqby=M&	DOMESTIC	20.00 (BAILER)	60.00 (BAILER)	12414
105599		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=105599&reqby=M&	UNKNOWN	30.00 (BAILER)	130.00 (BAILER)	
121816		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=121816&reqby=M&	DOMESTIC	20.00 (AIR)		
122373		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=122373&reqby=M&	DOMESTIC	20.00 (AIR)		
134632		0	NO	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=134632&reqby=M&	PUBLIC WATER SUPPLY	91.00 (AIR)	80.00 (AIR)	88721
134635		0	NO	YES		2	0	1	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=134635&reqby=M&	PUBLIC WATER SUPPLY	94.00 (AIR)		88721
135307		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=135307&reqby=M&		15.00 (BAILER)	117.00 (BAILER)	85653
154703		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=154703&reqby=M&	DOMESTIC	20.00 (AIR)	90.00 (AIR)	106639
154816		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=154816&reqby=M&	DOMESTIC	25.00 (AIR)	65.00 (AIR)	
158489		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=158489&reqby=M&	DOMESTIC	12.00 (AIR)	135.00 (AIR)	102988
158490		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=158490&reqby=M&	DOMESTIC	20.00 (AIR)	115.00 (AIR)	102886
158491		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=158491&reqby=M&	DOMESTIC	20.00 (AIR)	115.00 (AIR)	103005
158492		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=158492&reqby=M&	DOMESTIC	20.00 (BAILER)	70.00 (BAILER)	
168333		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=168333&reqby=M&	DOMESTIC	20.00 (AIR)	100.00 (AIR)	117251
170215		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=170215&reqby=M&	DOMESTIC	20.00 (AIR)	120.00 (AIR)	30016311
170216		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=170216&reqby=M&	DOMESTIC	20.00 (AIR)	126.00 (AIR)	105635
175985		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=175985&reqby=M&	DOMESTIC	23.00 (AIR)		106698
187345		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=187345&reqby=M&	DOMESTIC	25.00 (AIR)		30047277
189398		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=189398&reqby=M&	DOMESTIC	20.00 (AIR)		30012431
189402		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=189402&reqby=M&	DOMESTIC	20.00 (AIR)		30069
193717		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=193717&reqby=M&	DOMESTIC	20.00 (AIR)		30001556
193718		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=193718&reqby=M&	DOMESTIC	20.00 (AIR)		30001529
193719		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=193719&reqby=M&	DOMESTIC	20.00 (AIR)		30001528
193720		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=193720&reqby=M&	DOMESTIC	20.00 (AIR)		30001525
193721		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=193721&reqby=M&	DOMESTIC	20.00 (AIR)		30003288
193722		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=193722&reqby=M&	DOMESTIC	20.00 (AIR)		30003287
193723		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=193723&reqby=M&	DOMESTIC	20.00 (AIR)		30002206
193724		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=193724&reqby=M&	DOMESTIC	20.00 (AIR)		30002205
193725		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=193725&reqby=M&	DOMESTIC	20.00 (AIR)		30002203
193726		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=193726&reqby=M&	DOMESTIC	20.00 (AIR)		30003286
193727		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=193727&reqby=M&	DOMESTIC	20.00 (AIR)		30002204
201027		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=201027&reqby=M&	DOMESTIC	15.00 (PUMP)		
207290		0	NO	YES		2	61	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=207290&reqby=M&	DOMESTIC	20.00 (AIR)		30006783
207596		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=207596&reqby=M&	DOMESTIC	38.00 (PUMP)	46.92 (PUMP)	
207597		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=207597&reqby=M&	DOMESTIC	50.00 (PUMP)	41.84 (PUMP)	
209291		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=209291&reqby=M&	IRRIGATION	400.00 (AIR)		
216639		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=216639&reqby=M&	DOMESTIC	108.00 (PUMP)		
216643		0	NO	YES		1	14	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=216643&reqby=M&	DOMESTIC	60.00 (AIR)		
219993		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=219993&reqby=M&	DOMESTIC	30.00 (AIR)		30022887
228369		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=228369&reqby=M&	DOMESTIC	25.00 (AIR)		30025582
228370		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=228370&reqby=M&	DOMESTIC	25.00 (AIR)		30023585
228873		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=228873&reqby=M&	DOMESTIC	25.00 (AIR)		
234537		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=234537&reqby=M&	DOMESTIC	30.00 (AIR)		30028683
234867		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=234867&reqby=M&	DOMESTIC	25.00 (AIR)		
248703		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=248703&reqby=M&	MONITORING	5.00 (AIR)		
248707		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=248707&reqby=M&	MONITORING	5.00 (AIR)		
276550		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=276550&reqby=M&	IRRIGATION	40.00 (AIR)		
285983		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=285983&reqby=M&	DOMESTIC	100.00 (AIR)		
285984		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=285984&reqby=M&	DOMESTIC	100.00 (AIR)		
285996		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=285996&reqby=M&	DOMESTIC	100.00 (AIR)		
287197		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=287197&reqby=M&	DOMESTIC	25.00 (AIR)		
290486		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=290486&reqby=M&	DOMESTIC	20.00 (AIR)		30148212
290699		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=290699&reqby=M&	DOMESTIC	20.00 (AIR)		30120950
301435		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=301435&reqby=M&	DOMESTIC, STOCKWATER	0.00 (AIR)		
302124		0	YES	YES		0	0	0	http://mbmggwic.mtech.edu/sqlserver/v11/reports/SiteSummary.asp?gwicid=302124&reqby=M&	DOMESTIC	17.00 (AIR)		30130743

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

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View scanned well log (11/21/2006 11:13:35 AM)

Site Name: RANCH VIEW ESTATES* WATER USERS ASSN - WELL 1
GWIC Id: 134632
DNRC Water Right: 88721

Section 1: Well Owner(s)

1) RANCHVIEW ESTATES WUA C/O STUART FULLER
PRESIDENT (MAIL)
PO BOX 9732
HELENA MT N/A [06/25/1999]
2) RANCH VIEW EST. (MAIL)
PO BOX 233
WOLF CREEK MT 59648 [04/27/1993]

Section 2: Location

Township	Range	Section	Quarter Sections
11N	03W	17	NW¼ NW¼ NW¼

County: LEWIS AND CLARK
Geocode:

Latitude	Longitude	Geomethod	Datum
46.718	-112.0181	MAP	NAD27

Ground Surface Altitude: **Ground Surface Method:** **Datum:** **Date:**

Addition: RANCH VIEW EST.
Block: **Lot:**

Section 3: Proposed Use of Water

PUBLIC WATER SUPPLY (1)

Section 4: Type of Work

Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Tuesday, April 27, 1993

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	19	10
19	100	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2	100	6	0.25		WELDED	STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
70	100	6		3/16X1	MILLS KNIFE

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	19	CEMENT	

Section 7: Well Test Data

Total Depth: 100
Static Water Level: 53
Water Temperature:

Air Test *

91 gpm with drill stem set at _ feet for 2 hours.
Time of recovery 0.01 hours.
Recovery water level 53 feet.
Pumping water level 80 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	70	GRAVELY CLAY
70	100	CRS SAND AND GRAVEL

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: SHAWN TONEY
Company: H & L DRILLING INC
License No: WWC-447
Date Completed: 4/27/1993

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Return to menu
Plot this site in State Library Digital Atlas
Plot this site in Google Maps
View field visits for this site
View water quality for this site
View scanned well log (11/21/2006 11:14:21 AM)

Site Name: RANCHVIEW ESTATES WATER USERS ASSN * WELL 2
GWIC Id: 134635
DNRC Water Right: 88721

Section 1: Well Owner(s)

1) RANCHVIEW ESTATES WUA C/O PRESIDENT STUART FULLER (MAIL)
PO BOX 9732
HELENA MT N/A [06/25/1999]
2) RANCH VIEW EST (MAIL)
PO BOX 233
WOLF CREEK MT 59648 [04/28/1993]

Section 2: Location

Township	Range	Section	Quarter Sections
11N	03W	17	NW¼ NW¼ NW¼

County: LEWIS AND CLARK
Geocode:

Latitude	Longitude	Geomethod	Datum
46.7143	-112.0181	NAV-GPS	NAD83

Ground Surface Altitude: **Ground Surface Method:** **Datum:** **Date:**

Addition: RANCH VIEW EST **Block:** **Lot:**

Section 3: Proposed Use of Water

PUBLIC WATER SUPPLY (1)

Section 4: Type of Work

Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Wednesday, April 28, 1993

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	19	10
19	120	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2	118	6	0.25		WELDED	STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
70	120	6		3/16X1	MILLS KNIFE

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	19	CEMENT	

Section 7: Well Test Data

Total Depth: 120
Static Water Level: 52
Water Temperature:

Air Test *

94 gpm with drill stem set at 120 feet for 2 hours.
Time of recovery 0.01 hours.
Recovery water level 52 feet.
Pumping water level _ 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

120SNGR - SAND AND GRAVEL (TERTIARY)

From	To	Description
0	70	GRAVELY CLAY
70	120	CRS SAND AND GRAVEL

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: SHAWN TONEY
Company: H & L DRILLING INC
License No: WWC-447
Date Completed: 4/28/1993

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Go to GWIC website
Plot this site in State Library Digital Atlas
Plot this site in Google Maps
View scanned well log (11/21/2006 11:13:50 AM)

Site Name: DOUBECK JOHN
GWIC Id: 64823

Section 1: Well Owner(s)

1) DOUBECK, JOHN (MAIL)
NORTH MONTANA
HELENA MT 59602 [05/25/1972]

Section 2: Location

Township	Range	Section	Quarter Sections
11N	03W	17	SW¼ NW¼

County LEWIS AND CLARK

Geocode

Latitude	Longitude	Geomethod	Datum
46.713741	-112.019131	TRS-SEC	NAD83

Ground Surface Altitude	Ground Surface Method	Datum Date
3780		

Addition **Block** **Lot**

Section 3: Proposed Use of Water

DOMESTIC (1)

Section 4: Type of Work

Drilling Method: CHURN
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Thursday, May 25, 1972

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	72.3	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-1.5	72.5	6				STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
62	72	6		1/8X6	PERFORATED CASING

Annular Space (Seal/Grout/Packer)

There are no annular space records assigned to this well.

Section 7: Well Test Data

Total Depth: 72
Static Water Level: 44
Water Temperature:

Bailer Test *

30 gpm with _ feet of drawdown after 1 hours.
Time of recovery _ hours.
Recovery water level _ feet.
Pumping water level 60 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

110ALVM - ALLUVIUM (QUATERNARY)

From	To	Description
0	14	PINK SANDY CLAYEY SILT W/ SEATTERED GRAVEL
14	16	PINK CLAYEY SILTY GRAVEL
16	25	TAN SANDY CLAYEY SILT W/ SEATTERED GRAVEL
25	26	TAN GRAVELLY CLAYEY SILT
26	52	TAN SANDY CLAYEY SILT W/ SEATTERED GRAVEL
52	54	TAN CLAY
54	56	TAN GRAVELLY CLAYEY SILT
56	63	TAN CLAYEY SILTY SAND GRAVEL
63	66	TAN GRAVELY SILTY CLAY
66	72.5	TAN CLAYEY SANDY FINE GRAVEL

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: LEONARD C. MAHLUM
Company: MAHLUM DRILLING
License No: WWC-225
Date Completed: 5/25/1972

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Go to GWIC website
Plot this site in State Library Digital Atlas
Plot this site in Google Maps

Site Name: GRUB STAKE RESTAURANT & LOUNGE
GWIC Id: 276550

Section 1: Well Owner(s)

1) GRUB STAKE RESTAURANT & LOUNGE (MAIL)
1450 LINCOLN RD. E.
HELENA MT 59602 [08/29/2013]

Section 2: Location

Township	Range	Section	Quarter Sections
11N	03W	17	SW¼ NE¼ NW¼

County: LEWIS AND CLARK
Geocode:

Latitude	Longitude	Geomethod	Datum
46.7164922633	-112.0149640155	TRS-SEC	NAD83

Ground Surface Altitude: **Ground Surface Method:** **Datum:** **Date:**

Addition: **Block:** **Lot:**

Section 3: Proposed Use of Water

IRRIGATION (1)

Section 4: Type of Work

Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Thursday, August 29, 2013

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	100	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2	100	6	0.25		WELDED	A53B STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
80	93	6	390	1"X5/16"	MILLS KNIFE

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	80	BENTONITE	

Section 7: Well Test Data

Total Depth: 100
Static Water Level: 17
Water Temperature:

Air Test *

40 gpm with drill stem set at 100 feet for 1 hours.
Time of recovery 0.05 hours.
Recovery water level 17 feet.
Pumping water level _ 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	55	BROWN CLAY & SHALEY GRAVEL
55	100	SHALEY GRAVEL

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: SHAWN TONEY
Company: H & L DRILLING INC
License No: WWC-447
Date Completed: 8/29/2013

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Go to GWIC website
Plot this site in State Library Digital Atlas
Plot this site in Google Maps
View scanned well log (11/16/2006 4:13:52 PM)

Site Name: HENDRIX RICHARD A AND DEBORAH
GWIC Id: 189398
DNRC Water Right: 30012431

Section 1: Well Owner(s)

1) HENDRIX, RICHARD A AND DEBORAH (MAIL)
1130 YURI RD
HELENA MT 59602 [03/21/2001]

Section 2: Location

Township	Range	Section	Quarter Sections
11N	03W	18	SE¼ NE¼ NE¼

County: LEWIS AND CLARK

Geocode

Latitude	Longitude	Geomethod	Datum
46.716459	-112.023066	TRS-SEC	NAD83

Ground Surface Altitude | **Ground Surface Method** | **Datum Date**

Addition: LONE WOLF MAJOR
Block:
Lot: A-1D

Section 3: Proposed Use of Water

DOMESTIC (1)

Section 4: Type of Work

Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Wednesday, March 21, 2001

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	18	8
18	120	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2	18	6	0.250			STEEL
12	120	4		160.00		PVC

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
100	120	4			1/4X4 SLOT

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	18	BENTONITE	

Section 7: Well Test Data

Total Depth: 120
Static Water Level: 73
Water Temperature:

Air Test *

20 gpm with drill stem set at 115 feet for 1 hours.
Time of recovery 1 hours.
Recovery water level 73 feet.
Pumping water level _ 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	TOPSOIL
2	15	SHALE/ CLAY
15	22	CLAY/ RUSTY RED
22	62	SHALE/ RUSTY RED/ GREEN/ GRAY
62	65	CLAY
65	97	SHALE/ RUSTY RED/ GREEN/ GRAY
97	120	SHALE/ GREEN/ GRAY

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: TREASURE STATE DRILLING
License No: WWC-606
Date Completed: 3/21/2001

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Go to GWIC website
Plot this site in State Library Digital Atlas
Plot this site in Google Maps
View scanned well log (11/21/2006 11:13:35 AM)

Site Name: RANCH VIEW ESTATES* WATER USERS ASSN - WELL 1
GWIC Id: 134632
DNRC Water Right: 88721

Section 1: Well Owner(s)

1) RANCHVIEW ESTATES WUA C/O STUART FULLER
PRESIDENT (MAIL)
PO BOX 9732
HELENA MT N/A [06/25/1999]
2) RANCH VIEW EST. (MAIL)
PO BOX 233
WOLF CREEK MT 59648 [04/27/1993]

Section 2: Location

Township	Range	Section	Quarter Sections
11N	03W	17	NW¼ NW¼ NW¼

County LEWIS AND CLARK

Geocode

Latitude	Longitude	Geomethod	Datum
46.718	-112.0181	MAP	NAD27

Ground Surface Altitude **Ground Surface Method** **Datum** **Date**

Addition RANCH VIEW EST.

Block **Lot**

Section 3: Proposed Use of Water

PUBLIC WATER SUPPLY (1)

Section 4: Type of Work

Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Tuesday, April 27, 1993

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	19	10
19	100	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2	100	6	0.25		WELDED	STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
70	100	6		3/16X1	MILLS KNIFE

Annular Space (Seal/Grout/Packer)

From	To	Description	

Section 7: Well Test Data

Total Depth: 100
Static Water Level: 53
Water Temperature:

Air Test *

91 gpm with drill stem set at _ feet for 2 hours.
Time of recovery 0.01 hours.
Recovery water level 53 feet.
Pumping water level 80 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	70	GRAVELY CLAY
70	100	CRS SAND AND GRAVEL

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: SHAWN TONEY
Company: H & L DRILLING INC
License No: WWC-447
Date Completed: 4/27/1993

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Go to GWIC website
Plot this site in State Library Digital Atlas
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View field visits for this site
View water quality for this site
View scanned well log (11/21/2006 11:14:21 AM)

Site Name: RANCHVIEW ESTATES WATER USERS ASSN * WELL 2
GWIC Id: 134635
DNRC Water Right: 88721

Section 1: Well Owner(s)

1) RANCHVIEW ESTATES WUA C/O PRESIDENT STUART FULLER (MAIL)
PO BOX 9732
HELENA MT N/A [06/25/1999]
2) RANCH VIEW EST (MAIL)
PO BOX 233
WOLF CREEK MT 59648 [04/28/1993]

Section 2: Location

Township	Range	Section	Quarter Sections
11N	03W	17	NW¼ NW¼ NW¼

County LEWIS AND CLARK — **Geocode**

Latitude	Longitude	Geomethod	Datum
46.7143	-112.0181	NAV-GPS	NAD83

Ground Surface Altitude — **Ground Surface Method** — **Datum** — **Date**

Addition RANCH VIEW EST — **Block** — **Lot**

Section 3: Proposed Use of Water

PUBLIC WATER SUPPLY (1)

Section 4: Type of Work

Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Wednesday, April 28, 1993

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	19	10
19	120	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2	118	6	0.25		WELDED	STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
70	120	6		3/16X1	MILLS KNIFE

Annular Space (Seal/Grout/Packer)

From	To	Description	

Section 7: Well Test Data

Total Depth: 120
Static Water Level: 52
Water Temperature:

Air Test *

94 gpm with drill stem set at 120 feet for 2 hours.
Time of recovery 0.01 hours.
Recovery water level 52 feet.
Pumping water level _ 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

120SNGR - SAND AND GRAVEL (TERTIARY)

From	To	Description
0	70	GRAVELY CLAY
70	120	CRS SAND AND GRAVEL

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: SHAWN TONEY
Company: H & L DRILLING INC
License No: WWC-447
Date Completed: 4/28/1993

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Go to GWIC website
Plot this site in State Library Digital Atlas
Plot this site in Google Maps
View scanned well log (11/21/2006 11:14:31 AM)

Site Name: RANCHVIEW ESTATES WATER USERS ASSOCIATION
GWIC Id: 209291

Section 1: Well Owner(s)

1) RANCHVIEW ESTATES WATER USERS ASSOCIATION (MAIL)
PO BOX 9732
HELENA MT 59604 [10/20/2003]

Section 2: Location

Township	Range	Section	Quarter Sections
11N	03W	17	NE¼ SW¼ NW¼

County / **Geocode**

LEWIS AND CLARK

Latitude	Longitude	Geomethod	Datum
46.714658	-112.017742	TRS-SEC	NAD83

Ground Surface Altitude / **Ground Surface Method** / **Datum** / **Date**

Addition / **Block** / **Lot**

Section 3: Proposed Use of Water

IRRIGATION (1)

Section 4: Type of Work

Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Monday, October 20, 2003

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	183	10

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2	148	10	0.250		WELDED	STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
152	172	9.5	70		SCREEN-CONTINUOUS-STAINLESS

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	0	BENTONITE	Y
143	143	K PACKER	

Section 7: Well Test Data

Total Depth: 183
Static Water Level: 47
Water Temperature:

Air Test *

400 gpm with drill stem set at 183 feet for 4 hours.
Time of recovery 0.25 hours.
Recovery water level 47 feet.
Pumping water level _ 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	30	SHALE GRAVEL AND CLAY
30	55	SANDY CLAY
55	79	SHALE GRAVEL AND CLAY
79	110	FRACTURED RED SHALE
110	115	HARD FRACTURED SHALE
115	145	SHALE GRAVEL AND CLAY
145	150	RED CLAY
150	183	FRACTURED SHALE

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: SHAWN TONEY
Company: H & L DRILLING INC
License No: WWC-447
Date Completed: 10/20/2003

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Go to GWIC website
Plot this site in State Library Digital Atlas
Plot this site in Google Maps
View scanned well log (11/21/2006 11:15:59 AM)

Site Name: RANCHVIEW ESTATES WATER USERS ASSOCIATION
GWIC Id: 64824
DNRC Water Right: 89787

Section 1: Well Owner(s)

1) RANCH VIEW ESTATES WATER USERS ASSN (MAIL)
7645 NORTH MONTANA AVE
HELENA MT 59602 [10/23/2002]
2) DOUBECK, JOHN (MAIL)
7645 NORTH MONTANA AVE
HELENA MT 59602 [08/04/1973]

Section 2: Location

Township	Range	Section	Quarter Sections
11N	03W	17	NW¼ SW¼ NW¼

County: LEWIS AND CLARK
Geocode:

Latitude	Longitude	Geomethod	Datum
46.714658	-112.02052	TRS-SEC	NAD83

Ground Surface Altitude	Ground Surface Method	Datum Date
3760		

Addition: RANCH VIEW ESTATES
Block:
Lot:

Section 3: Proposed Use of Water

IRRIGATION (1)

Section 4: Type of Work

Drilling Method: CHURN
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Saturday, August 4, 1973

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	115	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-1	115	6				STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
90	114	6		1/4	SAW SLOTS

Annular Space (Seal/Grout/Packer)

There are no annular space records assigned to this well.

Section 7: Well Test Data

Total Depth: 115
Static Water Level: 38.5
Water Temperature:

Air Test *

450 gpm with drill stem set at 75 feet for 36 hours.
Time of recovery _ hours.
Recovery water level _ feet.
Pumping water level _ 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

110ALVM - ALLUVIUM (QUATERNARY)

From	To	Description
0	2	TOPSOIL
2	21	RED GRAVELY CLAY
21	29	RED GRAVELY SANDY CLAY
29	40	TAN GRAVELY SANDY SILTY CLAY
40	46	TAN GRAVELY CLAY
46	53	TAN CLAYEY GRAVEL
53	60	RED CLAY SANDY GRAVEL
60	65	RED SILTY SANDY CLAY
65	67	RED SANDY GRAVEL
67	71	RED SANDY GRAVELY CLAY
71	73	RED FINE SILTY SAND
73	78	RED SANDY CLAY
78	81	RED COARSE SANDY GRAVEL
81	85	RED CLAYEY GRAVEL
85	95	RED COARSE SAND

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: LEONARD C. MAHLUM
Company: MAHLUM DRILLING
License No: WWC-225
Date Completed: 8/4/1973

Site Name: RANCHVIEW ESTATES WATER USERS ASSOCIATION
GWIC Id: 64824
Additional Lithology Records

From	To	Description
95	97	RED FINE SAND
97	102	RED GRAVELY SAND
102	115	RED SANDY PEA GRAVEL

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Go to GWIC website
Plot this site in State Library Digital Atlas
Plot this site in Google Maps
View scanned well log (11/16/2006 4:13:38 PM)

Site Name: WENE DANIEL F AND M KATHLEEN
GWIC Id: 219993
DNRC Water Right: 30022887

Section 1: Well Owner(s)

1) WENE, DANIEL F AND M KATHLEEN (MAIL)
1165 YURI ROAD
HELENA MT 59602-8387 [08/09/2006]
2) HOVING, RON (MAIL)
1165 YURI ROAD
HELENA MT 59624 [06/29/2005]

Section 2: Location

Township	Range	Section	Quarter Sections
11N	03W	18	SE¼ NE¼ NE¼

County: LEWIS AND CLARK
Geocode:

Latitude	Longitude	Geomethod	Datum
46.716459	-112.023066	TRS-SEC	NAD83

Ground Surface Altitude: **Ground Surface Method:** **Datum Date:**

Addition: LONE WOLF MAJOR **Block:** **Lot:** B2

Section 3: Proposed Use of Water

DOMESTIC (1)

Section 4: Type of Work

Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Wednesday, June 29, 2005

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	18	9
18	140	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-1.5	18.5	6	0.250		WELDED	STEEL
7	138	4		220.00	SOLVENT WELD	PVC

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
118	138	4		.030	SCREEN-CONTINUOUS-PVC

Annular Space (Seal/Grout/Packer)

Section 7: Well Test Data

Total Depth: 140
Static Water Level: 65
Water Temperature:

Air Test *

30 gpm with drill stem set at 140 feet for 1 hours.
Time of recovery 1 hours.
Recovery water level 65 feet.
Pumping water level _ 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

DRILLED BY TERRY RAPRAGER, USED 5 BAGS OF BENTONITE

Section 9: Well Log

Geologic Source

Unassigned

From	To	Description
0	4	BOULDERS AND GRAVEL
4	15	GRAVELY SILTY CLAY
15	22	BROWNISH CLAY AND GRAVEL
22	31	REDDISH BROWN SANDY CLAY
31	39	REDDISH BROWN GRAVELY CLAY
39	75	REDDISH BROWN SILTY GRAVEL
75	92	REDDISH BROWN GRAVEL
92	107	REDDISH BROWN SILTY CLAY
107	131	REDDISH BROWN GRAVEL AND SAND
131	140	REDDISH BROWN GRAVEL AND COBBLES

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: TREASURE STATE DRILLING
License No: WWC-522
Date Completed: 6/29/2005

MONTANA WELL LOG REPORT

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Other Options

Go to GWIC website
Plot this site in State Library Digital Atlas
Plot this site in Google Maps
View scanned well log (11/21/2006 11:16:45 AM)

Site Name: WIRTH PHILIP R.
GWIC Id: 64819
DNRC Water Right: 1169

Section 1: Well Owner(s)

1) WIRTH, PHILIP R (MAIL)
PO BOX 233
WOLF CREEK MT 59648-0233 [06/08/2004]
2) DOUBECK, JOHN (MAIL)
HELENA VALLEY
HELENA MT N/A [12/14/1973]

Section 2: Location

Township	Range	Section	Quarter Sections
11N	03W	17	NW¼ SW¼ NW¼

County LEWIS AND CLARK

Geocode

Latitude	Longitude	Geomethod	Datum
46.714658	-112.02052	TRS-SEC	NAD83

Ground Surface Altitude **Ground Surface Method** **Datum** **Date**

Addition **Block** **Lot**

Section 3: Proposed Use of Water

IRRIGATION (1)
STOCKWATER (2)

Section 4: Type of Work

Drilling Method: CABLE
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Friday, December 14, 1973

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	150	10

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
0	150	10			WELDED	STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
50	150	10		1/4X1.25IN	PERFORATED CASING

Annular Space (Seal/Grout/Packer)

There are no annular space records assigned to this well.

Section 7: Well Test Data

Total Depth: 150
Static Water Level: 20
Water Temperature:

Air Test *

500 gpm with drill stem set at _ feet for 4 hours.
Time of recovery _ hours.
Recovery water level _ feet.
Pumping water level 80 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	5	TOPSOIL & GRAVEL
5	40	GRAVEL & CLAY
40	48	CLAY
48	69	GRAVEL & SAND
69	150	ALTERNATE LAYERS OF SAND & GRAVEL SM CLAY SEAMS

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: WESLEY LINDSAY
Company: LINDSAY DRILLING CO INC
License No: WWC-38
Date Completed: 12/14/1973

MONTANA WELL LOG REPORT

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Other Options

Return to menu
Plot this site in State Library Digital Atlas
Plot this site in Google Maps
View scanned well log (11/21/2006 11:15:59 AM)

Site Name: RANCHVIEW ESTATES WATER USERS ASSOCIATION
GWIC Id: 64824
DNRC Water Right: 89787

Section 1: Well Owner(s)

1) RANCH VIEW ESTATES WATER USERS ASSN (MAIL)
7645 NORTH MONTANA AVE
HELENA MT 59602 [10/23/2002]
2) DOUBECK, JOHN (MAIL)
7645 NORTH MONTANA AVE
HELENA MT 59602 [08/04/1973]

Section 2: Location

Township	Range	Section	Quarter Sections
11N	03W	17	NW¼ SW¼ NW¼

County: LEWIS AND CLARK
Geocode:

Latitude	Longitude	Geomethod	Datum
46.714658	-112.02052	TRS-SEC	NAD83

Ground Surface Altitude	Ground Surface Method	Datum	Date
3760			

Addition: RANCH VIEW ESTATES
Block:
Lot:

Section 3: Proposed Use of Water

IRRIGATION (1)

Section 4: Type of Work

Drilling Method: CHURN
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Saturday, August 4, 1973

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	115	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-1	115	6				STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
90	114	6		1/4	SAW SLOTS

Annular Space (Seal/Grout/Packer)

There are no annular space records assigned to this well.

Section 7: Well Test Data

Total Depth: 115
Static Water Level: 38.5
Water Temperature:

Air Test *

450 gpm with drill stem set at 75 feet for 36 hours.
Time of recovery _ hours.
Recovery water level _ feet.
Pumping water level _ 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

110ALVM - ALLUVIUM (QUATERNARY)

From	To	Description
0	2	TOPSOIL
2	21	RED GRAVELY CLAY
21	29	RED GRAVELY SANDY CLAY
29	40	TAN GRAVELY SANDY SILTY CLAY
40	46	TAN GRAVELY CLAY
46	53	TAN CLAYEY GRAVEL
53	60	RED CLAY SANDY GRAVEL
60	65	RED SILTY SANDY CLAY
65	67	RED SANDY GRAVEL
67	71	RED SANDY GRAVELY CLAY
71	73	RED FINE SILTY SAND
73	78	RED SANDY CLAY
78	81	RED COARSE SANDY GRAVEL
81	85	RED CLAYEY GRAVEL
85	95	RED COARSE SAND

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: LEONARD C. MAHLUM
Company: MAHLUM DRILLING
License No: WWC-225
Date Completed: 8/4/1973

Site Name: RANCHVIEW ESTATES WATER USERS ASSOCIATION
GWIC Id: 64824
Additional Lithology Records

From	To	Description
95	97	RED FINE SAND
97	102	RED GRAVELY SAND
102	115	RED SANDY PEA GRAVEL

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Return to menu
Plot this site in State Library Digital Atlas
Plot this site in Google Maps
View scanned well log (11/21/2006 11:14:31 AM)

Site Name: RANCHVIEW ESTATES WATER USERS ASSOCIATION
GWIC Id: 209291

Section 1: Well Owner(s)

1) RANCHVIEW ESTATES WATER USERS ASSOCIATION (MAIL)
PO BOX 9732
HELENA MT 59604 [10/20/2003]

Section 2: Location

Township	Range	Section	Quarter Sections
11N	03W	17	NE¼ SW¼ NW¼

County / **Geocode**
LEWIS AND CLARK

Latitude	Longitude	Geomethod	Datum
46.714658	-112.017742	TRS-SEC	NAD83

Ground Surface Altitude **Ground Surface Method** **Datum** **Date**

Addition **Block** **Lot**

Section 3: Proposed Use of Water

IRRIGATION (1)

Section 4: Type of Work

Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Monday, October 20, 2003

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	183	10

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2	148	10	0.250		WELDED	STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
152	172	9.5	70		SCREEN-CONTINUOUS-STAINLESS

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	0	BENTONITE	Y
143	143	K PACKER	

Section 7: Well Test Data

Total Depth: 183
Static Water Level: 47
Water Temperature:

Air Test *

400 gpm with drill stem set at 183 feet for 4 hours.
Time of recovery 0.25 hours.
Recovery water level 47 feet.
Pumping water level _ 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

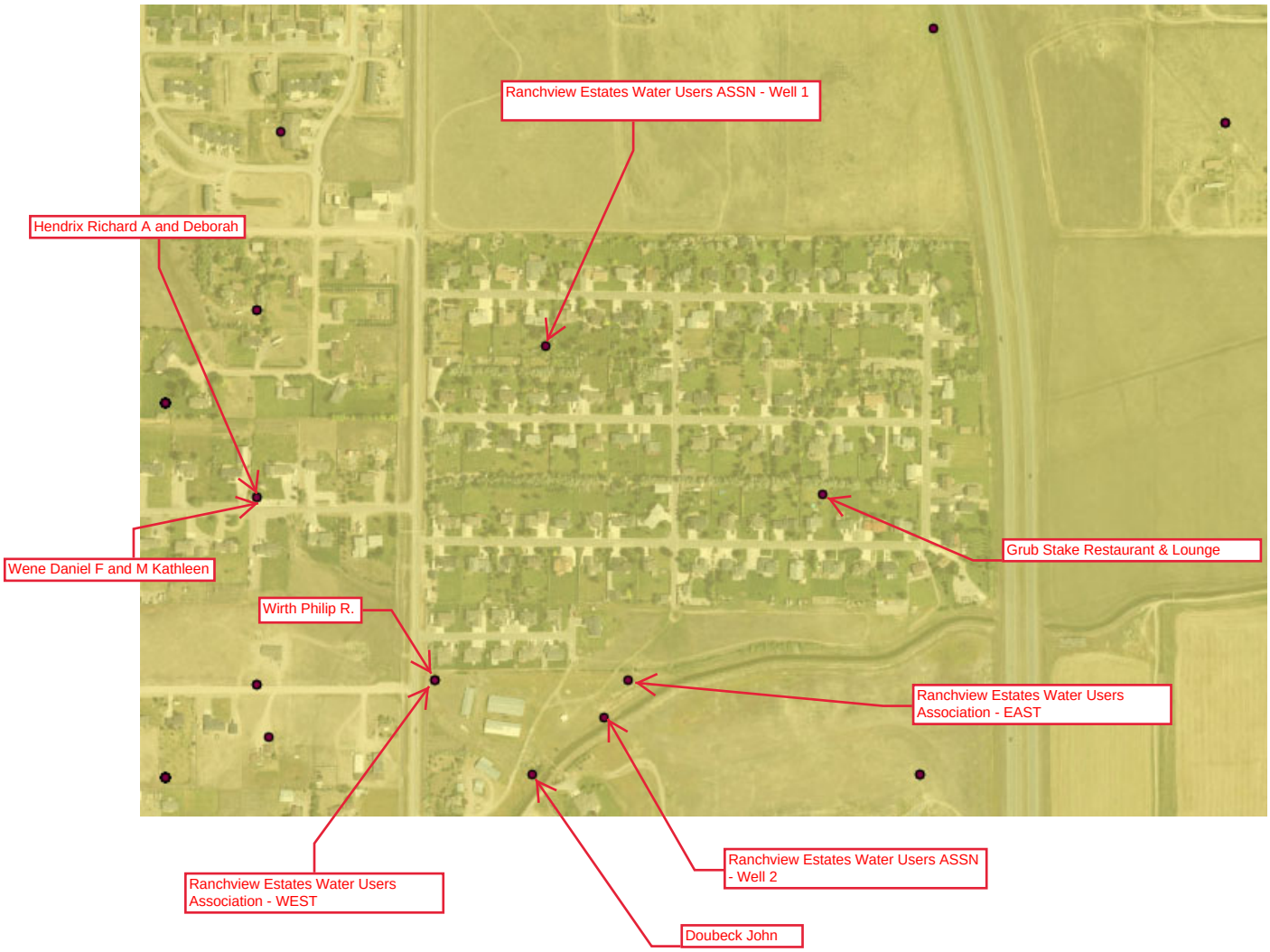
From	To	Description
0	30	SHALE GRAVEL AND CLAY
30	55	SANDY CLAY
55	79	SHALE GRAVEL AND CLAY
79	110	FRACTURED RED SHALE
110	115	HARD FRACTURED SHALE
115	145	SHALE GRAVEL AND CLAY
145	150	RED CLAY
150	183	FRACTURED SHALE

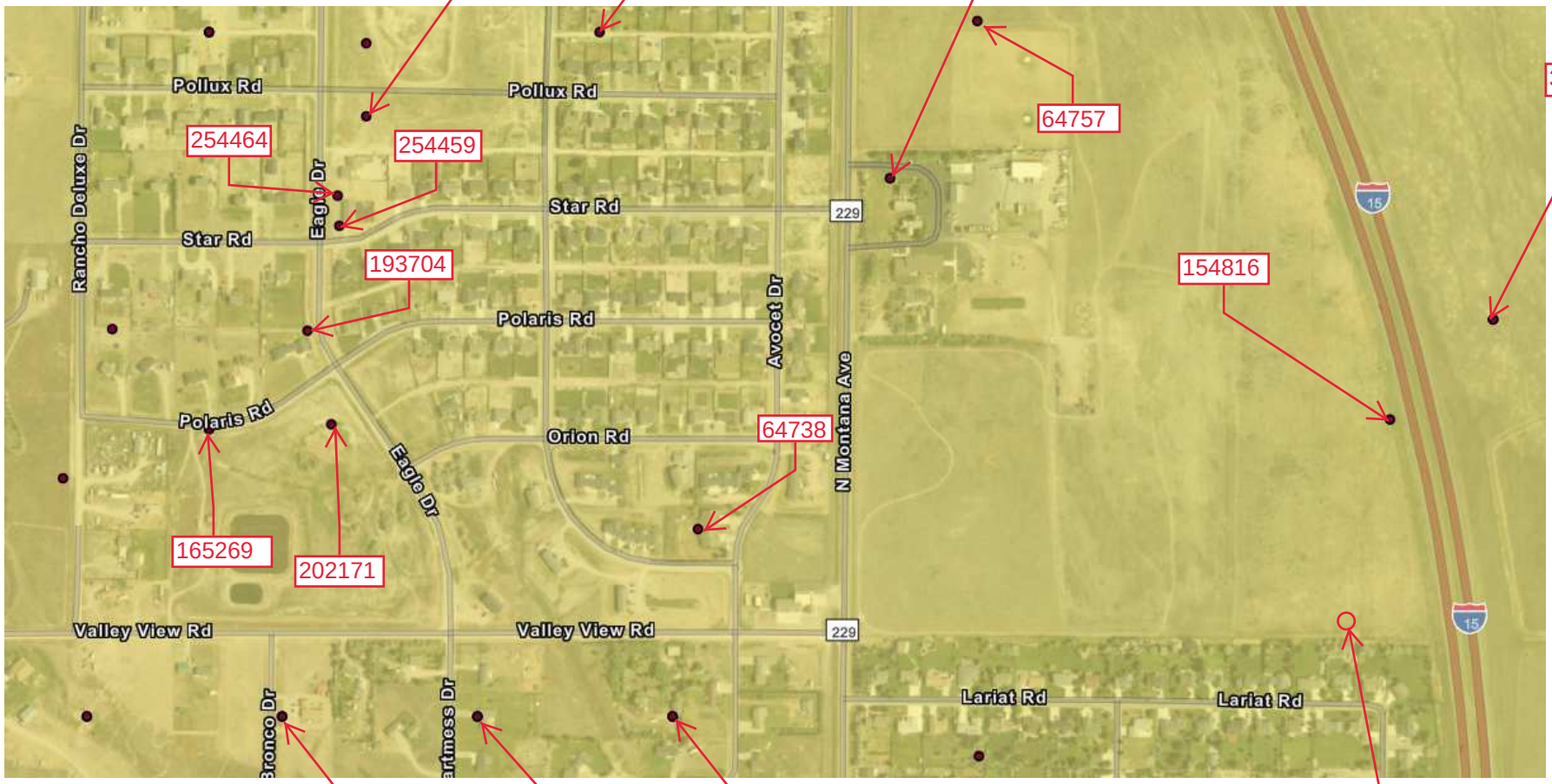
Driller Certification

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: SHAWN TONEY
Company: H & L DRILLING INC
License No: WWC-447
Date Completed: 10/20/2003

Ranchview Surrounding Wells




194427
254487
64755
64757
301435
254464
254459
193704
154816
64738
165269
202171
272390
135307
187345
Potential New North Well Location
Pollux Rd
Pollux Rd
Star Rd
Star Rd
Polaris Rd
Polaris Rd
Orion Rd
Valley View Rd
Valley View Rd
Lariat Rd
Lariat Rd
Rancho Deluxe Dr
Eagle Dr
Eagle Dr
Avocet Dr
N Montana Ave
229
229
15
15

Wells North of Ranchview - Evaluation

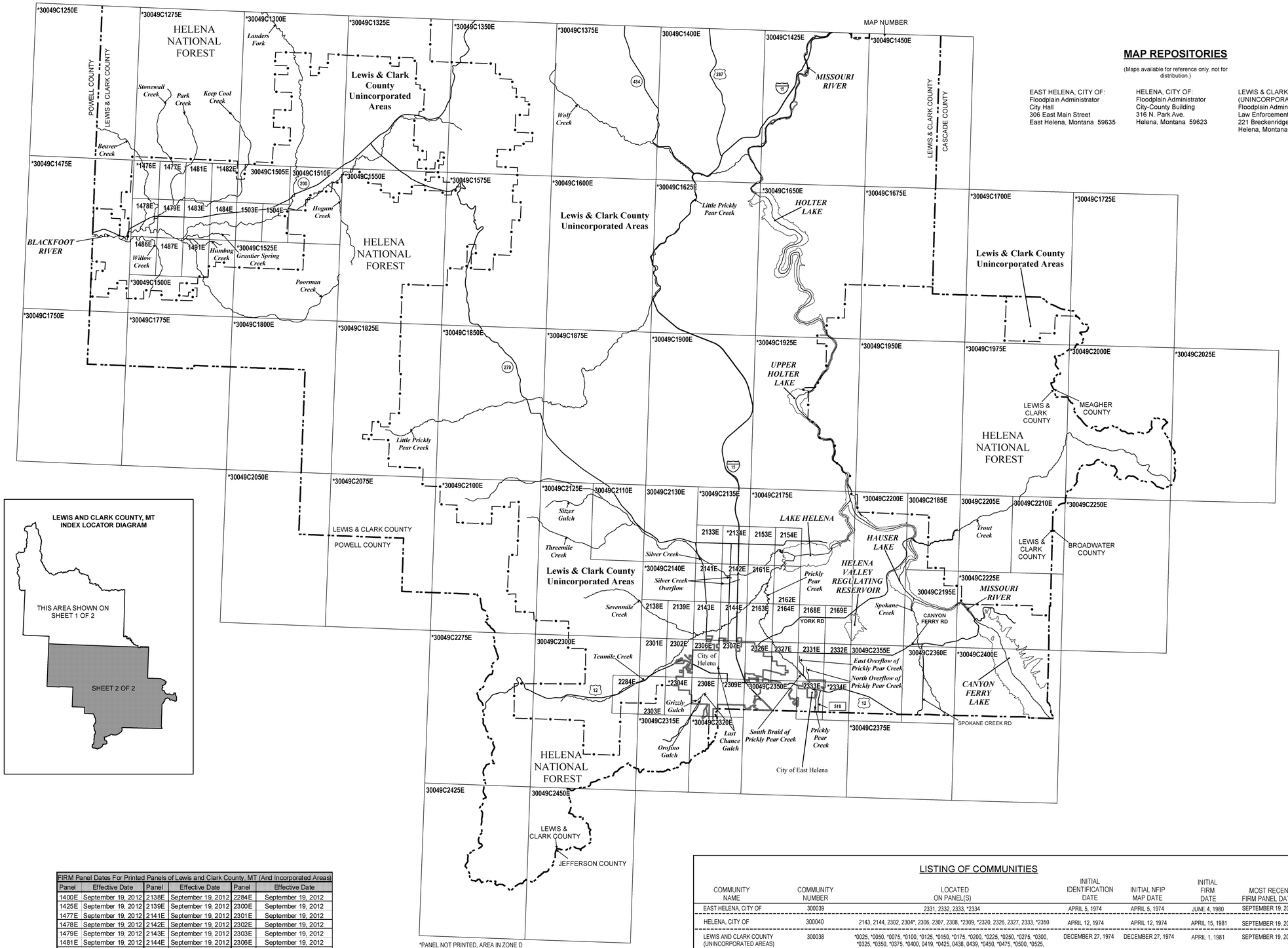
GWIC	Owner	Aprx. Dist From Potential Well	Depth (ft.)	Dia. (in.)	Static Water Depth (ft.)	Test Flow (gpm)	Formation
154816	Smith	900' NE	74	6	52	25	Fractured shale
64755	State	2000' NW	441	8	40	6	grey shale
187345	Clark	2100' W	80	6	39	25	brown shale
135307	Bartmess	3600' W	117	6	87	15	red shale
64738	West Valley Fire	1900' W	88	6	34	15	shale/hard rock
202171	North Star (Dry)	3200' W, 600' N	100	6	88	1	red shale
301435	Made it home ranch	900' E, 1300' N	240	6	?	0	clay/shale/rock
193704	Peterson	3300' W, 1000' N	120	6	18	111	fractured red shale
165269	Heppner	3600' W, 700'N	140	6	95	20	
272390	Peters		157	6	85	25	purple shale, ceramic, clay seams
254459	North Star PH6 well #1	3300'W, 1300'N	140	6	18	111	shale
254464	North Star PH6 well #2	3300'W, 1500'N	110	6	92	65	shale
254487	North Star PH6 well #3	2900'W, 1800' N	475	not avail	90	not avail	shale
194427	Peterson (Floy Well 2)	2200'W, 2000'N	120	6	19	65	red/green shale
64757	Smith	2300' NW	66	6	20	30	Shale/Gravel
15 Wells		**Avg** (less deep wells)	**119.4**		**55.5**	**26.5** (less high flow anomolies)	

Per the Northstar DEQ Inspection Report, Northstar wells #4, 8, and 9 are extended up to between 440-540 feet producing over 80 gpm

(See well logs for North Star)

Appendix G

Floodplain Map



*PANEL NOT PRINTED, AREA IN ZONE D

MAP REPOSITORIES

(Maps available for reference only, not for distribution.)

EAST HELENA, CITY OF:
Floodplain Administrator
City Hall
306 East Main Street
East Helena, Montana 59635

HELENA, CITY OF:
Floodplain Administrator
City-County Building
316 N. Park Ave.
Helena, Montana 59623

LEWIS & CLARK COUNTY (UNINCORPORATED AREAS):
Floodplain Administrator
Law Enforcement Center
221 Breckenridge Ave.
Helena, Montana 59601

MAP DATES

This FIRM Index displays the map date for each FIRM panel at the time that this Index was printed. Because this Index may not be distributed to unaffected communities in subsequent revisions, users may determine the current map date for each FIRM panel by visiting the FEMA Map Information eXchange (FMIX) website at http://msc.fema.gov, or by calling the FEMA Map Information eXchange (FMIX) at 1-877-336-2627

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Map Service Center at the number listed above.

NOTE TO USER

Future revisions to this FIRM Index will only be issued to communities that are located on FIRM panels being revised. This FIRM Index therefore remains valid for FIRM panels dated September 19, 2012 or earlier. Please refer to the "MOST RECENT FIRM PANEL DATE" column in the Listing of Communities table to determine the most recent FIRM Index date for each community.

LEWIS AND CLARK COUNTY, MT
INDEX LOCATOR DIAGRAM

FIRM Panel Dates For Printed Panels of Lewis and Clark County, MT (And Incorporated Areas)					
Panel	Effective Date	Panel	Effective Date	Panel	Effective Date
1400E	September 19, 2012	2138E	September 19, 2012	2284E	September 19, 2012
1425E	September 19, 2012	2139E	September 19, 2012	2300E	September 19, 2012
1477E	September 19, 2012	2141E	September 19, 2012	2301E	September 19, 2012
1478E	September 19, 2012	2142E	September 19, 2012	2302E	September 19, 2012
1479E	September 19, 2012	2143E	September 19, 2012	2303E	September 19, 2012
1481E	September 19, 2012	2144E	September 19, 2012	2306E	September 19, 2012
1483E	September 19, 2012	2153E	September 19, 2012	2307E	September 19, 2012
1484E	September 19, 2012	2154E	September 19, 2012	2308E	September 19, 2012
1486E	September 19, 2012	2161E	September 19, 2012	2326E	September 19, 2012
1487E	September 19, 2012	2162E	September 19, 2012	2327E	September 19, 2012
1491E	September 19, 2012	2163E	September 19, 2012	2331E	September 19, 2012
1503E	September 19, 2012	2164E	September 19, 2012	2332E	September 19, 2012
1504E	September 19, 2012	2168E	September 19, 2012	2333E	September 19, 2012
1505E	September 19, 2012	2169E	September 19, 2012	2355E	September 19, 2012
1510E	September 19, 2012	2185E	September 19, 2012	2360E	September 19, 2012
2110E	September 19, 2012	2195E	September 19, 2012	2425E	September 19, 2012
2130E	September 19, 2012	2205E	September 19, 2012	2450E	September 19, 2012
2133E	September 19, 2012	2210E	September 19, 2012		

LISTING OF COMMUNITIES

COMMUNITY NAME	COMMUNITY NUMBER	LOCATED ON PANEL(S)	INITIAL IDENTIFICATION DATE	INITIAL NFIP MAP DATE	INITIAL FIRM DATE	MOST RECENT FIRM PANEL DATE
EAST HELENA, CITY OF	300039	2331, 2332, 2333, *2334	APRIL 5, 1974	APRIL 5, 1974	JUNE 4, 1980	SEPTEMBER 19, 2012
HELENA, CITY OF	300040	2143, 2144, 2302, 2304*, 2306, 2307, 2308, *2309, *2320, 2326, 2327, 2333, *2350	APRIL 12, 1974	APRIL 12, 1974	APRIL 15, 1981	SEPTEMBER 19, 2012
LEWIS AND CLARK COUNTY (UNINCORPORATED AREAS)	300038	*0025, *0050, *0075, *0100, *0125, *0150, *0175, *0200, *0225, *0250, *0275, *0300, *0325, *0350, *0375, *0400, 0419, *0425, 0438, 0439, *0450, *0475, *0500, *0525, *0550, *0575, *0600, *0625, 0631, 0632, 0635, *0650, 0651, *0675, *0700, *0725, *0750, *0775, *0800, *0825, *0850, *0875, *0900, *0925, *0950, *0975, *1000, *1025, *1050, *1075, *1100, *1125, *1150, *1175, 1200, *1225, *1250, *1275, *1300, *1325, *1350, *1375, 1400, 1425, *1450, *1475, *1476, 1477, 1478, 1479, 1481, *1482, 1483, 1484, 1486, 1487, 1491, *1500, 1503, 1504, 1505, 1510, *1525, *1550, *1575, *1600, *1625, *1650, *1675, *1700, *1725, *1750, *1775, *1800, *1825, *1850, *1875, *1900, *1925, *1950, *1975, *2000, *2025, *2050, *2075, *2100, 2110, *2125, 2130, 2133, *2134, *2135, 2138, 2139, *2140, 2141, 2142, 2143, 2144, 2153, 2154, 2161, 2162, 2163, 2164, 2168, 2169, *2175, 2185, 2195, *2200, 2205, 2210, *2225, *2250, *2275, 2284, 2300, 2301, 2302, 2303, 2304*, 2306, 2307, 2308, *2309, *2315, *2320, 2326, 2327, 2331, 2332, 2333, *2334, *2350, 2355, 2360, *2375, *2400, 2425, 2450,	DECEMBER 27, 1974	DECEMBER 27, 1974	APRIL 1, 1981	SEPTEMBER 19, 2012

*PANEL NOT PRINTED

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

MAP INDEX

FIRM

FLOOD INSURANCE RATE MAP

LEWIS AND CLARK COUNTY, MONTANA AND INCORPORATED AREAS

(SEE LISTING OF COMMUNITIES TABLE)

MAP INDEX

PANELS PRINTED: 1400, 1425, 1477, 1478, 1479, 1481, 1483, 1484, 1486, 1487, 1491, 1503, 1504, 1505, 1510, 2110, 2130, 2133, 2138, 2139, 2141, 2142, 2143, 2144, 2153, 2154, 2161, 2162, 2163, 2164, 2168, 2169, 2185, 2195, 2205, 2210, 2284, 2300, 2301, 2302, 2303, 2306, 2307, 2308, 2326, 2327, 2331, 2332, 2333, 2355, 2360, 2425, 2450

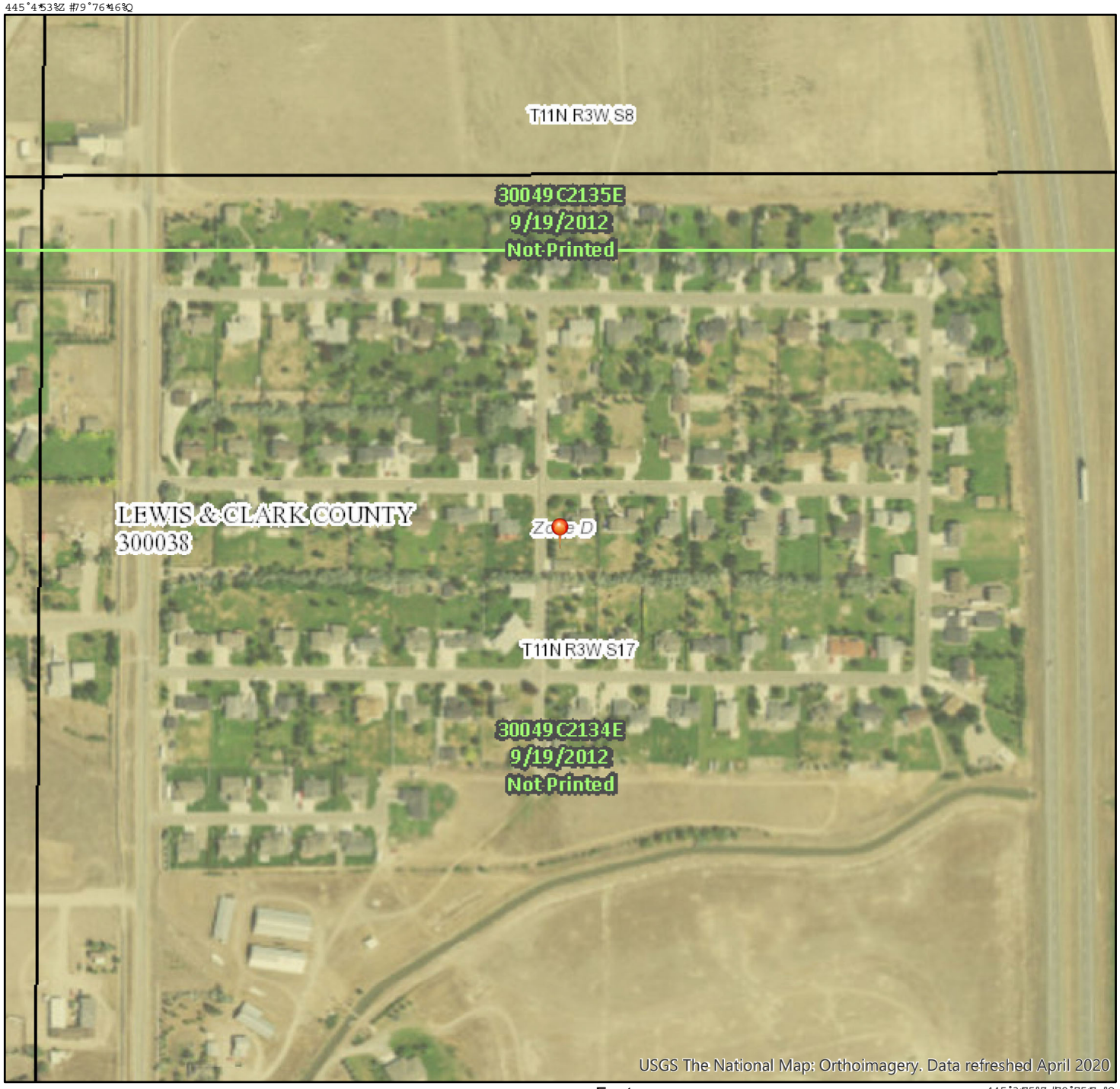
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
30049CIND2A
EFFECTIVE DATE
SEPTEMBER 19, 2012

Federal Emergency Management Agency

National Flood Hazard Layer FIRMette

FEMA



0 250 500 1,000 1,500 2,000 Feet

1:6,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 6/25/2020 at 11:30 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Appendix H

National Wetlands Inventory Map

U.S. Fish and Wildlife Service

National Wetlands Inventory

wetlands map



June 25, 2020

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

Appendix I

Target Rate and Census Data

COMMUNITY DEVELOPMENT DIVISION



Census and Target Rate 2015 Info

CDD Target Rate Calculation Resource

The Community Development Division (CDD) has updated the U.S. Census Bureau's American Communities Survey (ACS) data set 2011-2015 for the calculation of local government target rates. The Treasure State Endowment Program (TSEP) and Community Development Block Grant (CDBG) programs use ACS information as the base data set to calculate applicant target rates for community infrastructure systems.

These calculated rates, along with other demographic information, are components of the review and analysis of applications submitted to the programs for funding requests. Applications to be submitted in 2018 or later for TSEP or CDBG programs must use the 2015 ACS data for the calculation of target rates for an applicant.

Search below for 2015 American Communities Survey data used to calculate target rates when applying to the **Treasure State Endowment Program** and **Community Development Block Group Grant Program.**

Select a Location:

City/Designated location Choose City **or** County Lewis and Clark County

County	*Lewis and Clark County*
Total Population	65,357
Total Households	26,753
Median Household Income	$56,197
Low & Moderate Income Percent	38.09
Percent Poverty	12.2 %

Target Rates

Water & Waste Water	$107.71
Water Only	$65.56
WasteWater Only	$42.15
Solid Waste Only	$14.05

Amounts are computed using the 2015 census and target percentage rationale reviewed biennially by Commerce. The target percentages are:
2.3% combined (water and wastewater)
1.4% for water alone
0.9% for wastewater alone
0.3% for solid waste

For example: Community median household income is $25,000 and the residents pay both water and wastewater rates, the calculation would be: $25,000 times 2.3% divided by 12 equals monthly target rate of $47.92. (25,000 x 2.3%)/12 = $47.92)

Having trouble finding data for your community? Some communities may not be listed in the resources above because the American Community Survey (ACS) did not provide 2015 MHI data for those areas. Please contact us at (406) 841-2770 or email **TSEP** or **CDBG** if you have any questions about this information.

Mapping

To see maps of the City/Town/CDP or County in which you are interested, please go to **http://ceic.mt.gov/**. For more information about the maps or tools available, please contact the Census and Economic Information Bureau at (406) 841-2713 or email **ceic@mt.gov**.

Contacts

Treasure State Endowment Program (TSEP) 406 841-2770

Community Development Block Grant Program (CDBG)	406 841-2770
Census & Economic Information Center	406 841-2740

Definitions

Census Designated Place (CDP): Census designated places (CDPs) have been created for each decennial census as the statistical counterparts of incorporated places. CDPs are delineated to provide census data for concentrations of population, housing, and commercial structures that are identifiable by name but are not within an incorporated place. CDP boundaries usually are defined in cooperation with state, local, and tribal officials. These boundaries, which usually coincide with visible features or the boundary of an adjacent incorporated place or other legal entity boundary, have no legal status, nor do these places have officials elected to serve traditional municipal functions.

Household: A household includes all the people who occupy a housing unit as their usual place of residence.

Income of households: This includes the income of the householder and all other individuals 15 years old and over in the household, whether they are related to the householder or not.

Low and Moderate Income Percent: Low and Moderate Income Percent is calculated by U.S. Housing and Urban Development (HUD) using data from the U.S. Census Bureau's Decennial Census, specifically for the Community Development Block Grant Program (CDBG). LMI families are defined as those families whose income does not exceed 80% of the county median income for the previous year or 80% of the median income of the entire non-metropolitan area of the State of Montana, whichever is higher.

Median income: The median income divides the income distribution into two equal groups, one having incomes above the median, and other having incomes below the median.

Notes: Total Population and Total Households are from Summary File (SF) 1, 100% data. Poverty Rates and Median Household Income are from Summary File (SF) 3, Sample data. Low and Moderate Income Percentage was developed by HUD using Census 2010 data.

Sources: U.S. Census Bureau & HUD
Median Household Income
Census Bureau, American Community Survey 2011 - 2015 Estimates

Total Population & Households
U.S. Census Bureau, 2015 Census - Summary File 1 (SF1) 100% Data

Low to Moderate Income Percent
HUD 2015 Low and Moderate Income Data

Target Rates for 2010 Census Data

View 2010 Census data rates for comparison purposes.

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Appendix J

Community Engagement Materials

RANCHVIEW COUNTY WATER DISTRICT





PRELIMINARY ENGINEERING REPORT

Public Hearing November 9, 2020

Matthew Mudd, PE

1

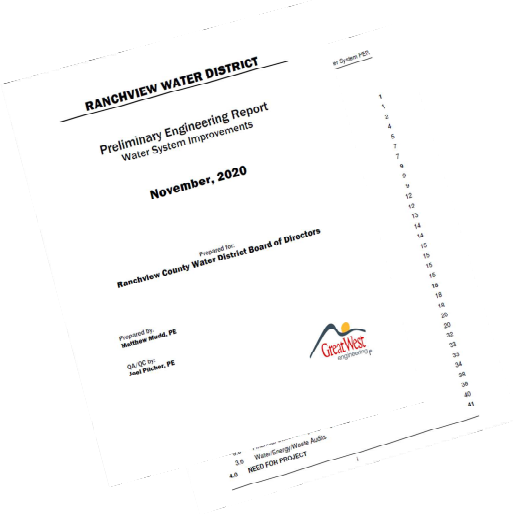
WHY IS GREAT WEST HERE

- District Identified Water System Needs
- Planning Grants Were Obtained
- Preliminary Engineering Report (PER) Process
- Explain Potential Water Alternatives
- Summarize Environmental Assessment (EA)
- Explain Proposed Funding Strategy and Rate Impacts
- Take Public Comment

2

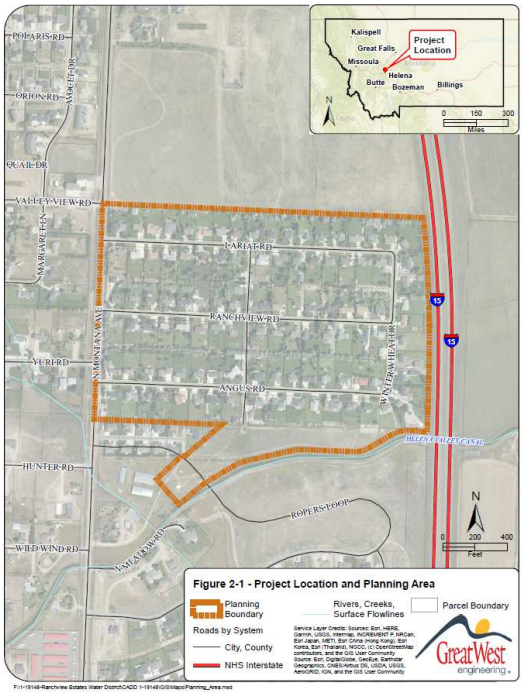
PRELIMINARY ENGINEERING REPORT

- What is a PER
  - Technical Report Document
    - Required by Funding Agencies to Qualify for Grants
    - Defines a Project
- **Evaluates Alternatives**
- **Establishes Costs and Funding Scenarios**
- **Develops Implementation Schedule**



3

PLANNING AREA



4

POPULATION

Year	Ranchview Water District	Lewis and Clark County
2000 (1)	-	55,878
2010 (1)	-	63,565
2015 (2)	257	66,138
2020	257	
2040 (3)	257	-

(1) US Census Bureau
(2) American Communities Survey
(3) 107 connections at 2.4 person/house
(4) Assume No growth, District Built out

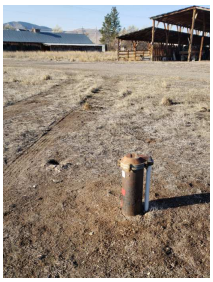
5

EVALUATION OF EXISTING SUPPLY - WELLS







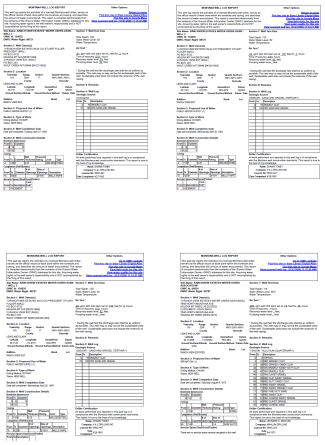




6

EVALUATION OF EXISTING SUPPLY - WELLS

Ranchview Estates Water Supply Source and Pump Information				
Description	**Well 1 (Potable)**	**Well 2 (Potable)**	**Irrigation Well 2**	**Irrigation Well 1**
Well Log Information				
GWIC ID	134632	134635	64824	209291
DNRC Water Right	88721	88721	89787/88721	89787/88721
Well Completion Date	1993	1993	1973	2003
Total Depth (ft.)	100	120	115	183
Static Water Level (ft.)	53	52	38.5	47
Original Pumping Rate (gpm)	91	94	450	400
Original Design Files and Water Rights Information				
Pump Make and Model	Series S McDonald 7 ½ hp 21750 S – 24 Stage	Series S McDonald 7 ½ hp 21750 S – 24 Stage	Goulds Model 7CLC 350 gpm	Grundfos Model: 150S200-11,
Pump Controls	Lead Pump Pressure Range: 65-85 psi Lag Pump Pressure Range: 50-70 psi		75 psi	
Maximum Design Pumping Rate (gpm)	60-70	60-70	290	290 per water right
Operator Knowledge and Verified Conditions				
Current Pump Flow Rate (gpm) (at service pressure)	15-20	5-10	275 gpm	
Static Water Levels (ft.) (June 2020)	48.7	48.5	Not measured	Not measured
VFDs Installed	No		Yes	
Other Information	New pump and motor installed in June 2019: Grundfos Model 35S50-19	Pump 2 is currently not in use	2 pumps (reported to be 20 hp) installed using a lead/lag configuration. Well No. 1 in 2019, pump no. 2 was replaced in 2016	



7

Evaluation of Existing Water Supply - Demands

Ranchview Estates Potable System Source Average Monthly Flows		
Month	Average Source Flow/Month (gallons per day)	Average Per Capita Use (gpcd)[1]
July 19	11,863	46
August 19	17,953	70
September 19	16,643	65
October 19	14,793	58
November 19	15,687	61
December 19	13,470	52
January 20	14,267	56
February 20	15,480	60
March 20	15,310	60
April 20	15,273	59
May 20	17,827	69
June 20	16,953	66
Average	15,460	60
[1]Based on existing service population of 257		

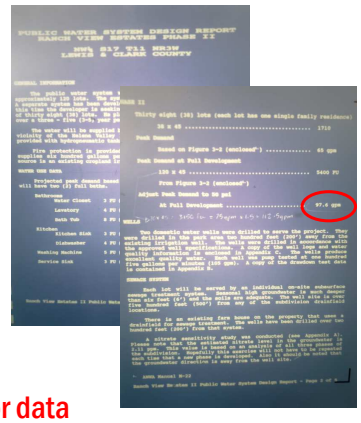
Ranchview Estates Irrigation System Source Average Monthly Flows			
Month	Average Source Flow/Month (gallons per day)	Average Per Capita Use (gpcd)[1]	Average Per Lot Use (gal/lot)[2]
19-Jul	226,947	884	2121.0
19-Aug	247,460	964	2312.7
19-Sep	165,137	643	1543.3
19-Oct	2,597	10	24.3
19-Nov	90	0.35	0.8
19-Dec	27	0.1	0.3
20-Jan	30	0.12	0.3
20-Feb	33	0.13	0.3
20-Mar	210	0.82	2.0
20-Apr	21,383	83	199.8
20-May	187,153	729	1749.1
20-Jun	207,680	809	1940.9
Average (May-Sept.)	206,875	806	1933.4
[1]Based on existing service population of 257			
[2]Based on 107 lots			

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Evaluation of Existing Water Supply - Demands

Ranchview Estates Water System Demand Summary		
Water Demand	**Potable Water System**	**Irrigation Water System**
Average Day	15,460 gpd	206,875 gpd
	11 gpm	144 gpm
Maximum Day	54,110 gpd	247,460 gpd
	38 gpm	172 gpm
Peak Instantaneous	98 gpm[1]	290 gpm

1. *From original design capacity*

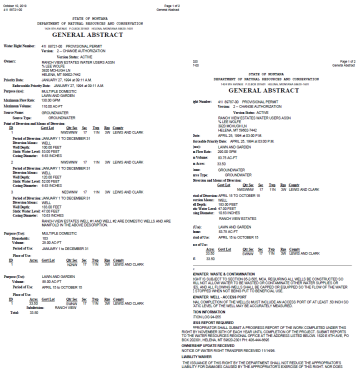

PUBLIC WATER SYSTEM DESIGN REPORT
RANCH VIEW ESTATES PHASE II
LEWIS & CLARK COUNTY

- Don't know what actual peak day flows are
- Consider more frequent monitoring at times or data logger

9

Evaluation of Existing Water Supply – Water Rights

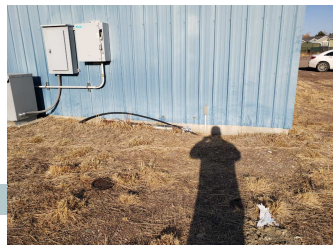
Ranchview Estates Water Rights Summary						
Water Right #	**Priority Date**	**Purpose/ Use**	**Diversion Means**	**Maximum Flow Rate (gpm)**	**Maximum Volume (ac-ft)**	**Actual Volume (ac-ft)**
41I 88721-00	1994	Multiple Domestic	Wells	130	25	
		Lawn and Garden			85	
41I 89787-00	1994	Lawn and Garden	Wells	290	83.75	
				Total	420	193.75	130-140


STATE OF MONTANA
DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION
GENERAL ABSTRACT

10

Evaluation of Existing Supply – Pump House











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Evaluation of Existing Supply – Pump House









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Evaluation of Existing Supply – Pump House Issues

- Flow Meters Beyond Useful Design Life
- No Backup Power
- Electrical and Control Issues
- Insufficient Surge Protection/Amperage Overload
- Reduced Pressures and Peak Demands
- Pump House Piping Concerns

Notes from Intetraged Water Invoices - Non Typical work descriptions
Repeated problems or trends highlighted

Date	Description
10/28/2019	Replace pressure tank.
8/17/2019	Birds on power line disrupted power
6/14/2019	Furnish/Install Potable Pump
6/10/2019	Furnish/Install Irrigation Pump. Replaced Galvanized Drop Piping.
2/9/2019	Emergency call for low heat.
10/26/2018	Pulled pump and replaced lines. (Irrigation Well?)
9/30/2018	Found holes in well riser pipe. (Well # ?)
8/7/2018	Replace new starter on potable pump
7/2/2018	Reset emergency potable well
6/11/2019	Reset irrigation well #2 pump VFD with over-voltage fault.
4/29/2018	No pressure on potable response
2/10/2018	Low temperature in building alarm response
1/5/2018	Potable pump tripeed on. Found bad fuse on pump
12/21/2017	Low Temperature Alarm
11/1/2017	Repaired broken pipe to well #1 (Potable)
10/31/2017	Broken waterline inside pump house. Pressure switch replaced.
8/15/2017	NWE powerline work
8/9/2017	Power outage. Birds on line.
8/2/2017	Two blown fuse lines. NWE called for repairs.
4/22/2017	Power outage. Reset pumps
7/18/2016	Power outage - After hours
6/17/2016	Water outage and resetting of drives
Jul-Aug (2016)	Major Irrigation Well #2 Retrofits: Hydrometrics Video'd Well, Okeefe Drilling "Airbusted", Wall Screenings Area, New 20 HP Pump, Replaced 40 HP Pump
11/6/2014	Fabricate and install new domestic manifold & piping
7/29/2014	Re-install static measuring tube
7/14/2014	Remove and replace defective well clap
6/30/2014	Remove and replace 40 hp motor on irrigation pump
5/23/2014	Repair VFD problems
4/4/2014	Repaired electrical conduit on the nort irrigation well. Also pulled the pump on the new irrigation well & ordered a new pump
2/19/2014	Reset pumps after power outage
1/22/2014	Repaired the flush out pipe on the domestic side
12/6/2013	Removed old pressure tank
8/26/2013	Respond to power outage
5/6/2013	Respond to low level alarm & turn on back up well
4/17/2013	Reset VED after power outage

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Evaluation of Existing Water System Distribution



Figure 3-1
Existing Water System
RANCHVIEW ESTATES WATER PER

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Evaluation of Existing Water System Distribution

Ranchview Estates Potable Distribution System Summary	
Potable Water System PVC	Length
2" Diameter	9,171 LF
3" Diameter	763 LF
Total Potable	9,934 LF

Potable System

- No individual water meters
- No fire suppression
- Isolation Valves
- Blow Off Valves
- Curb Stops
- No reported regular leaks/ruptures to surface
- Services: 1" PE
- No Storage
  - (except hydropneumatic tanks)
- Cross Connections?

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Evaluation of Existing Water System Distribution

Ranchview Estates Distribution System Summary	
3" Diameter	9,310 LF
6" Diameter	766 LF
Total Irrigation	10,076 LF

Irrigation System

- Isolation Valves
- Blow Off Valves
- No reported regular leaks/ruptures to surface
- Services: 1.5" PE
- Curb Stops
- No Storage
  - (except hydropneumatic tanks)
- Cross Connections

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Water System Distribution – Hydraulic Modeling



- Simulates Existing System
- Models existing pipe sizes
- Looks at Nodes and Junctions
- At Different Demands
- Output of pressures
- Compare to Actual Measurements

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Water System Distribution – Hydraulic Modeling

Potable System

Date	Time	Flow (gpm)	Discharge Pressure (psi)	Measured Pressures at Properties (psi) 1335 Lariat	1290 Lariat	1280 Angus	1380 Lariat
7/20/2020[1]	9:00 AM	16	55	44	40	58	52
		Model Pressures (psi)		45	44	51	48
7/23/2020	9:30 AM	18	55	-	54	42	-
		Model Pressures (psi)		-	44	50	-
7/23/2020	3:00 PM	18	55	58	-	-	-
		Model Pressures (psi)		45	-	-	-

Irrigation System

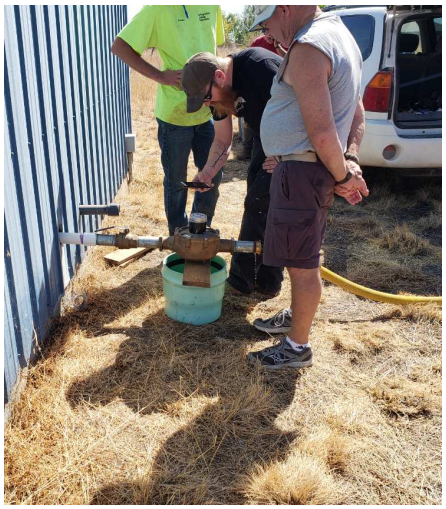
Date	Time	Flow (gpm)	Discharge Pressure (psi)	Measured Pressures at Properties (psi) 1335 Lariat	1290 Lariat	1280 Angus	1380 Lariat	1280 Lariat
7/20/2020[1]	9:00 AM	260	75	59	58	64	52	60
		Model Pressures (psi)		60	58	69	62	58
7/23/2020	9:30 AM	200	75	48	60	60	-	-
		Model Pressures (psi)		62	61	70	-	-
7/23/2020	3:00 PM	200	75	68	-	-	-	-
		Model Pressures (psi)		62	-	-	-	-

[1]Model output report included in Appendix

- District Checked Pressures and Flows to Calibrate Model

18

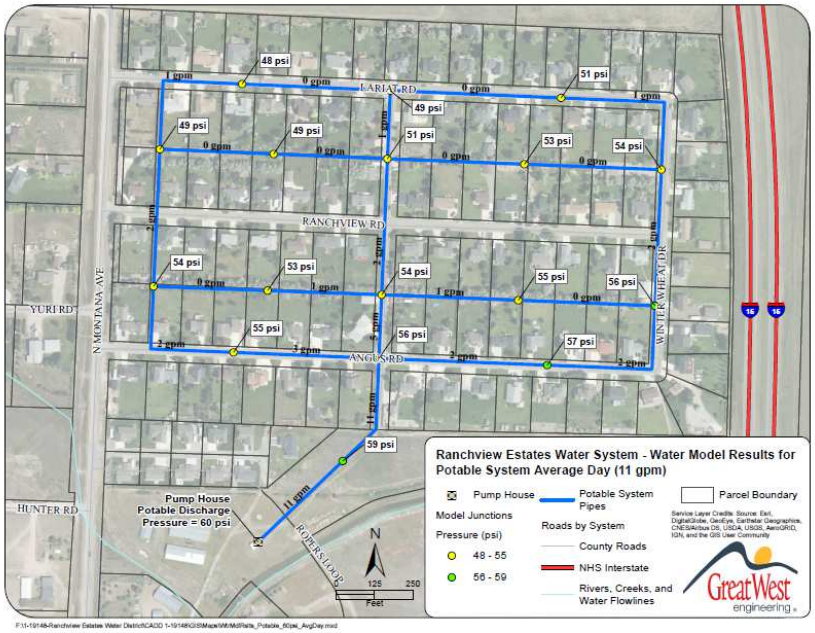
Water System Distribution – Pump Testing



- Isolate Each Potable Pump
- Blow Out Through Flow Meter
- Potable Pump 1
  - 58 gpm @ 12 psi
  - 15 gpm @ 55 psi
- Potable Pump 2
  - 75 gpm @ 20 psi
  - 7 gpm @ 15 psi

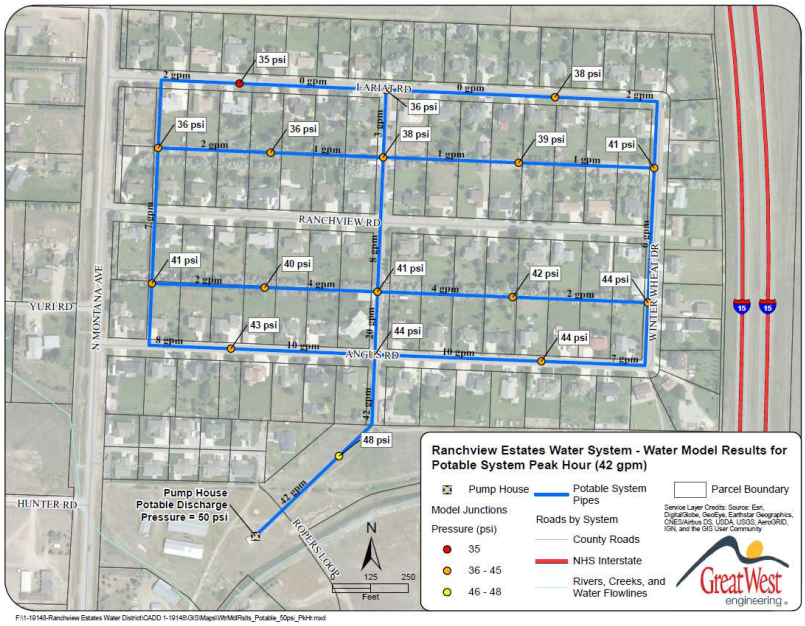
19

Water System Distribution – Hydraulic Modeling



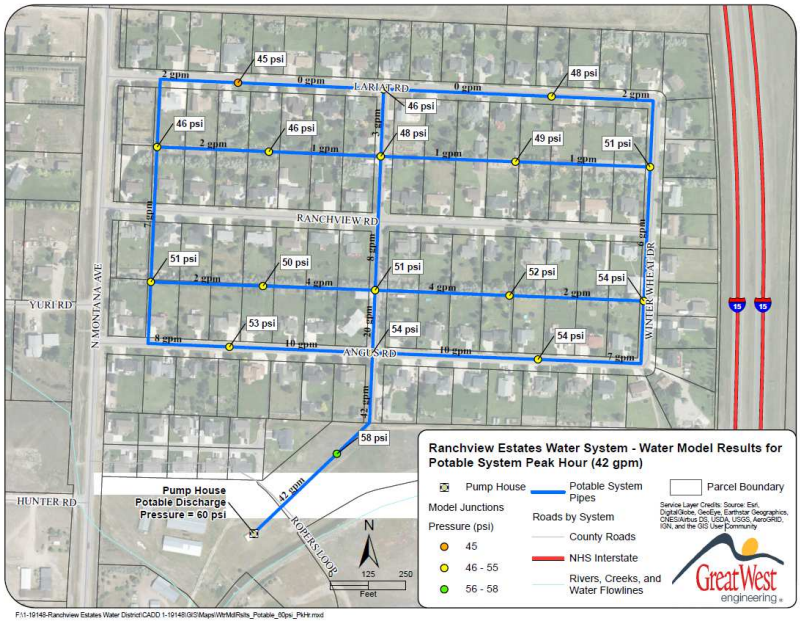
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Water System Distribution – Hydraulic Modeling



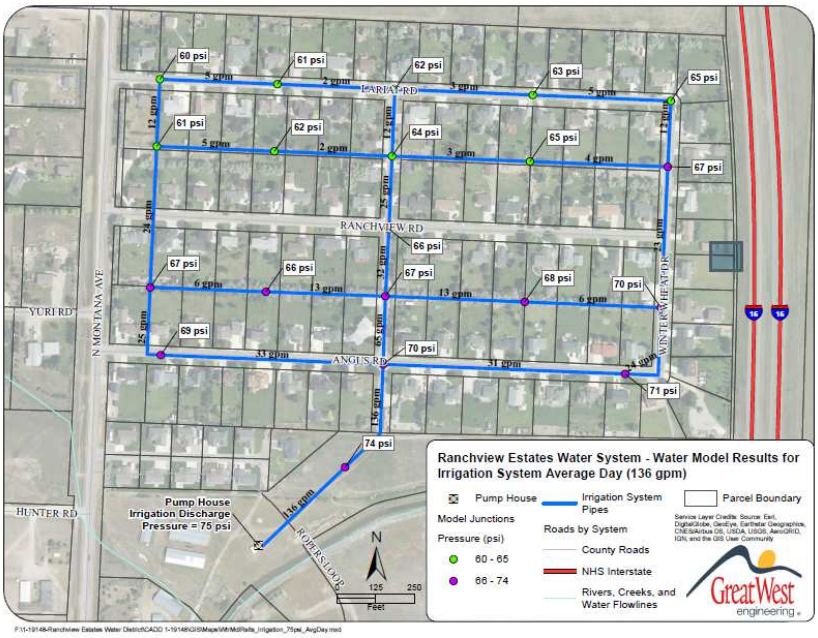
21

Water System Distribution – Hydraulic Modeling



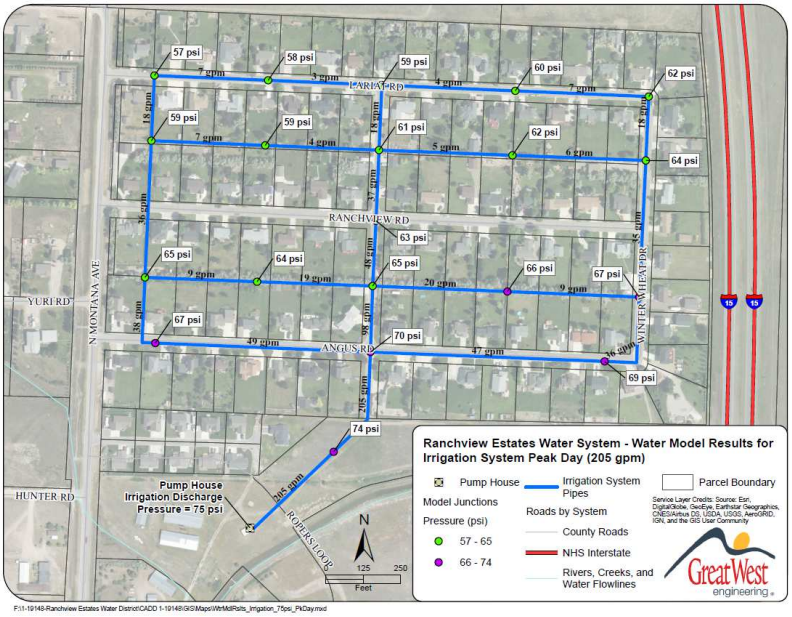
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Water System Distribution – Hydraulic Modeling



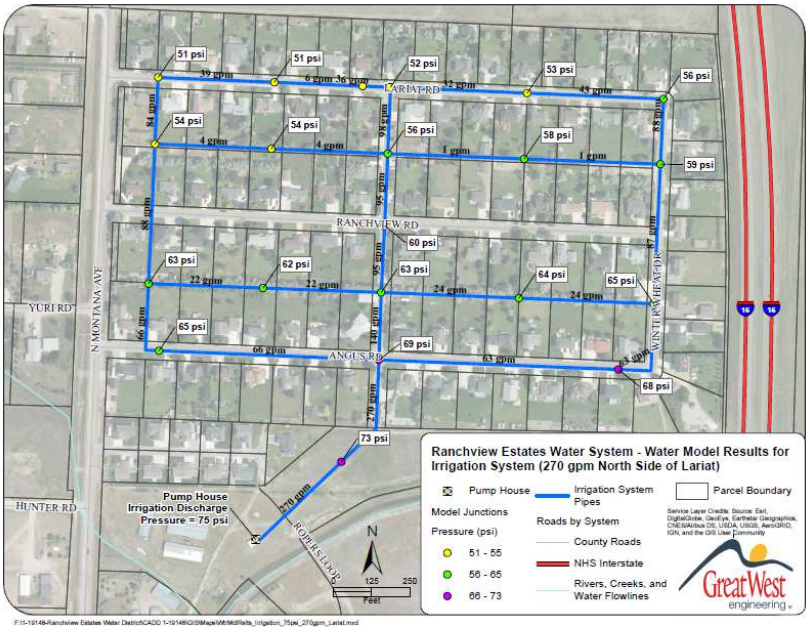
23

Water System Distribution – Hydraulic Modeling



24

Water System Distribution – Hydraulic Modeling



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Water System Distribution – Hydraulic Modeling

- Summary of Findings & Recommendations
- Potable System
  - 50 psi pressure at pump house relates to less than 35 psi in distribution in northwest - keep above 60 psi pump discharge
  - Periodic peak demands can exceed current pump output – get pump 2 online
  - Pipe sizes appear to be sufficient
- Irrigation
  - At demands above 270 gpm, the 3-inch pipe starts to show increased head losses
  - Limit instantaneous demands: encourage sprinkler nozzle replacements, and remind of irrigation watering schedules
  - If demands cannot be mitigated in future, could consider upsizing some of the 3-inch mains can help

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Alternatives Analysis - Supply

- All Alternatives: To Complete or Not Complete
- Alt. S-1: Replace Well Pump 2
  - Doesn't appear replaced
  - Higher Output/Flow Pump at Service Pressures
  - Pull, check, and Replace





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Alternatives Analysis - Supply

- Alt. S-2: Replace Pump Controls and Electrical
  - S-2A: With Variable Frequency Drives (VFDs)
    - Allows tighter pressure "window"
    - More Efficient
    - Can Reduce No. of Pressure Tanks
  - S-2B: Without VFDs (Across-the-line starters)
    - Larger pressure on/off window
    - Less Efficient
    - Need Pressure Tanks
  - S-2B: Surge Suppression/Amperage Overload
    - Protect pump motors from failure or multiple resets
    - For entire building
    - 50k Amps







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Alternatives Analysis - Supply

- Alt. S-3: Replace Flow Meters
  - S-3A: Replace 2" Potable Flow Meter
  - S-3B: Replace 2" Irrigation Flow Meter

- Beneficial Add-ons/Features
  - Data Logging Add-on
  - Flow Pacing Signal for Chemical System
  - Accuracy
  - Consider Upstream/Downstream pipe length



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Alternatives Analysis - Supply

- Alt. S-4: Replace Pump House Pipe and Fittings
  - S-4A: Replace Potable Piping/Fittings
  - S-4B: Replace Irrigation Piping/Fittings
  - Metallic Piping: i.e. galv., stainless steel, copper



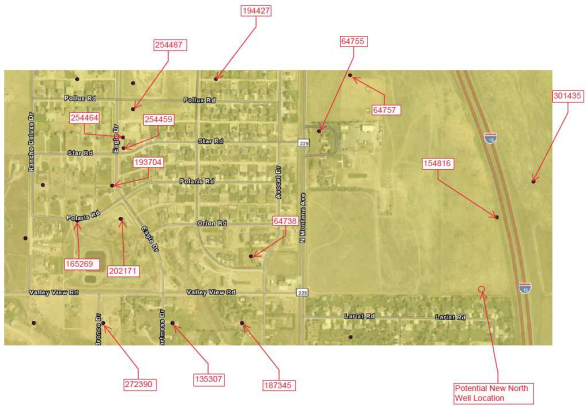




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Alternatives Analysis - Supply

- Alt. S-5: Construct New Well – North Side Evaluation



Wells North of Ranchview - Evaluation

GWIC	Owner	Aprx. Dist From Potential Well	Depth (ft.)	Dia. (in.)	Static Water Depth (ft.)	Test Flow (gpm)	Formation
154816	Smith	900' NE	74	6	52	25	Fractured shale
64755	State	2000' NW	441	8	40	6	grey shale
187345	Clark	2100' W	80	6	39	25	brown shale
135307	Bartmess	3600' W	117	6	87	15	red shale
64738	West Valley Fire	1900' W	88	6	34	15	shale/hard rock
202171	North Star (Dry)	3200' W, 600' N	100	6	88	1	red shale
301435	Made it home ranch	900' E, 1300' N	240	6	?	0	clay/shale/rock
193704	Peterson	3300' W, 1000' N	120	6	18	111	fractured red shale
165269	Heppner	3600' W, 700'N	140	6	95	20	
272390	Peters		157	6	85	25	purple shale, ceramic, clay seams
254459	North Star PH6 well #1	3300'W, 1300'N	140	6	18	111	shale
254464	North Star PH6 well #2	3300'W, 1500'N	110	6	92	65	shale
254487	North Star PH6 well #3	2900'W, 1800' N	475	not avail	90	not avail	shale
194427	Peterson (Floy Well 2)	2200'W, 2000'N	120	6	19	65	red/green shale
64757	Smith	2300' NW	66	6	20	30	Shale/Gravel
15 Wells		**Avg** (less deep wells)	**119.4**		**55.5** (less high flow anomolies)	**26.5**	

Per the Northstar DEQ Inspection Report, Northstar wells #4, 8, and 9 are extended up to between 440-540 feet producing over 80 gpm
(See well logs for North Star)

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Alternatives Analysis - Supply

- Alt. S-5: Construct New Well (S-5A: Irrigation Well Only)



Figure 5-1
Alternative S-5A:
New North Irrigation Well
RANCHVIEW ESTATES WATER PER

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Alternatives Analysis - Supply

- Alt. S-5: Construct New Well (S-5B: Irrigation, Potable Backup)



Figure 5-2
Alternative S-5B:
New North Irrigation Well
(Backup Potable)
RANCHVIEW ESTATES WATER PER

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Alternatives Analysis - Supply

- Alt. S-6: Backup Generator
  - S-6A: Potable Only Backup Generator
    - Potable Pumps Only 35kW Capacity Est.
  - S-6B: Potable, Irrigation pumps and building
    - 60kW Capacity Est.
  - Considerations
    - Recommended with Systems with only pumped Flows (i.e. no gravity tanks)
    - Meets Current DEQ standards
    - Common with Other Systems in the Valley
    - Generator & Transfer Switch
    - Natural Gas, Diesel, Propane



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Alternatives Analysis - Distribution

- Alt. D-1 Reconnect Cross Connected Waterlines
  - Health and Safety Concern - Irrigation System Not Regulated for Contaminants
  - Identify Locations and Number First
  - Licensed Plumber to do work
  - Assumed to be Inside-the-Home Fix
  - District to Cover Cost

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Selection of Preferred Alternative

Ranchview Estates Potable System Source Average Monthly Flows		
1	D-1: Reconnect Cross Connected Water Lines	$500/each ($1,500 total)
2	S-1: Install New Well Pump #2	$5,000
3	S-2A: Upgrade Potable System Pump Controls & Electrical (w/ VFDs)	$5,000
4	S-2C: Pump House Surge/Overload Protection (50,000 Amp Unit)	$2,500
5	S-3A: Replace Potable Flow Meter	$2,500
	S-3B: Replace Irrigation Flow Meter	$3,000
6	S-5A: New North Irrigation Well Only	$322,000
	S-5b: New North Irrigation Well (Backup Potable)	$383,000
7	S-4A: Replace Irrigation Pump House Piping/Fittings	$8,000
	S-4B: Replace Potable Pump House Piping/Fittings	$10,000
8	S-6A: Potable Pump Backup Generator (35 kW)	$29,000
	S-6B: Potable plus Irrigation Backup Generator (60 kW)	$42,000

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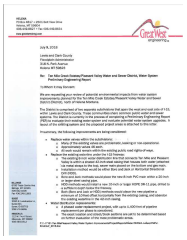
Environmental Assessment

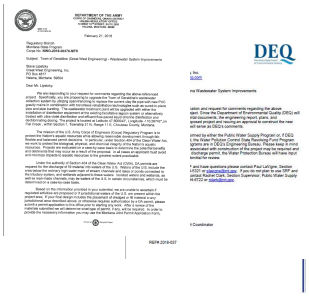
What is an Environmental Assessment (EA)?

- Public document analyzing environmental issues

Draft EA has been completed

- State, federal, local agencies have been contacted
- Many responses have been received
- Public comments solicited



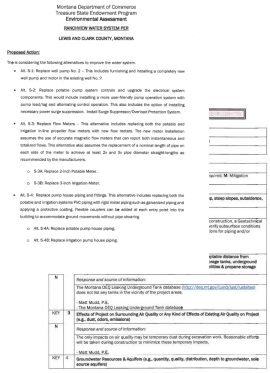


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Environmental Assessment

No Substantive Comments or Assessments

- Some Mitigated Impacts
  - Water Rights
  - Property Rights
  - Storm Water During Construction



Decision:

- Environmental Assessment is Acceptable
- Environmental Impact Statement (EIS) is not necessary

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Project Funding Options

Funding Sources Being Considered

- DNRC – Department of Natural Resources and Conservation
- SRF – State Revolving Fund
- Others Not Eligible nor Recommended:
  - TSEP – Treasure State Endowment Program
  - CDBG – Community Development Block Program
  - RD – Department of Agriculture, Rural Development Program

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Project Funding Options

Target Rate Analysis for Grant Eligibility

- Using DOC Data 2015 for Lewis and Clark County

Medium Household Income (MHI)	**=$56,197**
Department of Commerce Target Rate Threshold:	
(Target Rate is 1.4% for water)	
Water only Target Rate	**=$65.56/MO**
Current Water Base Rate	**=$45/MO**

District is Not Eligible for TSEP or CDBG
Are Eligible for DNRC

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Project Funding Options – Financial Status

Ranchview Estates Summary of Revenues and Operating Expenses			
Description	**2017**	**2018**	**2019**
Revenues			
Water Revenues	$56,296	$55,754	$52,796
Other Revenues	$3,829	$2,858	$1,391
Total Revenues	**$60,124**	**$58,612**	**$54,186**
Expenses			
Accounting Fees	$4,325	$4,450	$4,800
Advertising and Promotion	$0	$85	$0
Bank Fees (ACH)	$67	$62	$170
Bank Fees (Credit Card)	$738	$908	$888
Business Licenses and Permits	$20	$35	$0
Charity	$50	$25	$0
Computer and Internet Expenses	$172	$172	$0
Insurance Expense	$2,477	$2,479	$2,567
Office Supplies	$16	$124	$451
Postage and Delivery	$308	$474	$313
Printing and Copying	$774	$411	$445
Professional Fees	$0	$1,242	$278
Property Management Fees	$30	$0	$0
Reconciliation Discrepancies	$0	-$1,508	$1,625
Testing (Water)	$3,431	$470	$444
Utilities (Electricity)	$10,086	$12,027	$9,930
Utilities (Telephone)	$663	$555	$569
Water Well Management	$8,087	$11,502	$18,895
Total Expenses	**$31,246**	**$33,513**	**$41,373**
Net Revenue	**$28,879**	**$25,099**	**$12,813**

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Project Funding Options

Funding Options for Ranchview New North Well			
ITEM	SCENARIO #1 SRF Loan (2.5% for 20 years)	SCENARIO #X2 SRF Loan (2.5% for 20 years) w/ District $150k Contribution	SCENARIO #3 SRF (2.5% for 20 years) w/ 50% loan principle forgiveness
Alternative S-5B: New North Irrigation Well (Potable Backup)	$383,000	$383,000	$383,000
Rounded Total	$383,000	$383,000	$383,000
TSEP Grant	$0	$0	$0
DNRC Grant	$0	$0	$0
Local District Contribution	$0	$150,000	$0
RD Grant	$0	$0	$0
SRF Principal Forgiveness	$0	$0	$191,500
SRF Loan	$383,000	$233,000	$191,500
RD Loan	$0	$0	$0
Total Project Funds	$383,000	$383,000	$383,000
SRF Bond Reserve (1/2 year payment)	$12,294	$5,569	$6,147
Total Loan Amount	$395,294	$238,569	$197,647
Annual Loan Payment	$25,380	$15,320	$12,690
Total Loan Payments Over Life of Loan	$507,600	$306,400	$253,800
Total Interest Paid Over Life of Loan	$112,306	$67,831	$56,153
Annual Loan Coverage	$2,538	$1,532	$1,269
TOTAL ANNUAL CAPITAL DEBT SERVICE COST	$27,918	$16,852	$13,959
User Capital Cost/Month	$21.74	$13.12	$10.87
Current Annual O&M [1]	$35,000	$35,000	$35,000
Current Annual Debt Service	$0	$0	$0
Additional O&M Due To Project	$5,700	$5,700	$5,700
TOTAL ANNUAL O&M COSTS to USERS	$40,700	$40,700	$40,700
New User O&M Cost/Month	$31.70	$31.70	$31.70
USER COST/MONTH FOR PROJECT	$53.44	$44.82	$42.57
Existing Water System Cost/Month/EDU	$45.00	$45.00	$45.00
COST/MONTH INCREASE/EDU	$8.44	-$0.18 (zero increase)	-$2.43 (zero increase)
Total Proposed Water Cost/Month	$53.36	$44.82	$42.57
Water Only Target Rate	$65.56	$65.56	$65.56
PERCENT OF COMBINED TARGET RATE	81.5%	68.4%	64.9%

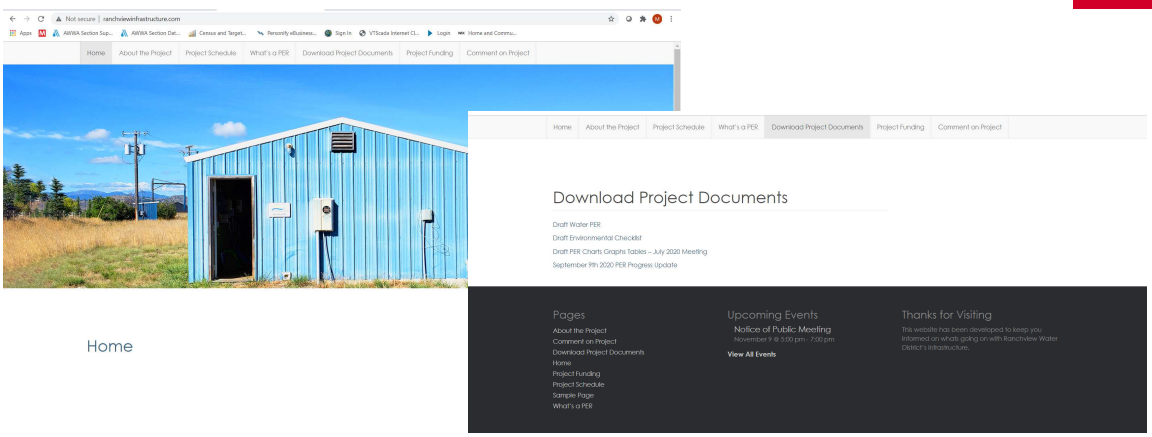
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Schedule

Action	Date
Draft PER Complete	October 28, 2020
Public Hearing on Draft PER & EA	November 9, 2020
Resolutions to Adopt EA and PER	November 11, 2020
Complete/Submit Final PER to DNRC/TSEP for Draws	December, 2020
Complete Alternatives: S-1, S-2, S-3, D-1	November 2020 – February 2021
Well Project Only	
Apply for SRF Loan	May, 2021
Begin Design	June, 2021
Test Well/Hydrogeologic Study	July – August 2021
Design Basis Report/Cost Estimates to the District	August - September, 2021
Land Acquisition: Private and DNRC	September - October, 2021
Submit Design Plans and Specifications to MDEQ	November, 2021
MDEQ Review & Approval	December - January, 2022
Advertise and Open Bids	February, 2022
Finalize Financing and SRF Loan Close	March, 2022
Start Construction	April, 2022
Complete Well Project	July, 2022

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Project Website



www.ranchviewinfrastructure.com

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Questions/Comments

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*** Proof of Publication ***

HELENA INDEPENDENT RECORD
2222 Washington St
Helena, MT 59602
Ph: (406) 447-4000

GREAT WEST ENGINEERING INC

2501 BELTVIEW DR.

HELENA MT 59601

ORDER NUMBER 16719

The undersigned, being duly sworn, deposes and says. That she is the principal clerk of The HELENA INDEPENDENT RECORD, a newspaper of general circulation published daily in the City of Helena, in the County of Lewis & Clark, State of Montana, and has charge of the advertisements thereof:
That the Notice of Public Meeting

a true copy of which is printed, was published in said newspaper for the same number of insertions provided below.

Oct. 28 + Nov. 4, 2020

STATE OF MONTANA
County of Lewis & Clark

Subscribed and sworn to me this 4th day of November 2020.

Section: Legal

Category: 0701 Legals Helena

PUBLISHED ON: 10/28/2020, 11/04/2020

TOTAL AD COST: 229.02

FILED ON: 11/4/2020

Billie Jo Williams

NOTARY PUBLIC for the State of Montana
Printed Name: Billie Jo Williams
Residing at Clancy, Montana 59634
My commission expires August 31, 2022

(Notary Seal)

BILLIE JO WILLIAMS NOTARIAL SEAL STATE OF MONTANA

BILLIE JO WILLIAMS
NOTARY PUBLIC for the
State of Montana
Residing at Clancy, Montana
My Commission Expires
August 31, 2022

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The purpose of the meeting will be to obtain public comments regarding the findings of the PER and associated projects to improve the water system. At the public meeting, a representative of Great West Engineering, Inc. will present the PER, including an explanation of identified problems, the preferred alternatives, the project area, construction activities, project budget, sources of funding, and the potential impact of the project users. The assessment of the project's potential impact on the environment will also be discussed. All interested persons will be given the opportunity to ask questions and express opinions regarding the PER. Comments may be given orally at the meeting or submitted in writing before the meeting.
Anyone wanting to review the PER, project impacts or submit questions and comments should contact mmudd@greatwes-teng.com. Copies of the draft environmental assessment and PER, and an opportunity to comment online, are available at www.ranchviewinfrastructure.com.
Ranchview County Water District
Bob Bennett
President
October 28 & November 4, 2020. **MNAXLP**

*** Proof of Publication ***

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Ranchview County Water District
Bob Bennett
President
October 28 & November 4, 2020. **MNAXLP**

Resolution No. _____

A RESOLUTION OF THE RANCHVIEW COUNTY WATER DISTRICT TO ACCEPT THE FINDINGS OF THE ENVIRONMENTAL ASSESSMENT AND DETERMINATION THAT THE PREPARATION OF AN ENVIRONMENTAL IMPACT STATEMENT IS NOT NECESSARY FOR THE WATER SYSTEM IMPROVEMENTS PROJECT

WHEREAS, the Ranchview Water District has completed an assessment to identify potential environmental impacts of analysis of improvements for construction of a public drinking water system to serve the District;

WHEREAS, the draft Environmental Assessment was made available for public comment and the findings were presented at a public meeting held in Ranchview Water District on November 9, 2020;

WHEREAS, public comment was received;

WHEREAS, the Ranchview Water District has determined that the construction of improvements to the water system, if completed, will not affect the quality of the human environment, and accordingly the District's Board of Directors has established that an Environmental Impact Statement is not necessary;

NOW, THEREFORE, BE IT RESOLVED by the Ranchview Water District as follows;

The Ranchview Water District's Board of Directors adopt the final Environmental Assessment for the construction of a public drinking water system to serve the District.

PASSED AND ADOPTED by the Ranvhiew Water District at a regular meeting thereof held on the 12 Day of November, 2020.

Robert E Bennett
Bob Bennett, President

Nov 12, 2020
Date

Thomas D. Pahut
Attest:

11/12/2020
Date

Resolution No. _____

A RESOLUTION OF THE RANCHVIEW COUNTY WATER DISTRICT TO ADOPT A DETAILED PRELIMINARY ENGINEERING REPORT CONDUCTED AND PREPARED BY GREAT WEST ENGINEERING, INC.

WHEREAS, Great West Engineering did submit a detailed Preliminary Engineering Report to the Ranchview Water District describing the current situation related to drinking water for the District; developed, evaluated, and recommended preferred alternatives for improvements, and

WHEREAS, the Ranchview Water District's Board of Directors did meet with Great West Engineering to review and approve said Preliminary Engineering Report; and

WHEREAS, the Ranchview Water District has conducted a public hearing on November 9, 2020, and Great West Engineering has incorporated information from the hearing in the Preliminary Engineering Report.

NOW, THEREFORE, BE IT RESOLVED AS FOLLOWS: The Ranchview Water District's Board of Directors has reviewed the Preliminary Engineering Report (PER) and submitted change requests necessary to effectuate the acceptance of the PER and hereby declares the document acceptable to the District; and

That Robert Bennett, District President, is authorized to execute and attest any documents required to adopt the PER and effectuate its submission to the appropriate governing agencies:

PASSED AND ADOPTED by the Ranchview Water District at the meeting thereof held on the 12 Day of November

Robert E. Bennett
Robert Bennett, President

Nov 13, 2020
Date

Thomas D. Pahut
Attest:

11/12/2020
Date

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Ranchview County Water District
Bob Bennett
President
Publish Two Times
Helena Independent Record
October 28, 2020
November 4, 2020

RANCHVIEW WATER DISTRICT

2020 PRELIMINARY ENGINEERING REPORT

CHARTS/GRAPHS/TABLES

WATER SYSTEM

DRAFT

DISTRICT BOARD WORK SESSION
JULY 13, 2020

Prepared By:

GreatWest engineering®

EXISTING SYSTEM SUMMARY

1. Background and Scope

- The Ranchview Estates subdivision was constructed in the 1990's. The subdivision is served by a potable water system and separate irrigation system. Two wells supply the potable system and a third well serves the separate irrigation system, with a stand by irrigation well.

- Purpose of PER

    - Evaluates Water System:
        - Supply, Storage, Treatment, Distribution
        - The objective of this PER is to provide the District with an analysis of their water system.
        - Planning document for District's system.

    - Preliminary Engineering Report (PER)

        - Required by Regulatory Agencies for Compliance and Funding Agencies for Grants/Loans
        - Identify Problem Definition
        - Evaluate Alternatives including Selection of Preferred Alternative
        - Establishes Costs and Potential Funding Scenarios
        - Facilitates Public Comment

2. Population and Planning Period

- Planning period of 20 years for analysis (2040)

- District currently has 107 total houses/water accounts, all residential

- The subdivision is built-out and no population increase will be assumed for the 20-year planning period.

- Estimated population is 107x2.4=257 +/- people
    - County census data is 2.4 people/home

3. Water Supply and Pumping

Table 1 Well Log Water Supply Source Information					
Well Name	**GWIC ID**	**Well Completion Date**	**Total Depth (ft.)**	**Static Water Level (ft.)**	**Original Pumping Rate (gpm)**
Well 1 (Potable)	134632	1993	100	53	91
Well 2 (Potable)	134635	1993	120	52	94
Irrigation	64824	1973	115	38.5	450
Irrigation	209291	2003	183	47	400

- Other Information (Well 1)
  - 6" steel casing
  - Screening: 70-100 ft. (in sand and gravel layer)
  - Static water level (June 30 2020) – 48.7ft.
  - 7.5 HP motor (from original design report)
  - Current pump flow rate 20 gpm (as observed by turning on pump below pressure set point)
  - Pump Model McDonald Series S 21750 S-24 Stage (from original design report)
  - VFD for speed/flow control (but does not appear to be connected)
  - Three new riser pipe sections replaced Oct 2018
  - New pump and motor installed in June 2019 Per Integrated. (Need Pump Curve)

- Other Information (Well 2)
  - 6" steel casing
  - Screening: 70-120 ft. (in sand and gravel)
  - Static water level (June 30 2020) – 48.5ft.
  - 7.5 HP motor (from original design report)
  - Current pump flow rate 5 gpm (as observed by turning on pump below pressure set point)
  - Pump Model McDonald Series S 21750 S-24 Stage (from original design report)
  - Connected to a VFD for speed/flow control (but does not appear to be connected)
  - Three new riser pipe sections replaced July 2019

- Water Rights for Potable wells
  - Water Right No: P088721-00
    - Max Volume 25 Acre-Feet

- Water Rights for Irrigation wells
  - Water Right No: 411-P088721-00
    - Max Volume 85 Acre-Feet

4. Water Quality/Water Treatment

- Do not disinfect.
    - Record plan for pump house does show a "future disinfection room" if needed.
- DEQ Sanitary Survey Inspection. Nov. 21, 2017. Typically done every 3 years.
- As a community water system, test for several parameters including:
    - coliform/ecoli (monthly), nitrate/nitrite (annual), arsenic (3 yr. cycle), VOCs (3 yr. cycle),radium's 9 yr. cycle), fluoride (3 yr. cycle), gross alphas (6 yr. cycle), lead/copper (3 yr.)
- Violations: no violations in last 5-years or less.

5. Water Usage

Existing Water Usage – Potable System

- Original peak demands based on fixture unit method, 45 fixture units per residence. Peak demand at full development = 97.6 gpm.
- The District provided existing pumped water meter data provided by the operator.
- Water demand calculations are based on the last year of water source monthly flows. Table 2 summarizes monthly source flows of the potable system and resulting per-capita-per-day water use.

Table 2
Potable System Per Capita Use

Month/Year	Average Source Flow/Month (gallons per day)	Average Per Capita Use (gpcd)[1]
July 19	11,863	46
August 19	17,953	70
September 19	16,643	65
October 19	14,793	58
November 19	15,687	61
December 19	13,470	52
January 20	14,267	56
February 20	15,480	60
March 20	15,310	60
April 20	15,273	59
May 20	17,827	69

June 20	16,953	66
Average	**15,460**	**60**
[1]Based on existing service population of 257		

- Average day per capita use = 60 gpcd (potable only)

- Max day per capita use = 70 gpcd (based on max source flow month of August) The definition of maximum day demand is the highest volume of water consumed on any day in a year. (Daily flow records were not available so the value used here is actually the average day of the maximum month.)

- Max day peaking factor = 1.16 (max day/avg day). This is not a true maximum day peaking factor without daily flow records.

- Typical maximum day to average day peaking factors range from 1.5 to 3.5 based on AWWA guidance.

- Per DEQ, the water system must be able to provide the maximum daily demand with the highest capacity pump out of service. According to the well data presented previously, the total pumping rate of all the potable wells is 25 gpm. With the largest well out of service, the supply is only 5 gpm. The existing water supply is not adequate to meet demands with the largest well out of service. Well pump #2 flow should be double checked.

- For Well Pump Capacity Montana DEQ recommends that:

  "The total developed ground water source capacity for systems utilizing gravity storage or pumped storage, unless otherwise specified by MDEQ, must equal or exceed the design maximum day demand with the largest producing well out of service. The total developed ground water source capacity for systems utilizing hydropneumatics storage tanks as the only storage facility must be sufficient to equal or exceed the peak instantaneous demand with the largest producing well out of service."

Existing Water Usage – Irrigation System

Table 3 Irrigaton System Per Capita Water Use		
Month/Year	**Average Source Flow/Month (gallons per day)**	**Average Per Capita Use (gpcd)[1]**
July 19	226,947	884
August 19	247,460	964
September 19	165,137	643
October 19	2,597	10
November 19	90	0.35
December 19	27	0.10
January 20	30	0.12
February 20	33	0.13
March 20	210	0.82
April 20	21,383	83
May 20	187,153	729
June 20	207,680	809
Average (May-Sept)	**206,875**	**806**
[1]Based on existing service population of 257		

- Comparison to other non-metered systems: TMPV in Valley is 300-400 gpcd (annual average with combined potable/non potable, with peak summer months at 500-700 gpcd)

6. Fire Flow

- No fire flow in the distribution provided now.
  - Original design report states fire protection is provided by a tanker truck fill site that supplies 600 gpm on demand. The source is an existing cropland irrigation system.
- For systems providing fire capacity, DEQ standards require a minimum storage capacity equal to average day flow plus fire demand.
  - Existing average day (potable demand) = 15,460 gallons
  - Recommended fire flow is 1,000 gpm for 2 hours = 120,000 gallons.
- To provide fire flow with pumps – need to be at over 1,000 gpm for 2 hours or approximately 150,000 gallons of storage would be required. (with buffer capacity)
- Can look into ISO and insurance benefits if fire flow is provided.
- Any input from local fire authority?

7. Water Distribution

- Potable System
    - 2” looped distribution mains
    - As built shows 3” to the subdivision (correct?)
    - No meters
    - No major ruptures noted.

- Irrigation System
    - 3” looped distribution mains
    - As built shows 6” to the subdivision (correct?)
    - No major ruptures noted.

8. Water Model Summary

- Computer modeling was conducted to evaluate hydraulics of the potable and irrigation systems.

- The potable system was analyzed under four domestic demand scenarios:
    - Average day domestic demand: 11 gpm
    - Maximum day domestic demand: 17 gpm (PF=1.5)
    - Peak hour domestic demand: 42 gpm (PF = 4)
    - Peak design flow from original design report: 98 gpm

- Per DEQ requirements, pressures must remain at 35 psi or above at all service locations in the system under domestic demand conditions.

- The model was set up so the supply source is represented by a reservoir at a specified elevation to equal the pressure tank pump on/off set points. The pumping system was not modeled. (Need pump curve to do so) Per the water system operator, the pressure tank set points of the potable system are pump on at 40 psi and pump off at 60 psi.

- Figure 1 displays the potable system peak hour water model results when the pressure tank set point is 40 psi. Resulting pressures in the system are less than 35 psi. The minimum system pressure is around 25 psi at the northwestern corner of the subdivision. Figure 2 displays the potable system peak hour water model results when the pressure tank set point is 60 psi. The minimum system pressure is 45 psi and overall system pressures are adequate.

- The following conclusions can be made regarding the potable system modeling.
    - 40 psi is too low of a set point for the pressure tanks. In order to keep all points in the system above 35 psi, the minimum pressure tank set point should be no less than 50 psi.
    - Distribution system pipe sizes are adequate for the estimated peak hour demand of 42 gpm. If actual system demands are greater than this and closer to the estimated peak demand of 98 gpm from the original design report, excessive headloss begins to affect the system and pressure begins to drop

below 35 psi in the northwestern portion of the system (see Figure 3). Upsizing the supply main from 3-inch to 6-inch could be a potential solution.

- The irrigation system was analyzed under three domestic demand scenarios:
  - Average day irrigation season (May-Sept.) demand: 136 gpm
  - Maximum day irrigation season demand: 205 gpm (PF=1.5)
  - Irrigation well design pump rate: 290 gpm

- The irrigation system model was set up so the supply source is represented by a reservoir at a specified elevation to equal the pressure tank pump on/off set points. The pumping system was not modeled. (need pump curve to do so) Per the water system operator, the pressure tank set point of the irrigation system is constant at 75 psi.

- Figure 4 displays the irrigation system maximum day water model results when the pressure tank set point is 75 psi. System pressures appear to be adequate. The minimum system pressure is around 57 psi at the northwestern corner of the subdivision. Figure 5 displays the irrigation system design flow water model results when the pressure set point is 75 psi. The minimum system pressure is 52 psi and overall system pressures are adequate.

- Irrigation system pressures appear to be adequate with the current pipe sizing and pressure set point. If actual demands are higher than modeled, the 3-inch pipe in the distribution system may see excessive headloss and greater pressure drops.

- Other potential causes of low pressure (not modeled)
  - Restrictions in plumbing from the main to the residence
  - Closed valves
  - Insufficient pump capacity
  - Leaks

9. Water Storage

- No storage, only hydroneumatic tanks.

10. Problem Definition

- Operator reported pressure switch issue, replacing soon.

- Aging and problematic electronics VFD systems

  - Can arrange for an electrical/control company to give opinion/cost

- Flow meter indication on irrigation system in non-irrigation months (Oct – March) might point to leakage. Is there usage on irrigation system at this time?

- Operator states there have been complaints for low pressures both systems.

11. Alternatives Being Considered (In Progress)

Supply Alternatives

- **No Action**
- **S-1:New Irrigation Only Well**
- **D-2:New Irrigation Well**
  - (Construct to DEQ-1 PW standards for potential potable backup or fire service)
  - Eligible for loan/grant funding

Distribution System Alternatives

- **No Action**
- **D-1: (TBD)**
- **D-2: (TBD)**

Pump House Upgrades

- **Replace missing pressure tanks**
- **Fix/replace valves for blow offs**
- **Electronics/VFD upgrades**
  - **Can help with power/efficieny and constant pressure**

Treatment System Alternatives

- **None**

12. Grants and Funding

TARGET RATE ANALYSIS

- Using 2015 Department of Commerce Census and Target rate – Lewis and Clark County

MDOC Target Rate Analysis		
Median Household Income (MHI)	=	$56,197
Low to Moderate Income (LMI)	=	38%
Department of Commerce Target Rate Threshold		
Water Only Target Rate (1.4 of MHI)	=	$787/year
Water Only Target Rate (Monthly)	=	$65.56/mo.

Existing Rates		
		Residential
Water Only Rate	=	$45.00
Outstanding Water Debt Service	=	$00.00
Water Rate	=	**$45.00**

Funding Options

- Treasure State Endowment Program (TSEP)
  - If at 100% of Target - $500,000
  - 125% of Target - $625,000
  - 150% of Target - $750,000
  - Dollar for dollar match
  - Bi-annual funding cycle
  - Project must show benefit to public health and human safety
  - Applications due May 2022
  - **Not a fit given current rates**

- Department of Natural Resource and Conservation (DNRC)
  - $125,000 – Target rate does not apply
  - No match requirement
  - Bi-annual funding cycle
  - Projects must provide strong natural resource benefit
  - Applications due May 2022

- Community Development Block Grant Program (CDBG) - $450,000
  - 25% local match
  - 51% low to moderate income (LMI)
  - Annual program – Applications accepted each Spring/Summer
  - Target rate is used to determine eligibility
  - **District does not qualify**

- State Revolving Loan Program (SRF)
  - Low interest loans (2.5% or lower)
  - 20 year terms
  - 50% loan forgiveness up to $500,000 (limited funds)
  - **An option to finance public water projects – not irrigation**

- Rural Development Grant & Loan Program (RD)
  - Grant/loan combinations
  - Open cycle
  - Requires installation of water meters
  - Terms up to 40 years
  - MHI < $38,205
    - Poverty Eligibility
    - Grant eligible up to 75% of project cost
    - Loan Rate of 1.125%
  - $38,205 < MHI $47,757
    - Intermediate Rate
    - Grant eligible up to 45% of project cost
    - Loan Rate of 1.50%
  - MHI > $47,757
    - Market Rate
    - Not grant eligible
    - Loan Rate of 1.875%

District Financials

Existing Water System Revenues and Expenses

Existing Water System Revenues and Expenses			
Description	**2018**	**2019**	**2020**
Revenues			In Progress
Water Revenues	55,574	52,795	
Other Revenues	2,859	1,391	
Total Revenues	**58,433**	**54,186**	
Expenses			
Accounting Fees	4,450	4,800	
Advertising/Promotion	85	-	
Bank fees (ACH)	62	170	
Bank Fees (Credit Card)	908	888	
Business Licence/Permits	35	-	
Charity	25	-	
Computer/internet	172		
Insurance	2,479	2,567	
Office Supplies	124	451	
Postage/Delivery	474	313	
Printing/Copying	411	445	
Professional Fees	1,242	278	
Reconciliation	-1,508	1,625	
Testing – Water	470	444	

Utilities – Electricity	12,027	9,930	
Utilities – Telephone	555	569	
Water Well Management	11,502	18,895	
Total Expenses (Estimated)	**33,513**	**41,375**	
Net Profit (Estimated)	**24,920**	**12,811**	

- *Table based on Financial reports by District bookkeeper.*

13. Selecting An Alternative & Potential Funding

- **Pending**

14. Next Steps

- Get pump curves to add to water model
- Define a project to complete PER cost estimates, budget analysis, and Environmental Assessment
- Public Hearing Required at Some Point
- We can set up a project website if needed
- Intended Schedule

Matthew Mudd

From: Matthew Mudd
Sent: Wednesday, August 19, 2020 3:58 PM
To: Bob Bennet; Jim Oppedahl; Mark Fitzwater; Tom Schulke; Tom Pahut; Christie Killeen
Cc: Jessica Salo
Subject: Ranchview Water Preliminary Engineering Report (PER) - Update
Attachments: Ranchview Water PER-Draft Chapter 3.docx.pdf

Good Afternoon Ranchview Board Members:

I thought it would be beneficial to give the Board an overall update on your water PER that is in progress.

For your reference, please see the attached draft version of Chapter 3 of the PER (Chapter 3 is the Existing System Description). Before moving forward with any potential upgrades to further consider/evaluate and recommend, it makes sense to get a good handle of the existing system and any notable problems before developing a potential project list. Once a potential project list is developed, we can narrow in on the costs, priorities, and potential funding options.

For your information, the required PER outline consists of these chapters: 1) Executive Summary, 2) Project Planning Environmental, 3) Existing Facilities, 4) Need for Project, 5) Alternatives Considered, 6) Selection of an Alternative, 7) Proposed Project (Defined), 8) Conclusions and Recommendations (including funding). To date, we have made good progress on chapters 2 through 4, along with having completed supporting research, modeling, and investigations. We have also completed the required environmental research and agency comment solicitation to support chapter 2.

I would like to request that you please review the draft Chapter 3 and provide any questions or comments to us for incorporation into the PER.

Based on our initial site investigations, modeling, and research, we note the following problems:

- Potable Well/Pump No. 2 Performance – the pump is not providing the same capacity as pump #1 based on cursory level field assessments. Pump 1 alone appears to not meet the calculated peak instantaneous demands. Also, the controls are not currently set to operate pump 2, nor as an alternating or lead/lag operation; the pump control is currently in the "pump 2 off" position.
    - DEQ -1, 3.2.1 states, *"The total developed ground water source capacity for systems utilizing hydropneumatic storage tanks as the only storage facility must be sufficient to equal or exceed the peak instantaneous demand with the largest producing well out of service. For systems serving 50 or less equivalent dwelling units, MDEQ may allow a reduction in total required system capacity provided the system can maintain the minimum pressures required in Section 8.2.1 with the largest producing well out of service."*
    - It is important to verify if the pump 2 or the well is not operating correctly. It is noted that the District replaced pump no. 1 in 2019, but not pump 2.
- Reduced service pressures with increased/peak instantaneous demands - Users for both irrigation and potable systems have reported reductions in service pressures at times.
    - Per DEQ, the pressures in the potable system must be greater than 35psi in all conditions (DEQ 8.2.1)
    - The lowest pressures are located in the highest elevations
    - Modeled and field measurements show that the pipe sizes appear to be sufficient to limit head loss impacts.
    - It is likely that the lower pressures are experienced when the demands exceed the pump output
    - A pump #2 improvement (and lead/lag operation fix, etc.) could help with potable pressure issues. A potential new well (say north side) could potentially address low irrigation pressures

- Flow Meters Beyond Useful Design Life – The existing flow meters are the original models. When flow meters age, they can tend to err due to mechanical wear and tear. Newer models are more accurate.
- Pump House Piping – The piping is non-rigid (glued PVC). The PVC piping is reported to have sheared and ruptured during the last major earthquake. (Rigid: i.e. more robust metal - Ductile Iron or Galvanized pipine with pipe supports can be considered for a future upgrade)
- Potable/Irrigation Service Cross Connections – there are reportedly possibly up to 3 irrigation/potable cross-connections existing in the system. Cross connections are out of compliance with DEQ standards as only the potable system is monitored for state/federal drinking water regulations. Moreover, irrigation systems can be subject to back siphonage and contamination concerns that can originate with irrigation type system use.
- Electrical and Control System Issues – Underperforming controls, surge arrestors, and some various outdated electrical, etc. Nash electric performed an electrical system site assessment in July .The final quote for such a proposal to improve the system is pending. I will reach out to Jon Nash again and push get his proposal ETA.
- No Backup Power – DEQ-1, 3.2.1.3 states: *"When power failure would result in cessation of minimum essential service, sufficient power must be provided to meet average day demand."* While the District is not required to install backup power, it is good practice by many systems (including those in the Helena Valley) that provide solely pumped flows.
- Other noted maintenance and housekeeping recommended practices:
    - Pump House: Recommend doing a full clean-up of the pump house and inventory or dispose of loose/unused equipment
    - Blow offs in the system need to be used annually to flush/clean the system. It doesn't appear that this is being done in recent history.
    - Check/adjust hydropneumatic tank pressure settings

Based on the problem summary, the potential improvement projects may include:

Description	**Budgetary Cost**	**Priority**	**Funding**
Well or Pump #2 Rehab or Replacement	TBD – (need to detn. if pump or well issue)	TBD	TBD
Rigid (DIP or Galv) Pipe	$10k to $12k rough est.	TBD	TBD
Install redundant well (possibly north side)	Highly Variable (see note 1) (could be $150k to $400k +/-) for total project cost	TBD	TBD
Replace Flow Meters	$8k to $10k rough est.	TBD	
Upgrade Electrical and Controls	TBD - Nash Proposal	TBD	TBD
Install backup generator	$30 to $50k (see note 2)	TBD	TBD
Remedy Irrigation/Potable Cross Connections	$500 per each? (note 3)	TBD	By District?

1. *Well project costs can vary greatly depending on site-specific access and easements, land acquisition, electrical extension costs, water transmission main length, pump house building size/type, drill depth, DEQ review if built to DEQ potable well standards, and extent of engineering/inspection, funding agency involvement.*
2. *Varies depending on if providing backup for only potable or potable plus irrigation horsepower pumps.*
3. *Cross-connection remedy assumes internal plumbing work only, and not exterior/excavation work. A more detailed plumber quote could be attained.*

Questions and next steps:

- Attain feedback and input from District on the existing facility and problem descriptions
- Further investigate well/pump #2 issue, operation, and performance
- Better Investigate the potable well pump #1 flow rate. (This might require use of temp flow meter and directing water out of building blow out, or opening up a distribution system blow out)

- Attain the Nash electric proposal and include on the project list. It appeared that Nash might require more of his own investigation. I will check.
- Verify if the District would like to evaluate a new well option
- Determine a plan to single out irrigation/potable “cross-connections” locations and how to fix
- Input on District for project priority ranking
- Any other issues with the system needs to be reported? Are any color or odor water quality issues to report?
- Matt can attend the next board meeting to engage in further discussion/planning, narrowing in on schedule and PER.

Please let me know if you have any questions. I will be available and in touch.

Thanks,

Matthew Mudd, PE | Project Manager

Great West Engineering, Inc.
PO Box 4817
2501 Belt View Drive
Helena, MT 59604

DIRECT: 406.495.6196
FAX: 406.449.8631
OFFICE: 406.449.8627
www.greatwesteng.com



Ranchview County Water District

www.ranchviewwaterusers.com
PO Box 9732, Helena, MT 59604

September 21, 2020

Dear Ranchview Neighbors:

As summer comes to an end in 2020, I have some important updates about domestic and irrigation water systems for the Ranchview Water Users community. First, the Board of Directors has been very involved this year in a project to assess and improve our overall water system. Earlier this year, the Board applied for and received two planning grants from the Montana Department of Natural Resources Renewable Resources Grant and Loan (DNRC-RRGL) and the Montana Department of Commerce Treasure State Endowment Program (TSEP) to conduct a Preliminary Engineering Report (PER) that evaluates our overall water systems, assesses current operating capabilities and any deficiencies and provides the Board with recommendations on improving the continued delivery of safe and adequate water supplies.

Great West Engineering has been hired to conduct the PER and has to date made good progress. In order to give Ranchview water users regular project updates Great West Engineering has created a website that contains project information and updates. Please go to http://ranchviewinfrastructure.com. There you will discover the broad outlines of this improvement project and detailed findings by the engineers as the study progresses. Through the website you will also be able to share your thoughts and ideas.

Your input is vital to the success of this project. You can provide this input in at least two ways: (1) by going to the website and providing comments, or (2) by attending a Public Hearing on the PER scheduled for November 11, 2020 beginning at 7:00 p.m. Because of Covid-19 concerns and the unavailability of other public spaces, I'll host the meeting at my garage – and I promise I'll have the heat on! Please wear masks.

Second, as part of our water system improvement project, we have discovered that there are things that individual property owners can do to improve the overall functioning of our water system. One thing that property owners can do fairly easily is to replace the little red or blue sprinkler nozzles on your sprinkler heads. If these are not changed every 3 or 4 years, the nozzle tends to erode and become bigger in size. This leads to an increase in instantaneous demands resulting in pressure losses in the system. Changing the sprinkler nozzles on a regular basis will also conserve water, decrease demands, reduce pump wear and improve the overall performance of our irrigation system.

Third, during this improvement project it has come to the Board's attention that the domestic and irrigation water lines in perhaps 3 or 4 properties in the subdivision may have been wrongly cross-connected by the contractor who originally built homes in Ranchview. By wrongly, I mean that the contractor may have connected the irrigation water line up to the domestic system – and the domestic water line up to the irrigation system. As you know, we have 2 wells that service domestic water to our homes and 2 wells that service the outside irrigation system. Wrongly cross-connected pipes can be a

Continued to back page

health and safety concern, and not compliant with Department of Environmental Quality (DEQ) requirements since water from the domestic wells are tested for contaminants on a regular basis to meet DEQ drinking water standards. And while the water from the irrigation wells comes from the same aquifer and similar pump house plumbing as the domestic wells, and we believe all our water is safe, the irrigation well water is not tested on a regular basis. **Therefore, if water lines are cross-connected inside your home, the Board wants to get them connected properly and will pay for the costs associated with correctly connecting the water supply lines inside your home.**

There's really only one easy and effective way to determine which, if any, homes have cross-connected or "reversed" water lines: that's to turn off the irrigation water and ask residents in all our homes to monitor your domestic water. If your home's domestic water goes off when the irrigation water is turned off – you will know that your water distribution lines are reversed and need to be corrected. If your domestic water is still on when the irrigation water is turned off – your home's water distribution system is correctly connected.

In order to find out which homes (if any) have this problem, the Board is proposing to turn off the irrigation water system for 2 hours on Saturday, October 10th beginning at 10:00 a.m. and ending at noon. When this happens, if your domestic water turns off, please call me as soon as possible.

Individual homeowners can also check their own water distribution network for reverse connections prior to the October 10th test. Here's how to check your system. There are two black polyurethane pipes that enter your home and provide domestic and irrigation water. The domestic pipe is typically 1 inch in diameter and the irrigation pipe is 1-½ inches in diameter. To test to see if your pipes are reversed, shut off (close the ball valve) on the larger 1-½ inch pipe. Then check to see if your domestic water in the house is off. If it is, your pipes are reversed, and you should call me immediately. If the domestic water is still on when you turn off the water in the 1-½ inch pipe – your system is correctly plumbed, and you have no problem. **If you have any questions or concerns about the water connections in your home, please do not hesitate to call me! And, if you have any other issues or concerns about the water system, such as low pressures or water quality, please also reach out to me or comment on the website so this can be documented in the Preliminary Engineering Report.**

Finally, thank you for your continued support for the maintenance and improvement of our Ranchview water system. I look forward to hearing your ideas on the website and also your input at the November 11th Public Hearing.

Best regards,

Bob Bennett – President
Ranchview County Water District
(406) 422-9247

Matthew Mudd

From: Matthew Mudd
Sent: Tuesday, October 6, 2020 10:47 PM
To: Jim Oppedahl; Bob Bennet; Tom Pahut; Tom Schulke (tschulke@bresnan.net); Mark Fitzwater; Killeen Christie
Cc: Jessica Salo
Subject: Ranchview Water PER update
Attachments: North Well Evaluation Summary.xlsx; North Well Evaluation.pdf; Ranchview Estates Past Inegrated Invoice Data.xlsx; 1-19148-Figure 5-1 Alt S-5a New Irrigation Well.pdf; 1-19148-Figure 5-2 Alternative S-5B-Exhibit.pdf; DEQ SRF Feeback on Well Option.pdf

Good Evening Board Members:

I just wanted to give you a (not so quick) update on the Water PER and the latest findings ahead of time to be able to solicit any of your comments or questions before the next meeting. (I also didn't want to surprise you with any new information, as I won't see you until the public hearing and when the PER is in near-final draft form.) Please consider the following:

1. **Review of operations/improvements records (Integrated Invoices)**
    a. I looked at the last 7 years of your invoice records and descriptions of work from Integrated (Thanks, Christie for providing this information)
    b. See attached for the summary spreadsheet of noted non-typical operations/repairs in your pump house. The major observations include:
        i. Periodic heating issues in the winter (do you need to upgrade the heating/thermostat?)
        ii. Several overvoltage faults and forced pump resets (which Nash is helping with)
        iii. Power outages occur and force pump resets (Nash work will help with this but might want to keep backup generator option on your radar)

2. **Cross Connection Responses**
    a. I understand that your recently submitted mailers mention you will be shutting down the irrigation system this Saturday to test for the cross connection locations. Please let me know what you find so I can capture it in the PER.

3. **North Well Evaluation: (See attached for supporting well log research information)**

    I performed a preliminary assessment of the nearby wells within a ½ mile or less proximity to the potential new north well location and reviewed the available well logs for 15 wells. This is the text I currently have in the PER:

    If the District chooses to pursue a new well on the north side of the subdivision to provide a redundant irrigation and/or potable water supply and to maintain system pressures, available well log data from nearby wells is beneficial in estimating the well performance in this location. A potential north well is near the transition from the more productive Helena Valley sand and gravel alluvium aquifer formation (south of the subdivision) to a fractured shale-rock aquifer. A desktop evaluation of up to 15 nearby wells, within ½ mile immediately north and west of the potential well location, shows well depths in the range of 120-130 feet deep, with an average static water depth of about 60-feet, and with a typical average tested flow rate of about 20-25 gpm. While there are some wells that have recorded flow test above 50 gpm, the probability of acquire a new well with this production is likely low. With a limited producing well yield of less than 25 gpm, a storage tank with a separate high service pump would be needed to buffer the difference between the peak demands and the actual well yield. When the District chooses to move forward with a new well on the north side, a test well with a hydrogeologic study is

highly recommended to verify the well production before proceeding with the costly new full production well, pump, storage tank, and related piping improvements.

The budgetary costs for a new north well are estimated to be: (See attached schematic layouts of Alternative 5A and 5B for reference)

- Alternative S-5a New North Well (Irrigation Only): $322,000
- Alternative S5-b: New North Well, Irrigation (and backup potable): $383,000
- Both cost estimates assume the similar items including: Drilling/Testing/Producing Wells/Riser pipes, Pumphouse building, directional drill a new main through a private lot, 3-phase power extension from Montana, Easements through DNRC and private lots, submersible pumps/electrical, buried storage tank w/ intermediate pumps, etc. 10% contingency, engineering/admin.
    - Please note that feedback is still pending from Andy Burgoyne with DNRC regarding a potential easement.
    - Alternative S-5b (irrigation + potable well) would require additional engineering for DEQ design/reviews, increased well testing, and a backflow assembly for potable/irrigation connection (Which does require a DEQ deviation)
- I can share the detailed estimates if you like upon request
- Note that for each alternative, the District would also realize additional operating expenses (i.e. power, operations, spare parts, etc.)
- Alternative S-5b ($383,000) could be eligible for SRF funding (as it pertains to a potable system upgrade).
    - Feedback on the SRF/DEQ drinking water program manager, Mark Smith, was provided regarding this. (See attached email copy)
    - SRF currently offers 20 year loans at 2.5% interest.
    - To give you a rough rate evaluation: If the District kicked in $150,000 of local funds and financed $233,000 on an SRF loan, a rate increase would still not be needed (in other words, the existing rates would be enough to cover loan coverage, considering the budget situation)

4. **Public Hearing and Required Newspaper Notice**
    a. We will have to put in an advertisement for a minimum of 2x for the PER public hearing. We could put in the Oct 1st and 8th(Sunday's papers) or say the Oct 28 and Nov 4 (Wednesdays or other weekday). We exclude this fee from our contracts and I think the typical cost for this is around $600-$700 for Sundays. I think your main audience of interest is your subdivision and that notice went with your mailer anyway. I will assume you are ok with week day notices (which I think are less expensive) unless you tell me otherwise.

Please let me know if you have any questions or comments on any of these items, or new information to be incorporated into the PER.

Thanks,

Matthew Mudd, PE | Project Manager

Great West Engineering, Inc.
PO Box 4817
2501 Belt View Drive
Helena, MT 59604

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Ranchview Water PER

Progress Update – September 9, 2020 Board Meeting

Project Status

- Last meeting attended in July, 2020 - preliminary charts/graphs/tables given

- Completed to date
    - Flows and water usage have been evaluated. Comparison to Water Rights Made
    - Periodic pressure checks at various homes completed
    - Pump house site assessments completed
        - Electrical and Controls Site Assessment by Nash (Proposal in Progress)
        - Pump discharge flow rate test completed (two pressure/flow points)
            - Pump #1: 58 gpm at 12 psi, and 12-15 gpm at 55 psi
            - Pump #2: 75 gpm at 20 psi, and 6-8 gpm at 55 psi
    - Pump curves attained for actual new pumps installed (See attached)
    - Water modeling at demand peak conditions completed
        - shows that pipe sizes are adequate
        - Low pressures likely caused when instantaneous demands outpace the pump
    - Chapter 3 – Existing System – Section Draft Written. (Copy Attached)
        - Comments Solicited from District
    - Problem Definition Developed (See Below)
    - Project List w/ Budgetary Costs Made (See Below)
    - Website domain secured: www.ranchviewinfrastructure.com
        - To put documents, estimates, etc

- TSEP/DNRC planning grants: (Funded w/ $15k each agency)
    - DNRC completion deadline December 31, 2020
    - TSEP deadline April 30, 2021
    - 50% reimbursement at 50% PER draft

Problem Summary

- Potable Well/Pump Performance – Well pump no. 2 is not providing the same capacity as pump #1 based on level field assessments and pump flow tests. Pump 1 alone appears to not meet the calculated peak instantaneous demands. Also, the controls are not currently set to operate pump 2, nor as an alternating or lead/lag operation.

  "The total developed ground water source capacity for systems utilizing gravity storage or pumped storage, unless otherwise specified by MDEQ, must equal or exceed the design maximum day demand with the largest producing well out of service. The total developed ground water source capacity for systems utilizing hydropneumatics storage tanks as the only storage facility must be sufficient to equal or exceed the peak instantaneous demand with the largest producing well out of service." (DEQ Circular-1, 3.2.1) When the largest well/well pump (Well No. 1) is taken out of service, this standard is not met. For systems serving 50 or less equivalent dwelling units, MDEQ

may allow a reduction in total required system capacity provided the system can maintain the minimum pressures required (35 psi minimum) in Section 8.2.1 with the largest producing well out of service."

- Electrical and Controls - The controls are not currently set to operate pump 2, nor as an alternating or lead/lag operation; the pump control is currently in the "pump 2 off" position. The panels for the potable pumps are not equipped with surge arrestors. Underperforming controls, surge arrestors, and some various outdated electrical components are a concern for a sustainable water system.

- Reduced service pressures with increased/peak instantaneous demands - Users for both irrigation and potable systems have reported periodic reductions in service pressures at times. Per DEQ, the pressures in the potable system must be greater than 35 psi in all conditions (DEQ 8.2.1) The modeled and field measurements show that the pipe sizes appear to be sufficient to limit head loss impacts. It is determined that the lower pressures are likely experienced when the demands exceed the pump(s) output.

- Flow Meters Beyond Useful Design Life – The existing flow meters are the original models that were installed in the early 1990's. When flow meters age, they can tend provide errors due to mechanical wear and tear. Newer flow meter models are more accurate. The main flow meters are a critical component of the infrastructure which are needed to confirm that annual water usages are within the available water rights as well as the evaluation of water usage for leakages and anomalies.

- Pump House Piping Concerns – The existing internal pump house piping is non-rigid (glued PVC). The PVC piping is reported to have sheared and ruptured and filled the pump house room with standing water during the last major (5.8 magnitude, Lincoln MT) earthquake in 2018. (Rigid: i.e. more robust metal - Ductile Iron or Galvanized piping with pipe supports and flexible couplers can be considered for a future upgrade)

- Potable/Irrigation Service Cross Connections – there are reportedly up to three (3) irrigation/potable cross-connections existing in the system. Cross connections are out of compliance with DEQ standards as only the potable system is monitored for state/federal drinking water regulations. Moreover, irrigation systems can be subject to back siphonage and contamination concerns that can originate with irrigation type system usage.

- No Backup Power – DEQ-1, 3.2.1.3 states: "When power failure would result in cessation of minimum essential service, sufficient power must be provided to meet average day demand." It is good practice by many systems (including those in the Helena Valley) that provide solely pumped flows.

Potential Project List (For Discussion)

Ranchview Water System Draft Improvement Program		
PRIORITY	**ALTERNATIVE/DESCRIPTION**	**ESTIMATED CAPITAL COST (Nearest 1,000)**
2	S-1: Install New Well Pump #2	$5,000
3	S-2a: Upgrade Potable System Pump Controls & Electrical (w/ VFDs)	$5,000
-	S-2b: Upgrade Potable System Pump Controls & Electrical (w/o VFDs)	Aprpx. Same cost – Doing w/ VFDs
4	Building Surge/Overload Protection (50,000 Amp Unit)	$2,500
5	S-3a: Replace Potable Flow Meter	$2,500
	S-3b: Replace Irrigation Flow Meter	$3,000
7	S-4a: Replace Pump House Irrigation Piping/Fittings	$8,000
	S-4a: Replace Pump House Potable Piping/Fittings	$10,000
6	S-5a: New North Irrigation Well Only	TBD
	S-5b: New North Irrigation Well (Backup Potable Capable)	TBD
8	S-6a: Potable Pump Generator (35 kW)	
	S-6b: Potable plus Irrigation Generator (60 kW)	
1	S-7a: Reconnect Cross Connected Water Lines	

The priorities were determined by the Board at the meeting.

Addressing the cross connected water is listed as a high priority (by the engineer) as it relates to a health and safety issue.

The District would like to see what the estimated cost would be to install a new well on the north side of the subdivision, if needed.

As discussed on the meeting on 9.9.20, the peak irrigation demands could be diminished by reminding folks to replace their sprinkler nozzles. This could acutely reduce the demands by as much as 15-30% if done collectively.

Action Items

- Attain feedback about any other problems from District
- Consider the evaluation of the new north well/pump cost as a potential reference point if needed
- District's plan single out cross connection connections and make repairs
- Input on project priority ranking, the timing of listed items
- Public Hearing Date/Time – November?
- Others…?

RANCHVIEW COUNTY WATER DISTRICT
SUMMER 2020 NEWSLETTER

WWW.RANCHVIEWWATERUSERS.COM



President's Message



As we begin another Spring/Summer watering season, I want to remind everyone, that the odd/even & time schedules have not changed for Ranchview. They are effective all year long. So please be a good neighbor and be considerate to the neighborhood and follow the rules.

The number of homeowners who don't follow our watering schedule continues to be very few. You can find a complete copy of the rules & regulation on our website. Remember, no watering for anyone on the 31st. If you are struggling with your controller, please consider replacing it with a more modern version. The board members have contact information of local businesses that can do the work of replacing the controllers for you. Please feel free to call one of us for more information.

We recently had an election for three open board member positions who's terms were up. The results of the election were Bob Bennett, Tom Pahut and Jim Oppedahl, all elected for a four year term. Tom Pahut replaced Vicki Chapman who has served our subdivision as a board member for several years. She did an outstanding job and we are very grateful to her for her service. Thank you again Vicki for your time & dedication to the Water Board. At the same time we welcome Tom Pahut to the Board. Tom will be at the next scheduled Board meeting, so drop by and say hi.

The Water Board has been busy working with Great West Engineering and successfully was awarded a grant to study our current water system and figure out ways to get our system to work at its best, investigate water pressure issues during peak watering times (Lariat Road does not have good pressure), and compile a complete study of future needs.

We are happy to see more and more users utilizing the Ranchview website to pay their water fees. It's easy, fast and secure. You can quickly pay your water fees and avoid late payment fees and mailing costs. The website also has other information that is quickly available to you. I continue to encourage those that struggle with the monthly payment of $45 to pay for the whole year, or pay quarterly, to avoid the timely process of a hearing and added late fees.



President's message continued on next page

IRRIGATION WATERING RULES

WATERING TIME #1
6 am to 12 pm (noon)

LARIAT DRIVE:

All homes water at this time, subject to the **odd/even schedule**.

No other streets will water at this time.

WATERING TIME #2
6 pm to 12 am (midnight)

RANCHVIEW DRIVE:

All homes water at this time, subject to the **odd/even schedule**.

WINTER WHEAT DRIVE:

5855 & 5865 water at this time on even days.

5875 & 5885 water at this time on odd days.

WATERING TIME #3
12 am (midnight) to 6 am

ANGUS DRIVE:

All homes water at this time, subject to the **odd/even schedule**.

WINTER WHEAT DRIVE:

5815 & 5825 water at this time on even days.

5835 & 5845 water at this time on odd days.

WATERING TIME #4
1:30 pm to 4:30 pm

Watering of GARDENS AND SHRUBS is not restricted to odd/even days. But is limited to **1:30 pm to 4:30 pm** only.

Homeowners are encouraged to use drip systems for this purpose or to purchase timers to use on your hose bibs with sprinkler heads.

Please update and maintain your sprinkler system at all time.

For new lawns or seeding please contact a Board Member for special times. No open hoses or flood irrigation allowed.

President's Message (continued)



Our water fees continue to be some of the lowest in the Helena valley. The Water Board will be discussing water fees at the July board meeting. Please check the website for more information about upcoming board meetings.

I would like to thank all of you for following the rules and being considerate of our neighbors and paying your water bill on time. We are so fortunate to live in such a beautiful subdivision. Let's continue to be known as one of the best subdivisions in Helena!

As always, I ask you to consider getting involved with your Water Board by attending our meetings and/or consider being a board member when a vacancy comes up. It's challenging and rewarding serving on the Ranchview-Water Board and well worth your time. Hope to see you all sometime.

Have a great Summer!

Bob Bennett
President,
Water District



Ranchview County

Fun Facts:

- Approximately 400 billion gallons of water are used in the US per day.
- 75% of the earth is covered with water.
- Only 3% of the earths water is fresh water.
- Less than 1% of the water treated by public water systems is used for drinking and cooking.
- Nationwide, about 11% of pollution in rivers comes from storm sewers and urban runoff.
- About 40% of the US population uses groundwater as drinking water.

BOARD OF DIRECTORS

President
Bob Bennett
406-458-1906

Vice-President
Jim Oppedahl
406-431-6623

Treasurer
Tom Schulke
406-458-5565

Incoming Director (July 1st)
Tom Pahut
406-458-6135

Director
MarkFitzwater
406-431-9088

General Manager/Secretary
Christie Killeen
406-461-6463

Annual Drinking Water Quality Report

The 2020 Drinking Water Quality Report is available on our website. Our drinking water is safe and meets federal and state requirements.

If you have any questions, please contact a board member listed above.

www.ranchviewwaterusers.com

PLEASE REMBMBER:

- **Odd/Even irrigation schedule & watering times are in effect all year.**
- **Irrigation watering times are in effect all year.**
- **NO irrigation watering is allowed on the 31st of a month.**

2020 Monthly Water Fee

$45.00 per month, $135 per quarter, or $540 per year.

Due on the 1st of each month.

$15.00 Late fee after 30 days.
Pay On-Line:
www.ranchviewwaterusers.com



RANCHVIEW COUNTY WATER DISTRICT

SUMMER 2019 NEWSLETTER



WWW.RANCHVIEWWATERUSERS.COM



President's Message

We have now been a water district for a year, and things have gone really well. We had a couple of minor growing pains, but things really are running very smoothly.

The replacement of a pump on one well and a motor on another well this past year were our two biggest issues. We also contracted with Great West Engineering to help us "try" to get some grant money to find ways to improve our water system and to have equal pressure throughout the subdivision.

We still have that small number of homeowners who don't think they need to follow the watering times and odd/even schedule. So far, we have not had to shut off anyone's water but have sent out notices of intent to shut off their water if they don't start complying. A few of the violations have been the result of old controllers that can't be programed to odd/even watering schedules. So, when a month has 31 days that controller won't be in the correct cycle. For a very modest price those controllers can be replaced and the headache for all of us goes away. I highly recommend if you have one of these old controllers you replace it with new one. The Board Members have contact information of local businesses that can do the work of replacing the controllers for you. Please feel free to call one of us for more information.

We also continue to have a few homeowners that don't pay their water bill on time and incur a $15 a month late fee. Again, we almost did a water shut off for a delinquent account. After holding a hearing with the homeowner, the homeowner settled the account. I encourage those that struggle with the monthly payment of $45 to pay for the whole year, or pay quarterly, to avoid the timely process of a hearing and added late fees. You can pay On-line at: www.ranchviewwaterusers.com



President's message continued on next page

Irrigation Watering Rules

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All homes water at this time, subject to the **odd/even schedule**.

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5835 & 5845 water at this time on

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1:30 pm to 4:30 pm
Watering of **GARDENS AND SHRUBS** is not restricted to odd/even days. But is limited to the time above.

Homeowners are encouraged to use drip systems for this purpose or to purchase timers to use on your hose bibs with sprinkler heads.

No open hoses or flood irrigation will be allowed.

President's Message (continued)



The website is an easy way to pay your bill and has a wealth of information for Ranchview homeowners.

For the vast majority of the folks living in our beautiful subdivision, I would like to thank you for following the rules and being considerate of our neighbors and paying your water bill on time. You are awesome! We are truly lucky to live in such a beautiful subdivision and have the lowest water rates around.

Finally, please consider getting involved with your Water Board by attending our meetings and/or consider being a Board Member when a vacancy comes up. It's challenging and rewarding serving on the Water Board and well worth your time. For more information see our website for meeting times and places and upcoming elections of officers.

Have a great Summer!

Bob Bennett
President, Ranchview County Water District



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406-458-1906

Vice-President
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Treasurer
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The 2019 Drinking Water Quality Report is available on our website. Our drinking water is safe and meets federal and state requirements.

If you have any questions, please contact a board member listed above.

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Appendix K

MDEQ Sanitary Survey

December 4, 2017

Ranchview Estates WUA
Attn: Christie Killeen
PO Box 9732
Helena, MT 59604

Re: Sanitary Survey Inspection of Ranchview Estates WUA (PWSID: MT0003782).

Dear Christie,

I would like to thank Ron Zelenka with Integrated Water for assisting me during the sanitary survey inspection of the Ranchview Estates public water supply system. As a Community (C) public water supply, your facility is required to have a sanitary survey inspection every three years. The system serves approximately 250 people through 104 service connections. These routine inspections offer us an opportunity to look for sanitary deficiencies that have the potential to cause contamination in the water system, as well as pointing out operation and maintenance concerns. The following are a few comments relating to the sanitary survey conducted on November 21, 2017.

SOURCE(s):
Well 1 (WL002) GWIC 134632: Well 1 was drilled April 27, 1993 to a depth of 100 feet and has a static water level of 53 feet. The well is reported by be grouted to 19 feet with cement. This well is located west of the pump house building.

Well 2 (WL003) GWIC 134635: Well 2 was drilled on April 28, 1993 to a depth of 120 feet and has a static water level of 52 feet. The well was grouted with cement to 19 feet. Both wells have been declared to be groundwater.

Both wells were observed to have a hole in the screened vent on the underside of the well caps. This would have constituted a significant deficiency. These were repaired by placing screen within the well cap and also filling the underside with steel wool as a secondary protection measure. Documentation was provided of the temporary repair.

- The lower well rings on each well should be replaced as a permanent repair for each of the wells. In lieu of the lower ring replacement, a new well cap should be installed on each of the wells to ensure that well is venting properly when pumping and the vent isn't susceptible to allowing contamination into the well.

SOURCE WATER:
Ranchview Estates obtains water from two wells (Sources WL 002 and WL 003). The service area comprises a rectangular area with houses along several east-west roads connected by Montana Avenue on the west, and another residential road on the east. The wells are located south of the houses in a currently undeveloped area adjacent to the

subdivision. The wells are installed into the Helena Valley Alluvial Aquifer near its northern limit. The Helena Valley Alluvial Aquifer combined with underlying Tertiary Sediments (present in the central and eastern part of the valley) are considered as a regional unconfined aquifer comprising the valley fill sediments of the Helena Valley. Ground water flow in the Ranchview Estates area is generally southward, towards the lowest elevation of the valley in Lake Helena. *(Excerpt from SWDAR May 2003)*

TREATMENT:
There is no treatment provided at this time.

DISTRIBUTION:
The distribution system consists of two and three inch PVC piping that is reported to be looped to minimize dead ends and stagnant water. The irrigation system is completely separate from the domestic distribution system with separate well sources and the pressure controls located in the same pump house as the domestic water system.

STORAGE:
There is no storage provided at this time.

PUMPS, PUMP FACILITIES, and CONTROLS:
The pressure control system (PC001) utilizes pressure switches to activate the submersible well pumps with the use of 8 captive air tanks to minimize well pump activation. There is a pressure gauge and flow meter at the common header for Wells 1 and 2 with each well having an hour meter that monitors each well's individual pumping. The system is equipped with a pressure relief that is piped to the outside. The outlet of the pressure relief valve was properly screened at the time of the survey. There were no issues noted with the pressure control system.

MONITORING, REPORTING, and DATA VERIFICATION:
A two year violations review showed no violations. Water quality sampling has been completed in a timely manner in the past and all sampling is currently up to date at this time.

MAINTENANCE, MANAGEMENT, SAFETY, and OPERATION:
The system appears to be adequately maintained, managed and operated at this time. There were no safety concerns of note with this system at the time of the survey.

OPERATOR COMPLIANCE WITH STATE REQUIREMENTS:
Integrated Water provides water operation personnel who are certified to operate this system and are in good standing with the DEQ Operator Certification Program.

SIGNIFICANT DEFICIENCIES:
No significant deficiencies were noted during this inspection.

WASTEWATER:

Wastewater is handled by individual wastewater systems at each residence with septic tanks and drain fields. There were no issues noted with the wastewater systems during the sanitary survey.

Thank you very much for your time and for your dedication to protecting public health through proper management of your public water system. If you have any questions about this report or public water supply regulations please give me a call at (406) 444-3967.

Sincerely,

Chris Erickson
Environmental Science Specialist
DEQ PWS, Helena
Phone: (406) 444-3967
Fax: (406) 444-1374

cc: Helena PWS File
Lewis and Clark County Sanitarian
Integrated Water-5368 N. Montana Ave. Helena, MT 59602

SANITARY SURVEY FORM - INVENTORY

1/2016

PWSID **MT0003782** | SYSTEM NAME **RANCHVIEW ESTATES WUA**

DATE OF SURVEY NOV. 21, 2017 | COUNTY LEWIS AND CLARK | SURVEYOR NAME CHRIS ERICKSON MT DEQ-HELENA

(SYSTEM REPRESENTATIVE) RON ZELENKA | (OTHER REPRESENTATIVE) _____

SYSTEM ADDRESS – ADMINISTRATIVE CONTACT

Addressee CHRISTIE KILLEEN (Primary Address)

Street PO BOX 9732

City HELENA State MT Zip 59604

System Phone (406) 461-6463 Fax (_____) _____

SYSTEM OWNER

Addressee RANCHVIEW ESTATES WUA (Owners Address)

Street PO BOX 9732

City HELENA State MT Zip 59602

Owner Phone (406) 459-3445 Fax (_____) _____

LOCATION OF SYSTEM

Nearest City HELENA Description or Physical Address ~1 MI. NORTH OF LINCOLN RD ON EAST SIDE OF N. MONTANA

☐ seasonal operation dates: _____ to _____

☒ year round operation

OPERATOR OF SYSTEM

Name RON ZELENKA

Certified Operator? ☒ Yes ☐ No ☐ Not required

Copy of Certificate? ☐ Yes ☒ No Certification # _____

Phone # (406) 442-2949 Cell Phone # (_____) _____

Fax # (_____) _____

ALTERNATE OPERATOR OF SYSTEM

Name LEE WOLFE

Certified Operator? ☒ Yes ☐ No ☐ Not required

Copy of Certificate? ☐ Yes ☒ No Certification # 2172

Phone # (406) 442-2949 Cell Phone # (_____) _____

SYSTEM STATUS

☒ **A** = Active ☐ **P** = Proposed *(Add New System)*

☐ **I** = Inactive

SYSTEM CLASS

☒ **C** = Community

☐ **NTNC** = Non-Transient Non-Community

☐ **TNC** = Transient Non-Community

Total Service Connections: Residential / Non-Transient: 104 Transient : _____

Total Active Connections: Residential / Non-Transient: _____ Transient: _____

Service Connections Metered? ☐ Yes ☒ No Percent Metered _____ %

Resident Population 250
(Number of permanent residents utilizing PWS daily)

Non-Transient Population _____
(Maximum number of non-transient persons utilizing PWS daily)

Transient Population _____
(Maximum number of transient persons served by PWS daily)

OWNER TYPE

☐ 1 Federal Government
☒ 2 Private Subdivision, Investor, Trust, Cooperative, Water Association, etc.
☐ 3 State Government
☐ 4 Local Government Authority, Commission, District, Municipality, City, etc.
☐ 5 Mixed Public/Private
☐ 6 Native American

SERVICE AREA CHARACTERISTICS LIST

☐ BR Bar
☐ DC Day Care Center
☐ DI Dispenser
☐ HS Head Start
☐ HA Homeowners Assoc.
☐ HM Hotel/Motel
☐ HR Highway Rest Area
☐ IA Industrial/Agricultural
☐ IC Interstate Carrier
☐ IN Institution
☐ MF Medical Facility
☐ MH Mobile Home Park
☐ MU Municipality
☐ OA Other Area
☐ ON Other Non-Transient Area (_____Average Daily Visitors TNC)
☐ OR Other Residential Area
☐ OT Other Transient Area
☐ PA Recreation Areas
☐ RA Residential Area
☐ RE Retail Employees
☐ RS Restaurant
☐ RV RV Park
☐ SC School
☐ SI Sanitary Improvement District
☐ SK Summer Camp
☐ SR Secondary Residences
☐ SS Service Station
☒ SU Subdivision
☐ WB Water Bottler
☐ WH Wholesaler (Sells Water)

Service Category Description SU-SUBDIVISION

Comments: Last Sanitary Survey 1/23/14

Community water system with two groundwater sources, a common header, a pressure control facility and a distribution system.

Two significant deficiencies were identified in that the well cap vents were found to be missing screens. This was repaired and documentation provided.

Wastewater is handled by individual septic systems with drainfields at each residence.

SANITARY SURVEY FORM – WATER SYSTEM FACILITIES

PWSID **MT0003782** | SYSTEM NAME **RANCHVIEW ESTATES WUA**

Water System Facilities (WSF) numbers are WSF Type Codes plus an assigned number. (i.e. source facility numbering starts with 002 and all non-source facilities start with 001). See instruction sheet for a list of WSF Type Codes. When a source is operational it is considered ***A***ctive, this includes systems that are seasonal. ***I***nactive sources are those which are shut down but can return to active status, such as a system out of business. ***P***roposed sources are those that have been identified through the Plan Review process, but are not connected to the water system.

*A **water source facility** is a well, spring, intake, infiltration gallery or consecutive connections from which a system draws or purchases water:*

Total Number of Source Facilities 2 ACTIVE SOURCES

WATER SYSTEM FACILITIES SUMMARY (WSF)

WSF ID	Facility Name	Water Type Code	Purchased	Seller PWSID	Activity Status*
WL002	WELL 1 GWIC 134632	GW	☐ Yes ☐ No		ACTIVE
WL003	WELL 2 GWIC 134635	GW	☐ Yes ☐ No		ACTIVE
			☐ Yes ☐ No		
CH001	COMMON HEADER WELLS 1 2		☐ Yes ☐ No		ACTIVE
			☐ Yes ☐ No		
PC001	PRESSURE CONTROL FACILITY		☐ Yes ☐ No		ACTIVE
			☐ Yes ☐ No		
DS001	DISTRIBUTION SYSTEM		☐ Yes ☐ No		ACTIVE
			☐ Yes ☐ No		
			☐ Yes ☐ No		
			☐ Yes ☐ No		
			☐ Yes ☐ No		
			☐ Yes ☐ No		
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			☐ Yes ☐ No		
			☐ Yes ☐ No		
			☐ Yes ☐ No		
			☐ Yes ☐ No		

Description of Water System Facility flow: WL002 & WL003 > CH001 > PC001 > DS001

Notes: EP502@CH001

(*Example: WL002 and WL003 > CH001 > TP001 > ST001 > PC001 > DS001*)

*(A)Active, (I)Inactive, (P)Proposed

EMERGENCY POWER

Does the system have emergency power? ☐ Yes ☒ No

If yes, what type: _____ Frequency of testing: _____

Record of primary power failures: _____ in last year Switchover: ☐ Automatic ☐ Manual

Comments: _____

SANITARY SURVEY FORM – WELLS & WELL PUMPS

PWSID **MT0003782** | SYSTEM NAME **RANCHVIEW ESTATES WUA**

(Please copy this sheet for additional wells & pumps)

COMPLETE ONE PAGE FOR EACH SOURCE | **STATUS OF SOURCE** ☒ **(A)**ctive ☐ **(I)**nactive ☐ **(P)**roposed

WSF ID WL002 (These are State assigned identification numbers) *Entry Point ID* EP502

Source Name WELL 1 (Example: Well 1 or South well, etc.) GWIC 134632

Location of Water Source (TRS or street address) **T11N R03W S17-E. OF PUMP HOUSE**

Entry Point Name EP FOR CH WELLS 1 2 (Example: EP for North Well 1 & South Well 2)

Entry Point is at WSF ID CH001 (EP is at the first water system facility with finished water.)

Available ☒ Perm ☐ Emerg ☐ Interim ☐ Seasonal ☐ Other
If seasonal: _____ to _____

GWUDISW PA completed with this inspection ☐ Yes ☒ No

Log Available? ☒ Yes ☐ No

Average Production UNK (indicate units)

Maximum Production UNK (indicate units)

Date Drilled 4/27/1993 (if well. . date drilled)

Casing Size 6 INCH (size of casing installed in well)

Case Depth -2 TO 100 FEET (depth of casing installed in well)

Well Depth 100 FEET (depth of well expressed in feet)

Grout Depth 19 FEET CEMENT (depth of grout used to seal well walls)

Log SWL 53 FEET (static) expressed in feet below ground elevation

Log PWL 80 FEET (pumping) expressed in feet below ground elevation

Test Pump Rate 91 GPM (AIR TEST) (expressed in gallons per min)

Intake Type 3/16X1 MILLS KNIFE (example: screen, slots, perforations, open)

Intake Interval 70-100 FEET (expressed in feet below ground elevation)

Well Yield UNK (pump tested in gallons per minute)

Latitude 46.71419º (in decimal degrees)

Longitude -112.01888º (in decimal degrees)

WELLS

	Yes	No	Unk	N/A
Is well metered?	☒	☐	☐	☐
Is well site protected from flooding?	☐	☐	☒	☐
Is well protected from potential sources of pollution (includes: surface water, known chemical spills, agricultural use, etc.)?	☐	☐	☒	☐

If no . . explain No extra well protection measures in place; irrigation canal is in area of well sources

Does casing extend at least				
☒18 inches above outside ground level;	☒	☐	☐	☐
☐12 inches above finished floor inside well house; and	☐	☐	☐	☒
☐3 feet above 100 year flood elevation? (Check for appropriate distance)	☐	☐	☒	☐
Is top of the well casing properly sealed? (sanitary seal)	☒	☐	☐	☐
Is well vented?	☒	☐	☐	☐
Is well vent properly screened and terminated in a downward position?	☒	☐	☐	☐
Does well have suitable sampling tap? Raw Water	☒	☐	☐	☐
Treated	☐	☐	☐	☒
Are check valves, blow-off valves and water meters maintained and operating properly?	☒	☐	☐	☐
Is upper termination of well protected (housed or fenced)?	☐	☒	☐	☐
Is intake located below the maximum drawdown?	☐	☐	☒	☐

PUMPS

Type 5 HP Submersible Pump (example: 30 hp line shaft turbine)
Rated Capacity _____

	Yes	No	Unk	N/A
Are pumps operable?	☒	☐	☐	☐
How frequently are pump(s) replaced? As needed				
Are backup pumps/motors provided?	☐	☒	☐	☐
Are controls functioning properly and adequately protected?	☒	☐	☐	☐
Do underground compartments have a drain?	☐	☐	☐	☒
Is facility properly protected against trespassing and vandalism?	☐	☒	☐	☐
Are pump records maintained (amp, drawdown, discharge, pressure, maintenance schedule, manuals, etc.)?	☒	☐	☐	☐
Is the plumbing adequately painted to prevent excessive corrosion?	☒	☐	☐	☐
Are adequate heating, lighting, and ventilation provided?	☒	☐	☐	☐
Is a preventive maintenance program in operation?	☒	☐	☐	☐
Are recommended spare parts on hand?	☐	☒	☐	☐
Cross connection protection provided?	☒	☐	☐	☐

Comment: Well was observed to have the small vent screen missing from the underside of the well cap. This was repaired and documentation provided.

Water is metered at the common header with individual wells having hour meters on them.

Explain Controls: Submersible well pump is activated using a pressure switch mounted near the pressure control facility

Comment: Wells 1 and 2 automatically alternate in use

SANITARY SURVEY FORM – WELLS & WELL PUMPS

PWSID **MT0003782** | SYSTEM NAME **RANCHVIEW ESTATES WUA**

(Please copy this sheet for additional wells & pumps)

COMPLETE ONE PAGE FOR EACH SOURCE | **STATUS OF SOURCE** ☒ **(A)**ctive ☐ **(I)**nactive ☐ **(P)**roposed

WSF ID WL003 (These are State assigned identification numbers) *Entry Point ID* EP502

Source Name WELL 2 (Example: Well 1 or South well, etc.) GWIC 134635

Location of Water Source (TRS or street address) **T11N R03W S17-N OF WELL CONTROL HOUSE**

Entry Point Name EP FOR CH WELLS 1 2 (Example: EP for North Well 1 & South Well 2)

Entry Point is at WSF ID CH001 (EP is at the first water system facility with finished water.)

Available ☒ Perm ☐ Emerg ☐ Interim ☐ Seasonal ☐ Other
If seasonal: _____ to _____

GWUDISW PA completed with this inspection ☐ Yes ☒ No

Log Available? ☒ Yes ☐ No

Average Production UNK (indicate units)

Maximum Production UNK (indicate units)

Date Drilled 4/28/1993 (if well. . date drilled)

Casing Size 6 INCH (size of casing installed in well)

Case Depth -2 TO 118 FEET (depth of casing installed in well)

Well Depth 120 FEET (depth of well expressed in feet)

Grout Depth 19 FEET CEMENT (depth of grout used to seal well walls)

Log SWL 52 FEET (static) expressed in feet below ground elevation

Log PWL UNK (pumping) expressed in feet below ground elevation

Test Pump Rate 94 GPM (AIR TEST) (expressed in gallons per min)

Intake Type 3/16X1 MILLS KNIFE (example: screen, slots, perforations, open)

Intake Interval 70-120 FEET (expressed in feet below ground elevation)

Well Yield UNK (pump tested in gallons per minute)

Latitude 46.71430º (in decimal degrees)

Longitude -112.01865º (in decimal degrees)

WELLS

	Yes	No	Unk	N/A
Is well metered?	☒	☐	☐	☐
Is well site protected from flooding?	☐	☐	☒	☐
Is well protected from potential sources of pollution (includes: surface water, known chemical spills, agricultural use, etc.)?	☐	☐	☒	☐
If no . . explain No extra well protection measures in place; irrigation canal is in area of well sources				
Does casing extend at least				
☐18 inches above outside ground level;	☒	☐	☐	☐
☐12 inches above finished floor inside well house; and	☐	☐	☐	☒
☐3 feet above 100 year flood elevation? (Check for appropriate distance)	☐	☐	☒	☐
Is top of the well casing properly sealed? (sanitary seal)	☒	☐	☐	☐
Is well vented?	☒	☐	☐	☐
Is well vent properly screened and terminated in a downward position?	☒	☐	☐	☐
Does well have suitable sampling tap? Raw Water	☒	☐	☐	☐
Treated	☐	☐	☐	☒
Are check valves, blow-off valves and water meters maintained and operating properly?	☒	☐	☐	☐
Is upper termination of well protected (housed or fenced)?	☐	☒	☐	☐
Is intake located below the maximum drawdown?	☐	☐	☒	☐

PUMPS

Type 5 HP Submersible
(example: 30 hp line shaft turbine)
Rated Capacity _____

	Yes	No	Unk	N/A
Are pumps operable?	☒	☐	☐	☐
How frequently are pump(s) replaced? As needed				
Are backup pumps/motors provided?	☐	☒	☐	☐
Are controls functioning properly and adequately protected?	☒	☐	☐	☐
Do underground compartments have a drain?	☐	☐	☐	☒
Is facility properly protected against trespassing and vandalism?	☐	☒	☐	☐
Are pump records maintained (amp, drawdown, discharge, pressure, maintenance schedule, manuals, etc.)?	☒	☐	☐	☐
Is the plumbing adequately painted to prevent excessive corrosion?	☒	☐	☐	☐
Are adequate heating, lighting, and ventilation provided?	☒	☐	☐	☐
Is a preventive maintenance program in operation?	☒	☐	☐	☐
Are recommended spare parts on hand?	☐	☒	☐	☐
Cross connection protection provided?	☒	☐	☐	☐

Comment: Well was observed to have the small vent screen missing from the underside of the well cap. This was repaired and documentation provided.

The well cap on both wells should be replaced to ensure that the well is not contaminated by a failure of the temporary repairs made.

Explain Controls: Submersible well pump is activated using a pressure switch mounted near the pressure control facility

Comment: Wells 1 and 2 automatically alternate in use

SANITARY SURVEY FORM - PRESSURE CONTROL ASSEMBLIES

PWSID **MT0003782** | SYSTEM NAME **RANCHVIEW ESTATES WUA**

☒ ***CAPTIVE AIR TANK(S)*** ☐ ***PRESSURE TANK(S)*** ☐ ***NO TANK(S)***

WSF ID PC001 Location: In well control house to south of subdivision area

Latitude 46.714292º in decimal degrees

Longitude -112.01867º in decimal degrees

Pump size and type 5 HP Submersible well pumps (ex: 3 hp submersible)

Rated Capacity _____ Pump installation date: _____

Pump run time UNK Time of day _____

Cut-In 52 psi Cut-Out 68 psi

	Yes	No	Unk	N/A
Are redundant booster pumps provided?	☐	☐	☐	☒
Are spare pumps/motors provided?	☐	☐	☐	☒
Is there automatic cutoff for low suction pressure?	☐	☒	☐	☐
Is there a compound pressure gauge prior to the pump?	☐	☐	☐	☒
Is there a standard pressure gauge after the pump?	☒	☐	☐	☐
Does the low pressure level provide adequate pressure?	☒	☐	☐	☐
Is there a pressure relief valve?	☒	☐	☐	☐
Is the pressure relief valve properly sized?	☒	☐	☐	☐
Is the tank operating properly (not water logged)?	☒	☐	☐	☐
Is the tank(s) air charge system adequate?	☒	☐	☐	☐
Is exterior surface of the tank(s) in good physical condition?	☒	☐	☐	☐
Can tank(s) be by-passed for repair?	☒	☐	☐	☐
Is there a water level sight glass?	☐	☐	☐	☒
Is there a bottom drain valve on the tank(s)?	☒	☐	☐	☐
Is there adequate heating, lighting, and ventilation?	☒	☐	☐	☐
Do underground compartments have a drain?	☐	☐	☐	☒
Are controls protected and functioning properly?	☒	☐	☐	☐
Are pump records maintained (amp, pressure, maintenance schedule, manuals, etc.)?	☒	☐	☐	☐
Is facility properly protected against trespass?	☒	☐	☐	☐
Is the plumbing protected from excessive corrosion?	☒	☐	☐	☐
Is a preventive maintenance program in operation?	☒	☐	☐	☐

Describe components and controls: Pressure control facility consists of a pressure switch to activate submersible well pump and a total of 8 captive air tanks (3-Baron & 5 Well-X-Trol 350) to minimize well pump activation.

Comments: The tanks were found in good condition. There is a pressure relief valve present with the discharge end located outside and has a screen in place.
Well pumping is alternated automatically.

WSF ID _____ Location: _____

Latitude _____º in decimal degrees

Longitude _____º in decimal degrees

Pump size and type _____ (ex: 3 hp submersible)

Rated Capacity _____ Pump installation date: _____

Pump run time _____ Time of day _____

Cut-In _____ psi Cut-Out _____ psi

	Yes	No	Unk	N/A
Are redundant booster pumps provided?	☐	☐	☐	☐
Are spare pumps/motors provided?	☐	☐	☐	☐
Is there automatic cutoff for low suction pressure?	☐	☐	☐	☐
Is there a compound pressure gauge prior to the pump?	☐	☐	☐	☐
Is there a standard pressure gauge after the pump?	☐	☐	☐	☐
Does the low pressure level provide adequate pressure?	☐	☐	☐	☐
Is there a pressure relief valve?	☐	☐	☐	☐
Is the pressure relief valve properly sized?	☐	☐	☐	☐
Is the tank operating properly (not water logged)?	☐	☐	☐	☐
Is the tank(s) air charge system adequate?	☐	☐	☐	☐
Is exterior surface of the tank(s) in good physical condition?	☐	☐	☐	☐
Can tank(s) be by-passed for repair?	☐	☐	☐	☐
Is there a water level sight glass?	☐	☐	☐	☐
Is there a bottom drain valve on the tank(s)?	☐	☐	☐	☐
Is there adequate heating, lighting, and ventilation?	☐	☐	☐	☐
Do underground compartments have a drain?	☐	☐	☐	☐
Are controls protected and functioning properly?	☐	☐	☐	☐
Are pump records maintained (amp, pressure, maintenance schedule, manuals, etc.)?	☐	☐	☐	☐
Is facility properly protected against trespass?	☐	☐	☐	☐
Is the plumbing protected from excessive corrosion?	☐	☐	☐	☐
Is a preventive maintenance program in operation?	☐	☐	☐	☐

Describe components and controls : _____

Comments: _____

SANITARY SURVEY FORM - MISCELLANEOUS

PWSID **MT0003782** | SYSTEM NAME **RANCHVIEW ESTATES WUA**

DISTRIBUTION SYSTEM EVALUATION

WSF ID DS001

	Yes	No	Unk	N/A
System drawings available?	☒	☐	☐	☐
Accurate As-Built drawing(s) on-site?	☐	☒	☐	☐
Lines adequately sized?	☒	☐	☐	☐
Adequate pressure maintained?	☒	☐	☐	☐
Mains protected from freezing?	☒	☐	☐	☐
Distribution system free of leaks?	☒	☐	☐	☐
Asbestos concrete pipe used?	☐	☒	☐	☐
Fire hydrants?	☐	☒	☐	☐
Dead end lines minimized by looping mains?	☒	☐	☐	☐
Flushing program?	☐	☒	☐	☐
Pressure reducing stations? Number _____	☐	☒	☐	☐
Booster stations? Number _____	☐	☒	☐	☐
Are individual booster pumps on any service lines? (see DEQ-1 6.4.4)	☐	☒	☐	☐
Were cross connections observed?	☐	☒		

Describe distribution: The distribution system is reported to be made up of 2 and 3 inch PVC pioing that is looped to minimize dead ends and stagnant water.

Comments: There is a completely separate irrigation system with booster pumps located in same building as the domestic system.

SAFETY

	Yes	No	Unk	N/A
Were confined spaces observed?	☐	☐	☐	☐
Describe any confined spaces observed _____				
Confined space safety adequate?	☐	☐	☐	☒
Fall risks adequately mitigated?	☐	☐	☐	☒

Note all safety deficiencies (consider items such as ladders, tank supports, guards on rotating electrical equipment, lightning protection for pumps, etc.)

No safety concerns noted.

MONITORING AND RECORDKEEPING EVALUATION

	Yes	No	Unk	N/A
Does the system have a current Monitoring Schedule?	☒	☐	☐	☐
Bacti monitoring records maintained? (5 years)	☒	☐	☐	☐
Bacti Sample Site Plan submitted?	☒	☐	☐	☐
Familiar with repeat sampling?	☒	☐	☐	☐
Chemical monitoring records maintained? (10 years)	☒	☐	☐	☐
System specific records / plans maintained? (DBP, PB/CU, treatments, waivers, violations, etc.)	☒	☐	☐	☐
Familiar with Public Notice requirements?	☒	☐	☐	☐
Did Surveyor take a bacteriological sample?	☐	☒		

If Yes, date of Sample: _____ Time of Sample: _____

Comments: A two year violations review showed no violations.

MANAGEMENT

	Yes	No	Unk	N/A
Are there sufficient personnel?	☒	☐	☐	☐
Are operators properly certified?	☒	☐	☐	☐
Are personnel adequately trained?	☒	☐	☐	☐
Is there a current O&M manual on-site?	☐	☒	☐	☐
Is an emergency plan on-site and workable?	☐	☒	☐	☐
Has system addressed concerns from previous sanitary survey(s) or technical visit(s)?	☒	☐	☐	☐
Budget exists?	☒	☐	☐	☐
Does system maintain an emergency fund?	☐	☐	☒	☐
Does system contribute to facility replacement fund?	☐	☐	☒	☐
Are abandoned wells present?	☐	☒	☐	☐
Do abandoned wells appear to be properly abandoned? (see ARM 36.21.670)	☐	☐	☐	☒

Comments: System appears adequately managed at this time.

PWSID **MT0003782** | SYSTEM NAME **RANCHVIEW ESTATES WUA**

The State, or an authorized agent, must conduct sanitary surveys for all public water supply systems in Montana. DEQ believes that periodic sanitary surveys, along with appropriate corrective actions, are indispensable for assuring the long-term quality and safety of drinking water. When properly conducted, sanitary surveys can provide important information on a water system's design and operations and can identify minor and significant deficiencies for correction before they become major problems.

Minor deficiencies do not pose serious health threats. However, corrective action of minor deficiencies can be critical in the long-term operation and safety of a public water system. Minor deficiencies are generally described as suggested or recommended corrections in the letter to system owner(s).

Significant deficiencies can be defined as a defective water supply component(s) having or likely to have an adverse influence on public health. Significant deficiencies require immediate corrective action in efforts to protect consumers.

EPA and ASDWA guidance identifies eight broad components that should be covered in a sanitary survey. Using these eight broad components as a guide, minor and significant deficiencies should be described in the letter to system owner(s).

1) Source
2) Treatment
3) Distribution system
4) Finished water storage
5) Pumps, pump facilities, and controls
6) Monitoring and reporting, and data verification
7) System management and operation
8) Operator compliance with State requirements

With consideration that significant deficiencies may influence regulatory decisions and monitoring requirements, please list all significant deficiencies observed and corrective action(s) taken below.

Comments: **No significant deficiencies remain from the sanitary survey conducted 11/21/17.**

PWSID **MT0003782** | SYSTEM NAME **RANCHVIEW ESTATES WUA**

Please insert schematics, diagrams and maps as needed. Additional sheets may be added.

PC001 pumphouse lat. 46.71439 long. 112.201864

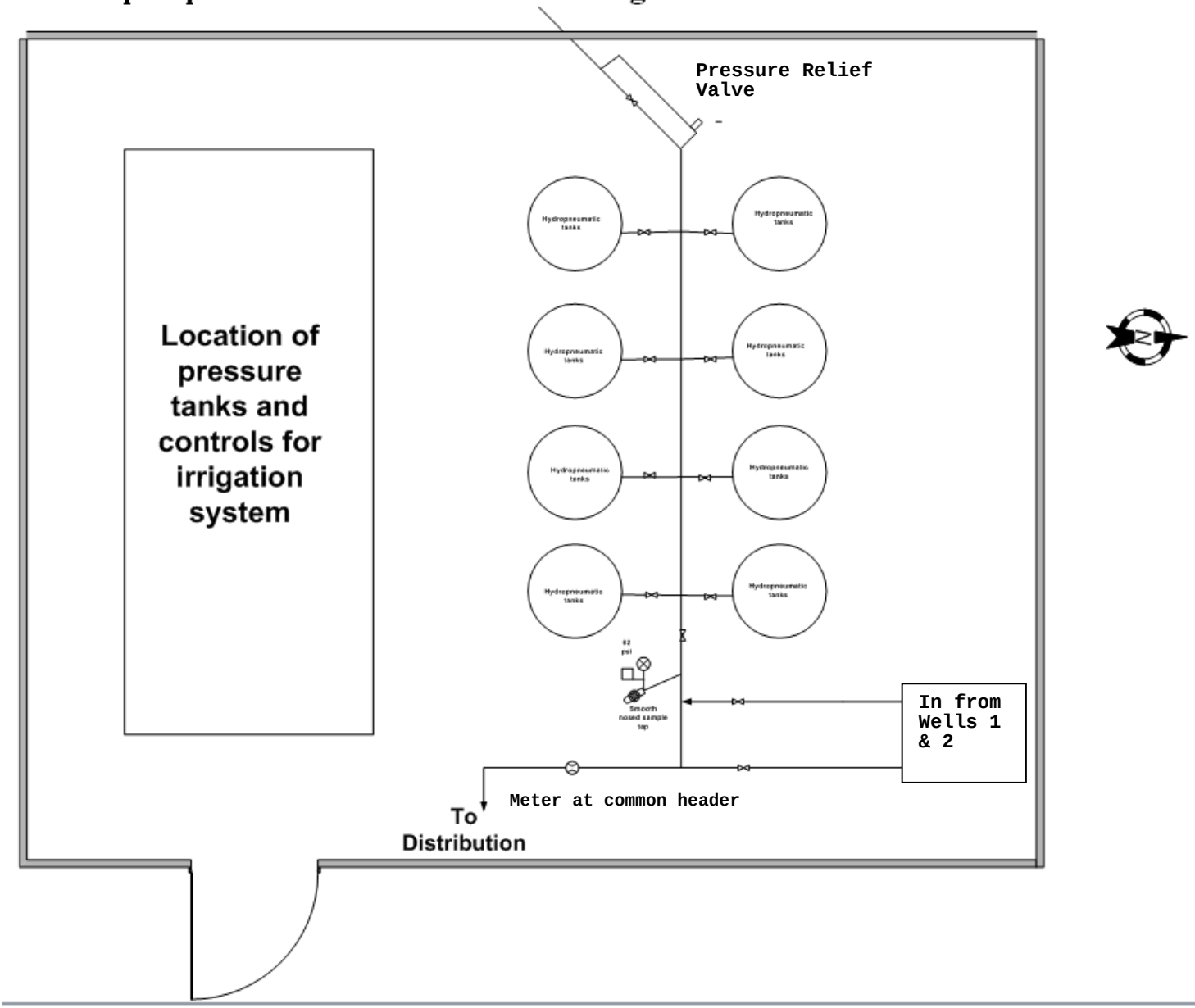


Image taken from previous sanitary surveys and modified

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Return to menu
Plot this site in State Library Digital Atlas
Plot this site in Google Maps
View scanned well log (11/21/2006 11:13:35 AM)

Site Name: RANCH VIEW ESTATES* WATER USERS ASSN - WELL 1
GWIC Id: 134632
DNRC Water Right: P088721-00

Section 1: Well Owner(s)

1) RANCHVIEW ESTATES WUA C/O STUART FULLER
PRESIDENT (MAIL)
PO BOX 9732
HELENA MT N/A [06/25/1999]
2) RANCH VIEW EST. (MAIL)
PO BOX 233
WOLF CREEK MT 59648 [04/27/1993]

Section 2: Location

Township	Range	Section	Quarter Sections
11N	03W	17	NW¼ NW¼ NW¼

County	Geocode
LEWIS AND CLARK	

Latitude	Longitude	Geomethod	Datum
46.718	-112.0181	MAP	NAD27

Ground Surface Altitude	Ground Surface Method	Datum	Date

Addition	Block	Lot
RANCH VIEW EST.		

Section 3: Proposed Use of Water

PUBLIC WATER SUPPLY (1)

Section 4: Type of Work

Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Tuesday, April 27, 1993

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	19	10
19	100	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2	100	6	0.25		WELDED	STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
70	100	6		3/16X1	MILLS KNIFE

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	19	CEMENT	

Section 7: Well Test Data

Well 1 (WL002)

Total Depth: 100
Static Water Level: 53
Water Temperature:

Air Test *

91 gpm with drill stem set at _ feet for 2 hours.
Time of recovery 0.01 hours.
Recovery water level 53 feet.
Pumping water level 80 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	70	GRAVELY CLAY
70	100	CRS SAND AND GRAVEL

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: SHAWN TONEY
Company: H & L DRILLING INC
License No: WWC-447
Date Completed: 4/27/1993

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Return to menu
Plot this site in State Library Digital Atlas
Plot this site in Google Maps
View field visits for this site
View water quality for this site
View scanned well log (11/21/2006 11:14:21 AM)

Site Name: RANCHVIEW ESTATES WATER USERS ASSN * WELL 2
GWIC Id: 134635
DNRC Water Right: P088721-00

Section 1: Well Owner(s)

1) RANCHVIEW ESTATES WUA C/O PRESIDENT STUART FULLER (MAIL)
PO BOX 9732
HELENA MT N/A [06/25/1999]
2) RANCH VIEW EST (MAIL)
PO BOX 233
WOLF CREEK MT 59648 [04/28/1993]

Section 2: Location

Township	Range	Section	Quarter Sections
11N	03W	17	NW¼ NW¼ NW¼

County	Geocode
LEWIS AND CLARK	

Latitude	Longitude	Geomethod	Datum
46.7143	-112.0181	NAV-GPS	NAD83

Ground Surface Altitude	Ground Surface Method	Datum	Date

Addition	Block	Lot
RANCH VIEW EST		

Section 3: Proposed Use of Water

PUBLIC WATER SUPPLY (1)

Section 4: Type of Work

Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Wednesday, April 28, 1993

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	19	10
19	120	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2	118	6	0.25		WELDED	STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
70	120	6		3/16X1	MILLS KNIFE

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	19	CEMENT	

Section 7: Well Test Data

Well 2 (WL003)

Total Depth: 120
Static Water Level: 52
Water Temperature:

Air Test *

94 gpm with drill stem set at 120 feet for 2 hours.
Time of recovery 0.01 hours.
Recovery water level 52 feet.
Pumping water level _ 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
120SNGR - SAND AND GRAVEL (TERTIARY)

From	To	Description
0	70	GRAVELY CLAY
70	120	CRS SAND AND GRAVEL

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: SHAWN TONEY
Company: H & L DRILLING INC
License No: WWC-447
Date Completed: 4/28/1993

Ranchview Estates WUA

MT0003782

11/21/17

Ranchview Estates WUA

Sanitary Survey 11/21/17

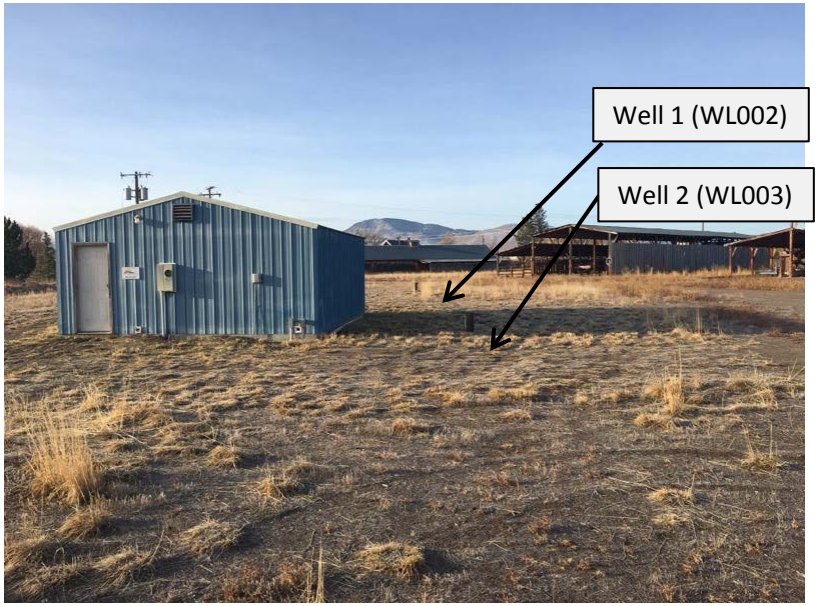


Ranchview Estates WUA

MT0003782

Sanitary Survey 11/21/17





Wells 1 & 2 are located just outside the well control house that also houses the pressure control facility.





Left: Image of well screen repair. The screen was placed within the well casing to prevent it from falling out by gluing it within the cap. As an extra layer of protection steel wool was also added to the underside of the cap in the vent hole.



Well 2 (WL003)



Well 2 is the southern most well. It had its screened vent repaired in a similar way to Well 1. These repairs will work but the well caps on both wells should be replaced as soon as possible to prevent any contamination to the source water via the temporary repaired screened vents.

Well 2 (WL003)



Pressure Control (PC001)



Wells 1 and 2 meet at a common header within the pressure control facility that is located in the small building just to the west of the wells. The wells alternate in pumping use automatically.



Water enters the pressure control facility in two lines, one from each wells source. They combine at a common header that is metered with the pressure control facility on a line that leads off of the common header. The wells also have an hour meter on each to monitor pumping times.



The pressure control facility consists of a pressure switch to activate well pumping and a total of 8 captive air tanks to minimize well pumping. The captive air tanks were found in good condition. There is a pressure relief valve that is plumbed to outside the building with a screen on the outlet end.



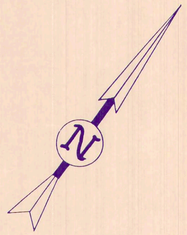


Left: Well control panels in well control house.
Right: The irrigation system for the subdivision is housed in the same building as the pressure control facility and is served by completely separate sources and pressure controls.

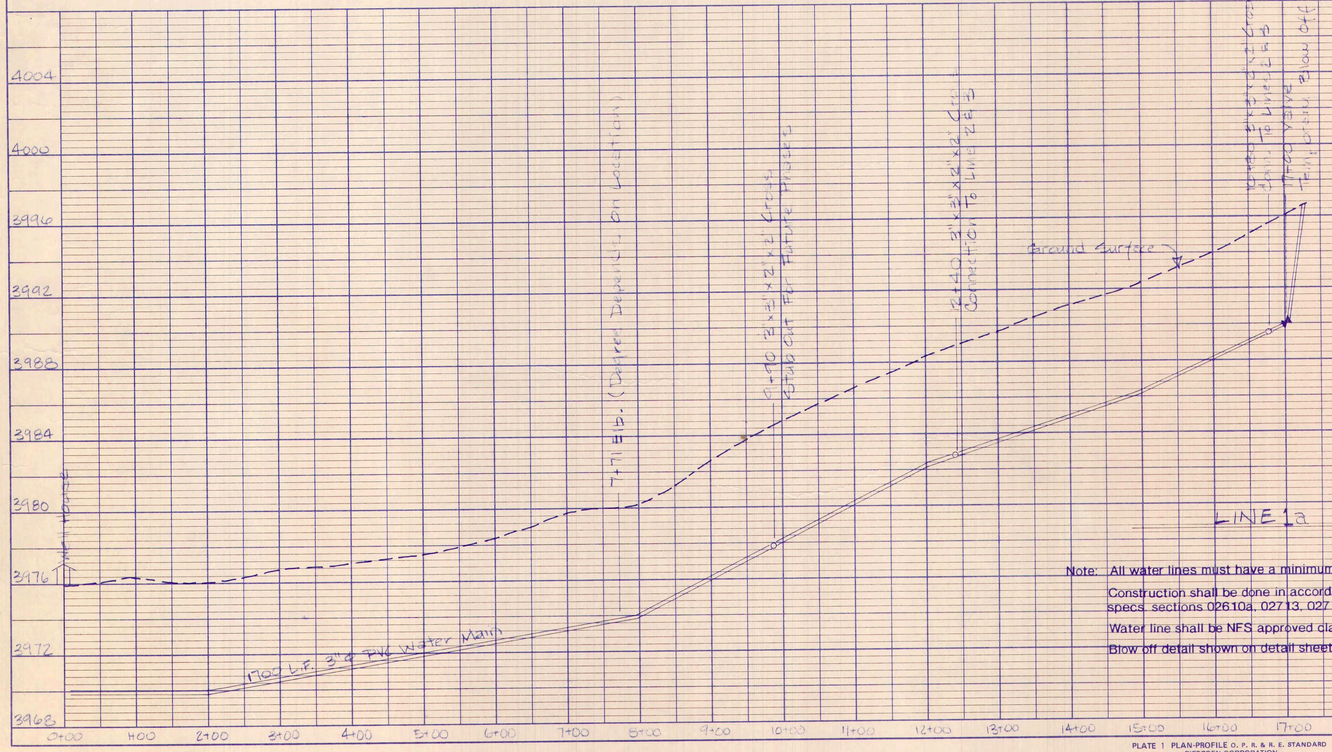
Appendix L

Original Design Files





PLAN VIEW
Scale: 1" = 100'



Note: All water lines must have a minimum of 6 feet of cover.
Construction shall be done in accordance with Montana public works standard (ADOPTED OCT 88 W/ ADDN 1 AUG 91) specs. sections 02610a, 02713, 02718, 02719.
Water line shall be NFS approved class 200 PVC
Blow off detail shown on detail sheet.

RANCH VIEW ESTATES PHASE 1
Water Main Plan & Profiles
Line 1a

Casne & Associates Inc.
P.O. Box 5957
Helena, Montana 59601
(406) 442-1656

Sheet 1 of 4

AS-BUILT

PLATE 1 PLAN-PROFILE O. P. R. & R. E. STANDARD
DIETZGEN CORPORATION
PRINTED IN U.S.A.

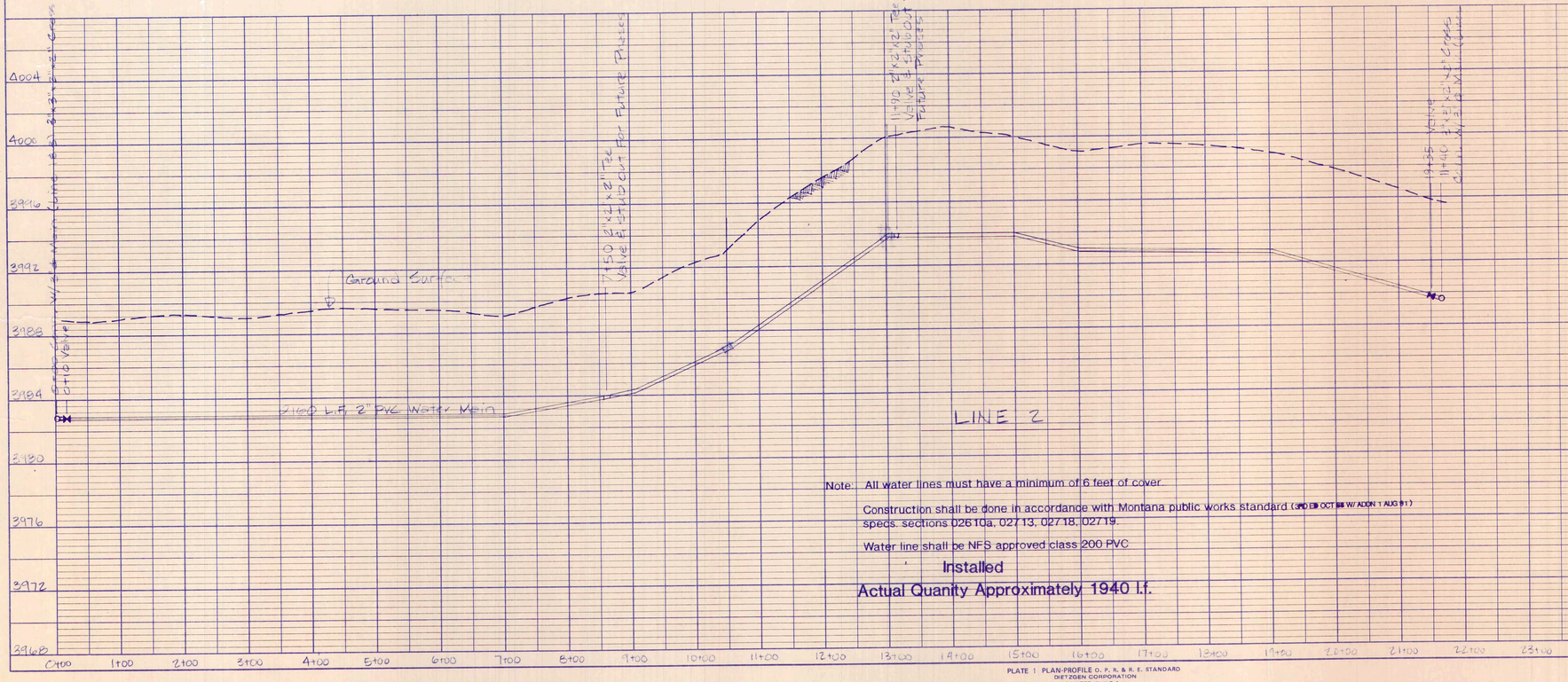
PLAN: SURVEYED, PLOTTED, ALIGNMENT CHECKED, R/T OF WAY CHECKED, NOTE BOOK, No., BY, DATE

PROFILE: SURVEYED, PLOTTED, GRADES CHECKED, R. M. = NOTED, STRUCTURE EXCAVATIONS CHECKED, NOTE BOOK, No., BY, DATE



PLAN VIEW

Scale: 1"=100'



LINE 2

Note: All water lines must have a minimum of 6 feet of cover.

Construction shall be done in accordance with Montana public works standard (SPOEC OCT 88 W/ ADDN 1 AUG 91) specs. sections 02610a, 02713, 02718, 02719.

Water line shall be NFS approved class 200 PVC

Installed

Actual Quanity Approximately 1940 l.f.

RANCH VIEW ESTATES PHASE 1
Water Main Plan & Profiles
Line 2

Casne & Associates Inc.
P.O. Box 5957
Helena, Montana 59601
(406) 442-1656

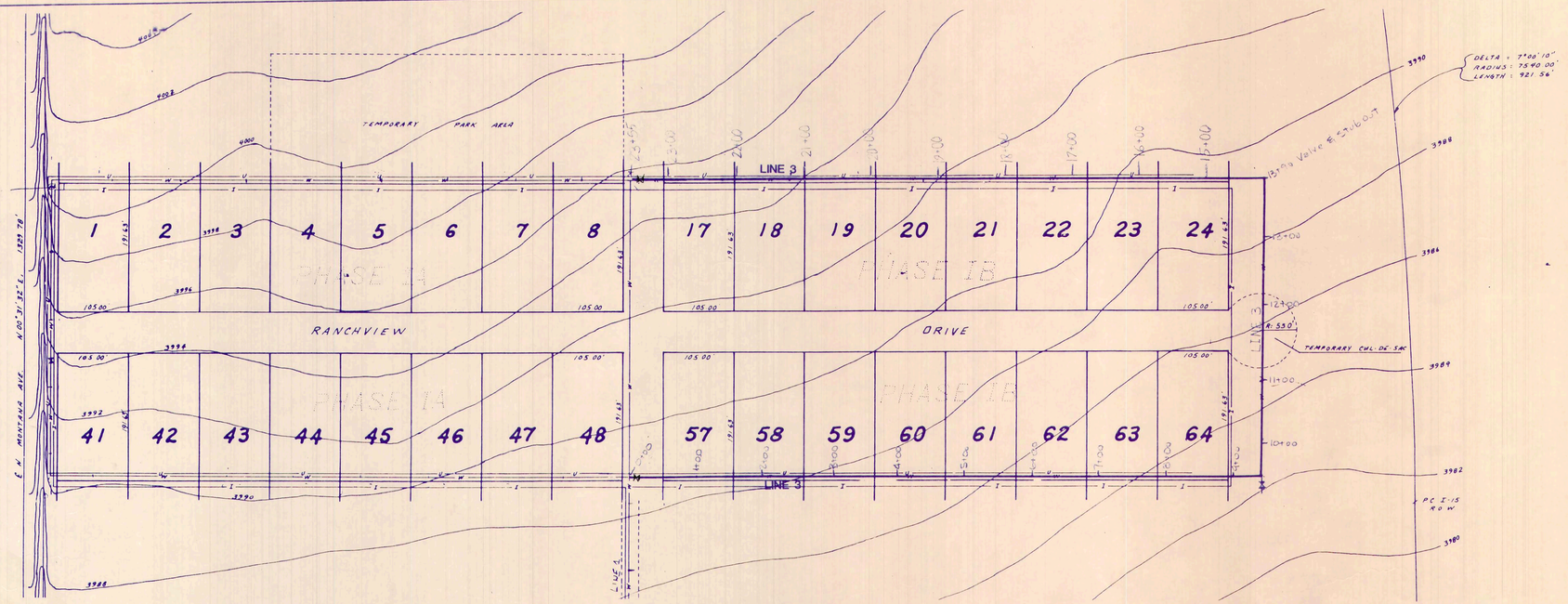
AS-BUILT

Sheet 2 of 4

PLAN: SURVEYED, PLOTTED, DRAWN, CHECKED, NOTE BOOK, ALIGNMENT CHECKED, No., RT. OF WAY CHECKED, BY, DATE

PROFILE: SURVEYED, PLOTTED, DRAWN, CHECKED, NOTE BOOK, ALIGNMENT NOTED, No., STRUCTURE NOTATIONS CHECKED, BY, DATE

PLATE 1 PLAN-PROFILE O. P. R. & R. E. STANDARD
DIETZGEN CORPORATION
PRINTED IN U.S.A.



PLAN VIEW

Scale: 1" = 100'

LINE 3

Note: All water lines must have a minimum of 6 feet of cover.

Construction shall be done in accordance with Montana public works standard (SPEC DOC ■ W/ ADDENDUM AUG 91) specs. sections 02610a, 02713, 02718, 02719.

Water line shall be NFS approved class 200 PVC

RANCH VIEW ESTATES PHASE 1

Water Main Plan & Profiles

Line 3

Casne & Associates Inc.

P.O. Box 5957

Helena, Montana 59601

(406) 442-1658

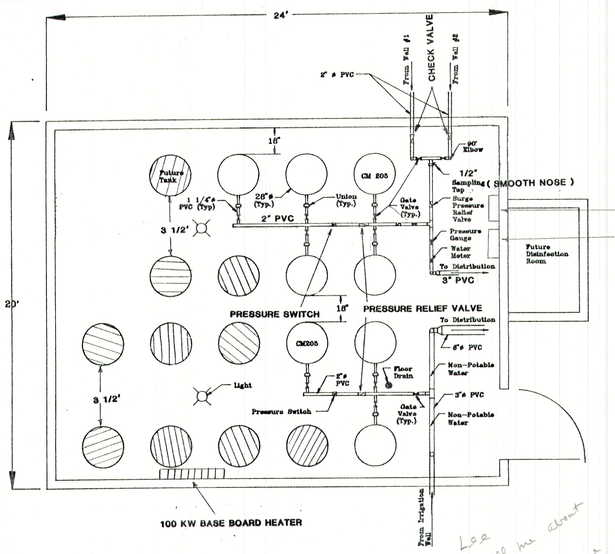
AS-BUILT

Sheet 3 of 4

PLAN: SURVEYED, PLOTTED, ALIGNMENT CHECKED, PT OF WAY CHECKED, NOTE BOOK, No., BY, DATE

PROFILE: SURVEYED, PLOTTED, PLANS NOTED, ALIGNMENT CHECKED, B. M. & NOTED, STRUCTURE NOTATIONS CHECKED, NOTE BOOK, No., BY, DATE

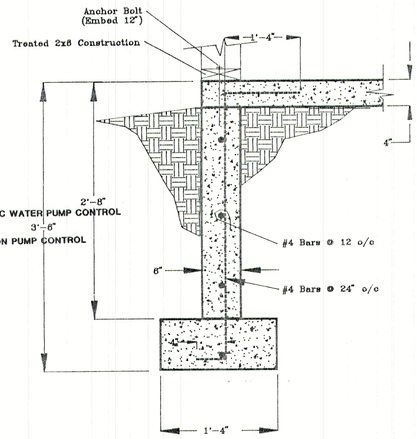
PLATE 1 PLAN-PROFILE O. P. R. & R. E. STANDARD
DIETZGEN CORPORATION
PRINTED IN U.S.A.



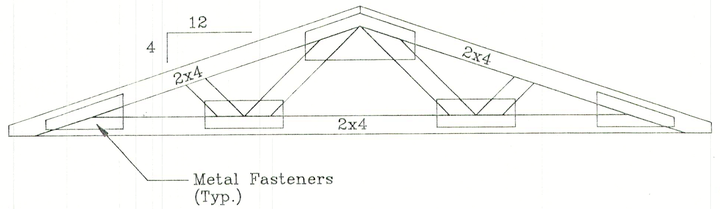
WELL HOUSE PLAN

NOT TO SCALE

Lee
Call me about
This
E&C Const
443-1656



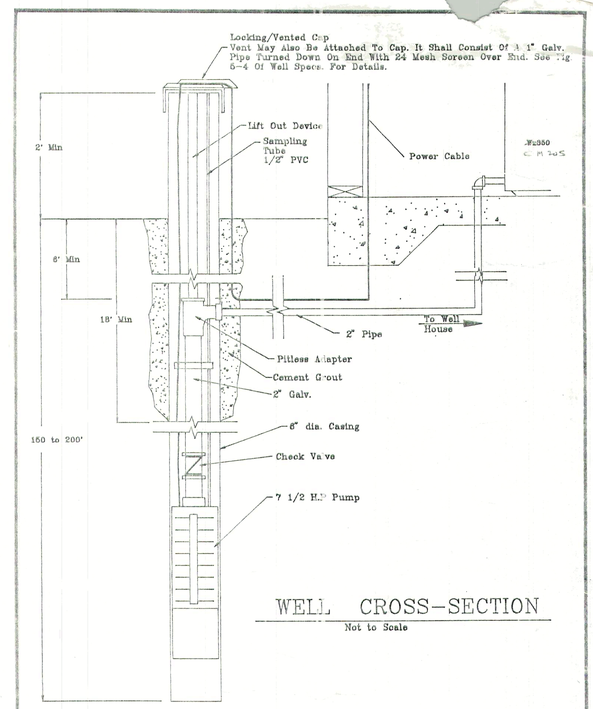
FOUNDATION FOOTING DETAIL



TRUSS CONSTRUCTION

Truss at 24" Centers

(Fit Number of Trusses to Roof dimension)

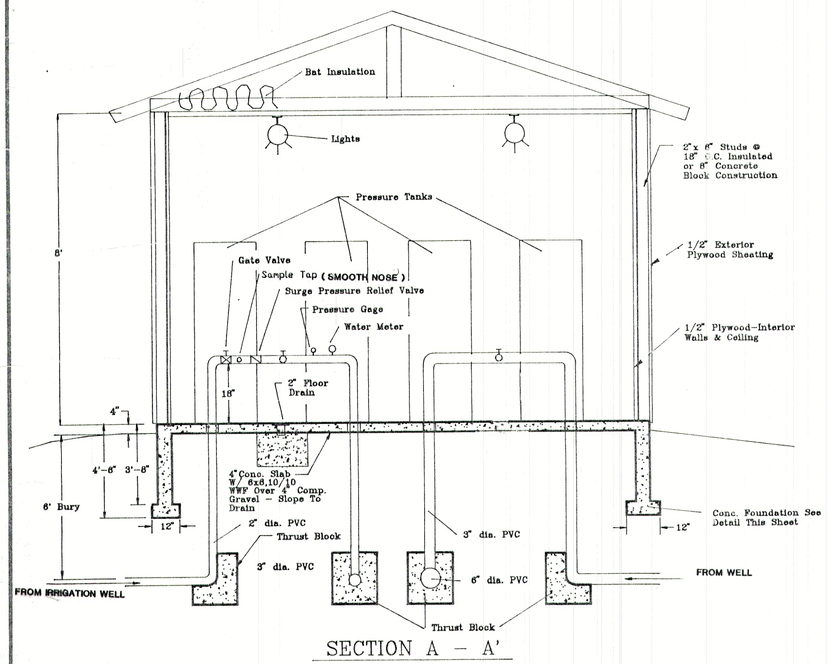


WELL CROSS-SECTION

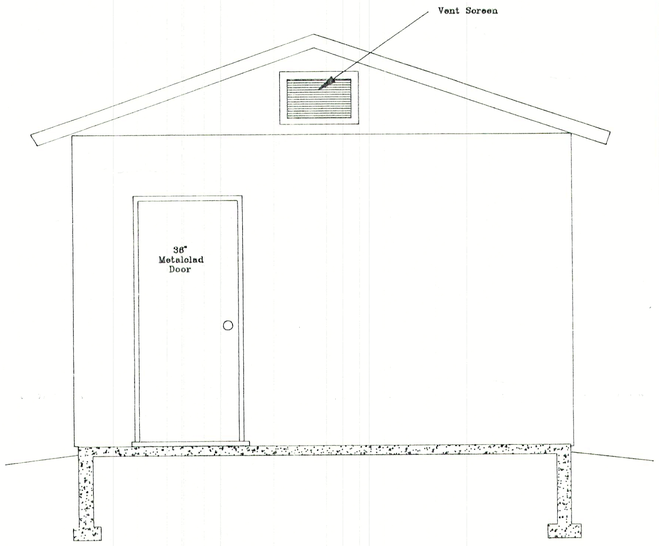
Not to Scale

NOTES:

1) Tank connections 1 1/4" dia. NPTF.
2) All non-potable lines to be painted yellow and labelled "Non Potable Water".
3) Slope floor to drain to floor drains.
4) Install gravel filled sump under each floor drain.
5) Walls shall be 2 x 6 studs or block construction.
6) Roof asphalt shingles or metal roofing.
7) See water system report for pump control requirements & pressure settings.
8) The hydroneumatic tanks shall be Clayton Mark CM 205s.
9) The tank pressure shall be set at 65/85 psi.

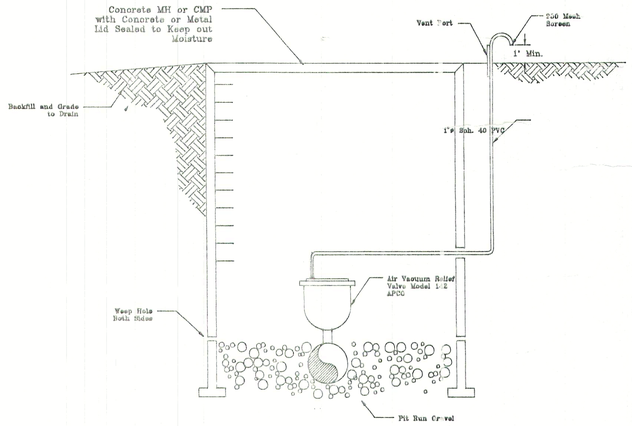


SECTION A - A'



WELL HOUSE - END VIEW

NOTE: Piping omitted from this view for clarity.



AIR VACUUM RELIEF MANHOLE DETAIL

Location Shown on Plan and Profile Sheet

Not to Scale

WELL HOUSE DETAILS

Not To Scale

AS-BUILT CAS14-92

RANCH VIEW ESTATES

Checked: EWC Date: 4/15/93 Rev.:	Well House Details and Well Completion Details	EXHIBIT 4

Casne and Associates, Inc.
Engineering and Environmental Consultants
P.O. Box 5957
Helena, Montana 59604

RANCHVIEW ESTATES
MASTER PLAN

S 89°22'59"E, 1955.82'

840.00'

1085.72'

S-7 S-8 S-18 S-17

FND 1/2" REBAR

BLOCK 3 — 65 66 67 68 PHASE II-A 69 70 71 72 73 74 75 76 77 PHASE II-B 78 79 80 81 82

BLOCK 1 — 16 15 14 PHASE 13 II-A 12 11 10 9 1 2 3 4 PHASE I-A 5 6 7 8

BLOCK 2 — 32 31 30 PHASE 29 II-B 28 27 26 25 17 18 19 20 PHASE 21 I-B 22 23 24

BLOCK 4 — 41 42 43 PHASE 44 I-A 45 46 47 48 40 39 38 37 PHASE III-A 36 35 34 33

BLOCK 5 — 57 58 59 PHASE 60 I-B 61 62 63 64 56 55 54 53 PHASE III-B 52 51 50 49

BLOCK 6 — 83 84 85 86 87 88 89 90

BLOCK 7 — 107 106 105 PHASE 104 III-A 103 102 101 100 99 98 97 PHASE 96 III-B 95 94 93 92 91

LARIAT

RANCH VIEW

ANGUS

WATER SYSTEM EASEMENT

WATER SYSTEM EASEMENT

FUTURE PARKLAND TO BE TRANSFERED TO THE COUNTY
5.81 ACRES

N 89°22'59"W, 2035.29'

N 00°31'11"E, 1329.78'

N 00°31'11"E, 505.41'

MONTANA AVENUE

443.24'

443.24'

443.24'

443.24'

1320'

30'

2"W

3"I

2"W

3"I

2"W

2"W

2"W

PUBLIC WATER SYSTEM DESIGN REPORT
RANCH VIEW ESTATES PHASE II

NW¼ S17 T11 NR3W
LEWIS & CLARK COUNTY

GENERAL INFORMATION

The public water system will serve a total development of approximately 120 lots. The system will supply domestic needs only. A separate system has been developed to supply irrigation water. At this time the developer is seeking approval of Phase II which consists of thirty eight (38) lots. He plans to phase in the total development over a three - five (3-5) year period.

The water will be supplied by two wells that were drilled in the vicinity of the Helena Valley Irrigation Canal. Storage will be provided with hydropneumatic tanks.

Fire protection is provided by a tanker truck fill site that supplies six hundred gallons per minute (600 gpm) on demand. The source is an existing cropland irrigation system.

WATER USE DATA

Projected peak demand based on fixture units. Assume all homes will have two (2) full baths.

Bathrooms			
	Water Closet	3 FU (2)	6
	Lavatory	4 FU (2)	8
	Bath Tub	8 FU (2)	16
Kitchen			
	Kitchen Sink	3 FU (1)	3
	Dishwasher	4 FU (1)	4
Washing Machine		5 FU (1)	5
Service Sink		3 FU (1)	3
			45 FU/ Residence

PHASE II

Thirty eight (38) lots (each lot has one single family residence)

38 x 45 1710

Peak Demand

Based on Figure 3-2 (enclosed[1.]) ..... 65 gpm

Peak Demand at Full Development

120 x 45 ..... 5400 FU

From Figure 3-2 (enclosed[1.])

Adjust Peak Demand to 50 psi

At Full Development ..... 97.6 gpm

120 x 45 = 3150 fu = 75 gpm x 1.5 = 112.5 gpm

WELLS

Two domestic water wells were drilled to serve the project. They were drilled in the park area two hundred feet (200') away from the existing irrigation well. The wells were drilled in accordance with the approved well specifications. A copy of the well logs and water quality information is enclosed in Appendix C. The wells produce excellent quality water. Each well was pump tested at one hundred five gallons per minutes (105 gpm). A copy of the drawdown test data is contained in Appendix B.

SEWAGE SYSTEM

Each lot will be served by an individual on-site subsurface sewage treatment system. Seasonal high groundwater is much deeper than six feet (6') and the soils are adequate. The well site is over five hundred feet (500') from any of the subdivision drainfield locations.

There is an existing farm house on the property that uses a drainfield for sewage treatment. The wells have been drilled over two hundred feet (200') from that system.

A nitrate sensitivity study was conducted (see Appendix A). Please note that the estimated nitrate level in the groundwater is 2.11 ppm. This value is based on an analysis of all three phases of the subdivision. Hopefully this exercise will not have to be repeated each time that a new phase is developed. Also it should be noted that the groundwater direction is away from the well site.

1. AWWA Manual M-22

PUMP REQUIREMENTS

The following is a breakdown of the total pumping head requirements.

Total Suction Lift

Static Water Level	50′
Drawdown	20′
Friction Losses	16′
	86′

Static Discharge Head

Elevation to Pressure Tank	10′
Tank Pressure 85 psi	196′
	206′

Discharge System Friction Losses

Piping Losses	10′
Fittings	3′
	13′

TOTAL PUMPING HEAD REQUIREMENT 305 FT

Based on this information a series S McDonald seven and a half horsepower (7½ hp) pump(s) will meet the established criteria. The pump model 21750 S - 24 stage was installed. The pump curve and additional information is enclosed in Appendix D. Both wells have a pump installed. The pump controls have been set so that the lead pump will operate in pressure range of 65 - 85 psi and the lag pump set at 50 - 70 psi. A duplexing pump control was used that reverses lead and lag pump at the end of each cycle.

WATER STORAGE

Storage is provided using hydropneumatic pressure tanks. The Clayton Mark Model CM-205 tanks have been installed. Information regarding the tank is enclosed in Appendix E. The pressure tanks will be housed in the well house. Pressure losses that must be compensated for are the following:

Elevation Change	28.6 ft or 12.4 psi	
Friction Losses	37.8 ft or 16.5 psi	(in the pipe network)
	Total 28.9 psi	

In order to maintain 35 psi on the system the tank pressure must be a minimum of 63.9. The tank pressure has been set at 65/85. This provides 21.8 gallons of drawdown per tank. A total of five (5) tanks have been installed providing approximately two (2) minutes of pump running time. Three (3) additional tanks will be added when Phase III is developed.

WATER LINES

The "as-builts" for Phase I show that a three inch (3") water main was installed (Line 1a). This line is of adequate size to easily handle the peak demand of approximately one hundred gallon per minute (100 gpm). Line 1a will be extended to serve Phase II. (See Sheet 2 of 5 Line 2a). The lots will be served by two inch (2") lines labelled Line 7 on Sheet 2 of 5 and Line 4 on Sheet 3 of 5. The lines are designed to serve domestic use only - no yard or garden irrigation. A separate irrigation system will be installed.

WATER SYSTEM

Two water systems have been installed, an irrigation system and a domestic water system. Two wells have been drilled to serve the domestic system.

Each well was pump tested at 105 gpm over a six (6) hour period and the drawdown of each was less than one foot (1'). Both wells have been supplied with pumps capable of producing 60 - 70 gpm which is adequate to serve the domestic needs of all three (3) phases of the subdivision.

The irrigation system utilizes an existing irrigation well. The pump has been installed and it will produce 290 gpm, enough to irrigate all phases of the subdivision.

It should be noted that current irrigation practices for hay production on Phase II requires approximately fourteen (14) million gallons of water per year. Water use after development will require approximately 13.5 million gallons per year. The 13.5 millon gallons is utilized over the entire year whereas the 14 million gallons is withdrawn during the summer months only.

SOLID WASTE DISPOSAL

The private firm, City-County Sanitation will provide garbage collection service. They pick up garbage in that part of the valley on Fridays. Currently they dispose of the garbage at Scratchgravel Landfill.

STORMWATER RUNOFF

The streets will be paved with concrete curb and gutters, as in Phase I. The streets are sloped to direct the runoff water to the hayfields south of Phase II. It will eventually be directed into the parkland located at the southeast edge of the subdivision.

COVENANTS & BY-LAWS

The restrictive covenants are on file with the County Clerk and Recorder.

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AUG 17 1994
MONTANA
DEPT. OF HEALTH & ENV. SCIENCES
WATER QUALITY BUREAU

WATER SUPPLY

Phase III will be supplied water by Ranch View Estate Homeowners Association. The system consists of two (2) separate and distinct water systems. The domestic water system consists of two (2) wells each capable of producing 125 gpm. Actually the wells can produce far more, production is limited by pump size. The irrigation system is operated by a third well designed to produce 290 gpm.

The water mains and well house have been sized to accommodate all phases of the subdivision. Phase I & II have a total of seventy (70) lots. Phase III adds thirty seven (37) lots for a total of one hundred seven (107) lots.

For Phase I & II design it was assumed that each home would have two (2) full baths. Based on existing house construction in Phase I & II, it is more accurate to use two (2) full baths and a half (½) bath. The fixture units are revised as follows:

Bathroom			
	Water Closets	3 FU (3)	9
	Lavatory	4 FU (3)	12
	Bath Tub	8 FU (2)	16
Kitchen			
	Kitchen Sink	3 FU (1)	3
	Dishwasher	4 FU (1)	4
	Wash Machine	5 FU (1)	5
	Service Sink	3 FU (1)	3
			52 FU/Residence

With one hundred seven (107) homes, the total FU is: **5564**

Peak Demand at Full Development

Based on Figure 3-2 (enclosed) ..... 80 gpm

Adjusted Peak to 50 psi **97.6 gpm**

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JUN 03 1997
MT. DEPT. OF ENV. QUALITY
PERMITTING & COMPLIANCE DIV.

PUMP REQUIREMENTS

The two (2) wells are equipped with 7½ HP. S McDonald Model 21750 S. The pumps are set to operate at 60 - 75 psi.

The pumps were sized based on the following TDH requirements:

Total Suction Lift	
Static Water Level	50'
Drawdown	20'
Friction Losses	16'
	86'
Static Discharge Head	
Elevation to Pressure Tank	10'
Tank Pressure (85 psi)	196'
	206'
Discharge System Friction Losses	
Pipe Losses	10'
Fittings	3'
	13'

A total of eight (8) Clayton Mark CM-205 or Well-X-Trol Model 350 hydropneumatic tanks will be installed. This will provide over two (2) minutes of pump run time. A copy of the AS BUILT well house is enclosed.

Also enclosed are two (2) copies of the water main extension plans.

WASTEWATER TREATMENT

Three copies of the LOT LAYOUTS are enclosed. The layouts show the drainfield, drainfield replacement area, test holes and percolation test location. Figure 2 shows a typical lot layout for all but Lots 87 through 91. Those particular lots do not have a mirror image lot across the street.

There are no wells in the vicinity. All lots in the subdivision are connected to the public water system. There are no neighboring on-site sewage treatment systems. All surrounding property is either park area or a portion of Ranch View Estates Subdivision Phase I & II.

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MT. DEPT. OF ENV. QUALITY
PERMITTING & COMPLIANCE

RANCH VIEW ESTATES III
HYDROGEOLOGIC STUDY

Background

The purpose of this study is to evaluate the pump test conducted on the existing irrigation well for the proposed Ranch View Estates III Subdivision. The analysis will include a calculation of the aquifer transmissivity based on the drawdown and recovery data from three observation wells. The knowledge gained from this study will be used in a nitrate sensitivity analysis to demonstrate that the proposed mixing zones will have a non-significant impact on nitrate levels in the underlying aquifer.

Location

The proposed subdivision is located six miles north of Helena. The location map in Appendix A shows the boundaries of the subdivision and the locations of the pumping well and observation wells. Also included is a map showing the drainfield and mixing zone locations for each lot.

Subsurface Geology

The lithologic log for the irrigation well which was used for the pump test shows about 90 feet of alternating sand, clay, and gravel. The well is completed in sand and pea gravel. The two public water supply well logs to the north indicate similar lithologies.

Aquifer Test Results

The pump test was conducted by the property owner with oversight by a hydrogeologist. Results from the pump test are found in Appendix C. The pumping well was pumped at 600 gpm for four hours. The pumping well could not be accessed with a probe; however, time-drawdown data was recorded from three observation wells at distances of 10, 38, and 151 feet away. The nearest well has no pump in it, and is referred to in this report as the monitor well. The middle well is an irrigation well for the existing Phases I and II of Ranch View Estates, and is referred to as the community irrigation well. The far well is the drinking water supply well for the subdivision, and is referred to as Public Water Supply Well 1.

All three of the wells supplied with pumps were taken off line and allowed to stabilize prior to the pump test. A second drinking water supply well (Public Water Supply Well 2) is located 70 feet further away from Well 1. This well was left on line to serve the in-house needs of the subdivision during the pump test. No discernible effect was noticed on Well 1 due to the intermittent cycling of Well 2 with relatively short-term

Appendix M

Water Usage Data

RANCH VIEW FLOW RECORDS

DATE	IRRIGATION METER	DOMESTIC METER	IRR DIFF	DOM DIFF
18-Dec	91376600	28372900		
Jan-19	91377000	28372900	400	0
19-Feb	91377200	28837290	200	464390
19-Mar	91378200	28837290	1000	0
19-Apr	91476300	28837290	98100	0
19-May	94192300	28837290	2716000	0
19-Jun	101746400	28869010	7554100	31720
19-Jul	108554800	29224900	6808400	355890
19-Aug	115978600	29763500	7423800	538600
19-Sep	120932700	30262800	4954100	499300
19-Oct	121010600	30706600	77900	443800
19-Nov	121013300	31177200	2700	470600
19-Dec	121014100	31581300	800	404100
20-Jan	121015000	32009300	900	428000
20-Feb	121016000	32379900	1000	370600
20-Mar	121022300	32839200	6300	459300
20-Apr	121663800	33297400	641500	458200
20-May	127278400	33832200	5614600	534800

Appendix N

Water Quality

INTEGRATED
Water, Inc.

A Division of Wolfe Water Management, Inc.

Montana state-certified water and wastewater operation

5368 N Montana Ave
Helena, Montana 59602

2020 Annual Drinking Water Quality Report
Ranch View Estates Water Users Association
Box 9732
Helena, MT 59604

We're pleased to present to you this year's Annual Water Quality Report. This report is designed to inform you about the water quality and services we deliver to you every day. Our goal is to provide you with a safe and dependable supply of drinking water. We want you to understand the efforts we make to continually improve the water treatment process and protect your water resources. We are committed to ensuring the quality of your water. Our water source is groundwater from three wells located to the south of the subdivision.

I'm pleased to report that our drinking water is safe and meets federal and state requirements. If you have any questions about this report or concerning your water utility, please contact Lee Wolfe or Richard Williams at (406)-442-2949. We want consumers to be informed about their water utility. If you want to learn more about opportunities for participation, please contact any Ranch View Estates Water Users Association board member.

Integrated Water routinely monitors water for constituents in your drinking water according to Federal and State laws. This table shows the results of our monitoring for the period of January 1st to December 31st, 2019. Some of the data in the tables are more than one year old, because certain chemical contaminants are monitored less than once a year. Included are the results of more recent sampling to bring everyone up to date on testing. The sampling frequency at Ranch View Estates WUA complies with EPA and State drinking water regulations.

In this table and in rules, you will find many terms and abbreviations with which you might not be familiar. To help you better understand these terms we've provided the following definitions:

- *Parts per million (ppm) or Milligrams per liter (mg/l)* - one part per million corresponds to one minute in two years or a single penny in $10,000.

- *Parts per billion (ppb) or Micrograms per liter* - one part per billion corresponds to one minute in 2,000 years, or a single penny in $10,000,000.

- *Action Level* - the concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water

system must follow.

- *Treatment Technique (TT)* - A treatment technique is a required process intended to reduce the level of a contaminant in drinking water.
- *Maximum Contaminant Level* - The "Maximum Allowed" (MCL) is the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
- *Maximum Contaminant Level Goal* - The "Goal"(MCLG) is the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
- *Maximum residual disinfection level goal* or MRDLG: The level of a drinking water disinfection below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
- *Maximum residual disinfectant level* or MRDL: The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
- *pCi/L*- picocuries per liter is a rate at which radioactive atoms break down. Picocuries break down at a rate of 2.2 disintegrations per minute in a liter of space. The curie is a standard measure for the intensity of radioactivity contained in a sample of radioactive material.
- *Variances and Exemptions* - State or EPA permission not to meet an MCL or a treatment technique under certain conditions.

TEST RESULTS

Contaminant	Violation Y/N	Sample Date	Highest Level Detected	Range Detected	Unit Measurement	MCLG	MCL	Likely Source of Contamination
Inorganic Contaminants								
Copper 90th percentile	N	2018	.076	N/A	ppm	1.3	AL=1.3	Corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives
Lead 90th percentile	N	2018	ND	N/A	ppb	0	AL=15	Corrosion of household plumbing systems, erosion of natural deposits
Nitrate (as Nitrogen)	N	03-13-19	0.354	4N/A	ppm	10	10	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits
8. Arsenic	N	03-13-19	.002	N/A	ppb	n/a	10	Erosion of natural deposits; runoff from orchards; runoff from glass and electronics production wastes
10. Barium	N	03-13-19	ND	N/A	ppm	2	2	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits
16. Fluoride	N	03-13-19	.4	N/A	ppm	4	4	Erosion of natural deposits; water additive which promotes strong teeth; discharge from fertilizer and aluminum factories
Gross Alpha	N	11-15-16	13.7	N/A	pCi/1	0	15	Erosion of natural deposits
Radium-226	N	11-15-16	0.2	N/A	pCi/1	0	N/A	Erosion of natural deposits
Radium-228	N	11-15-16	<1.5	N/A	pCi/1	0	N/A	Erosion of natural deposits

Ranch View Estates WUA also tested for bacteriological contamination on a monthly

basis, and many other required constituents that are on either six-or three-year rotations. We are not reporting the results on these tests because there were no detects of any of these constituents, or they are well below any action levels.

What does this mean? As you can see by the table, our system had no violations. We're proud that your drinking water meets or exceeds all Federal and State requirements. We have learned through our monitoring and testing that some constituents have been detected, but the EPA has determined that your water **IS SAFE** at these levels.

All sources of drinking water are subject to potential contamination by constituents that are naturally occurring or are manmade. Those constituents can be microbes, organic or inorganic chemicals, or radioactive materials. All drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that the water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline at 1-800-426-4791.

MCLs are set at very stringent levels. To understand the possible health effects described for many regulated constituents, a person would have to drink two liters of water every day at the MCL level for a lifetime to have a one-in-a-million chance of having the described health effect. Nitrates: As a precaution, we always notify physicians and health care providers in this area if a higher than normal level of nitrates occurs in the water supply.

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive materials, and can pick up substances resulting from the presence of animals or from human activity. Contaminants that may be present in source water include: Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife. Inorganic contaminants, such as salts and metals, which can be naturally occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming. Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses. Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems. Radioactive contaminants, which can be naturally-occurring or be the result of oil and gas production and mining activity.

In order to ensure that tap water is safe to drink, EPA prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. FDA regulations establish limits for contaminants in bottled water which must provide the same protection for public health. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline (800-426-4791). Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk for infections. These people should seek advice about drinking water from their health care

providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from Safe Drinking Water Hotline (800-426-4791).

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. Forest Park Water Users Association is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using the water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing materials, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.govsafewater/lead.

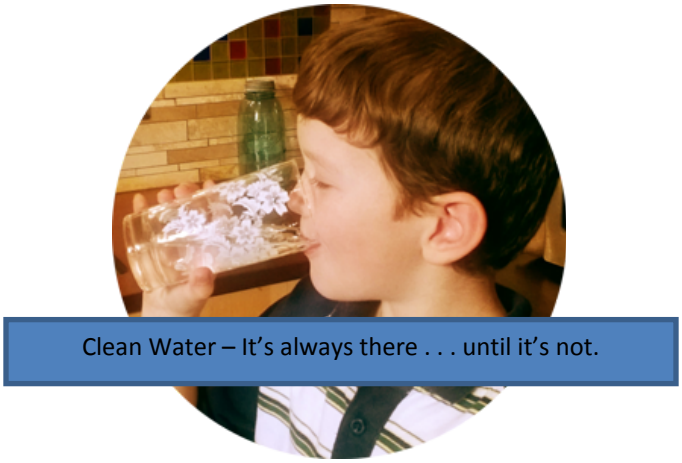
Thank you for allowing us to continue providing your family and community with clean, quality water this year. In order to maintain a safe and dependable water supply, we sometimes need to make improvements that will benefit all of our customers. These improvements are sometimes reflected as rate structure adjustments. Thank you for understanding.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by cryptosporidium and other microbiological contaminants are available from the Safe Drinking Water Hotline (800-426-4791).

Please call our office if you have questions. Integrated Water, Inc. and your board have worked hard to provide top quality water to every tap. We ask that all customers help protect water sources which are the heart of our community and our way of life.

INTEGRATED WATER
Duncan Quigley

(406) 442-2949



Drinking Water Branch

Sample Schedules

Return Links

Water System Detail

Water Systems

Water System Search

County Map

Glossary

Water System No. :	MT0003782	**Federal Type :**	C
Water System Name :	RANCHVIEW ESTATES WUA	**State Type :**	C
Principal County Served :	LEWIS AND CLARK	**Primary Source :**	GW
Status :	A	**Activity Date :**	02-14-2000

TCR Schedules

Sample Count	Sample Type	Sample Frequency	Effective Begin Date	Effective End Date	Seasonal Start MM/DD	Seasonal End MM/DD	Analyte Code	Analyte Name
1	RT	MN	11-01-2005		1/1	12/31	3100	COLIFORM (TCR)

Total Number of Records Fetched = 1

Frequent Field Sample Schedules

Water System Facility State Asgn ID	Water System Facility Name	Analyte Code	Analyte Name	Days to Monitor per month	Samples Required per day	Effective Begin Date	Effective End Date	Summary Type

Total Number of Records Fetched = 0

Non-TCR Group Schedules

Water System Facility State Asgn ID	Water System Facility Name	Analyte Group Code	Analyte Group Name	Sample Count	Sample Type	Sample Frequency	Effective Begin Date	Effective End Date	Seasonal Start MM/DD	Seasonal End MM/DD
CH001	COMMON HEADER FOR WELLS 1 2	ARSE	CDS ARSENIC	1	RT	3Y	01-01-1999		1/1	12/31
CH001	COMMON HEADER FOR WELLS 1 2	NITR	CDS NITRATE NITRITE	1	RT	YR	01-01-2002		0/0	0/0
CH001	COMMON HEADER FOR WELLS 1 2	INO1	CDS P2-5 INORGANICS	1	RT	3Y	01-01-1999		1/1	12/31

CH001	COMMON HEADER FOR WELLS 1 2	GRAL	CDS RAD GROSS ALPHA	1	RT	6Y	01-01-2017		0/0	0/0
CH001	COMMON HEADER FOR WELLS 1 2	COMB	CDS RADIUMS COMBINED	1	RT	9Y	01-01-2008		0/0	0/0
CH001	COMMON HEADER FOR WELLS 1 2	SOC	CDS SOC REGULATED	1	RT	3Y	01-02-2014		0/0	0/0
CH001	COMMON HEADER FOR WELLS 1 2	VOC1	CDS VOC	1	RT	3Y	01-01-2002		1/1	12/31
CH001	COMMON HEADER FOR WELLS 1 2	SWW	STATE WIDE WAIVERS	1	RT	9Y	01-01-2020		0/0	0/0
DS001	DISTRIBUTION SYSTEM	ASBE	CDS ASBESTOS	1	RT	9Y	01-01-2020		0/0	0/0
DS001	DISTRIBUTION SYSTEM	PBCU	CDS LEAD COPPER ONLY	5	RT	3Y	01-01-2005		6/1	9/30

Total Number of Records Fetched = 10

Non-TCR Individual Schedules

Water System Facility State Asgn ID	Water System Facility Name	Analyte Code	Analyte Name	Sample Count	Sample Type	Sample Frequency	Effective Begin Date	Effective End Date	Seasonal Start MM/DD	Seasonal End MM/DD

Total Number of Records Fetched = 0

Drinking Water Branch

Violations

Return Links

Water System Detail

Water Systems

Water System Search

County Map

Glossary

Water System No. :	MT0003782	**Federal Type :**	C
Water System Name :	RANCHVIEW ESTATES WUA	**State Type :**	C
Principal County Served :	LEWIS AND CLARK	**Primary Source :**	GW
Status :	A	**Activity Date :**	02-14-2000

****Please note**: some of these violations may have been resolved and/or returned to compliance. Please click on the violation to view more information on its compliance status.**

Group Violations

Violation No.	Status	Violation Type	Violation Name	Analyte Group Code	Analyte Group Name	Water System Facility State Asgn ID	Water System Facility Name

Total Number of Records Fetched = 0

Individual Violations

Violation No.	Status	Violation Type	Violation Name	Analyte Code	Analyte Name	Water System Facility State Asgn ID	Water System Facility Name
2013-4468412	V	71	CCR REPORT	7000	CONSUMER CONFIDENCE RULE	null	null
2012-4468411	V	23	MONITORING (TCR), ROUTINE MAJOR	3100	COLIFORM (TCR)	null	null
2011-4468410	V	66	LEAD CONSUMER NOTICE (LCR)	5000	LEAD & COPPER RULE	null	null
2008-4468308	V	71	CCR REPORT	7000	CONSUMER CONFIDENCE RULE	null	null
2004-4467104	V	52	FOLLOW-UP OR ROUTINE TAP M/R (LCR)	5000	LEAD & COPPER RULE	null	null
1996-4466996	V	25	MONITORING (TCR), REPEAT MAJOR	3100	COLIFORM (TCR)	null	null

Appendix O

Water Rights

STATE OF MONTANA
DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION
1424 9TH AVENUE P.O.BOX 201601 HELENA, MONTANA 59620-1601

GENERAL ABSTRACT

Water Right Number: 41I 88721-00 PROVISIONAL PERMIT
Version: 2 -- CHANGE AUTHORIZATION
Version Status: ACTIVE

Owners: RANCH VIEW ESTATES WATER USERS ASSN
% LEE WOLFE
3920 MCHUGH LN
HELENA, MT 59602-7442

Priority Date: JANUARY 27, 1994 at 09:11 A.M.

Enforceable Priority Date: JANUARY 27, 1994 at 09:11 A.M.

Purpose (use): MULTIPLE DOMESTIC
LAWN AND GARDEN

Maximum Flow Rate: 130.00 GPM

Maximum Volume: 110.00 AC-FT

Source Name: GROUNDWATER

Source Type: GROUNDWATER

Point of Diversion and Means of Diversion:

ID	Govt Lot	Qtr Sec	Sec	Twp	Rge	County
1		NWSWNW	17	11N	3W	LEWIS AND CLARK

Period of Diversion: JANUARY 1 TO DECEMBER 31
Diversion Means: WELL
Well Depth: 100.00 FEET
Static Water Level: 53.00 FEET
Casing Diameter: 6.63 INCHES

ID	Govt Lot	Qtr Sec	Sec	Twp	Rge	County
2		NWSWNW	17	11N	3W	LEWIS AND CLARK

Period of Diversion: JANUARY 1 TO DECEMBER 31
Diversion Means: WELL
Well Depth: 120.00 FEET
Static Water Level: 52.00 FEET
Casing Diameter: 6.63 INCHES

ID	Govt Lot	Qtr Sec	Sec	Twp	Rge	County
3		NESWNW	17	11N	3W	LEWIS AND CLARK

Period of Diversion: JANUARY 1 TO DECEMBER 31
Diversion Means: WELL
Well Depth: 183.00 FEET
Static Water Level: 47.00 FEET
Casing Diameter: 10.63 INCHES

RANCH VIEW ESTATES WELL #1 AND WELL #2 ARE DOMESTIC WELLS AND ARE MANIFOLD IN THE ABOVE DESCRIPTION.

Purpose (Use): MULTIPLE DOMESTIC
Households: 103
Volume: 25.00 AC-FT
Period of Use: JANUARY 1 to DECEMBER 31

Place of Use:

ID	Acres	Govt Lot	Qtr Sec	Sec	Twp	Rge	County
1			N2NW	17	11N	3W	LEWIS AND CLARK

Purpose (Use): LAWN AND GARDEN
Volume: 85.00 AC-FT
Period of Use: APRIL 15 to OCTOBER 15

Place of Use:

ID	Acres	Govt Lot	Qtr Sec	Sec	Twp	Rge	County
1	33.50		SWNW	17	11N	3W	LEWIS AND CLARK

Subdivision: RANCH VIEW

Total: 33.50

Remarks:

GROUNDWATER WASTE & CONTAMINATION

THIS RIGHT IS SUBJECT TO SECTION 85-2-505, MCA, REQUIRING A WELL BE CONSTRUCTED SO IT WILL NOT ALLOW WATER TO BE WASTED OR CONTAMINATE OTHER WATER SUPPLIES OR SOURCES, AND A FLOWING WELL MUST BE CAPPED OR EQUIPPED SO THE FLOW OF THE WATER MAY BE STOPPED WHEN NOT BEING PUT TO BENEFICIAL USE.

GROUNDWATER WELL - ACCESS PORT

THE FINAL COMPLETION OF THE WELL(S) MUST INCLUDE AN ACCESS PORT OF AT LEAST .50 INCH SO THE STATIC LEVEL OF THE WELL MAY BE ACCURATELY MEASURED.

REISSUED RIGHT

THE RIGHT ISSUED ON 10/27/2004 WAS REISSUED. THE RIGHT WAS REISSUED BECAUSE OF A MODIFICATION IN THE CHANGE DESCRIPTION AND ADDITIONAL WELL DIVERSION ADDED.

PROGRESS REPORT REQUIRED

THE APPROPRIATOR SHALL SUBMIT A PROGRESS REPORT OF THE WORK COMPLETED UNDER THIS RIGHT BY NOVEMBER 30TH OF EACH YEAR UNTIL COMPLETION OF THE PROJECT. SUBMIT REPORTS TO THE WATER RESOURCES REGIONAL OFFICE LISTED BELOW. HELENA, MT PH: 406-449-0944 FAX: 406-442-9315

OWNERSHIP UPDATE RECEIVED

NOTICE OF WATER RIGHT TRANSFER RECEIVED 11/14/1996.

LIABILITY WAIVER

THE ISSUANCE OF THIS RIGHT BY THE DEPARTMENT SHALL NOT REDUCE THE APPROPRIATOR'S LIABILITY FOR DAMAGES CAUSED BY THE APPROPRIATOR'S EXERCISE OF THIS RIGHT. NOR DOES THE DEPARTMENT IN ISSUING THE RIGHT IN ANY WAY ACKNOWLEDGE LIABILITY FOR DAMAGE CAUSED BY THE APPROPRIATOR'S EXERCISE OF THIS RIGHT.

STATE OF MONTANA
DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION
1424 9TH AVENUE P.O.BOX 201601 HELENA, MONTANA 59620-1601

GENERAL ABSTRACT

Water Right Number: 41I 89787-00 PROVISIONAL PERMIT
Version: 2 -- CHANGE AUTHORIZATION
Version Status: ACTIVE

Owners: RANCH VIEW ESTATES WATER USERS ASSN
% LEE WOLFE
3920 MCHUGH LN
HELENA, MT 59602-7442

Priority Date: APRIL 25, 1994 at 03:00 P.M.

Enforceable Priority Date: APRIL 25, 1994 at 03:00 P.M.

Purpose (use): LAWN AND GARDEN

Maximum Flow Rate: 290.00 GPM

Maximum Volume: 83.75 AC-FT

Maximum Acres: 33.50

Source Name: GROUNDWATER

Source Type: GROUNDWATER

Point of Diversion and Means of Diversion:

ID	Govt Lot	Qtr Sec	Sec	Twp	Rge	County
1		NWSWNW	17	11N	3W	LEWIS AND CLARK

Period of Diversion: APRIL 15 TO OCTOBER 15
Diversion Means: WELL
Well Depth: 183.00 FEET
Static Water Level: 47.00 FEET
Casing Diameter: 10.63 INCHES

RANCH VIEW ESTATES

Purpose (Use): LAWN AND GARDEN
Volume: 83.75 AC-FT
Period of Use: APRIL 15 to OCTOBER 15

Place of Use:

ID	Acres	Govt Lot	Qtr Sec	Sec	Twp	Rge	County
1	33.50		SWNW	17	11N	3W	LEWIS AND CLARK
Total:	33.50						

Remarks:

GROUNDWATER WASTE & CONTAMINATION

THIS RIGHT IS SUBJECT TO SECTION 85-2-505, MCA, REQUIRING ALL WELLS BE CONSTRUCTED SO THEY WILL NOT ALLOW WATER TO BE WASTED OR CONTAMINATE OTHER WATER SUPPLIES OR SOURCES, AND ALL FLOWING WELLS SHALL BE CAPPED OR EQUIPPED SO THE FLOW OF THE WATER MAY BE STOPPED WHEN NOT BEING PUT TO BENEFICIAL USE.

GROUNDWATER WELL - ACCESS PORT

THE FINAL COMPLETION OF THE WELL(S) MUST INCLUDE AN ACCESS PORT OF AT LEAST .50 INCH SO THE STATIC LEVEL OF THE WELL MAY BE ACCURATELY MEASURED.

OBJECTION INFORMATION

OBJECTION LOG 94-055

PROGRESS REPORT REQUIRED

THE APPROPRIATOR SHALL SUBMIT A PROGRESS REPORT OF THE WORK COMPLETED UNDER THIS RIGHT BY NOVEMBER 30TH OF EACH YEAR UNTIL COMPLETION OF THE PROJECT. SUBMIT REPORTS TO THE WATER RESOURCES REGIONAL OFFICE AT THE ADDRESS LISTED BELOW. 1520 E 6TH AVE, PO BOX 202301, HELENA, MT 59620-2301 PH: 406-444-6695

OWNERSHIP UPDATE RECEIVED

NOTICE OF WATER RIGHT TRANSFER RECEIVED 11/14/96.

LIABILITY WAIVER

THE ISSUANCE OF THIS RIGHT BY THE DEPARTMENT SHALL NOT REDUCE THE APPROPRIATOR'S LIABILITY FOR DAMAGES CAUSED BY THE APPROPRIATOR'S EXERCISE OF THIS RIGHT. NOR DOES

Remarks:

THE DEPARTMENT IN ISSUING THE RIGHT IN ANY WAY ACKNOWLEDGE LIABILITY FOR DAMAGE CAUSED BY THE APPROPRIATOR'S EXERCISE OF THIS RIGHT.

INTEGRATED
Water, Inc.

A Division of Wolfe Water Management, Inc.

Montana state-certified water and wastewater operation

5368 N Montana Ave
Helena, Montana 59602

DATE: 10/10/2019

Water Rights Bureau
Montana Department of Natural Resources and Conservation
1424 9th Avenue
Box 201601
Helena, MT. 50620-1601

RE: Report for Ranch View Estates W.U.A.
Permit # 41I-P089787-00 and # 41I-88721-00.

To Whom It May Concern,

The information provided explains the status of the permit mentioned above.

These two permit numbers are tied together with the Ranchview Estates subdivision as their place of use. Permit # 41I88721-00 has separate sources and main line distribution system and has multiple domestic and lawn and garden listed as use. Permit # 41I89787-00 has its own separate source and distribution system and has Lawn and garden listed as the exclusive use.

The pumping and distribution system have been completed and the development of the hook-ups is completed. All possible connections are active within the system.

The irrigation and domestic systems have pumped 31,291,405 gallons or 96.02 acre-feet into both distribution systems. The systems are separated in the WM-02 Reports.

If you have any questions about Ranch View Estates call me at 442-2949 or 431-1191

Sincerely,

Duncan Quigley
Integrated Water, Inc.

Form WM-02

WATER MEASUREMENT
FLOW METER REPORT

PAGE ____ of ____

DATE: _____

WATER RIGHT OWNER'S NAME: _____

WATER RIGHT NO(S): _____

LOCATION: _____

USER INFORMATION: _____

MEASUREMENTS REQUIRED: _____

TYPE OF DEVICE USED: _____

A DATE	**B** TIME	**C** PERIOD OF OPERATION (Hours)	**D** FLOW RATE (*Circle one:* CFS or GPM)	**E** VOLUME (*Circle one:* AF or GAL)
F. ≅ VOLUME AT END OF RECORDING PERIOD				
G. ≅ VOLUME AT START OF RECORDING PERIOD				
H. TOTAL VOLUME USED THIS YEAR (*Circle one:* GAL or AF)				
I. TOTAL VOLUME USED THIS YEAR IN ACRE-FEET) *(Conversion: 1 AF = 325,851 gallons)*				

J. METER MANUFACTURER _____ **K.** MODEL NO. _____ **L**.. PIPE DIAMETER (INCHES) _____

Form WM-02-INS

WATER MEASUREMENT
FLOW METER REPORT FORM

CARE & MAINTENANCE OF THE FLOW METER

A flow meter can be a highly sensitive, expensive piece of equipment. It should be protected against unnecessary rough handling and freezing temperatures. Installation needs to allow the meter to be removed after the recording period for storage in a non-freezing environment.

Calibration should be performed a minimum of once every four years. This is usually done during the non-recording period by returning the meter to the factory or sending it to an authorized service center.

RECORD KEEPING

1. **LINE G**: Prior to starting the pump at the beginning of the recording period, enter the meter reading requested at the bottom of the form. (See line G, VOLUME AT START OF RECORDING PERIOD.)

2. **COLUMNS A & B:** Record the date and time of day when the reading was taken.

3. **COLUMN C:** Record the number of hours the system was operated

3. **COLUMN D:** Record the flow rate and circle whether the flow rate is in gallons per minute (GPM) or cubic feet per second (CFS)

4. **COLUMN E:** Record the volume meter reading and circle whether the volume is in acre-feet (AF) or gallons (GAL).

5. Continue the above described procedure throughout the entire recording period.

6. **LINE F:** Enter the final volume reading on Line F after VOLUME AT END OF RECORDING PERIOD.

7. **LINE H:** Subtract the beginning volume from the final volume to obtain the total volume of water pumped for the recording period. Enter this amount on Line H – circle whether this volume is in GAL or AF.

8. **LINE I:** If the total volume is in gallons, convert this number to acre-feet and enter this number on Line I. (*Example: 1,030,490 GAL ÷ 325,851 = 3.16 AF)*

Form WM-02

WATER MEASUREMENT
FLOW METER REPORT

PAGE ____ of ____

DATE: _____

WATER RIGHT OWNER'S NAME: _____

WATER RIGHT NO(S): _____

LOCATION: _____

USER INFORMATION: _____

MEASUREMENTS REQUIRED: _____

TYPE OF DEVICE USED: _____

A DATE	**B** TIME	**C** PERIOD OF OPERATION (Hours)	**D** FLOW RATE (*Circle one:* CFS or GPM)	**E** VOLUME (*Circle one:* AF or GAL)
F. ≅ VOLUME AT END OF RECORDING PERIOD				
G. ≅ VOLUME AT START OF RECORDING PERIOD				
H. TOTAL VOLUME USED THIS YEAR (*Circle one:* GAL or AF)				
I. TOTAL VOLUME USED THIS YEAR IN ACRE-FEET) *(Conversion: 1 AF = 325,851 gallons)*				

J. METER MANUFACTURER _____ **K.** MODEL NO. _____ **L**.. PIPE DIAMETER (INCHES) _____

Form WM-02-INS

WATER MEASUREMENT
FLOW METER REPORT FORM

CARE & MAINTENANCE OF THE FLOW METER

A flow meter can be a highly sensitive, expensive piece of equipment. It should be protected against unnecessary rough handling and freezing temperatures. Installation needs to allow the meter to be removed after the recording period for storage in a non-freezing environment.

Calibration should be performed a minimum of once every four years. This is usually done during the non-recording period by returning the meter to the factory or sending it to an authorized service center.

RECORD KEEPING

1. **LINE G**: Prior to starting the pump at the beginning of the recording period, enter the meter reading requested at the bottom of the form. (See line G, VOLUME AT START OF RECORDING PERIOD.)

2. **COLUMNS A & B:** Record the date and time of day when the reading was taken.

3. **COLUMN C:** Record the number of hours the system was operated

3. **COLUMN D:** Record the flow rate and circle whether the flow rate is in gallons per minute (GPM) or cubic feet per second (CFS)

4. **COLUMN E:** Record the volume meter reading and circle whether the volume is in acre-feet (AF) or gallons (GAL).

5. Continue the above described procedure throughout the entire recording period.

6. **LINE F:** Enter the final volume reading on Line F after VOLUME AT END OF RECORDING PERIOD.

7. **LINE H:** Subtract the beginning volume from the final volume to obtain the total volume of water pumped for the recording period. Enter this amount on Line H – circle whether this volume is in GAL or AF.

8. **LINE I:** If the total volume is in gallons, convert this number to acre-feet and enter this number on Line I. (*Example: 1,030,490 GAL ÷ 325,851 = 3.16 AF)*

ACKNOWLEDGEMENT OF WATER RIGHT TRANSFER
FROM
DEPARTMENT OF NATURAL RESOURCES AND CONSERVATON
STATE OF MONTANA

WATER RIGHT NUMBER 41I -P-088721-00

****
WE HAVE RECEIVED AND RECORDED A TRANSFER OF WATER RIGHT OWNERSHIP IN WHICH YOU WERE NAMED AS A PARTY. THE RECORDS MAINTAINED BY THE WATER RIGHTS BUREAU HAVE BEEN CHANGED TO REFLECT THE NEW OWNERSHIP ACCORDING TO THE WATER RIGHT TRANSFER. THE ABSTRACT BELOW SHOWS THE CURRENT WATER RIGHT INFORMATION. BOTH BUYER AND SELLER HAVE BEEN SENT THIS ACKNOWLEDGEMENT.

IF YOU HAVE QUESTIONS, PLEASE CONTACT YOUR LOCAL WATER RESOURCES REGIONAL OFFICE. HELENA REGIONAL OFFICE, 444-6695.
**********DNRC*LOCATE*##*P*5*HE*941206***

OWNERS: RANCH VIEW ESTATES WATER USERS ASSN
% CHERI GOOSEN, TREASURER
1294 RANCH VIEW RD
HELENA MT 59602

PRIORITY DATE: JAN 27, 1994 9:11

FLOW RATE: 130.00 GALLONS PER MINUTE (G)

VOLUME: 110.00 ACRE FEET PER YEAR (AF)

SOURCE: WELL

PURPOSE:

USE	FLOW	VOLUME (AF)	ACRES	PERIOD OF USE
DOMESTIC (MULTIPLE)	130.00 G	110.00		JAN 1 TO DEC 31

POINTS OF DIVERSION AND MEANS OF DIVERSION:

WELL:

LOT	BLK	QTR SEC	SEC	TWP	RGE	COUNTY
		NWSWNW	17	11N	03W	LEWIS & CLARK
		NWSWNW	17	11N	03W	LEWIS & CLARK

RANCH VIEW ESTATES
TWO MANIFOLD WELLS IN THE ABOVE DESCRIPTION

PUMP

PLACE OF USE FOR DOMESTIC (MULTIPLE):

ACRES	LOT	BLK	QTR SEC	SEC	TWP	RGE	COUNTY
001			N2NW	17	11N	03W	LEWIS & CLARK

NOTICE OF COMPLETION OF PERMITTED WATER DEVELOPMENT FORM 617 DUE: DEC 31, 2001

** TRANSFER OF OWNERSHIP:
UPON A CHANGE IN OWNERSHIP OF ALL OR ANY PORTION OF THIS PERMIT, THE PARTIES TO THE TRANSFER SHALL FILE WITH THE DEPARTMENT OF NATURAL RESOURCES AND CONSERVATON A WATER RIGHT TRANSFER CERTIFICATE, FORM 608, PURSUANT TO SECTION 85-2-424, MCA.

REMARKS: NOTICE OF WATER RIGHT TRANSFER RECEIVED 11/14/96.

REMARKS CONTINUED:

** WAIVER OF LIABILITY:
THE ISSUANCE OF THIS PERMIT BY THE DEPARTMENT SHALL NOT REDUCE THE PERMITTEE'S LIABILITY FOR DAMAGES CAUSED BY PERMITTEE'S EXERCISE OF THIS PERMIT, NOR DOES THE DEPARTMENT IN ISSUING THE PERMIT IN ANY WAY ACKNOWLEDGE LIABILITY FOR DAMAGE CAUSED BY THE PERMITTEE'S EXERCISE OF THIS PERMIT.

** WASTE AND CONTAMINATION, ACCESS PORT:
THIS PERMIT IS SUBJECT TO SECTION 85-2-505, MCA, REQUIRING THAT ALL WELLS BE CONSTRUCTED SO THEY WILL NOT ALLOW WATER TO BE WASTED, OR CONTAMINATE OTHER WATER SUPPLIES OR SOURCES, AND ALL FLOWING WELLS SHALL BE CAPPED OR EQUIPPED SO THE FLOW OF WATER MAY BE STOPPED WHEN NOT BEING PUT TO BENEFICIAL USE.

THE FINAL COMPLETION OF THE WELL MUST INCLUDE AN ACCESS PORT OF AT LEAST .50 INCH SO THAT THE STATIC LEVEL OF THE WELL MAY BE ACCURATELY MEASURED.

** PROGRESS REPORT:
THE PERMITTEE SHALL SUBMIT A PROGRESS REPORT OF THE WORK COMPLETED UNDER THIS PERMIT BY NOVEMBER 30 OF EACH YEAR UNTIL COMPLETION OF THE PROJECT. SUBMIT REPORTS TO THE WATER RESORUCES REGIONAL OFFICE 1520 EAST SIXTH AVENUE, HELENA MT 59620.

ACKNOWLEDGEMENT OF WATER RIGHT TRANSFER
FROM
DEPARTMENT OF NATURAL RESOURCES AND CONSERVATON
STATE OF MONTANA

WATER RIGHT NUMBER 41I -P-089787-00

****
WE HAVE RECEIVED AND RECORDED A TRANSFER OF WATER RIGHT OWNERSHIP IN WHICH YOU WERE NAMED AS A PARTY. THE RECORDS MAINTAINED BY THE WATER RIGHTS BUREAU HAVE BEEN CHANGED TO REFLECT THE NEW OWNERSHIP ACCORDING TO THE WATER RIGHT TRANSFER. THE ABSTRACT BELOW SHOWS THE CURRENT WATER RIGHT INFORMATION. BOTH BUYER AND SELLER HAVE BEEN SENT THIS ACKNOWLEDGEMENT.

IF YOU HAVE QUESTIONS, PLEASE CONTACT YOUR LOCAL WATER RESOURCES REGIONAL OFFICE. HELENA REGIONAL OFFICE, 444-6695.
**********DNRC*LOCATE**P*5*HE*950801***

OWNERS: RANCH VIEW ESTATES WATER USERS ASSN
% CHERI GOOSEN, TREASURER
1294 RANCH VIEW RD
HELENA MT 59602

PRIORITY DATE: APR 25, 1994 15:00

FLOW RATE: 290.00 GALLONS PER MINUTE (G)

VOLUME: 83.75 ACRE FEET PER YEAR (AF)

SOURCE: WELL

MAXIMUM ACRES: 33.50

PURPOSE:

USE	FLOW	VOLUME (AF)	ACRES	PERIOD OF USE
LAWN & GARDEN	290.00 G	83.75	33.50	APR 15 TO OCT 15

POINTS OF DIVERSION AND MEANS OF DIVERSION:

WELL:

LOT	BLK	QTR SEC	SEC	TWP	RGE	COUNTY
		NWSWNW	17	11N	03W	LEWIS & CLARK

RANCH VIEW ESTATES

PUMP

PLACE OF USE FOR LAWN & GARDEN:

	ACRES	LOT	BLK	QTR SEC	SEC	TWP	RGE	COUNTY
001	33.50			NW	17	11N	03W	LEWIS & CLARK
TOTAL	33.50							

NOTICE OF COMPLETION OF PERMITTED WATER DEVELOPMENT FORM 617 DUE: DEC 31, 2002

** TRANSFER OF OWNERSHIP:
UPON A CHANGE IN OWNERSHIP OF ALL OR ANY PORTION OF THIS PERMIT, THE PARTIES TO THE TRANSFER SHALL FILE WITH THE DEPARTMENT OF NATURAL RESOURCES AND CONSERVATON A WATER RIGHT TRANSFER CERTIFICATE, FORM 608, PURSUANT TO SECTION 85-2-424, MCA.

REMARKS: NOTICE OF WATER RIGHT TRANSFER RECEIVED 11/14/96.

** ASSOCIATED RIGHTS:

REMARKS CONTINUED:
THIS PERMIT AND 41I-C-041488-00 USE THE SAME WELL.

** WASTE AND CONTAMINATION:
THIS PERMIT IS SUBJECT TO SECTION 85-2-505, MCA, REQUIRING THAT ALL WELLS BE CONSTRUCTED SO THEY WILL NOT ALLOW WATER TO BE WASTED, OR CONTAMINATE OTHER WATER SUPPLIES OR SOURCES, AND ALL FLOWING WELLS SHALL BE CAPPED OR EQUIPPED SO THE FLOW OF WATER MAY BE STOPPED WHEN NOT BEING PUT TO BENEFICIAL USE.
THIS RIGHT IS SUBJECT TO SECTION 85-2-505, MCA, REQUIRING ALL WELLS BE CONSTRUCTED SO THEY WILL NOT ALLOW WATER TO BE WASTED OR CONTAMINATE OTHER WATER SUPPLIES OR SOURCES, AND ALL FLOWING WELLS SHALL BE CAPPED OR EQUIPPED SO THE FLOW OF THE WATER MAY BE STOPPED WHEN NOT BEING PUT TO BENEFICIAL USE.

THE FINAL COMPLETION OF THE WELL(S) MUST INCLUDE AN ACCESS PORT OF AT LEAST .50 INCH SO THE STATIC LEVEL OF THE WELL MAY BE ACCURATELY MEASURED.

** WAIVER OF LIABILITY:
THE ISSUANCE OF THIS PERMIT BY THE DEPARTMENT SHALL NOT REDUCE THE PERMITTEE'S LIABILITY FOR DAMAGES CAUSED BY PERMITTEE'S EXERCISE OF THIS PERMIT, NOR DOES THE DEPARTMENT IN ISSUING THE PERMIT IN ANY WAY ACKNOWLEDGE LIABILITY FOR DAMAGE CAUSED BY THE PERMITTEE'S EXERCISE OF THIS PERMIT.

THE ISSUANCE OF THIS RIGHT BY THE DEPARTMENT SHALL NOT REDUCE THE APPROPRIATOR'S LIABILITY FOR DAMAGES CAUSED BY THE APPROPRIATOR'S EXERCISE OF THIS RIGHT. NOR DOES THE DEPARTMENT IN ISSUING THE RIGHT IN ANY WAY ACKNOWLEDGE LIABILITY FOR DAMAGE CAUSED BY THE APPROPRIATOR'S EXERCISE OF THIS RIGHT.

** PROGRESS REPORT:
THE PERMITTEE SHALL SUBMIT A PROGRESS REPORT OF THE WORK COMPLETED UNDER THIS PERMIT BY NOVEMBER 30 OF EACH YEAR UNTIL COMPLETION OF THE PROJECT. SUBMIT REPORTS TO THE WATER RESORUCES REGIONAL OFFICE 1520 EAST SIXTH AVENUE, HELENA MT 59620.

THE APPROPRIATOR SHALL SUBMIT A PROGRESS REPORT OF THE WORK COMPLETED UNDER THIS RIGHT BY NOVEMBER 30TH OF EACH YEAR UNTIL COMPLETION OF THE PROJECT. SUBMIT REPORTS TO THE WATER RESOURCES REGIONAL OFFICE AT THE ADDRESS LISTED BELOW.
1520 E 6TH AVE, PO BOX 202301, HELENA, MT 59620-2301
PH: 406-444-6695

Appendix P

Source Water Delineation Report

Ranchview Estates Public Water Supply

Source Water Delineation and Assessment Report (SWDAR)

Montana Public Water Supply ID# 3782

May 2003

Source Water Delineation and Assessment Report (SWDAR)

Ranchview Estates Public Water Supply

Public Water Supply ID# 3782

System Location
One-quarter mile north of Lincoln Road
East side of North Montana Avenue

Certified Operator
Lee Wolfe
System Contact and Mailing Address
Stuart Fuller
P.O. Box 9732
Helena, Montana 59601

System Phone: 458-5907



The University of Montana-Helena
COLLEGE OF TECHNOLOGY

May 2003

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List of Acronyms

BMP - Best Management Practices

CAFO - Confined Animal Feeding Operation

CECRA - Comprehensive Environmental Cleanup and Responsibility Act

CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act

LUST - Leaking Underground Storage Tank

MCL - Maximum Contaminant Level

MBMG-GWIC - Montana Bureau of Mines and Geology – Ground Water Information Center

MPDES - Montana Pollutant Discharge Elimination System

NPDES - National Pollutant Discharge Elimination System

PWS - Public Water System.

RCRA - Resource Conservation and Recovery Act

SMCL - Secondary Maximum Contaminant Levels

SWDAR - Source Water Delineation and Assessment Report.

SWPP - Source Water Protection Plan

SWL - Static Water Level

SOC - Synthetic Organic Compounds

TMDL - Total Maximum Daily Load

UST - Underground Storage Tank

VOC - Volatile Organic Compounds

See glossary at end of text for definitions of acronyms and other terms used in this report

INTRODUCTION

The Safe Drinking Water Act (SDWA) Amendments of 1996 require states to develop and implement Source Water Assessment Programs (SWAP) to analyze existing and potential threats to the quality of the public drinking water supplies throughout the state. The Montana SWAP was formally approved by the US Environmental Protection Agency (EPA) in November 1999. The Montana SWAP was developed from the former Wellhead Protection Program, but includes surface water sources and requires a more rigorous inventory of potential contaminant sources. For communities that have already developed wellhead protection plans, SWAP revises these plans to meet the expanded requirements. DEQ also works with other groups such as Montana Rural Water Systems, Inc., and Midwest Assistance Programs to implement the program.

SWAP addresses only public water systems (PWS) regulated according to the Federal Safe Drinking Water Act. A public water supply system is defined, according to Federal and Montana regulations, as a system that supplies water for human consumption. A public water supply system has at least 15 service connections or regularly provides water to at least 25 persons daily for a minimum of 60 days in a calendar year. There are three types of public water supply systems:

- Community water systems provide water on a year-round basis, and have a minimum of 15 service connections or regularly serve at least 25 residents. In addition to incorporated towns, community systems may serve smaller areas such as housing subdivisions or trailer courts.
- Non-transient non-community systems do not serve communities, but provide water regularly to a minimum of 25 of the same people for at least 6 months of a year. These systems serve public buildings such as schools and hospitals, where people are employed but do not reside.
- Transient non-community systems do not serve communities, and do not regularly serve a minimum of 25 of the same people for at least 6 months of the year. These systems are usually seasonal, and are located in areas such as campgrounds and parks.

Source water protection is a common sense approach to guarding public health by protecting drinking water supplies. In the past, water suppliers have used most of their resources to treat water from rivers, lakes, and underground sources before supplying it to the public as drinking water. Source water protection means preventing contamination and reducing the need for treatment of drinking water supplies. Source water protection also means taking positive steps to manage potential sources of contaminants and contingency planning for the future by determining alternate sources of drinking water. Protecting source water is an active step towards safe drinking water; a source water protection program (along with treatment, if necessary) is important for a community's drinking water supply. A community may decide to develop a source water protection program based on the results of a source water assessment, which includes the delineation of the area to be protected and an inventory of the potential contaminants within that area.

The Montana Source Water Protection Program is intended to be a practical and cost-effective approach to help public drinking water supplies protect their water source from contamination.

The Montana Source Water Protection Program is responsible for completing delineation and assessment reports for all public water supplies in Montana. The Source Water Delineation and Assessment Report (SWDAR) compiles the appropriate data and other technical information about an area to allow communities to develop source water protection plans. Delineation is a process whereby areas that contribute water to aquifers or surface waters used for drinking water, called source water protection areas, are identified on a map. Geologic and hydrologic conditions are evaluated in order to delineate source water protection areas. Assessment involves identifying potential contaminant sources in delineated source water protection areas, and evaluating the potential for contamination of drinking water from these sources under "worst-case" conditions such as a flood, fire or human error. Although voluntary, source water protection plans are the ultimate focus of source water delineation and assessment. This delineation and assessment report is written to encourage and facilitate the Helena area communities and public water supply operators develop source water protection plans that meets their specific needs.

Scope and Purpose

This report presents the source water delineation and assessments for the public water supply for the Ranchview Estates located north of the City of Helena, in Lewis and Clark County, Montana. The Ranchview Estates is classified as a community public water supply. This report is intended to meet the technical requirements for the completion of the delineation and assessment report for this PWS, as required by the Montana Source Water Protection Program (DEQ, 1999) and the federal Safe Drinking Water Act (SDWA) Amendments of 1996 (P.L. 104-182).

This report addresses the public water supply area with a watershed-type approach, recognizing that potential contaminant sources may threaten more than one public water supply. The report presents information for the area near and upgradient from the PWS. This information will be used as a basis to develop SWDARs for additional public water supply sources in the area that have overlapping source water protection areas with similar threats.

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Limitations

This report was prepared to assess threats to Ranchview Estates public water supply and is based on published information, and information obtained from local residents familiar with the community. The terms "drinking water supply" or "drinking water source" refer specifically to sources for regulated public water supplies, and not any other type of water supply. The inventory of potential contaminant sources focuses on the management areas delineated for the public water supplies in this report. As a result, other potential sources of contamination to surface and ground water in the area may not be identified.

The term "contaminant" is used in this report to refer to any chemical or biologic constituent in water that are listed as regulated under state and federal regulations. Water constituents are generally regulated based on health effects that may occur when ingested at certain levels. Water quality standards are based on maximum contaminant level goals (MCLGs) for a compound, which represents a concentration where adverse health effects are not considered likely to occur when ingested. However, as natural waters contain many dissolved constituents and MCLGs are frequently not attainable using economically viable water treatment alternatives, maximum concentration levels (MCLs) are used. MCLs represent concentrations that may result in chronic or acute health problems when ingested. MCLs are based on the relative risk, or likelihood that health problems may occur, and economics associated with a treatment technology for a specific constituent of water. In some cases, sources for constituents with Secondary MCLs are also evaluated in this report. Secondary MCLs are non-regulatory guidelines regarding cosmetic effects (such as tooth or skin discoloration) or aesthetic effects (such as taste, odor, or color) of drinking water.

BACKGROUND

The Community

Ranchview Estates is located north of the City of Helena. Helena is located in the southeastern part of Lewis and Clark County, in the southern part of the Helena Valley within the southern part of the Lewis & Clark County Water Quality Protection District as shown in Figure 1. The population of Helena was estimated at 25,780 people in the 2000 census, with an estimated total population of 40,000 people in the Helena Valley. Helena is the state capitol and considered a major Montana city as the primary place of employment for many residents within the Helena Valley and the region. The local economy is linked to the state government as a major employer in the area, with technical contractors and service industries supporting government functions. Many small businesses and a limited amount of industry are present in the valley. Agriculture is present in the area surrounding the developments outside of the greater Helena metropolitan area. Major industry in the area is located near central Helena and East Helena, south of the service area for Ranchview Estates. The primary roads through the area are I-15, which runs north-south through Helena, US 287 which connects Helena to the east and southeast, and US 12 which enters Helena from the west. Lincoln Road runs east-west south of the Ranchview Estates, connecting the north part of the valley and I-15 with Lincoln to the northwest.

Wastewater in Ranchview Estates is collected and treated with septic systems. The City of Helena city municipal sanitary sewer system is present well south of Ranchview Estates. There are no municipal sewer systems located within the northern part of the Helena Valley. Areas outside of the Helena city limits are typically served by septic systems for wastewater treatment and disposal.

The subdivision is equipped with separate potable and irrigation water systems (Pers.Comm. Joe Strasko, HOA Board Member. 2004). Each home is plumbed with a separate potable and irrigation system. The irrigation system utilizes water from a non-public well.

Geographic setting

Ranchview Estates is located at approximately 46.717º North latitude and 112.017º West longitude, in Section 17 of Township 11 North, Range 3 West. The Helena Valley is an intermontane basin in the Northern Rocky Mountains geographic province. The Helena Valley is bounded by the Big Belt Mountains to the east, the Scratch Gravel Hills to the west, the Elkhorn Mountains and Boulder Batholith to the south, and the "North Hills" to the north. The Ranchview Estates service area is located in the southern part of the North Hills area, in the northern part of the Helena Valley. The elevation of the Helena is approximately 3,800 feet above sea level, with the elevation of Lake Helena about 3650 feet, the lowest point in the valley. The elevation at the Ranchview Estates is approximately 3800 feet above sea level. The elevation of the mountains surrounding Helena rise as high as 9,000 feet above sea level.

All surface water in the Helena Valley flows towards Lake Helena, which discharges into Hauser Reservoir damned on the north flowing Missouri River (USGS HUC#100300101) in this area. Surface flow in the Ranchview Estates area is generally to the south following topography. Silver Creek (USGS HUC#100300101140) with headwaters near the continental divide flows

from the Marysville area in the western part of Lewis and Clark County eastward through the Helena Valley. Silver Creek flows south of the Ranchview Estates service area, with water flow related to the local ground water systems as discussed later in this document. Prickly Pear Creek (USGS HUC#100300101120) flows from a watershed in the Elkhorn Mountains and Boulder Batholith south of Helena northward through East Helena into the valley. Tenmile Creek (USGS HUC#100300101130) enters the Helena Valley from the southwest, south of the Scratch Gravel Hills with a watershed adjacent to the continental divide in the southwest corner of Lewis and Clark County. The Helena Valley Irrigation Canal flows in a clockwise direction around the outside of the Helena Valley, from the Helena Regulating Reservoir to Lake Helena.

The climate in the area is typical for southwestern Montana. Weather data is reported for Helena, from a weather station near the Airport. Data for Helena is available from 1893 to 2001. Helena receives an average of 11.99 inches of precipitation annually, with the wettest months in May and June averaging 1.92 and 2.10 inches. The driest months are November through February, with averages between 0.48 and 0.62 inches per month. Helena receives an average total of 51.3 inches of snowfall per year. The temperature ranges from an average high of 82.4º F in July (minimum July average of 53.3º F) to an average of 29.5º F in January (minimum January average of 11.1º F).

General description of the Source Water

Ranchview Estates obtains water from two wells (Sources WL 002 and WL 003). The service area comprises a rectangular area with houses along several east-west roads connected by Montana Avenue on the west, and another residential road on the east. The wells are located south of the houses in a currently undeveloped area adjacent to the subdivision. The wells are installed into the Helena Valley Alluvial Aquifer near its northern limit. The Helena Valley Alluvial Aquifer combined with underlying Tertiary Sediments (present in the central and eastern part of the valley) are considered as a regional unconfined aquifer comprising the valley fill sediments of the Helena Valley. Ground water flow in the Ranchview Estates area is generally southward, towards the lowest elevation of the valley in Lake Helena. Silver Creek flows eastward through the area, and the Helena Valley Irrigation Canal flows eastward south of the Ranchview Estates area. Water flow in Silver Creek responds to seasonal changes in ground water elevation. The aquifer is recharged from stream loss in the Helena Valley Irrigation Canal, stream loss from Silver Creek as it crosses from bedrock to alluvium in the Helena Valley, from the discharge of bedrock aquifers from the Scratch Gravel Hills into the alluvial aquifer in the subsurface, and from infiltration of precipitation. The Silver Creek watershed, considered as the recharge area for the aquifer for this assessment, is located northwest of Helena as depicted in Figure 2.

The Public Water Supply

Ranchview Estates PWS serves an estimated population of 235 residents though approximately 80 active service connections and two wells. The subdivision was expanding at the time of the most recent sanitary survey, and may include more connections in the future. The wells are located south of the subdivision area in an undeveloped area as shown in Figure 3. The wells are located approximately 50 feet apart. Water from Well 1 is pumped towards Well 2, where the water is combined for flow into a wellhouse. Water enters the distribution system from a single access point. The distribution system follows the roads. A copy of the most recent sanitary

survey for the system is included in Appendix A. The water system operates an irrigation system using a third well.

Water from the wells is pressurized with air tanks into the distribution system in the wellhouse. The sanitary survey for the system (Appendix A) does not indicate any treatment or storage for the water. Well logs from the MBMG-GWIC database for the PWS well and other wells in the area are included in Appendix B. The well logs indicate that

- Well 1 was completed on April 27, 1993 to an approximate depth of 100 feet. The well is screened from 70 to 100 feet.
- Well 2 was completed on April 28, 1993 to an approximate depth of 120 feet. The well is screened from 70 to 120 feet.

Water Quality

Every PWS is required to perform monitoring for contamination to their water supply. The monitoring parameters typically include coliforms (as an indicator of pathogenic organisms), nitrates, metals and multiple chemicals. The monitoring schedule depends on many factors such as the size of the system, the water source for the PWS, the number of sources (e.g. wells), and land use in the area. A specific monitoring program is designed for each PWS that follows the general protocols for operation of a PWS defined by DEQ following the guidelines originally established in the federal Safe Drinking Water Act. A review of the DEQ PWS database of monitoring results for Ranchview Estates PWS does not indicate any monitoring violations during the past few years (Appendix A).

Water quality data for the Helena area was obtained electronically from the Montana Bureau of Mines and Geology (MBMG) database (GWIC – see Appendix C). Table 1 lists the data for the two wells within the same section as the Ranchview Estates PWS Wells, and for three wells in the North Hills area downgradient.. This data is considered to represent background concentrations for ground water near the PWS sources. The GWIC database for the Helena Valley area near Ranchview Estates is included in Appendix C.

Ongoing studies by the WQPD and USGS indicate that elevated levels of nitrates are found in ground water downgradient from subdivisions with high concentrations of septic systems in the northern Helena Valley (Appendix C). During the past few years, multiple residents have reported well yield has diminished during the past several year, resulting in many long-term residents installing new, deeper wells. In response to the apparent reduced yield from the aquifer and elevated nitrate levels, DNRC temporarily classified the North Hills area as a controlled ground water area. This classification limits the installation of new wells except for replacement of an existing well. The final classification has not been determined by DNRC at the time of preparation of this report.

Table 1 – Background Water Quality in Ranchview Estates Area

Site Location Data

Site Name	Twn	Rng	Sec	Q Sec	Type	Depth (ft)	Sample Date	Lab PH	Lab SC
LCWQPD – North Hills Well	11N	03W	7	BCDA	Well	100	11/28/01	7.71	364
LCWQPD – North Hills Well	11N	03W	7	BCDA	Well	100	11/28/01	7.58	405
State of Montana – Dept. of State	11N	03W	8	BCBA	Well	208	10/31/90	7.86	404.9
LCWQPD – Gravel Pit Well	11N	03W	18	CCCC	Well	100	11/28/01	7.7	676
LCWQPD – Gravel Pit Well	11N	03W	18	CCCC	Well	100	11/28/01	7.54	685

Anion/Cation and Nutrient Data

Site Name	Ca mg/l	Mg mg/l	Na mg/l	K mg/l	Fe mg/l	Mn mg/l	SiO2 mg/l	HCO3 mg/l	SO4 mg/l	Cl mg/l	NO3 mg/l	F mg/l	OPO4 Mg/l	TDS mg/l
LCWQPD – North Hills Well	39.8	15.8	14.2	0.977	0.025	<.001	16.2	109.8	17.8	7.11	0.97	0.214	<.05	*Nl*
LCWQPD – North Hills Well	40.7	16.2	14.5	0.955	0.008	<0.001	15.3	208.6	16.5	6.45	0.787	0.219	<.05	*Nl*
State of Montana – Dept. of State	44.5	12.5	16.4	1.71	0.004	0.004	17.1	162	29.9	23.5	1.2	0.27	<.1	*Nl*
LCWQPD – Gravel Pit Well	68.8	21.2	31	2.7	0.033	<.001	10.7	152.3	81.4	93	3.84	<.5	<.5	*Nl*
LCWQPD – Gravel Pit Well	67	19.9	31.8	2.57	0.015	<0.001	9.81	141.5	98.8	77.7	3.7	0.05	<0.05	*Nl*

Metals Data

Site Name	Ag ug/l	Al ug/l	As ug/l	B ug/l	Ba ug/l	Br ug/l	Cd ug/l	Cr ug/l	Cu ug/l	Li ug/l	Mo ug/l	Ni ug/l	Pb ug/l	Sr ug/l	Ti ug/l	U ug/l	V ug/l	Zn ug/l
LCWQPD – North Hills Well	<1	<30	<1	<30	107	<50	<2	<2	<2	7.95	<10	2.07	<2	252	<1	1.93	<5	2.91
LCWQPD – North Hills Well	*NL*	<30	<10	<30	113	<50	<1	<10	<5	7.81	<10	<2	<10	240	<1	*NL*	<10	<2
State of Montana – Dept. of State	7	147	*NL*	<40.	132	<100.	<5.	9	7	10	<40.	<20.	*NL*	261	14	*NL*	11	77
LCWQPD – Gravel Pit Well	<1	<30	2.15	<30	96.1	<500	<2	<2	<2	5.51	<10	3.59	<2	224	<1	1.34	<5	276
LCWQPD – Gravel Pit Well	*NL*	<30	<10	<30	95.5	460	<1	<10	<5	5.03	<10	<2	<10	193	<1	*NL*	<10	6.31

NL = Not listed in Database

HYDROGEOLOGIC SETTING AND DELINEATION

The source water protection area, the land area that contributes water to Ranchview Estates PWS, is identified in this chapter. For the PWS source, three management areas are identified within the source water protection area; the control zone, inventory region, and recharge region. The control zone, also known as the exclusion zone, is an area at least 100-foot radius around the well. The inventory region for the well is delineated based on a three-year time of travel distance for ground water to the sources. The recharge region represents the area where the aquifer is replenished. Since the source aquifer is unconfined and ultimately recharged by surface water, a surface water buffer zone is delineated around the Helena Valley Irrigation Canal upgradient from the inventory zone. The surface water buffer zone represents the area of a one-half mile wide buffer on each side of a surface water body, for a distance of ten miles upstream from the PWS source.

Hydrogeologic Conditions

The information presented in this section is based predominantly on the assessments of the hydrogeology of the area performed by the United States Geological Survey (USGS) and Montana Bureau of Mines and Geology (MBMG). This includes a study of the Helena Valley alluvial aquifer presented in Briar and Madison (1992), and Bedrock Aquifers in the Helena Area presented in Thamke (2000). A geologic map of the Silver Creek Watershed Region showing the major units is depicted in Figure 4.

Ground water in the Helena Valley is present in an unconfined alluvial aquifer. The Helena Valley is a structural basin with bedrock boundaries. The central part of the valley is filled with up to 6,000 feet of sediments derived from the bedrock in the area. The valley is filled with a thick sequence of interlayered fine and coarse grained Tertiary sediments; overlain by up to 100 feet of Quaternary alluvium. The Tertiary beds and the alluvium are considered as a single aquifer in the area. In the area near the Ranchview Estates northeast of the Scratch Gravel Hills, and south of the North Hills, the alluvium is present directly over either granitic bedrock or shales of the North Hills. Tertiary pediment surfaces and terraces are present in various areas along the margins of the valley, and may be considered part of the alluvial aquifer when present in sufficient thickness to represent a water bearing unit.

Ground water in the area near Ranchview Estates generally flow south, following topography towards lake Helena. The aquifer in this area comprises valley fill alluvium and terrace gravels overlying the fractured bedrock of the North Hills area. A potentiometric surface map showing the general direction for ground water flow in the area is presented in Figure 5. Water flow in the alluvium is primarily horizontal, with vertical hydraulic conductivities generally 1-3 orders of magnitude less (Briar and Madison, 1992). Recharge to the alluvial aquifer occurs from stream loss along the valley margins, direct infiltration of precipitation, leakage from irrigation canals, and from direct infiltration of water from bedrock aquifers in the subsurface. The Helena Valley Irrigation Canal is located at a downgradient position several hundred feet from the wells. The canal is considered close enough to provide recharge to the source aquifer. The depth to ground water in the area ranges from approximately 40 to 60 feet below the ground surface, and varies during the year.

Conceptual Model and Assumptions

A conceptual hydrogeologic model is a simplified representation of the hydrogeologic system. For Ranchview Estates PWS, water is obtained from an unconfined alluvial aquifer. A generalized cross section depicting the geology is shown in Figure 6. Ground water flow is generally to the south, following topography. Recharge to the aquifer occurs from infiltration of precipitation in the North Hills area upgradient from the PWS, and from stream loss from the Helena Valley Irrigation Canal. The unconfined alluvial aquifer is considered to have a ***high*** source water sensitivity to contamination.

Well Information

The wells for Ranchview Estates PWS is located north of the Helena city limits as depicted in Figure 3. The well logs with stratigraphy and well construction information are included in Appendix B. Well information is summarized in Table 2.

Methods and Criteria

The methods and criteria used to delineate the source water protection zones for Ranchview Estates water system are specified in the Montana Department of Environmental Quality Source Water Protection Program (DEQ, 1999). The criterion for an unconfined aquifer system was applied. The control zone was established using a fixed radius of 100 feet around the wellhead. The inventory zone was delineated based on a ground water time of travel distance of three years. This distance was determined using a simple ground water flow model using the uniform flow equation (EPA, 1991). Conservative estimates for aquifer properties were made using available data from published reports, as discussed in the following. The inventory zone for the well was broadened to reflect potential changes in the flow system during seasonal periods of high and/or low flow. The recharge area for the alluvial aquifer is considered to be the entire surface water watershed above Ranchview Estates. A surface water buffer zone is delineated around the Helena Valley Irrigation Canal based on a standard distance criterion of ten miles upstream from the well, with the buffer encompassing the land area of one-half mile width on each side of the stream.

Table 2 - Source Well Information for Ranchview Estates

Information	Well 1	Well 2
PWS Source Code	002	003
Well Location	T11N, R3W, Sec 17 BBDC	T11N, R3W, Sec 17 BBDC
	Lat 46.7165 N Long 112.0174 W	Lat 46.7165 N Long 112.0175 W
MBMG/GWIC #	134632	134635
Water Right #	P088721-00	P088721-00
Date Completed	27 April 1993	28 April 1993
Total Depth	100 feet	120 feet
Perforated Interval	70 – 100 feet	70 – 120 feet
Static Water Level	53 feet	52 feet
Pumping Water Level	80 feet	--
Drawdown	27 feet	--
Test Pumping Rate	91 gpm	94 gpm
Specific Capacity	3.4 gpm/ft	--

Model Input
The values selected for the calculation of time of travel represent conservative assumptions made to identify areas that may potentially impact Ranchview Estates PWS source. The values for aquifer properties are based on published information characterizing the regional aquifer system (Briar and Madison, 1992: Thamke, 2000). The criteria for selection of the values used for the delineation of the inventory zone are as follows:

- ***Thickness***: The value for the thickness of the aquifer (b) is estimated at 50 feet, based on the estimated thickness of the screened part of the aquifer, and the depth to ground water from well logs.
- ***Hydraulic Conductivity***: A hydraulic conductivity value of 100 feet/day is used as a conservative estimate, based on information from Briar and Madison (1992)
- ***Transmissivity***: The transmissivity value for the alluvium is estimated at 5,000 ft^2/day based on the relationship T = K*b.
- ***Hydraulic Gradient***: The hydraulic gradient was measured from the potentiometric surface map in Briar and Madison (1992) shown in Figure 5. The gradient shows an approximate value of 0.015.
- ***Flow Direction***: The flow direction is considered south to southeast, based on the map of Briar and Madison (1992).
- ***Porosity***: The value for effective porosity for the alluvium is estimated from (Todd, 1980) at 30%. The estimated value is considered representative of medium to coarse grained gravel.
- ***Pumping Rate***: The pumping rate for the wells was estimated at 50 gpm, which is a conservative estimate reflecting the needs of the system.

Delineation Results
The results of the calculations for the alluvial aquifer to the wells indicate an estimated distance of 1,920 feet (0.36 miles) for a one-year time of travel (TOT), and a distance of 5,590 feet (1.06 miles) for a three-year TOT. A summary of the time of travel calculations is included in Appendix D. The delineated inventory zone for the wells is depicted in Figure 7.

The inventory zone comprises the area northwest of the wells. Part of the inventory zone is covered by a pediment surface considered part of the alluvial aquifer. A surface water buffer zone is delineated around the Helena Valley Irrigation Canal upstream from where the canal crosses the inventory zone for the wells (Figure 7). The recharge region is considered to be the surface water watershed area shown in Figure 7.

Limiting Factors
The interaction of surface water between the alluvial aquifer and the Helena Valley Irrigation Canal is not well understood at this time due to the limited amount of data on the system. In particular, the changes in the flow regime under seasonal conditions of high and low flow are not known. The delineation was completed using conservative assumptions to help ensure that the inventory zone reflects the actual area where contamination to the system may occur. In all cases, the interpretations and conclusions on ground water flow in the aquifer(s) are based on general principles of hydrogeology, and the physical mechanics of ground water flow.

INVENTORY

An inventory of potential sources of contamination was conducted for Ranchview Estates PWS source within the control and inventory zones. Potential sources of all primary drinking water contaminants, including pathogens, were identified. However, only significant potential contaminant sources based on criteria outlined in the Montana Source Water Protection Program (DEQ, 1999) were selected for detailed inventory. The inventory for Ranchview Estates PWS focuses on all activities in the control zone, certain sites or land use activities in the inventory zone, and general land uses and large facilities in the recharge region. The inventory results from the various steps (Appendix E) are summarized in Table 4. The significant potential contaminants in the inventory region for the wells includes nitrates and pathogens from septic systems and agriculture; and herbicides and pesticides from cropped agricultural land.

Inventory Method

The initial inventory steps comprise querying existing state and federal electronic databases for regulated facilities that use, store or release regulated chemicals. The steps to the database searches, and the results from each step are listed in Appendix E. The assessment of agriculture land use and urban areas, and major transportation routes through the area are shown on Figure 8. The limits of the municipal sewer system and relative density of septic systems in the area are shown on Figure 9. The database search is supplemented and verified with a "windshield survey" and a business directory search of the delineated inventory zones for each PWS in the study area. The results of the business directory search are included in Appendix E. This method helps ensure the inventory is a complete data collection exercise to identify all potential contaminant sources.

The results of the inventory process are summarized in Table 3, which summarizes the properties or sites within the inventory zone study area. The potential contaminants are listed, with a description of the potential release mechanism for the site. In all cases, releases may occur due to unavoidable conditions such as flooding, lightning or fire. The sites where this is the primary potential release mechanism are identified as concerns resulting from such a disaster. For other sites where other release mechanisms may be more common, the potential for a release from such a disaster is assumed.

The results of the "windshield survey" were consistent with the results from database searches, and did not indicate any additional facilities to review. Storm water flows into drainage ditches through the area. While not observed in this area, storm water drains that discharge into infiltration galleries represent injection wells of surface water into shallow ground water. Class V injection wells are classified as waste disposal conduits that discharge directly to shallow ground water. The evaluation of the use of Class V injection wells in Montana is currently the responsibility of the EPA.

The Montana Source Water Protection Program identifies specific types of potential contaminant sources as significant, for further evaluation of the susceptibility of the water source to these sources. The following categories of potential contaminant sources are considered significant:

1. Large quantity hazardous waste generators.
2. Landfills.
3. Underground storage tanks.
4. Underground injection wells.
5. Major roads or rail transportation routes.
6. Cultivated cropland greater than 20 % of the inventory region.
7. Known groundwater contamination (including open or closed hazardous waste sites, state or federal superfund sites, and UST leak sites).
8. Animal feeding operations.
9. Abandoned or active mines, and gravel pits.
10. Septic systems.
11. Sewer mains.
12. Storm sewer outflows.
13. Wastewater treatment facilities, sludge handling sites, or land application areas.

Inventory Results/Control Zone

The control zone represents the most critical point to protecting the integrity of a wellhead for ground water sources. The control zone for the wells are located in an open field with no fencing or other protection from access to the wellhead. The pumphouse is located within the control zone for the wells. Potential contaminant sources within the control zone include septic systems, lawn maintenance chemicals and/or fertilizers.

Table 3 - Summary of Inventory Results for Ranchview Estates PWS.

Source Type	*Potential Contaminants*	*Description/Concern*
Step 1 Results		
Agricultural Land Use	*Pathogens and Nitrates; Pesticides and Herbicides*	*Non-point source pollution, concentration of fertilizers/chemicals in surface/ground water*
Urban Land Use	*Spills of various chemicals*	*Non-point source pollution, small spills of household chemicals*
Septic Systems	*Pathogens and Nitrates*	*Non-point source pollution, loading o f ground water system with effluent*
EPA Envirofacts Sites (Step 2)	*No Sites identified*	
EPA-PCSs Sites (Step 3)	*No sites identified*	
DEQ Database (Step 4)		
UST/LUST Sites	*No sites identified*	
CECRA Sites	*No sites identified*	
Business – SIC Code Sites (Step 5)	*No sites identified*	
Miscellaneous Others, including Step 6		
West Valley Fire Dept	*Spills of various chemicals*	*Disaster – spill/release of chemicals and fuels stored at facility*
DNRC North Hills Facility	*Spills of various chemicals*	*Disaster – spill/release of chemicals and fuels stored and used at facility*
Roads	*Spills of various chemicals*	*Disaster – spill/release of chemicals and fuels transported on Highway*
Class V Injection Wells	*Various chemicals*	*Direct discharge of chemical to shallow ground water system*

* Note: Sites identified from multiple search queries are listed with the first step that identified the specific site. Individual sites identified are evaluated in Chapter 5.

Inventory Results/Inventory Region
The inventory region represents the area near the source well where any contamination spilled onto the ground or subsurface has the potential to migrate directly into the PWS source aquifer. A summary of the inventory results of significant potential contaminant sources are listed in Table 4. Land use in this area is classified as predominantly non-urban and non-agriculture. The identified potential contaminant sources include the roads and septic tanks. Fuel storage tanks were identified at the West Valley Volunteer Fire Department and the DNRC North Hills, which also has vehicle maintenance facilities.

Inventory Results/Recharge Region
The recharge region for the wells is the watershed area above the PWS. The primary potential contaminant source(s) are from limited agricultural land use.

Inventory Update
The certified operator for Ranchview Estates PWS will update the inventory every year. Changes in land uses or potential contaminant sources will be noted and additions made as needed. The complete inventory will be submitted to DEQ every five years to ensure re-certification of the source water delineation and assessment report.

Inventory Limitations
The inventory is limited by the accuracy of information in databases used for the assessment. The windshield survey provides a level of quality assurance that the information presented reflects current conditions at the time of preparation of this report. The location of Class V injection wells is not complete at this time, and is currently being compiled by EPA for the area. The data from the MBMG-GWIC database on wells in the area may not be complete, as not all wells are included in the database.

Table 4. Significant potential contaminant sources for Ranchview Estates PWS.

Source	*Contaminants*	*Description*
Agricultural Land Use	*Pathogens and Nitrate; Pesticide/Herbicides (SOCs)*	*Primary concern in cultivated and grazing lands in Tenmile Creek watershed upstream from wells.*
Septic Systems	*Pathogens and Nitrate*	*Area around the wells with moderate density, within well inventory zone. Additional areas are present within the Surface Water Buffer Zones*
Storm Water Discharge Points	*Various organic chemicals*	*Not inventoried at this time*
West Valley Fire Department	*Fuel Hydrocarbons*	*Above ground storage tank for fuel storage located at facility*
DNRC North Hills Facility	*Various Chemicals*	*Fuel storage and vehicle maintenance on site*
Roads	*Various Chemicals*	*Transportation corridors near PWS, concern over an accident and spill of any transported chemicals*
Class V Injection Wells	*Various organic chemicals*	*Not inventoried at this time (EPA responsibility); may provide conduits for chemicals into subsurface*

SUSCEPTIBILITY ASSESSMENT

Susceptibility is the potential for a public water supply to draw water contaminated by inventoried sources at concentrations that would pose concern. Susceptibility is assessed in order to prioritize potential pollutant sources for management actions by local entities, in this case Ranchview Estates PWS.

The goal of Source Water Management is to protect the source water by 1) controlling activities in the control zone, 2) managing significant potential contaminant sources in the Inventory Region, and 3) ensuring that land use activities in the Recharge Region pose minimal threat to the source water. Management priorities in the Inventory Region are determined by ranking the significant potential contaminant sources identified in the previous chapter according to susceptibility. Alternative management approaches that could be pursued by Ranchview Estates PWS to reduce susceptibility are recommended.

Susceptibility is determined by considering the hazard rating for each potential contaminant source and the existence of barriers that decrease the likelihood that contaminated water will flow to Ranchview Estates PWS source (Table 5). Susceptibility ratings are presented individually for each significant potential contaminant source and each associated contaminant (Table 7).

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

For point sources, the relative hazard for the potential contaminant sources is assigned based on the type of aquifer. For unconfined aquifers, the relative hazards for point source are based on the location of the potential contaminant source relative to the well. Potential sources within a one-year time of travel distance to the well are assigned a relative hazard of high. Potential contaminant sources located between a one-year and thee-year time of travel distance are assigned a relative hazard of moderate. Any other potential contaminant sources within the recharge area are assigned a relative hazard of low.

After the relative hazard of a potential contaminant source is assigned, the relative susceptibility is determined based on the presence of barriers that may mitigate the potential for a contaminant source to impact a water source. Barriers may represent natural conditions, engineered barriers or management actions. Natural barriers include anything that can be demonstrated as effective in mitigating the migration of any chemicals released at the surface, such as thick clay-rich soils or surface flowing artesian conditions. Engineered barriers represent man-made structure to contain chemicals if they are released, such as spill containment for underground storage tanks.

Management barriers are plans that prohibit or control potentially polluting activities, but only if there is a plan or approach that has been formally implemented. For Ranchview Estates PWS sources, no natural barriers were identified present due to the coarse grained and highly transmissive nature of the source aquifer.

For non-point sources, the relative hazard is assigned based on the relative concentrations present within the delineated inventory zone for the aquifers, following the criteria listed in Table 6.

Table 6 – Relative Hazards for Non-Point Potential Contaminant Sources

Source Type	*High Hazard*	*Moderate Hazard*	*Low Hazard*
Septic Systems	> 300 per sq. mi.	50 – 300 per sq. mi.	< 50 per sq. mi.
Municipal Sanitary Sewer (% Land Use)	> 50% of region	20% – 50% of region	< 20% of region
Cropped Agricultural Land (% Land Use)	> 50% of region	20% – 50% of region	< 20% of region

Susceptibility Assessment Results

The results of the susceptibility assessment for Ranchview Estates PWS are listed in Table 7. The primary threats identified within the one-year time of travel distance are the fuels stored at the West Valley Fire Department, agricultural land use and areas with concentrated numbers of septic systems. The location of roads within the area represents potential threats with a very high susceptibility rating, where an accidental spill or leak could impact water quality in the source aquifer.

The summary information in Table 7 reviews the relative hazard, barriers and susceptibility ranking of each potential source. Management alternatives are recommended that can help reduce the relative susceptibility of each identified potential contaminant source to the PWS sources.

Table 7. Susceptibility assessment of significant potential contaminant sources.

Source	Contaminant	Hazard	Hazard Rating	Barriers	Susceptibility	Management
Inventory Zone						
Agricultural Land	Pesticides/ Herbicides/ Nitrates and Pathogens	Infiltration and Runoff	Low	None	Moderate	Promote the use and development of agricultural BMPs for the area
Septic Systems	Pathogens and Nitrate	Infiltration and Runoff	Moderate	None	High	Monitor septic system performance
West Valley Fire Department	Fuel Hydrocarbons	Infiltration and Runoff	High	None	Very High	Develop emergency response plan
DNRC North Hills Facility	Fuel Hydrocarbons, Various Chemicals	Infiltration and Runoff	Moderate	None	High	Develop emergency response plan
Roads	Various Chemicals	Spills	High	None	Very high	Develop emergency response plan
Surface Water Buffer Zone						
Septic Systems	Pathogens and Nitrate	Infiltration and Runoff	Moderate	None	High	Monitor septic system performance
Sanitary Sewer System	Pathogens and Nitrate	Infiltration and Runoff	Moderate	None	High	Monitor sewer system performance
Cropped Agricultural Land	Pesticides/ Herbicides/ Nitrates and Pathogens	Infiltration and Runoff	Low	None	Moderate	Promote agricultural BMPs for the area
Recharge Area						
Cropped Agricultural Land	Pesticides/ Herbicides/ Nitrates and Pathogens	Infiltration and Runoff	Low	None	Moderate	Promote agricultural BMPs for the area
Septic Systems	Nitrates and Pathogens	Infiltration and Runoff	Low	None	Moderate	Monitor septic system performance

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Appendix Q

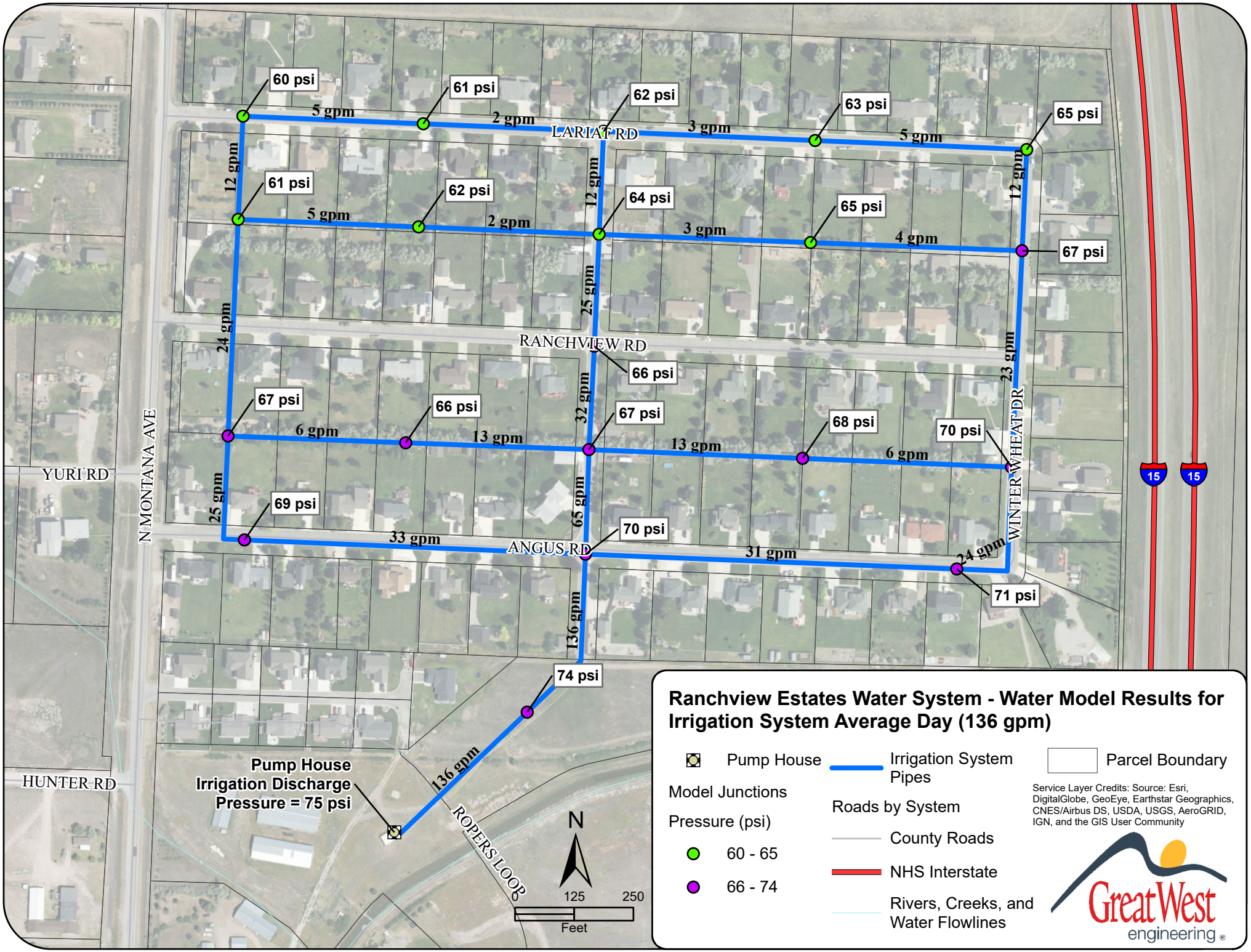
Hydraulic Water Model Results



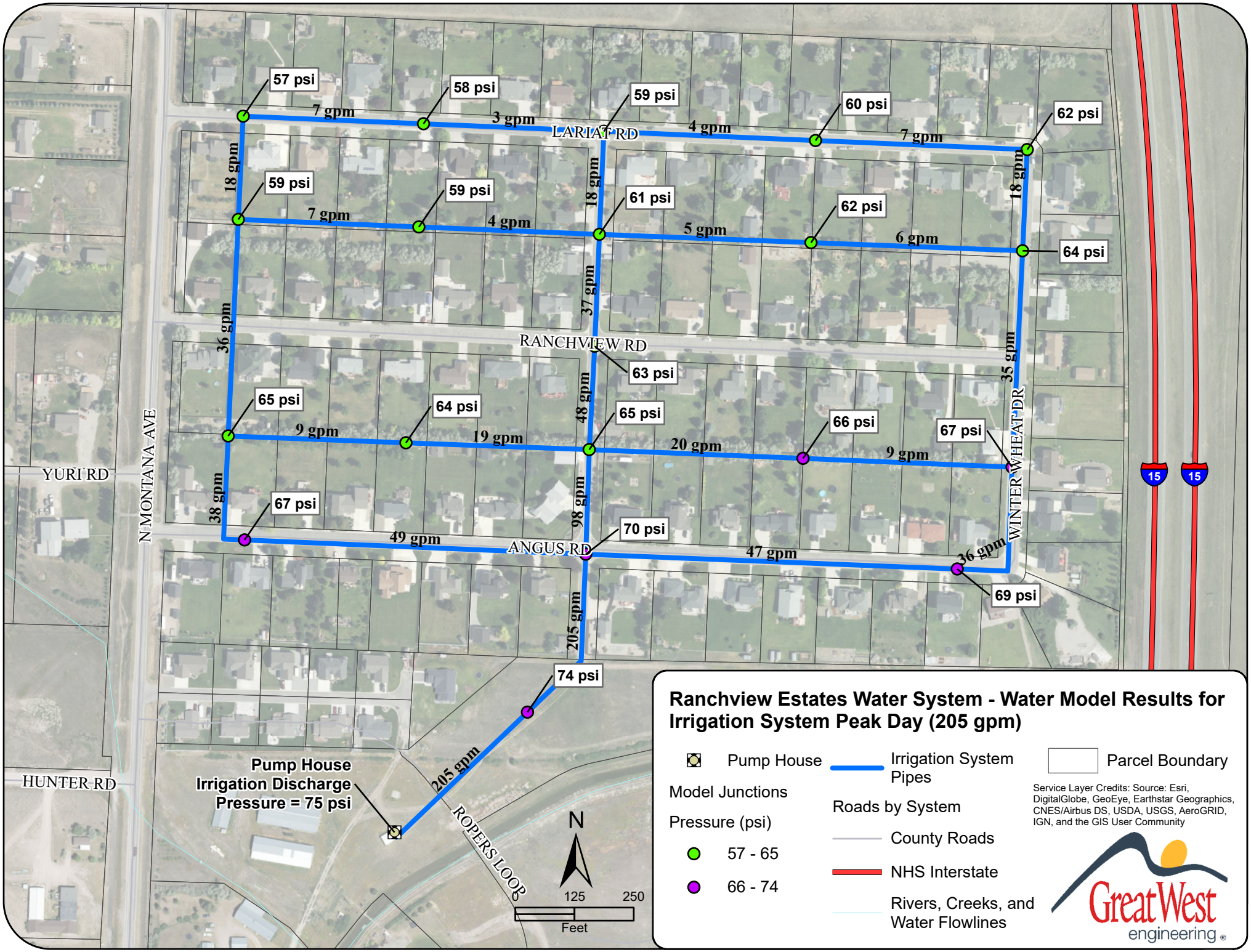
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Ranchview Estates Water System - Water Model Results for Irrigation System Peak Day (205 gpm)

Pump House

Model Junctions

Pressure (psi)

- 57 - 65
- 66 - 74

Irrigation System Pipes

Roads by System

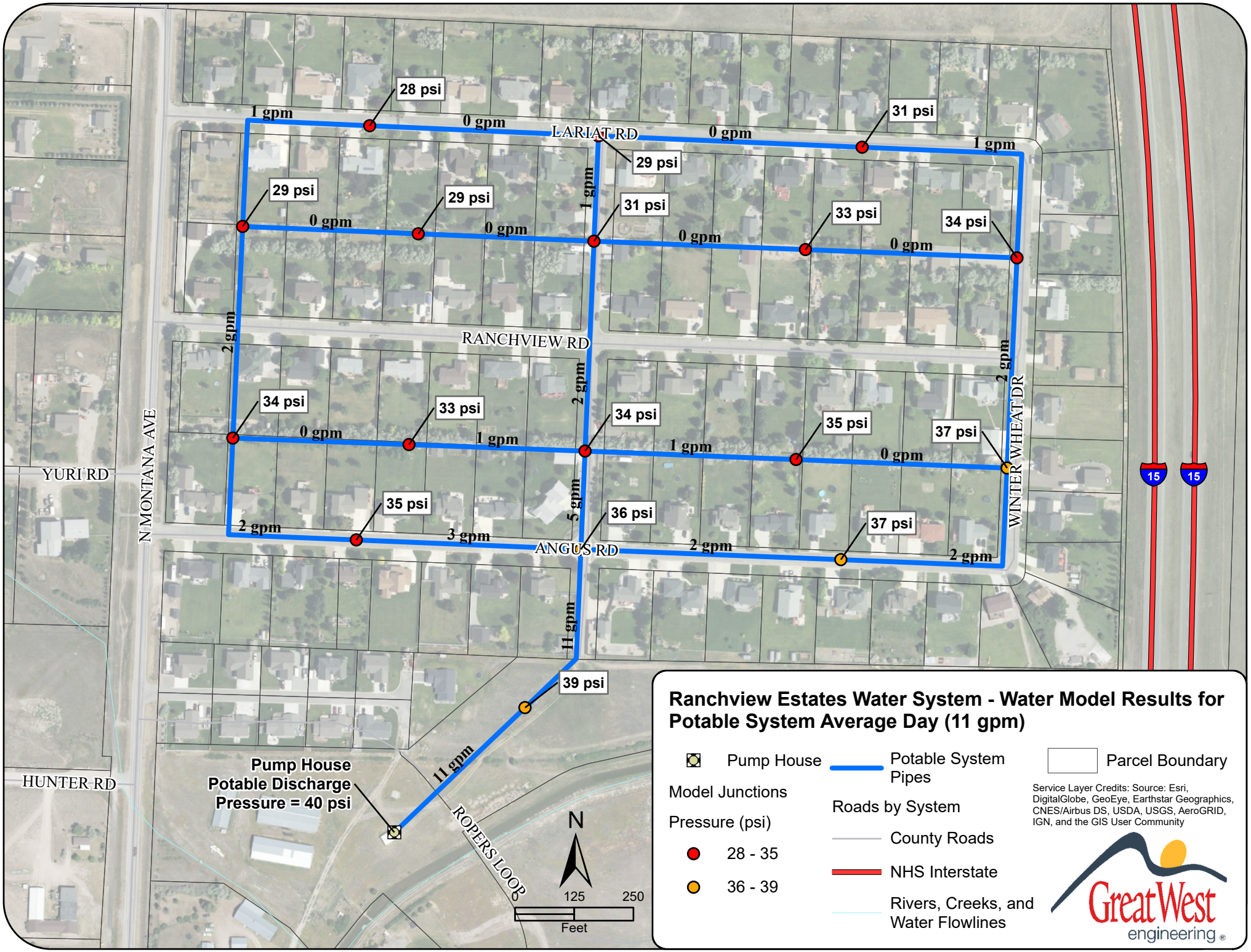
- County Roads
- NHS Interstate
- Rivers, Creeks, and Water Flowlines

Parcel Boundary

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

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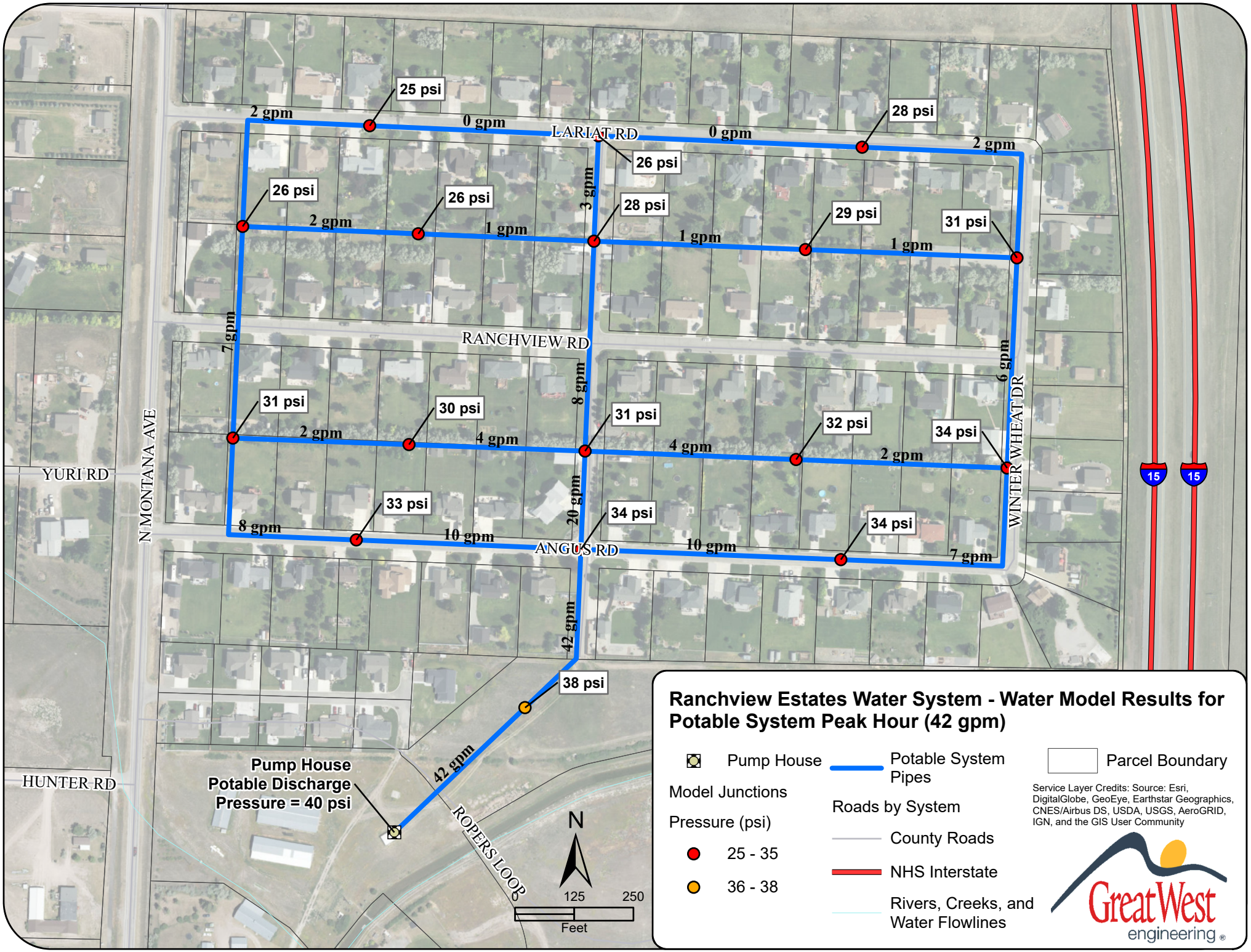
Ranchview Estates Water System - Water Model Results for Potable System Average Day (11 gpm)

- Pump House
- Model Junctions
- Pressure (psi)
  - 28 - 35
  - 36 - 39
- Potable System Pipes
- Roads by System
  - County Roads
  - NHS Interstate
  - Rivers, Creeks, and Water Flowlines
- Parcel Boundary

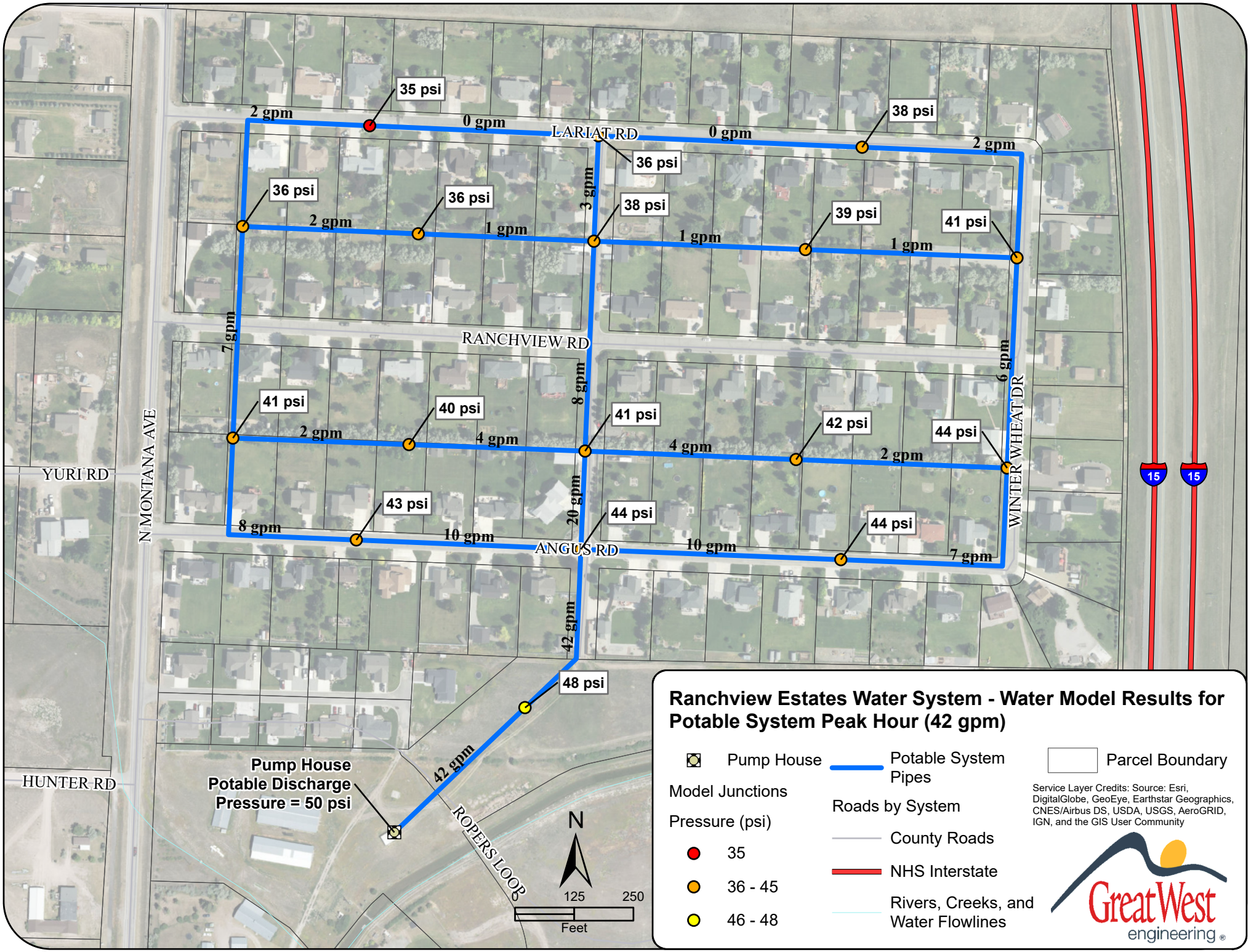
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GreatWest engineering

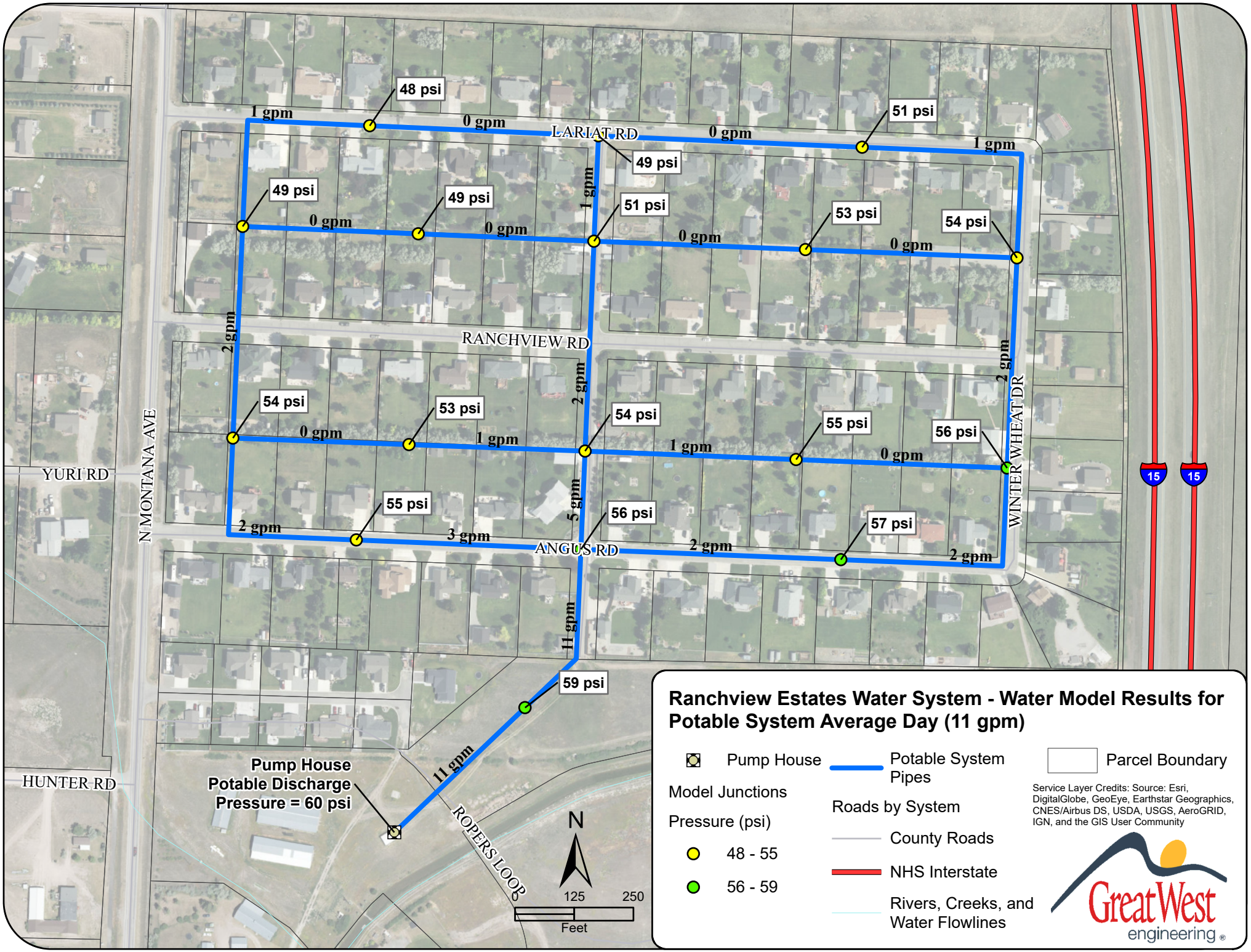
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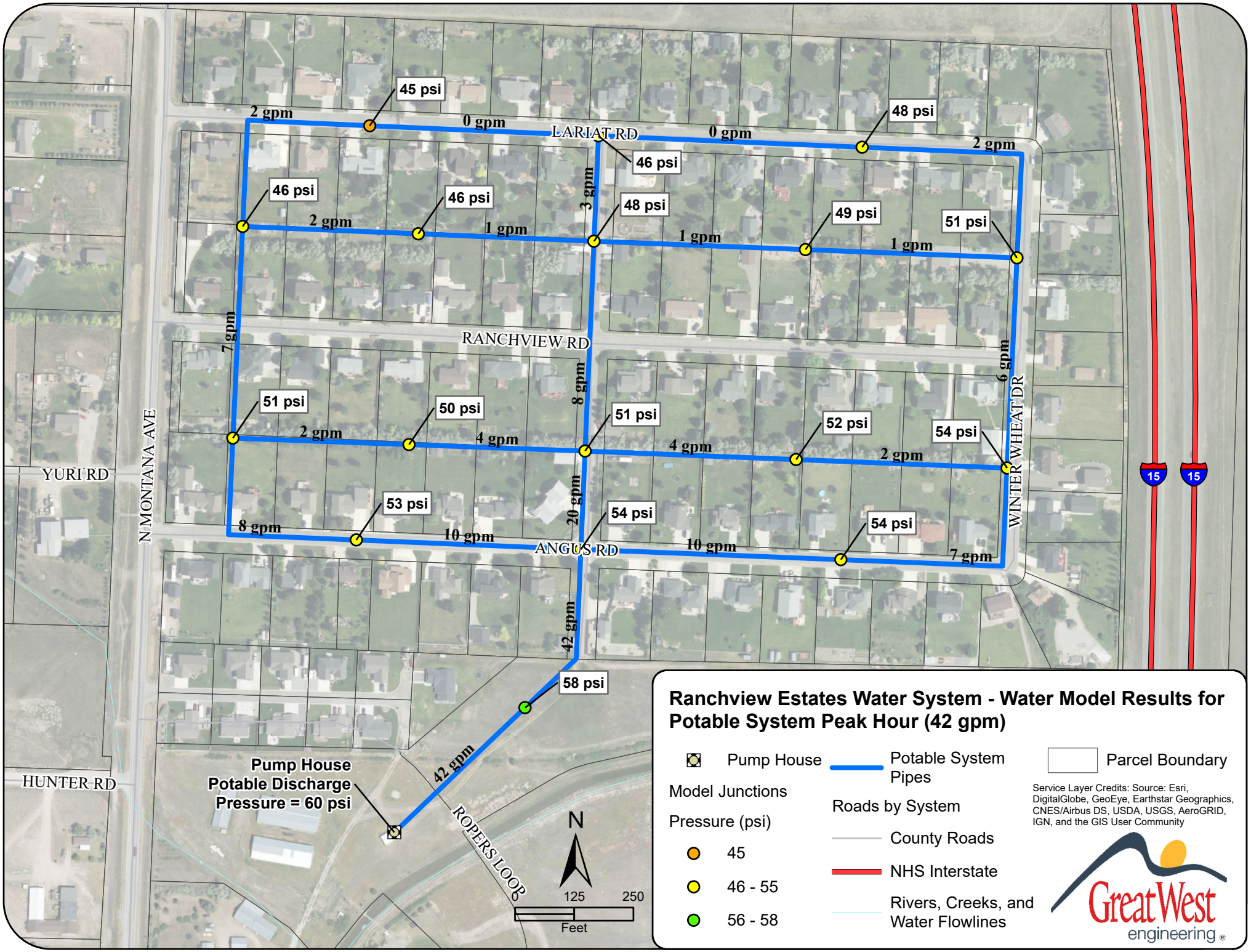
Ranchview Estates Water System - Water Model Results for Potable System Average Day (11 gpm)

- Pump House
- Model Junctions
- Pressure (psi)
  - 48 - 55
  - 56 - 59
- Potable System Pipes
- Roads by System
  - County Roads
  - NHS Interstate
  - Rivers, Creeks, and Water Flowlines
- Parcel Boundary

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

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Ranchview Estates Water System - Water Model Results for Potable System Peak Hour (42 gpm)

Pump House

Model Junctions

Pressure (psi)

- 45
- 46 - 55
- 56 - 58

Potable System Pipes

Roads by System

- County Roads
- NHS Interstate
- Rivers, Creeks, and Water Flowlines

Parcel Boundary

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

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Potable System Calibration Test

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)
P-1	445	J-25	J-26	2.0	PVC	150.0	2	0.23	0.000
P-2	208	1280 Angus	J-5	2.0	PVC	150.0	8	0.77	0.001
P-9	444	J-5	J-10	2.0	PVC	150.0	3	0.32	0.000
P-10	448	J-17	J-12	2.0	PVC	150.0	-3	0.27	0.000
P-11	223	J-10	1290 Lariat	2.0	PVC	150.0	1	0.13	0.000
P-12	22	Potable Well	J-46	3.0	PVC	150.0	16	0.73	0.001
P-13	359	J-46	J-18	3.0	PVC	150.0	16	0.73	0.001
P-14	382	J-18	1280 Angus	3.0	PVC	150.0	16	0.73	0.001
P-15	549	1280 Angus	J-24	2.0	PVC	150.0	4	0.39	0.000
P-16	549	J-24	J-25	2.0	PVC	150.0	3	0.30	0.000
P-17	446	J-25	J-28	2.0	PVC	150.0	-1	0.09	0.000
P-18	446	J-28	J-5	2.0	PVC	150.0	-2	0.19	0.000
P-19	447	J-26	J-30	2.0	PVC	150.0	0	0.02	0.000
P-20	447	J-30	J-10	2.0	PVC	150.0	-1	0.07	0.000
P-21	218	J-26	1380 Lariat	2.0	PVC	150.0	1	0.11	0.000
P-22	339	1380 Lariat	J-27	2.0	PVC	150.0	0	0.04	0.000
P-23	157	J-27	1335 Lariat	2.0	PVC	150.0	0	0.00	0.000
P-24	401	1335 Lariat	1290 Lariat	2.0	PVC	150.0	-1	0.06	0.000
P-25	483	1290 Lariat	J-16	2.0	PVC	150.0	0	0.00	0.000
P-26	317	J-16	J-45	2.0	PVC	150.0	-1	0.07	0.000
P-27	166	J-45	J-17	2.0	PVC	150.0	-1	0.15	0.000
P-28	371	J-10	J-20	2.0	PVC	150.0	0	0.00	0.000
P-29	371	J-20	J-17	2.0	PVC	150.0	-1	0.07	0.000
P-30	372	J-5	J-21	2.0	PVC	150.0	1	0.14	0.000
P-31	372	J-21	J-12	2.0	PVC	150.0	1	0.06	0.000
P-32	475	J-12	J-13	2.0	PVC	150.0	-3	0.30	0.000
P-33	475	J-13	1280 Angus	2.0	PVC	150.0	-4	0.41	0.000

Junction Table - Time: 0.00 hours

Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
1280 Angus	3,788.11	<None>	<Collection: 1 item>	1	3,904.88	51
1290 Lariat	3,802.35	<None>	<Collection: 1 item>	1	3,904.45	44
1335 Lariat	3,799.33	<None>	<Collection: 1 item>	1	3,904.45	45
1380 Lariat	3,794.59	<None>	<Collection: 1 item>	1	3,904.45	48

Potable System Calibration Test

Junction Table - Time: 0.00 hours

Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-5	3,791.99	<None>	<Collection: 1 item>	1	3,904.59	49
J-10	3,798.84	<None>	<Collection: 1 item>	1	3,904.46	46
J-12	3,791.99	<None>	<Collection: 1 item>	1	3,904.56	49
J-13	3,788.49	<None>	<Collection: 1 item>	1	3,904.68	50
J-16	3,806.00	<None>	<Collection: 1 item>	1	3,904.45	43
J-17	3,803.52	<None>	<Collection: 1 item>	0	3,904.47	44
J-18	3,780.13	<None>	<Collection: 0 items>	0	3,905.18	54
J-20	3,802.32	<None>	<Collection: 1 item>	1	3,904.46	44
J-21	3,793.20	<None>	<Collection: 1 item>	1	3,904.57	48
J-24	3,784.90	<None>	<Collection: 1 item>	1	3,904.66	52
J-25	3,785.94	<None>	<Collection: 1 item>	1	3,904.53	51
J-26	3,792.04	<None>	<Collection: 1 item>	1	3,904.46	49
J-27	3,797.64	<None>	<Collection: 1 item>	0	3,904.45	46
J-28	3,789.67	<None>	<Collection: 1 item>	1	3,904.54	50
J-30	3,794.91	<None>	<Collection: 1 item>	1	3,904.46	47
J-45	3,804.38	<None>	<Collection: 1 item>	1	3,904.46	43
J-46	3,778.56	<None>	<Collection: 0 items>	0	3,905.47	55

Reservoir Table - Time: 0.00 hours

Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
Potable Well	3,905.48	<None>	16	3,905.48

Potable System Average Day (50 psi)

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)
P-1	445	J-25	J-26	2.0	PVC	150.0	2	0.16	0.000
P-2	208	1280 Angus	J-5	2.0	PVC	150.0	5	0.52	0.001
P-9	444	J-5	J-10	2.0	PVC	150.0	2	0.21	0.000
P-10	448	J-17	J-12	2.0	PVC	150.0	-2	0.18	0.000
P-11	223	J-10	1290 Lariat	2.0	PVC	150.0	1	0.08	0.000
P-12	22	Potable Well	J-46	3.0	PVC	150.0	11	0.49	0.000
P-13	359	J-46	J-18	3.0	PVC	150.0	11	0.49	0.000
P-14	382	J-18	1280 Angus	3.0	PVC	150.0	11	0.49	0.000
P-15	549	1280 Angus	J-24	2.0	PVC	150.0	3	0.26	0.000
P-16	549	J-24	J-25	2.0	PVC	150.0	2	0.20	0.000
P-17	446	J-25	J-28	2.0	PVC	150.0	-1	0.06	0.000
P-18	446	J-28	J-5	2.0	PVC	150.0	-1	0.13	0.000
P-19	447	J-26	J-30	2.0	PVC	150.0	0	0.02	0.000
P-20	447	J-30	J-10	2.0	PVC	150.0	0	0.05	0.000
P-21	218	J-26	1380 Lariat	2.0	PVC	150.0	1	0.07	0.000
P-22	339	1380 Lariat	J-27	2.0	PVC	150.0	0	0.03	0.000
P-23	157	J-27	1335 Lariat	2.0	PVC	150.0	0	0.00	0.000
P-24	401	1335 Lariat	1290 Lariat	2.0	PVC	150.0	0	0.04	0.000
P-25	483	1290 Lariat	J-16	2.0	PVC	150.0	0	0.00	0.000
P-26	317	J-16	J-45	2.0	PVC	150.0	0	0.05	0.000
P-27	166	J-45	J-17	2.0	PVC	150.0	-1	0.10	0.000
P-28	371	J-10	J-20	2.0	PVC	150.0	0	0.00	0.000
P-29	371	J-20	J-17	2.0	PVC	150.0	0	0.05	0.000
P-30	372	J-5	J-21	2.0	PVC	150.0	1	0.09	0.000
P-31	372	J-21	J-12	2.0	PVC	150.0	0	0.04	0.000
P-32	475	J-12	J-13	2.0	PVC	150.0	-2	0.20	0.000
P-33	475	J-13	1280 Angus	2.0	PVC	150.0	-3	0.27	0.000

Junction Table - Time: 0.00 hours

Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
1280 Angus	3,788.11	<None>	<Collection: 1 item>	0	3,893.66	46
1290 Lariat	3,802.35	<None>	<Collection: 1 item>	0	3,893.45	39
1335 Lariat	3,799.33	<None>	<Collection: 1 item>	0	3,893.45	41
1380 Lariat	3,794.59	<None>	<Collection: 1 item>	0	3,893.45	43

Potable System Average Day (50 psi)

Junction Table - Time: 0.00 hours

Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-5	3,791.99	<None>	<Collection: 1 item>	1	3,893.52	44
J-10	3,798.84	<None>	<Collection: 1 item>	1	3,893.46	41
J-12	3,791.99	<None>	<Collection: 1 item>	1	3,893.50	44
J-13	3,788.49	<None>	<Collection: 1 item>	1	3,893.56	45
J-16	3,806.00	<None>	<Collection: 1 item>	1	3,893.45	38
J-17	3,803.52	<None>	<Collection: 1 item>	0	3,893.46	39
J-18	3,780.13	<None>	<Collection: 0 items>	0	3,893.80	49
J-20	3,802.32	<None>	<Collection: 1 item>	1	3,893.46	39
J-21	3,793.20	<None>	<Collection: 1 item>	1	3,893.51	43
J-24	3,784.90	<None>	<Collection: 1 item>	1	3,893.55	47
J-25	3,785.94	<None>	<Collection: 1 item>	1	3,893.49	47
J-26	3,792.04	<None>	<Collection: 1 item>	1	3,893.46	44
J-27	3,797.64	<None>	<Collection: 1 item>	0	3,893.45	41
J-28	3,789.67	<None>	<Collection: 1 item>	1	3,893.49	45
J-30	3,794.91	<None>	<Collection: 1 item>	1	3,893.45	43
J-45	3,807.00	<None>	<Collection: 1 item>	1	3,893.46	37
J-46	3,778.56	<None>	<Collection: 0 items>	0	3,893.94	50

Reservoir Table - Time: 0.00 hours

Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
Potable Well	3,893.94	<None>	11	3,893.94

Potable System Maximum Day (50 psi)

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)
P-1	445	J-25	J-26	2.0	PVC	150.0	5	0.55	0.001
P-2	208	1280 Angus	J-5	2.0	PVC	150.0	18	1.82	0.007
P-9	444	J-5	J-10	2.0	PVC	150.0	7	0.75	0.001
P-10	448	J-17	J-12	2.0	PVC	150.0	-6	0.63	0.001
P-11	223	J-10	1290 Lariat	2.0	PVC	150.0	3	0.29	0.000
P-12	22	Potable Well	J-46	3.0	PVC	150.0	38	1.71	0.004
P-13	359	J-46	J-18	3.0	PVC	150.0	38	1.71	0.004
P-14	382	J-18	1280 Angus	3.0	PVC	150.0	38	1.71	0.004
P-15	549	1280 Angus	J-24	2.0	PVC	150.0	9	0.92	0.002
P-16	549	J-24	J-25	2.0	PVC	150.0	7	0.70	0.001
P-17	446	J-25	J-28	2.0	PVC	150.0	-2	0.21	0.000
P-18	446	J-28	J-5	2.0	PVC	150.0	-4	0.46	0.001
P-19	447	J-26	J-30	2.0	PVC	150.0	1	0.05	0.000
P-20	447	J-30	J-10	2.0	PVC	150.0	-2	0.16	0.000
P-21	218	J-26	1380 Lariat	2.0	PVC	150.0	2	0.25	0.000
P-22	339	1380 Lariat	J-27	2.0	PVC	150.0	1	0.10	0.000
P-23	157	J-27	1335 Lariat	2.0	PVC	150.0	0	0.00	0.000
P-24	401	1335 Lariat	1290 Lariat	2.0	PVC	150.0	-1	0.15	0.000
P-25	483	1290 Lariat	J-16	2.0	PVC	150.0	0	0.00	0.000
P-26	317	J-16	J-45	2.0	PVC	150.0	-2	0.18	0.000
P-27	166	J-45	J-17	2.0	PVC	150.0	-3	0.36	0.000
P-28	371	J-10	J-20	2.0	PVC	150.0	0	0.01	0.000
P-29	371	J-20	J-17	2.0	PVC	150.0	-2	0.17	0.000
P-30	372	J-5	J-21	2.0	PVC	150.0	3	0.32	0.000
P-31	372	J-21	J-12	2.0	PVC	150.0	1	0.14	0.000
P-32	475	J-12	J-13	2.0	PVC	150.0	-7	0.71	0.001
P-33	475	J-13	1280 Angus	2.0	PVC	150.0	-9	0.96	0.002

Junction Table - Time: 0.00 hours

Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
1280 Angus	3,788.11	<None>	<Collection: 1 item>	1	3,891.03	45
1290 Lariat	3,802.35	<None>	<Collection: 1 item>	1	3,888.94	37
1335 Lariat	3,799.33	<None>	<Collection: 1 item>	1	3,888.91	39
1380 Lariat	3,794.59	<None>	<Collection: 1 item>	1	3,888.93	41

Potable System Maximum Day (50 psi)

Junction Table - Time: 0.00 hours

Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-5	3,791.99	<None>	<Collection: 1 item>	3	3,889.59	42
J-10	3,798.84	<None>	<Collection: 1 item>	3	3,888.99	39
J-12	3,791.99	<None>	<Collection: 1 item>	2	3,889.46	42
J-13	3,788.49	<None>	<Collection: 1 item>	2	3,890.03	44
J-16	3,806.00	<None>	<Collection: 1 item>	2	3,888.94	36
J-17	3,803.52	<None>	<Collection: 1 item>	1	3,889.03	37
J-18	3,780.13	<None>	<Collection: 0 items>	0	3,892.49	49
J-20	3,802.32	<None>	<Collection: 1 item>	2	3,888.99	37
J-21	3,793.20	<None>	<Collection: 1 item>	2	3,889.49	42
J-24	3,784.90	<None>	<Collection: 1 item>	2	3,889.96	45
J-25	3,785.94	<None>	<Collection: 1 item>	4	3,889.30	45
J-26	3,792.04	<None>	<Collection: 1 item>	2	3,888.96	42
J-27	3,797.64	<None>	<Collection: 1 item>	1	3,888.91	39
J-28	3,789.67	<None>	<Collection: 1 item>	2	3,889.35	43
J-30	3,794.91	<None>	<Collection: 1 item>	2	3,888.96	41
J-45	3,807.00	<None>	<Collection: 1 item>	2	3,888.97	35
J-46	3,778.56	<None>	<Collection: 0 items>	0	3,893.86	50

Reservoir Table - Time: 0.00 hours

Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
Potable Well	3,893.94	<None>	38	3,893.94

Potable System Peak Instantaneous (50 psi)

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)
P-1	445	J-25	J-26	2.0	PVC	150.0	14	1.43	0.004
P-2	208	1280 Angus	J-5	2.0	PVC	150.0	46	4.73	0.041
P-9	444	J-5	J-10	2.0	PVC	150.0	19	1.96	0.008
P-10	448	J-17	J-12	2.0	PVC	150.0	-16	1.65	0.006
P-11	223	J-10	1290 Lariat	2.0	PVC	150.0	7	0.77	0.001
P-12	22	Potable Well	J-46	3.0	PVC	150.0	98	4.43	0.022
P-13	359	J-46	J-18	3.0	PVC	150.0	98	4.43	0.022
P-14	382	J-18	1280 Angus	3.0	PVC	150.0	98	4.43	0.022
P-15	549	1280 Angus	J-24	2.0	PVC	150.0	23	2.39	0.011
P-16	549	J-24	J-25	2.0	PVC	150.0	18	1.83	0.007
P-17	446	J-25	J-28	2.0	PVC	150.0	-5	0.53	0.001
P-18	446	J-28	J-5	2.0	PVC	150.0	-12	1.19	0.003
P-19	447	J-26	J-30	2.0	PVC	150.0	1	0.14	0.000
P-20	447	J-30	J-10	2.0	PVC	150.0	-4	0.42	0.000
P-21	218	J-26	1380 Lariat	2.0	PVC	150.0	6	0.64	0.001
P-22	339	1380 Lariat	J-27	2.0	PVC	150.0	3	0.27	0.000
P-23	157	J-27	1335 Lariat	2.0	PVC	150.0	0	0.01	0.000
P-24	401	1335 Lariat	1290 Lariat	2.0	PVC	150.0	-4	0.38	0.000
P-25	483	1290 Lariat	J-16	2.0	PVC	150.0	0	0.01	0.000
P-26	317	J-16	J-45	2.0	PVC	150.0	-4	0.46	0.001
P-27	166	J-45	J-17	2.0	PVC	150.0	-9	0.92	0.002
P-28	371	J-10	J-20	2.0	PVC	150.0	0	0.02	0.000
P-29	371	J-20	J-17	2.0	PVC	150.0	-4	0.44	0.001
P-30	372	J-5	J-21	2.0	PVC	150.0	8	0.84	0.002
P-31	372	J-21	J-12	2.0	PVC	150.0	4	0.37	0.000
P-32	475	J-12	J-13	2.0	PVC	150.0	-18	1.83	0.007
P-33	475	J-13	1280 Angus	2.0	PVC	150.0	-24	2.49	0.012

Junction Table - Time: 0.00 hours

Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
1280 Angus	3,788.11	<None>	<Collection: 1 item>	4	3,876.83	38
1290 Lariat	3,802.35	<None>	<Collection: 1 item>	4	3,864.58	27
1335 Lariat	3,799.33	<None>	<Collection: 1 item>	4	3,864.42	28
1380 Lariat	3,794.59	<None>	<Collection: 1 item>	4	3,864.49	30

Potable System Peak Instantaneous (50 psi)

Junction Table - Time: 0.00 hours

Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-5	3,791.99	<None>	<Collection: 1 item>	7	3,868.40	33
J-10	3,798.84	<None>	<Collection: 1 item>	7	3,864.89	29
J-12	3,791.99	<None>	<Collection: 1 item>	5	3,867.65	33
J-13	3,788.49	<None>	<Collection: 1 item>	6	3,870.98	36
J-16	3,806.00	<None>	<Collection: 1 item>	5	3,864.58	25
J-17	3,803.52	<None>	<Collection: 1 item>	3	3,865.08	27
J-18	3,780.13	<None>	<Collection: 0 items>	0	3,885.39	46
J-20	3,802.32	<None>	<Collection: 1 item>	5	3,864.89	27
J-21	3,793.20	<None>	<Collection: 1 item>	5	3,867.79	32
J-24	3,784.90	<None>	<Collection: 1 item>	5	3,870.53	37
J-25	3,785.94	<None>	<Collection: 1 item>	9	3,866.69	35
J-26	3,792.04	<None>	<Collection: 1 item>	6	3,864.71	31
J-27	3,797.64	<None>	<Collection: 1 item>	3	3,864.42	29
J-28	3,789.67	<None>	<Collection: 1 item>	6	3,867.01	33
J-30	3,794.91	<None>	<Collection: 1 item>	5	3,864.68	30
J-45	3,807.00	<None>	<Collection: 1 item>	5	3,864.75	25
J-46	3,778.56	<None>	<Collection: 0 items>	0	3,893.45	50

Reservoir Table - Time: 0.00 hours

Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
Potable Well	3,893.94	<None>	98	3,893.94

Irrigation System Calibration Test

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)
P-3	442	J-35	J-37	3.0	PVC	150.0	-9	0.42	0.000
P-5	452	J-37	J-34	3.0	PVC	150.0	-31	1.41	0.003
P-7	387	J-34	J-38	3.0	PVC	150.0	23	1.05	0.002
P-8	376	J-38	J-36	3.0	PVC	150.0	6	0.28	0.000
P-34	218	J-8	1290 Lariat	3.0	PVC	150.0	17	0.79	0.001
P-36	219	J-3	J-9	3.0	PVC	150.0	-17	0.78	0.001
P-37	785	1280 Angus	J-33	3.0	PVC	150.0	61	2.75	0.009
P-38	326	J-33	J-35	3.0	PVC	150.0	46	2.08	0.006
P-39	458	J-35	J-7	3.0	PVC	150.0	38	1.73	0.004
P-40	447	J-8	J-29	3.0	PVC	150.0	12	0.56	0.000
P-41	447	J-29	J-7	3.0	PVC	150.0	-7	0.33	0.000
P-42	459	J-9	J-36	3.0	PVC	150.0	-43	1.94	0.005
P-43	262	J-36	J-32	3.0	PVC	150.0	-49	2.21	0.006
P-44	721	J-32	1280 Angus	3.0	PVC	150.0	-61	2.77	0.009
P-45	381	J-8	J-23	3.0	PVC	150.0	4	0.17	0.000
P-46	381	J-23	J-9	3.0	PVC	150.0	-11	0.49	0.000
P-47	92	1290 Lariat	1280 Lariat	3.0	PVC	150.0	5	0.21	0.000
P-48	289	1280 Lariat	J-22	3.0	PVC	150.0	-3	0.12	0.000
P-49	381	J-22	J-3	3.0	PVC	150.0	-10	0.45	0.000
P-50	221	1280 Angus	J-34	3.0	PVC	150.0	124	5.63	0.035
P-51	219	J-34	J-14	3.0	PVC	150.0	50	2.29	0.007
P-52	237	J-14	J-8	3.0	PVC	150.0	50	2.29	0.007
P-53	214	1380 Lariat	J-7	3.0	PVC	150.0	-14	0.63	0.001
P-54	447	1290 Lariat	1335 Lariat	3.0	PVC	150.0	8	0.36	0.000
P-55	447	1335 Lariat	1380 Lariat	3.0	PVC	150.0	-4	0.19	0.000
P-56	383	Irrigation Well	J-19	6.0	PVC	150.0	260	2.95	0.005
P-57	383	J-19	1280 Angus	6.0	PVC	150.0	260	2.95	0.005

Junction Table - Time: 0.00 hours

Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
1280 Angus	3,787.55	<None>	<Collection: 1 item>	15	3,947.94	69
1280 Lariat	3,803.28	<None>	<Collection: 1 item>	7	3,937.02	58
1290 Lariat	3,802.23	<None>	<Collection: 1 item>	5	3,937.03	58
1335 Lariat	3,799.02	<None>	<Collection: 1 item>	12	3,936.93	60

Irrigation System Calibration Test

Junction Table - Time: 0.00 hours

Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
1380 Lariat	3,794.76	<None>	<Collection: 1 item>	10	3,936.96	62
J-3	3,807.00	<None>	<Collection: 1 item>	7	3,937.15	56
J-7	3,791.68	<None>	<Collection: 1 item>	17	3,937.09	63
J-8	3,798.61	<None>	<Collection: 1 item>	17	3,937.23	60
J-9	3,803.85	<None>	<Collection: 1 item>	15	3,937.35	58
J-14	3,794.42	<None>	<Collection: 0 items>	0	3,938.78	62
J-19	3,779.93	<None>	<Collection: 0 items>	0	3,949.74	73
J-22	3,805.57	<None>	<Collection: 1 item>	7	3,937.03	57
J-23	3,802.60	<None>	<Collection: 1 item>	15	3,937.21	58
J-29	3,794.83	<None>	<Collection: 1 item>	19	3,937.01	62
J-32	3,788.93	<None>	<Collection: 1 item>	12	3,941.20	66
J-33	3,782.82	<None>	<Collection: 1 item>	15	3,940.70	68
J-34	3,791.58	<None>	<Collection: 1 item>	19	3,940.22	64
J-35	3,785.64	<None>	<Collection: 1 item>	17	3,938.89	66
J-36	3,792.17	<None>	<Collection: 1 item>	12	3,939.57	64
J-37	3,789.57	<None>	<Collection: 1 item>	22	3,939.01	65
J-38	3,793.20	<None>	<Collection: 1 item>	17	3,939.62	63

Reservoir Table - Time: 0.00 hours

Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
Irrigation Well	3,951.54	<None>	260	3,951.54

Irrigation System Average Day

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)
P-3	442	J-35	J-37	3.0	PVC	150.0	-5	0.23	0.000
P-5	452	J-37	J-34	3.0	PVC	150.0	-17	0.78	0.001
P-7	387	J-34	J-38	3.0	PVC	150.0	13	0.58	0.001
P-8	376	J-38	J-36	3.0	PVC	150.0	3	0.15	0.000
P-34	218	J-8	1290 Lariat	3.0	PVC	150.0	10	0.44	0.000
P-36	219	J-3	J-9	3.0	PVC	150.0	-10	0.43	0.000
P-37	785	1280 Angus	J-33	3.0	PVC	150.0	33	1.52	0.003
P-38	326	J-33	J-35	3.0	PVC	150.0	25	1.15	0.002
P-39	458	J-35	J-7	3.0	PVC	150.0	21	0.96	0.001
P-40	447	J-8	J-29	3.0	PVC	150.0	7	0.31	0.000
P-41	447	J-29	J-7	3.0	PVC	150.0	-4	0.18	0.000
P-42	459	J-9	J-36	3.0	PVC	150.0	-24	1.07	0.002
P-43	262	J-36	J-32	3.0	PVC	150.0	-27	1.22	0.002
P-44	721	J-32	1280 Angus	3.0	PVC	150.0	-34	1.53	0.003
P-45	381	J-8	J-23	3.0	PVC	150.0	2	0.09	0.000
P-46	381	J-23	J-9	3.0	PVC	150.0	-6	0.27	0.000
P-47	92	1290 Lariat	1280 Lariat	3.0	PVC	150.0	3	0.11	0.000
P-48	289	1280 Lariat	J-22	3.0	PVC	150.0	-1	0.07	0.000
P-49	381	J-22	J-3	3.0	PVC	150.0	-6	0.25	0.000
P-50	221	1280 Angus	J-34	3.0	PVC	150.0	69	3.11	0.012
P-51	219	J-34	J-14	3.0	PVC	150.0	28	1.26	0.002
P-52	237	J-14	J-8	3.0	PVC	150.0	28	1.26	0.002
P-53	214	1380 Lariat	J-7	3.0	PVC	150.0	-8	0.35	0.000
P-54	447	1290 Lariat	1335 Lariat	3.0	PVC	150.0	4	0.20	0.000
P-55	447	1335 Lariat	1380 Lariat	3.0	PVC	150.0	-2	0.11	0.000
P-56	383	Irrigation Well	J-19	6.0	PVC	150.0	144	1.63	0.002
P-57	383	J-19	1280 Angus	6.0	PVC	150.0	144	1.63	0.002

Junction Table - Time: 0.00 hours

Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
1280 Angus	3,787.55	<None>	<Collection: 1 item>	8	3,950.34	70
1280 Lariat	3,803.28	<None>	<Collection: 1 item>	4	3,946.70	62
1290 Lariat	3,802.23	<None>	<Collection: 1 item>	3	3,946.70	63
1335 Lariat	3,799.02	<None>	<Collection: 1 item>	7	3,946.67	64

Irrigation System Average Day

Junction Table - Time: 0.00 hours

Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
1380 Lariat	3,794.76	<None>	<Collection: 1 item>	5	3,946.68	66
J-3	3,807.00	<None>	<Collection: 1 item>	4	3,946.74	60
J-7	3,791.68	<None>	<Collection: 1 item>	9	3,946.72	67
J-8	3,798.61	<None>	<Collection: 1 item>	9	3,946.77	64
J-9	3,803.85	<None>	<Collection: 1 item>	8	3,946.81	62
J-14	3,794.42	<None>	<Collection: 0 items>	0	3,947.29	66
J-19	3,779.93	<None>	<Collection: 0 items>	0	3,950.94	74
J-22	3,805.57	<None>	<Collection: 1 item>	4	3,946.70	61
J-23	3,802.60	<None>	<Collection: 1 item>	8	3,946.76	62
J-29	3,794.83	<None>	<Collection: 1 item>	11	3,946.69	66
J-32	3,788.93	<None>	<Collection: 1 item>	7	3,948.09	69
J-33	3,782.82	<None>	<Collection: 1 item>	8	3,947.92	71
J-34	3,791.58	<None>	<Collection: 1 item>	11	3,947.77	68
J-35	3,785.64	<None>	<Collection: 1 item>	9	3,947.32	70
J-36	3,792.17	<None>	<Collection: 1 item>	7	3,947.55	67
J-37	3,789.57	<None>	<Collection: 1 item>	12	3,947.36	68
J-38	3,793.20	<None>	<Collection: 1 item>	9	3,947.57	67

Reservoir Table - Time: 0.00 hours

Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
Irrigation Well	3,951.54	<None>	144	3,951.54

Irrigation System Maximum Day

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)
P-3	442	J-35	J-37	3.0	PVC	150.0	-6	0.28	0.000
P-5	452	J-37	J-34	3.0	PVC	150.0	-21	0.93	0.001
P-7	387	J-34	J-38	3.0	PVC	150.0	15	0.69	0.001
P-8	376	J-38	J-36	3.0	PVC	150.0	4	0.18	0.000
P-34	218	J-8	1290 Lariat	3.0	PVC	150.0	11	0.52	0.000
P-36	219	J-3	J-9	3.0	PVC	150.0	-11	0.52	0.000
P-37	785	1280 Angus	J-33	3.0	PVC	150.0	40	1.82	0.004
P-38	326	J-33	J-35	3.0	PVC	150.0	30	1.38	0.003
P-39	458	J-35	J-7	3.0	PVC	150.0	25	1.14	0.002
P-40	447	J-8	J-29	3.0	PVC	150.0	8	0.37	0.000
P-41	447	J-29	J-7	3.0	PVC	150.0	-5	0.21	0.000
P-42	459	J-9	J-36	3.0	PVC	150.0	-28	1.28	0.002
P-43	262	J-36	J-32	3.0	PVC	150.0	-32	1.46	0.003
P-44	721	J-32	1280 Angus	3.0	PVC	150.0	-40	1.83	0.004
P-45	381	J-8	J-23	3.0	PVC	150.0	2	0.11	0.000
P-46	381	J-23	J-9	3.0	PVC	150.0	-7	0.33	0.000
P-47	92	1290 Lariat	1280 Lariat	3.0	PVC	150.0	3	0.14	0.000
P-48	289	1280 Lariat	J-22	3.0	PVC	150.0	-2	0.08	0.000
P-49	381	J-22	J-3	3.0	PVC	150.0	-7	0.30	0.000
P-50	221	1280 Angus	J-34	3.0	PVC	150.0	82	3.72	0.016
P-51	219	J-34	J-14	3.0	PVC	150.0	33	1.51	0.003
P-52	237	J-14	J-8	3.0	PVC	150.0	33	1.51	0.003
P-53	214	1380 Lariat	J-7	3.0	PVC	150.0	-9	0.42	0.000
P-54	447	1290 Lariat	1335 Lariat	3.0	PVC	150.0	5	0.24	0.000
P-55	447	1335 Lariat	1380 Lariat	3.0	PVC	150.0	-3	0.13	0.000
P-56	383	Irrigation Well	J-19	6.0	PVC	150.0	172	1.95	0.002
P-57	383	J-19	1280 Angus	6.0	PVC	150.0	172	1.95	0.002

Junction Table - Time: 0.00 hours

Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
1280 Angus	3,787.55	<None>	<Collection: 1 item>	10	3,949.87	70
1280 Lariat	3,803.28	<None>	<Collection: 1 item>	5	3,944.79	61
1290 Lariat	3,802.23	<None>	<Collection: 1 item>	3	3,944.80	62
1335 Lariat	3,799.02	<None>	<Collection: 1 item>	8	3,944.75	63

Irrigation System Maximum Day

Junction Table - Time: 0.00 hours

Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
1380 Lariat	3,794.76	<None>	<Collection: 1 item>	6	3,944.77	65
J-3	3,807.00	<None>	<Collection: 1 item>	5	3,944.86	60
J-7	3,791.68	<None>	<Collection: 1 item>	11	3,944.83	66
J-8	3,798.61	<None>	<Collection: 1 item>	11	3,944.89	63
J-9	3,803.85	<None>	<Collection: 1 item>	10	3,944.95	61
J-14	3,794.42	<None>	<Collection: 0 items>	0	3,945.61	65
J-19	3,779.93	<None>	<Collection: 0 items>	0	3,950.70	74
J-22	3,805.57	<None>	<Collection: 1 item>	5	3,944.80	60
J-23	3,802.60	<None>	<Collection: 1 item>	10	3,944.88	62
J-29	3,794.83	<None>	<Collection: 1 item>	13	3,944.79	65
J-32	3,788.93	<None>	<Collection: 1 item>	8	3,946.74	68
J-33	3,782.82	<None>	<Collection: 1 item>	10	3,946.50	71
J-34	3,791.58	<None>	<Collection: 1 item>	13	3,946.28	67
J-35	3,785.64	<None>	<Collection: 1 item>	11	3,945.66	69
J-36	3,792.17	<None>	<Collection: 1 item>	8	3,945.98	67
J-37	3,789.57	<None>	<Collection: 1 item>	14	3,945.72	68
J-38	3,793.20	<None>	<Collection: 1 item>	11	3,946.00	66

Reservoir Table - Time: 0.00 hours

Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
Irrigation Well	3,951.54	<None>	172	3,951.54

Irrigation System Peak Instantaneous

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)
P-3	442	J-35	J-37	3.0	PVC	150.0	-10	0.47	0.000
P-5	452	J-37	J-34	3.0	PVC	150.0	-35	1.57	0.003
P-7	387	J-34	J-38	3.0	PVC	150.0	26	1.17	0.002
P-8	376	J-38	J-36	3.0	PVC	150.0	7	0.31	0.000
P-34	218	J-8	1290 Lariat	3.0	PVC	150.0	19	0.88	0.001
P-36	219	J-3	J-9	3.0	PVC	150.0	-19	0.88	0.001
P-37	785	1280 Angus	J-33	3.0	PVC	150.0	67	3.06	0.011
P-38	326	J-33	J-35	3.0	PVC	150.0	51	2.33	0.007
P-39	458	J-35	J-7	3.0	PVC	150.0	43	1.93	0.005
P-40	447	J-8	J-29	3.0	PVC	150.0	14	0.62	0.001
P-41	447	J-29	J-7	3.0	PVC	150.0	-8	0.36	0.000
P-42	459	J-9	J-36	3.0	PVC	150.0	-48	2.16	0.006
P-43	262	J-36	J-32	3.0	PVC	150.0	-54	2.47	0.008
P-44	721	J-32	1280 Angus	3.0	PVC	150.0	-68	3.08	0.011
P-45	381	J-8	J-23	3.0	PVC	150.0	4	0.19	0.000
P-46	381	J-23	J-9	3.0	PVC	150.0	-12	0.55	0.000
P-47	92	1290 Lariat	1280 Lariat	3.0	PVC	150.0	5	0.23	0.000
P-48	289	1280 Lariat	J-22	3.0	PVC	150.0	-3	0.14	0.000
P-49	381	J-22	J-3	3.0	PVC	150.0	-11	0.51	0.000
P-50	221	1280 Angus	J-34	3.0	PVC	150.0	138	6.28	0.043
P-51	219	J-34	J-14	3.0	PVC	150.0	56	2.55	0.008
P-52	237	J-14	J-8	3.0	PVC	150.0	56	2.55	0.008
P-53	214	1380 Lariat	J-7	3.0	PVC	150.0	-16	0.71	0.001
P-54	447	1290 Lariat	1335 Lariat	3.0	PVC	150.0	9	0.40	0.000
P-55	447	1335 Lariat	1380 Lariat	3.0	PVC	150.0	-5	0.21	0.000
P-56	383	Irrigation Well	J-19	6.0	PVC	150.0	290	3.29	0.006
P-57	383	J-19	1280 Angus	6.0	PVC	150.0	290	3.29	0.006

Junction Table - Time: 0.00 hours

Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
1280 Angus	3,787.55	<None>	<Collection: 1 item>	16	3,947.14	69
1280 Lariat	3,803.28	<None>	<Collection: 1 item>	8	3,933.76	56
1290 Lariat	3,802.23	<None>	<Collection: 1 item>	5	3,933.77	57
1335 Lariat	3,799.02	<None>	<Collection: 1 item>	14	3,933.65	58

Irrigation System Peak Instantaneous

Junction Table - Time: 0.00 hours

Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
1380 Lariat	3,794.76	<None>	<Collection: 1 item>	11	3,933.69	60
J-3	3,807.00	<None>	<Collection: 1 item>	8	3,933.93	55
J-7	3,791.68	<None>	<Collection: 1 item>	19	3,933.85	62
J-8	3,798.61	<None>	<Collection: 1 item>	19	3,934.02	59
J-9	3,803.85	<None>	<Collection: 1 item>	16	3,934.17	56
J-14	3,794.42	<None>	<Collection: 0 items>	0	3,935.92	61
J-19	3,779.93	<None>	<Collection: 0 items>	0	3,949.34	73
J-22	3,805.57	<None>	<Collection: 1 item>	8	3,933.77	55
J-23	3,802.60	<None>	<Collection: 1 item>	16	3,933.99	57
J-29	3,794.83	<None>	<Collection: 1 item>	22	3,933.75	60
J-32	3,788.93	<None>	<Collection: 1 item>	14	3,938.88	65
J-33	3,782.82	<None>	<Collection: 1 item>	16	3,938.26	67
J-34	3,791.58	<None>	<Collection: 1 item>	22	3,937.69	63
J-35	3,785.64	<None>	<Collection: 1 item>	19	3,936.05	65
J-36	3,792.17	<None>	<Collection: 1 item>	14	3,936.89	63
J-37	3,789.57	<None>	<Collection: 1 item>	24	3,936.20	63
J-38	3,793.20	<None>	<Collection: 1 item>	19	3,936.95	62

Reservoir Table - Time: 0.00 hours

Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
Irrigation Well	3,951.54	<None>	290	3,951.54

Ranchview Estates Field Pressure/Model Pressure Comparison

Potable System

Date	Time	Flow (gpm)	Discharge Pressure (psi)	Measured Pressures at Properties (psi)			
				1335 Lariat	1290 Lariat	1280 Angus	1380 Lariat
7/20/2020[(1)]	9:00 AM	16	55	44	40	58	52
			Model Pressures (psi)	45	44	51	48
7/23/2020	9:30 AM	18	55	-	54	42	-
			Model Pressures (psi)	-	44	50	-
7/23/2020	3:00 PM	18	55	58	-	-	-
			Model Pressures (psi)	45	-	-	-

[(1)]Model output report included in Appendix

Irrigation System

Date	Time	Flow (gpm)	Discharge Pressure (psi)	Measured Pressures at Properties (psi)				
				1335 Lariat	1290 Lariat	1280 Angus	1380 Lariat	1280 Lariat
7/20/2020[(1)]	9:00 AM	260	75	59	58	64	52	60
			Model Pressures (psi)	60	58	69	62	58
7/23/2020	9:30 AM	200	75	48	60	60	-	-
			Model Pressures (psi)	62	61	70	-	-
7/23/2020	3:00 PM	200	75	68	-	-	-	-
			Model Pressures (psi)	62	-	-	-	-

[(1)]Model output report included in Appendix

Matthew Mudd

From: Jessica Salo
Sent: Tuesday, September 29, 2020 11:32 AM
To: Matthew Mudd
Subject: RE: Ranchview Pump Curve

Matt,

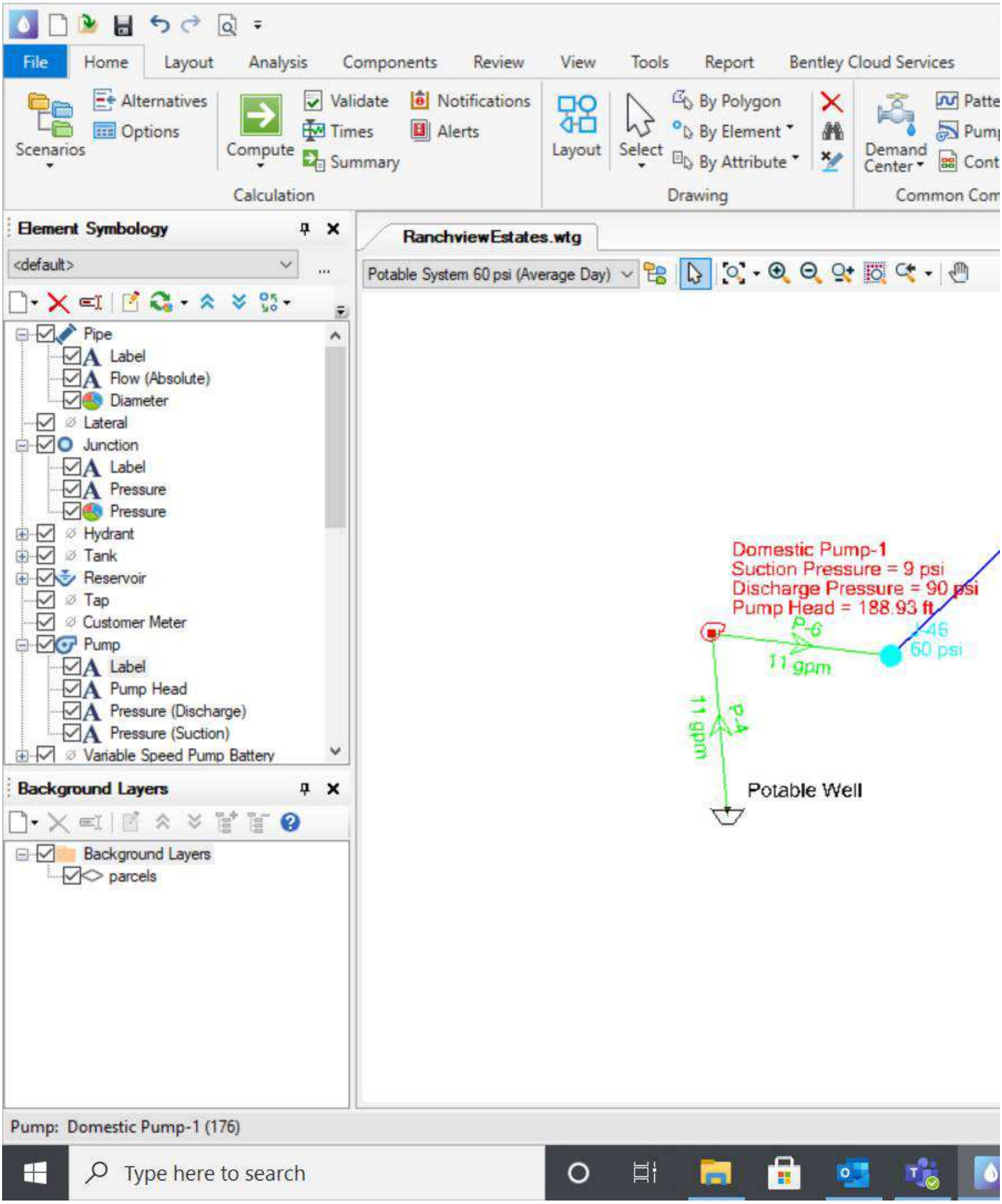
I plugged the information into the model to check our calculations.

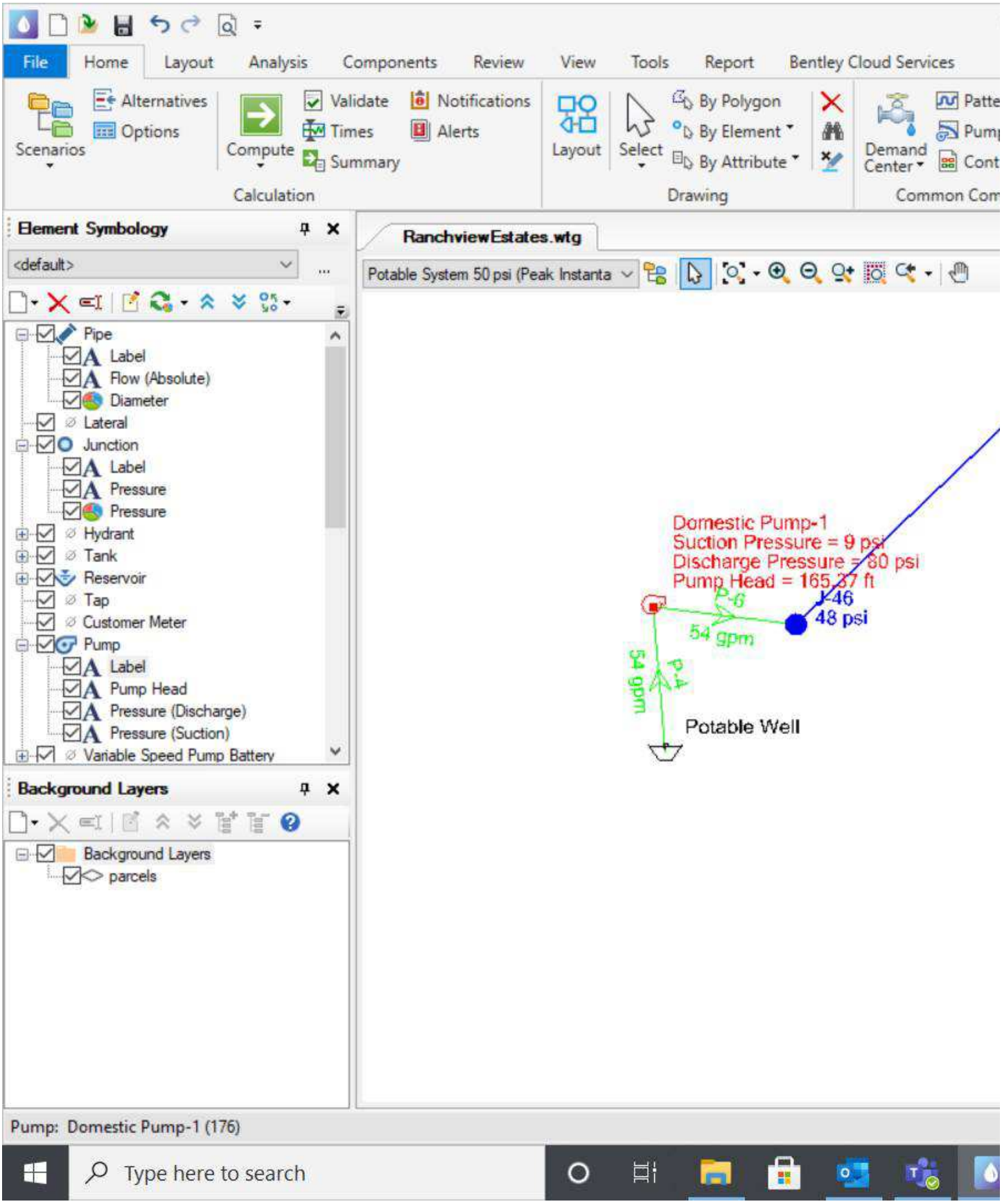
- I set the reservoir to an elevation of 3729 assuming static water level 50 feet below the ground surface of 3779.
- Then I put a short piece of pipe (only 1 ft) between the reservoir and pump. Headloss should be negligilbe due to the short pipe. In reality there is not a pipe there but the model needs it for connectivity.
- The pump is set at elevation 3709 (70' below ground surface).
- I entered the pump curve into the pump element and set it to have a discharge pressure at node J-46 of 60 psi.
- The pipe between the pump and J-46 is 70' of 2-inch pipe so headloss calculations take place in the riser pipe.
- Below is a screen shot of the resulting pump curve and operating point. The pump curve output says the pump is operating at 60% of full speed under our average day scenario of 11 gpm.

If this pump is allowed to run at full speed with no VFD or discharge pressure setting, the discharge pressures are obvioulsy very high under low flows. Below is a screen shot of the pump curve during average day.

The second screen shot shows what happens when demands get to be over 50 gpm. The pump-1 alone is running at full speed and cannot meet the 60 psi discharge setting. This is probably what is happening during high demand right now and the fact they aren't using pump-2.

I will be working all day from home today but will be in tomorrow afternoon if we want to discuss and put some more thought into this. Thanks.


File
Home
Layout
Analysis
Components
Review
View
Tools
Report
Bentley Cloud Services
Scenarios
Alternatives
Options
Compute
Validate
Times
Summary
Notifications
Alerts
Calculation
Layout
Select
By Polygon
By Element
By Attribute
Drawing
Demand Center
Common Com
Element Symbology
<default>
Pipe
Label
Flow (Absolute)
Diameter
Lateral
Junction
Label
Pressure
Pressure
Hydrant
Tank
Reservoir
Tap
Customer Meter
Pump
Label
Pump Head
Pressure (Discharge)
Pressure (Suction)
Variable Speed Pump Battery
Background Layers
Background Layers
parcels
RanchviewEstates.wtg
Potable System 60 psi (Average Day)
Domestic Pump-1
Suction Pressure = 9 psi
Discharge Pressure = 90 psi
Pump Head = 188.93 ft
P-6
11 gpm
60 psi
P-4
11 gpm
Potable Well
Pump: Domestic Pump-1 (176)
Type here to search



Jessica Salo, PE | Project Engineer

Great West Engineering, Inc.
PO Box 4817

2501 Belt View Drive
Helena, MT 59604

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www.greatwesteng.com


From: Matthew Mudd <mmudd@greatwesteng.com>
Sent: Monday, September 28, 2020 5:19 PM
To: Jessica Salo <jsalo@greatwesteng.com>
Subject: RE: Ranchview Pump Curve

So looking at the original design calculations. If we assume the pumps set at 70-deep and 2" riser pumps from the pump to the pump house bulding, we would have have 30 psi elevation plus maybe another 5 psi friction head, then we add that to the 60 psi of the service pressure to get 95 psi (220 ft about). That seems to match up with the curve…..

Matthew Mudd, PE | Project Manager

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From: Matthew Mudd
Sent: Monday, September 28, 2020 4:59 PM
To: Jessica Salo <jsalo@greatwesteng.com>
Subject: Ranchview Pump Curve

So here are the pump curves for the new potable well no. 1 pump and one of the irrigation pumps (not sure what number).

Does the potable pump curve make sense if well 1 is at a current depth of 100 ft? Not sure what the well depth is at but the static depth is at 50'. Operating pressures might be around 55-60 and the flow rate at that pressure is roughly 25-20 gpm…

Matthew Mudd, PE | Project Manager

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Appendix R

Financial Information

Ranch View Estates Water Users Association
Balance Sheet
As of December 31, 2017

	Dec 31, 17
ASSETS	
Current Assets	
Checking/Savings	
Farm Bureau Financial Services	154,500.00
Valley Bank - Bus Millenium Mkt	69,314.38
Valley Bank - Checking	24,612.49
Total Checking/Savings	248,426.87
Accounts Receivable	
Accounts Receivable	-8,795.00
Total Accounts Receivable	-8,795.00
Other Current Assets	
Prepaid Water Fees	8,795.00
Total Other Current Assets	8,795.00
Total Current Assets	248,426.87
TOTAL ASSETS	**248,426.87**
LIABILITIES & EQUITY	
Equity	
Opening Balance Equity	194,668.91
Unrestricted Net Assets	24,879.17
Net Income	28,878.79
Total Equity	248,426.87
TOTAL LIABILITIES & EQUITY	**248,426.87**

Ranch View Estates Water Users Association
Profit & Loss
January through December 2017

	Jan - Dec 17
Ordinary Income/Expense	
Income	
Association Dues	56,295.50
Interest Income	3,679.32
Late Fees	149.50
Total Income	60,124.32
Gross Profit	60,124.32
Expense	
Accounting Fees	4,325.00
Bank Fees - ACH	67.33
Bank Fees - Credit Card	737.91
Business Licenses and Permits	20.00
charity	50.00
Computer and Internet Expenses	172.26
Insurance Expense	2,477.00
office Supplies	16.25
Postage and Delivery	307.90
Printing and Copying	774.15
Property Management Fees	30.00
Testing - Water	3,431.00
Utilities - Electricity	10,086.48
Utilities - Telephone	663.12
Water Well Management	8,087.13
Total Expense	31,245.53
Net Ordinary Income	28,878.79
Net Income	**28,878.79**

Ranch View Estates Water Users Association
Profit & Loss
January through December 2017

	Jan 17	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17	Oct 17
Ordinary Income/Expense										
Income										
Association Dues	7,845.00	3,965.00	3,500.00	4,935.00	3,590.00	3,775.00	4,610.00	3,450.00	2,660.00	3,965.00
Interest Income	5.56	5.05	6.91	6.45	7.17	7.43	6.74	7.20	7.23	3,605.36
Late Fees	20.00	10.00	0.00	40.00	10.00	0.00	15.00	10.00	10.00	10.00
Total Income	7,870.56	3,980.05	3,506.91	4,981.45	3,607.17	3,782.43	4,631.74	3,467.20	2,677.23	7,580.36
Gross Profit	7,870.56	3,980.05	3,506.91	4,981.45	3,607.17	3,782.43	4,631.74	3,467.20	2,677.23	7,580.36
Expense										
Accounting Fees	350.00	350.00	350.00	350.00	350.00	350.00	450.00	375.00	350.00	350.00
Bank Fees - ACH	0.75	1.25	26.75	1.50	1.00	1.75	1.75	1.25	26.83	1.50
Bank Fees - Credit Card	39.00	39.00	39.00	68.99	68.99	68.99	68.99	68.99	68.99	68.99
Business Licenses and Permits	0.00	0.00	0.00	0.00	20.00	0.00	0.00	0.00	0.00	0.00
charity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.00
Computer and Internet Expenses	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	172.26	0.00
Insurance Expense	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2,477.00
office Supplies	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Postage and Delivery	47.00	0.00	0.00	0.00	48.75	0.00	95.08	0.00	0.00	0.00
Printing and Copying	0.00	0.00	0.00	0.00	240.90	0.00	0.00	0.00	0.00	0.00
Property Management Fees	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.00	0.00	0.00
Testing - Water	0.00	44.00	1,708.50	1,201.50	22.00	44.00	0.00	44.00	0.00	46.50
Utilities - Electricity	244.96	288.12	263.42	240.33	241.58	953.92	1,506.44	1,818.17	1,703.75	1,471.05
Utilities - Telephone	45.23	45.18	45.18	45.18	45.23	45.23	45.23	46.08	0.00	91.66
Water Well Management	742.80	395.00	340.00	340.00	555.00	340.00	490.00	520.00	1,127.50	390.00
Total Expense	1,469.74	1,162.55	2,772.85	2,247.50	1,593.45	1,803.89	2,657.49	2,903.49	3,449.33	4,946.70
Net Ordinary Income	6,400.82	2,817.50	734.06	2,733.95	2,013.72	1,978.54	1,974.25	563.71	-772.10	2,633.66
Net Income	**6,400.82**	**2,817.50**	**734.06**	**2,733.95**	**2,013.72**	**1,978.54**	**1,974.25**	**563.71**	**-772.10**	**2,633.66**

Ranch View Estates Water Users Association
Profit & Loss
January through December 2017

	Nov 17	Dec 17	TOTAL
Ordinary Income/Expense			
Income			
Association Dues	4,530.50	9,470.00	56,295.50
Interest Income	6.97	7.25	3,679.32
Late Fees	9.50	15.00	149.50
Total Income	4,546.97	9,492.25	60,124.32
Gross Profit	4,546.97	9,492.25	60,124.32
Expense			
Accounting Fees	350.00	350.00	4,325.00
Bank Fees - ACH	1.50	1.50	67.33
Bank Fees - Credit Card	68.99	68.99	737.91
Business Licenses and Permits	0.00	0.00	20.00
charity	0.00	0.00	50.00
Computer and Internet Expenses	0.00	0.00	172.26
Insurance Expense	0.00	0.00	2,477.00
office Supplies	16.25	0.00	16.25
Postage and Delivery	117.07	0.00	307.90
Printing and Copying	533.25	0.00	774.15
Property Management Fees	0.00	0.00	30.00
Testing - Water	276.50	44.00	3,431.00
Utilities - Electricity	1,012.02	342.72	10,086.48
Utilities - Telephone	45.98	162.94	663.12
Water Well Management	1,648.49	1,198.34	8,087.13
Total Expense	4,070.05	2,168.49	31,245.53
Net Ordinary Income	476.92	7,323.76	28,878.79
Net Income	**476.92**	**7,323.76**	**28,878.79**

Ranch View Estates Water Users Association
Profit & Loss
December 2016 through December 2017

	Dec 16	Jan 17	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17
Ordinary Income/Expense										
Income										
Association Dues	7,095.00	7,845.00	3,965.00	3,500.00	4,935.00	3,590.00	3,775.00	4,610.00	3,450.00	2,660.00
Interest Income	907.11	5.56	5.05	6.91	6.45	7.17	7.43	6.74	7.20	7.23
Late Fees	0.00	20.00	10.00	0.00	40.00	10.00	0.00	15.00	10.00	10.00
Total Income	8,002.11	7,870.56	3,980.05	3,506.91	4,981.45	3,607.17	3,782.43	4,631.74	3,467.20	2,677.23
Gross Profit	8,002.11	7,870.56	3,980.05	3,506.91	4,981.45	3,607.17	3,782.43	4,631.74	3,467.20	2,677.23
Expense										
Accounting Fees	350.00	350.00	350.00	350.00	350.00	350.00	350.00	450.00	375.00	350.00
Bank Fees - ACH	1.25	0.75	1.25	26.75	1.50	1.00	1.75	1.75	1.25	26.83
Bank Fees - Credit Card	39.00	39.00	39.00	39.00	68.99	68.99	68.99	68.99	68.99	68.99
Business Licenses and Permits	0.00	0.00	0.00	0.00	0.00	20.00	0.00	0.00	0.00	0.00
charity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Computer and Internet Expenses	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	172.26
Insurance Expense	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
office Supplies	60.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Postage and Delivery	102.01	47.00	0.00	0.00	0.00	48.75	0.00	95.08	0.00	0.00
Printing and Copying	0.00	0.00	0.00	0.00	0.00	240.90	0.00	0.00	0.00	0.00
Property Management Fees	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.00	0.00
Testing - Water	44.00	0.00	44.00	1,708.50	1,201.50	22.00	44.00	0.00	44.00	0.00
Utilities - Electricity	287.66	244.96	288.12	263.42	240.33	241.58	953.92	1,506.44	1,818.17	1,703.75
Utilities - Telephone	45.23	45.23	45.18	45.18	45.18	45.23	45.23	45.23	46.08	0.00
Water Well Management	540.00	742.80	395.00	340.00	340.00	555.00	340.00	490.00	520.00	1,127.50
Total Expense	1,469.15	1,469.74	1,162.55	2,772.85	2,247.50	1,593.45	1,803.89	2,657.49	2,903.49	3,449.33
Net Ordinary Income	6,532.96	6,400.82	2,817.50	734.06	2,733.95	2,013.72	1,978.54	1,974.25	563.71	-772.10
Net Income	**6,532.96**	**6,400.82**	**2,817.50**	**734.06**	**2,733.95**	**2,013.72**	**1,978.54**	**1,974.25**	**563.71**	**-772.10**

Ranch View Estates Water Users Association
Profit & Loss
December 2016 through December 2017

	Oct 17	Nov 17	Dec 17	TOTAL
Ordinary Income/Expense				
Income				
Association Dues	3,965.00	4,530.50	9,470.00	63,390.50
Interest Income	3,605.36	6.97	7.25	4,586.43
Late Fees	10.00	9.50	15.00	149.50
Total Income	7,580.36	4,546.97	9,492.25	68,126.43
Gross Profit	7,580.36	4,546.97	9,492.25	68,126.43
Expense				
Accounting Fees	350.00	350.00	350.00	4,675.00
Bank Fees - ACH	1.50	1.50	1.50	68.58
Bank Fees - Credit Card	68.99	68.99	68.99	776.91
Business Licenses and Permits	0.00	0.00	0.00	20.00
charity	50.00	0.00	0.00	50.00
Computer and Internet Expenses	0.00	0.00	0.00	172.26
Insurance Expense	2,477.00	0.00	0.00	2,477.00
office Supplies	0.00	16.25	0.00	76.25
Postage and Delivery	0.00	117.07	0.00	409.91
Printing and Copying	0.00	533.25	0.00	774.15
Property Management Fees	0.00	0.00	0.00	30.00
Testing - Water	46.50	276.50	44.00	3,475.00
Utilities - Electricity	1,471.05	1,012.02	342.72	10,374.14
Utilities - Telephone	91.66	45.98	162.94	708.35
Water Well Management	390.00	1,648.49	1,198.34	8,627.13
Total Expense	4,946.70	4,070.05	2,168.49	32,714.68
Net Ordinary Income	2,633.66	476.92	7,323.76	35,411.75
Net Income	**2,633.66**	**476.92**	**7,323.76**	**35,411.75**

Ranch View Estates Water Users Association
Expenses by Vendor Detail
December 13, 2017 through January 9, 2018

Type	Date	Num	Memo	Account	Clr	Split	Amount	Balance
Century Link								
Check	12/30/2017	online	12132017	Utilities - Telephone		Valley Bank - ...	116.96	116.96
Total Century Link							116.96	116.96
Christie Killeen								
Check	01/09/2018	210	Jan	Accounting Fees		Valley Bank - ...	350.00	350.00
Total Christie Killeen							350.00	350.00
Northwestern Energy								
Check	01/05/2018	auto	12202017	Utilities - Electricity		Valley Bank - ...	570.15	570.15
Total Northwestern Energy							570.15	570.15
USPS								
Check	12/28/2017	211	stamps	Postage and Delivery		Valley Bank - ...	49.00	49.00
Check	01/02/2018	212	PO Box Box ...	Postage and Delivery		Valley Bank - ...	62.00	111.00
Total USPS							111.00	111.00
TOTAL							**1,148.11**	**1,148.11**

* Does not Include Intograted Water bill for Dec

Ranch View Estates Water Users Association
Reconciliation Summary
Valley Bank - Checking, Period Ending 12/31/2017

	Dec 31, 17	
Beginning Balance		16,462.05
Cleared Transactions		
Checks and Payments - 6 items	-2,005.55	
Deposits and Credits - 56 items	7,860.18	
Total Cleared Transactions	5,854.63	
Cleared Balance		**22,316.68**
Uncleared Transactions		
Checks and Payments - 3 items	-179.19	
Deposits and Credits - 27 items	2,475.00	
Total Uncleared Transactions	2,295.81	
Register Balance as of 12/31/2017		**24,612.49**
New Transactions		
Checks and Payments - 2 items	-920.15	
Deposits and Credits - 22 items	2,335.00	
Total New Transactions	1,414.85	
Ending Balance		**26,027.34**

Ranch View Estates Water Users Association
Reconciliation Summary
Valley Bank - Bus Millenium Mkt, Period Ending 12/31/2017

	Dec 31, 17	
Beginning Balance		69,307.31
Cleared Transactions		
Deposits and Credits - 1 item	7.07	
Total Cleared Transactions	7.07	
Cleared Balance		**69,314.38**
Register Balance as of 12/31/2017		69,314.38
Ending Balance		69,314.38

RANCHVIEW ESTATES WATER USERS ASSN.
P.O. BOX 9732, HELENA, MT 59604
M E M O R A N D U M

January 27, 2019

TO : Ranchview County Water District – Board of Directors

FROM : Christie Killeen, Bookkeeper

SUBJECT : **December** 2018 Month End Report

Attached are the Financials for **December** 2018. Also included are the following reports.

Attached Reports:

Balance Sheet
Profit Loss for current month
Profit Loss Year to Date
Profit Loss month to month for current year
Profit Loss for last 12-month comparison
Expense Report for current bills
Bank Reconciliation (Valley Bank)
Bank Reconciliation (Farm Bureau Financial bi yearly)

Other Info.

New Homeowners – 1345 Angus – New Owners- Roger and Kathryn Welch
Water Violations – 0
On-line payments – 27
Website Hits- 149, Page views 159

Late Pays (Statements sent out the first of the month, late fees accessed on the 15th)
site not working.
Clayton Scotson - 1310 Ranchview, Paid $300. Owes $75.00. Bob is working on letter to send.

Peter Meyer – Complained that I don't process his checks fast enough, so he gets overdrafts on his account. I told him I deposit checks every couple of weeks if not more often. He is deducting his overdraft fees from his water bill. I told him he could come to a Board meeting and discuss and he said no I should stop by his house to discuss, he is too busy to come to Board meetings. Bob will contact him as well.

New Business:

Researching reconciliation items for Sept and Dec.

Quarterly Meetings for 2019 are the Second Wednesday of January, April, July, and October

If you have any questions, please call me at 461-6463

Ranchview County Water District
Balance Sheet
As of December 31, 2018

	Dec 31, 18
ASSETS	
Current Assets	
Checking/Savings	
Farm Bureau Financial Services	157,477.97
Valley Bank - Bus Millenium Mkt	99,416.35
Valley Bank - Checking	17,129.46
Total Checking/Savings	274,023.78
Accounts Receivable	
Accounts Receivable	-9,127.50
Total Accounts Receivable	-9,127.50
Other Current Assets	
Prepaid Water Fees	9,127.50
Total Other Current Assets	9,127.50
Total Current Assets	274,023.78
TOTAL ASSETS	**274,023.78**
LIABILITIES & EQUITY	
Equity	
Opening Balance Equity	194,668.91
Unrestricted Net Assets	54,255.97
Net Income	25,098.90
Total Equity	274,023.78
TOTAL LIABILITIES & EQUITY	**274,023.78**

Ranchview County Water District
Profit & Loss
December 2018

	Dec 18
Ordinary Income/Expense	
Income	
Association Dues	9,288.00
Interest Income	508.80
Late Fees	35.00
Total Income	9,831.80
Gross Profit	9,831.80
Expense	
Accounting Fees	400.00
Bank Fees - ACH	2.00
Bank Fees - Credit Card	128.99
Insurance Expense	1,101.00
Reconciliation Discrepancies	41.30
Testing - Water	50.00
Utilities - Electricity	568.58
Utilities - Telephone	46.72
Water Well Management	1,419.32
Total Expense	3,757.91
Net Ordinary Income	6,073.89
Net Income	**6,073.89**

Ranchview County Water District
Profit & Loss
January through December 2018

	Jan - Dec 18
Ordinary Income/Expense	
Income	
Association Dues	55,754.00
Interest Income	2,577.63
Late Fees	280.50
Total Income	58,612.13
Gross Profit	58,612.13
Expense	
Accounting Fees	4,450.00
Advertising and Promotion	85.38
Bank Fees - ACH	62.25
Bank Fees - Credit Card	907.88
Business Licenses and Permits	35.00
charity	25.00
Computer and Internet Expenses	172.26
Insurance Expense	2,479.00
office Supplies	124.27
Postage and Delivery	474.04
Printing and Copying	411.37
Professional Fees	1,241.70
Reconciliation Discrepancies	-1,508.40
Testing - Water	469.50
Utilities - Electricity	12,027.00
Utilities - Telephone	555.17
Water Well Management	11,501.81
Total Expense	33,513.23
Net Ordinary Income	25,098.90
Net Income	**25,098.90**

Ranchview County Water District
Profit & Loss
January through December 2018

	Jan 18	Feb 18	Mar 18	Apr 18	May 18	Jun 18
Ordinary Income/Expense						
Income						
Association Dues	6,285.00	3,854.50	4,470.00	3,970.00	5,560.00	2,460.00
Interest Income	7.29	6.61	7.59	7.18	8.77	9.27
Late Fees	15.00	105.50	25.00	5.00	15.00	15.00
Total Income	6,307.29	3,966.61	4,502.59	3,982.18	5,583.77	2,484.27
Gross Profit	6,307.29	3,966.61	4,502.59	3,982.18	5,583.77	2,484.27
Expense						
Accounting Fees	350.00	350.00	350.00	350.00	350.00	350.00
Advertising and Promotion	0.00	0.00	0.00	0.00	0.00	0.00
Bank Fees - ACH	1.00	1.50	1.50	1.00	2.25	91.50
Bank Fees - Credit Card	88.99	68.99	68.99	68.99	68.99	68.99
Business Licenses and Permits	0.00	0.00	0.00	35.00	0.00	0.00
charity	0.00	0.00	0.00	0.00	0.00	0.00
Computer and Internet Expenses	0.00	0.00	0.00	0.00	0.00	0.00
Insurance Expense	0.00	0.00	0.00	0.00	0.00	0.00
office Supplies	11.29	0.00	0.00	112.98	0.00	0.00
Postage and Delivery	111.00	0.00	84.99	0.00	0.00	71.77
Printing and Copying	0.00	0.00	0.00	25.89	25.68	0.00
Professional Fees	0.00	0.00	0.00	45.00	45.00	112.50
Reconciliation Discrepancies	0.00	0.00	0.00	0.30	0.00	0.00
Testing - Water	0.00	0.00	0.00	19.50	41.50	70.50
Utilities - Electricity	570.15	664.74	532.04	621.79	674.96	882.86
Utilities - Telephone	92.02	46.04	0.00	46.04	45.95	45.95
Water Well Management	612.50	745.92	722.50	495.00	530.00	630.00
Total Expense	1,836.95	1,877.19	1,760.02	1,821.49	1,784.33	2,324.07
Net Ordinary Income	4,470.34	2,089.42	2,742.57	2,160.69	3,799.44	160.20
Net Income	**4,470.34**	**2,089.42**	**2,742.57**	**2,160.69**	**3,799.44**	**160.20**

Ranchview County Water District
Profit & Loss
January through December 2018

	Jul 18	Aug 18	Sep 18	Oct 18	Nov 18	Dec 18
Ordinary Income/Expense						
Income						
Association Dues	5,452.00	3,080.00	3,270.00	3,815.00	4,249.50	9,288.00
Interest Income	8.99	10.18	8.19	1,984.21	10.55	508.80
Late Fees	20.00	0.00	0.00	15.00	30.00	35.00
Total Income	5,480.99	3,090.18	3,278.19	5,814.21	4,290.05	9,831.80
Gross Profit	5,480.99	3,090.18	3,278.19	5,814.21	4,290.05	9,831.80
Expense						
Accounting Fees	350.00	400.00	400.00	400.00	400.00	400.00
Advertising and Promotion	85.38	0.00	0.00	0.00	0.00	0.00
Bank Fees - ACH	-43.50	1.50	1.25	0.75	1.50	2.00
Bank Fees - Credit Card	68.99	68.99	68.99	68.99	68.99	128.99
Business Licenses and Permits	0.00	0.00	0.00	0.00	0.00	0.00
charity	0.00	25.00	0.00	0.00	0.00	0.00
Computer and Internet Expenses	0.00	0.00	172.26	0.00	0.00	0.00
Insurance Expense	0.00	0.00	0.00	1,378.00	0.00	1,101.00
office Supplies	0.00	0.00	0.00	0.00	0.00	0.00
Postage and Delivery	100.00	0.00	0.00	0.00	106.28	0.00
Printing and Copying	107.80	0.00	0.00	0.00	252.00	0.00
Professional Fees	926.70	112.50	0.00	0.00	0.00	0.00
Reconciliation Discrepancies	0.00	0.00	-1,550.00	0.00	0.00	41.30
Testing - Water	0.00	0.00	0.00	236.00	52.00	50.00
Utilities - Electricity	1,457.31	1,620.25	1,692.88	1,560.19	1,181.25	568.58
Utilities - Telephone	45.95	46.74	46.52	46.52	46.72	46.72
Water Well Management	960.00	3,099.81	992.76	390.00	904.00	1,419.32
Total Expense	4,058.63	5,374.79	1,824.66	4,080.45	3,012.74	3,757.91
Net Ordinary Income	1,422.36	-2,284.61	1,453.53	1,733.76	1,277.31	6,073.89
Net Income	**1,422.36**	**-2,284.61**	**1,453.53**	**1,733.76**	**1,277.31**	**6,073.89**

Ranchview County Water District
Profit & Loss
January through December 2018

	TOTAL
Ordinary Income/Expense	
Income	
Association Dues	55,754.00
Interest Income	2,577.63
Late Fees	280.50
Total Income	58,612.13
Gross Profit	58,612.13
Expense	
Accounting Fees	4,450.00
Advertising and Promotion	85.38
Bank Fees - ACH	62.25
Bank Fees - Credit Card	907.88
Business Licenses and Permits	35.00
charity	25.00
Computer and Internet Expenses	172.26
Insurance Expense	2,479.00
office Supplies	124.27
Postage and Delivery	474.04
Printing and Copying	411.37
Professional Fees	1,241.70
Reconciliation Discrepancies	-1,508.40
Testing - Water	469.50
Utilities - Electricity	12,027.00
Utilities - Telephone	555.17
Water Well Management	11,501.81
Total Expense	33,513.23
Net Ordinary Income	25,098.90
Net Income	**25,098.90**

Ranchview County Water District
Profit & Loss
December 2017 through December 2018

	Dec 17	Jan 18	Feb 18	Mar 18	Apr 18	May 18
Ordinary Income/Expense						
Income						
Association Dues	9,470.00	6,285.00	3,854.50	4,470.00	3,970.00	5,560.00
Interest Income	505.26	7.29	6.61	7.59	7.18	8.77
Late Fees	15.00	15.00	105.50	25.00	5.00	15.00
Total Income	9,990.26	6,307.29	3,966.61	4,502.59	3,982.18	5,583.77
Gross Profit	9,990.26	6,307.29	3,966.61	4,502.59	3,982.18	5,583.77
Expense						
Accounting Fees	350.00	350.00	350.00	350.00	350.00	350.00
Advertising and Promotion	0.00	0.00	0.00	0.00	0.00	0.00
Bank Fees - ACH	1.50	1.00	1.50	1.50	1.00	2.25
Bank Fees - Credit Card	68.99	88.99	68.99	68.99	68.99	68.99
Business Licenses and Permits	0.00	0.00	0.00	0.00	35.00	0.00
charity	0.00	0.00	0.00	0.00	0.00	0.00
Computer and Internet Expenses	0.00	0.00	0.00	0.00	0.00	0.00
Insurance Expense	0.00	0.00	0.00	0.00	0.00	0.00
office Supplies	0.00	11.29	0.00	0.00	112.98	0.00
Postage and Delivery	0.00	111.00	0.00	84.99	0.00	0.00
Printing and Copying	0.00	0.00	0.00	0.00	25.89	25.68
Professional Fees	0.00	0.00	0.00	0.00	45.00	45.00
Reconciliation Discrepancies	0.00	0.00	0.00	0.00	0.30	0.00
Testing - Water	44.00	0.00	0.00	0.00	19.50	41.50
Utilities - Electricity	342.72	570.15	664.74	532.04	621.79	674.96
Utilities - Telephone	162.94	92.02	46.04	0.00	46.04	45.95
Water Well Management	1,198.34	612.50	745.92	722.50	495.00	530.00
Total Expense	2,168.49	1,836.95	1,877.19	1,760.02	1,821.49	1,784.33
Net Ordinary Income	7,821.77	4,470.34	2,089.42	2,742.57	2,160.69	3,799.44
Net Income	**7,821.77**	**4,470.34**	**2,089.42**	**2,742.57**	**2,160.69**	**3,799.44**

Ranchview County Water District
Profit & Loss
December 2017 through December 2018

	Jun 18	Jul 18	Aug 18	Sep 18	Oct 18	Nov 18
Ordinary Income/Expense						
Income						
Association Dues	2,460.00	5,452.00	3,080.00	3,270.00	3,815.00	4,249.50
Interest Income	9.27	8.99	10.18	8.19	1,984.21	10.55
Late Fees	15.00	20.00	0.00	0.00	15.00	30.00
Total Income	2,484.27	5,480.99	3,090.18	3,278.19	5,814.21	4,290.05
Gross Profit	2,484.27	5,480.99	3,090.18	3,278.19	5,814.21	4,290.05
Expense						
Accounting Fees	350.00	350.00	400.00	400.00	400.00	400.00
Advertising and Promotion	0.00	85.38	0.00	0.00	0.00	0.00
Bank Fees - ACH	91.50	-43.50	1.50	1.25	0.75	1.50
Bank Fees - Credit Card	68.99	68.99	68.99	68.99	68.99	68.99
Business Licenses and Permits	0.00	0.00	0.00	0.00	0.00	0.00
charity	0.00	0.00	25.00	0.00	0.00	0.00
Computer and Internet Expenses	0.00	0.00	0.00	172.26	0.00	0.00
Insurance Expense	0.00	0.00	0.00	0.00	1,378.00	0.00
office Supplies	0.00	0.00	0.00	0.00	0.00	0.00
Postage and Delivery	71.77	100.00	0.00	0.00	0.00	106.28
Printing and Copying	0.00	107.80	0.00	0.00	0.00	252.00
Professional Fees	112.50	926.70	112.50	0.00	0.00	0.00
Reconciliation Discrepancies	0.00	0.00	0.00	-1,550.00	0.00	0.00
Testing - Water	70.50	0.00	0.00	0.00	236.00	52.00
Utilities - Electricity	882.86	1,457.31	1,620.25	1,692.88	1,560.19	1,181.25
Utilities - Telephone	45.95	45.95	46.74	46.52	46.52	46.72
Water Well Management	630.00	960.00	3,099.81	992.76	390.00	904.00
Total Expense	2,324.07	4,058.63	5,374.79	1,824.66	4,080.45	3,012.74
Net Ordinary Income	160.20	1,422.36	-2,284.61	1,453.53	1,733.76	1,277.31
Net Income	**160.20**	**1,422.36**	**-2,284.61**	**1,453.53**	**1,733.76**	**1,277.31**

Ranchview County Water District
Profit & Loss
December 2017 through December 2018

	Dec 18	TOTAL
Ordinary Income/Expense		
Income		
Association Dues	9,288.00	65,224.00
Interest Income	508.80	3,082.89
Late Fees	35.00	295.50
Total Income	9,831.80	68,602.39
Gross Profit	9,831.80	68,602.39
Expense		
Accounting Fees	400.00	4,800.00
Advertising and Promotion	0.00	85.38
Bank Fees - ACH	2.00	63.75
Bank Fees - Credit Card	128.99	976.87
Business Licenses and Permits	0.00	35.00
charity	0.00	25.00
Computer and Internet Expenses	0.00	172.26
Insurance Expense	1,101.00	2,479.00
office Supplies	0.00	124.27
Postage and Delivery	0.00	474.04
Printing and Copying	0.00	411.37
Professional Fees	0.00	1,241.70
Reconciliation Discrepancies	41.30	-1,508.40
Testing - Water	50.00	513.50
Utilities - Electricity	568.58	12,369.72
Utilities - Telephone	46.72	718.11
Water Well Management	1,419.32	12,700.15
Total Expense	3,757.91	35,681.72
Net Ordinary Income	6,073.89	32,920.67
Net Income	**6,073.89**	**32,920.67**

Ranchview County Water District
Expenses by Vendor Detail
December 16, 2018 through January 9, 2019

Type	Date	Num	Memo	Account	Clr	Split	Amount	Balance
Century Link								
Check	01/09/2019	online	12132018	Utilities - Telephone		Valley Bank - ...	46.72	46.72
Total Century Link							46.72	46.72
Christie Killeen								
Check	01/09/2019	267	bookkeeper fee	Accounting Fees		Valley Bank - ...	400.00	400.00
Total Christie Killeen							400.00	400.00
Integrated Water Inc								
Check	01/09/2019	268	914710	Water Well Manage...		Valley Bank - ...	525.00	525.00
Total Integrated Water Inc							525.00	525.00
Northwestern Energy								
Check	01/09/2019	auto	12192018	Utilities - Electricity		Valley Bank - ...	550.45	550.45
Total Northwestern Energy							550.45	550.45
USPS								
Check	01/09/2019	269	Post Office B...	Postage and Delivery		Valley Bank - ...	62.00	62.00
Total USPS							62.00	62.00
TOTAL							**1,584.17**	**1,584.17**

Ranchview County Water District
Reconciliation Summary
Valley Bank - Bus Millenium Mkt, Period Ending 12/31/2018

	Dec 31, 18	
Beginning Balance		99,406.87
Cleared Transactions		
Deposits and Credits - 1 item	9.48	
Total Cleared Transactions	9.48	
Cleared Balance		**99,416.35**
Register Balance as of 12/31/2018		99,416.35
Ending Balance		99,416.35

Ranchview County Water District
Reconciliation Summary
Valley Bank - Checking, Period Ending 12/31/2018

	Dec 31, 18	
Beginning Balance		11,538.48
Cleared Transactions		
Checks and Payments - 12 items	-3,856.61	
Deposits and Credits - 61 items	6,177.59	
Total Cleared Transactions	2,320.98	
Cleared Balance		13,859.46
Uncleared Transactions		
Deposits and Credits - 31 items	3,270.00	
Total Uncleared Transactions	3,270.00	
Register Balance as of 12/31/2018		17,129.46
New Transactions		
Checks and Payments - 5 items	-1,584.17	
Total New Transactions	-1,584.17	
Ending Balance		15,545.29

Ranchview County Water District
Reconciliation Summary
Farm Bureau Financial Services, Period Ending 12/31/2018

	Dec 31, 18	
Beginning Balance		156,972.00
Cleared Transactions		
Deposits and Credits - 4 items	505.97	
Total Cleared Transactions	505.97	
Cleared Balance		**157,477.97**
Register Balance as of 12/31/2018		157,477.97
Ending Balance		157,477.97

RANCHVIEW ESTATES WATER USERS ASSN.
P.O. BOX 9732, HELENA, MT 59604
M E M O R A N D U M

emailed 1/12/20

January 12, 2020

TO: Ranchview County Water District – Board of Directors

FROM: Christie Killeen, Bookkeeper

SUBJECT: **DECEMBER** 2019 Month End Report

Attached are the Financials for **DECEMBER** 2019. Also included are the following reports.

Attached Reports:

Balance Sheet
Profit Loss for current month
Profit Loss Year to Date
Profit Loss month to month for current year
Profit Loss for last 12-month comparison
Expense Report for current bills
Bank Reconciliation (Valley Bank)
Bank Reconciliation (Farm Bureau Financial bi yearly)

Other Info.

New Homeowners
- None

Water Violations: None reported
- None

On-line payments for **DECEMBER- 23**

Website Hits for **DECEMBER** – 37 viewers, 60 sessions

Late Pays
Statements sent to the following:
1. Cory Lunde – 1215 Lariat - PAID
2. Quinton and Jill Nyman-PAID
3. Kathy Cochrane = Nov. Dec and late fees
4. David C. Larson – Dec and late fee
5. Clayton and Stacey Scotson – Nov 20. Dec and late fee
6. David and Susan Soule – Nov. Dec and late fee

Statement sent to above on 1/13. Late fees for December accessed on 1/12/20. Notices will be sent 1/30 if not paid.

If you have any questions, please call me at 461-6463

Ranchview County Water District
Balance Sheet
As of December 31, 2019

	Dec 31, 19
ASSETS	
Current Assets	
Checking/Savings	
Farm Bureau Financial Services	159,997.62
Valley Bank - Bus Millenium Mkt	99,535.71
Valley Bank - Checking	29,443.98
Total Checking/Savings	288,977.31
Accounts Receivable	
Accounts Receivable	-6,290.00
Total Accounts Receivable	-6,290.00
Other Current Assets	
Prepaid Water Fees	6,290.00
Total Other Current Assets	6,290.00
Total Current Assets	288,977.31
TOTAL ASSETS	**288,977.31**
LIABILITIES & EQUITY	
Equity	
Opening Balance Equity	194,668.91
Unrestricted Net Assets	81,495.45
Net Income	12,812.95
Total Equity	288,977.31
TOTAL LIABILITIES & EQUITY	**288,977.31**

Ranchview County Water District
Profit & Loss
December 2019

	Dec 19
Ordinary Income/Expense	
Income	
Association Dues	7,070.00
Interest Income	524.09
Late Fees	45.00
Total Income	7,639.09
Gross Profit	7,639.09
Expense	
Accounting Fees	400.00
Bank Fees - ACH	1.00
Bank Fees - Credit Card	68.99
Postage and Delivery	174.00
Printing and Copying	230.00
Testing - Water	24.00
Utilities - Electricity	375.78
Utilities - Telephone	49.32
Total Expense	1,323.09
Net Ordinary Income	6,316.00
Net Income	**6,316.00**

Ranchview County Water District
Profit & Loss
January through December 2019

	Jan - Dec 19
Ordinary Income/Expense	
Income	
Association Dues	52,795.50
Interest Income	635.92
Late Fees	755.00
Total Income	54,186.42
Gross Profit	54,186.42
Expense	
Accounting Fees	4,800.00
Bank Fees - ACH	169.74
Bank Fees - Credit Card	887.88
Insurance Expense	2,567.00
office Supplies	450.83
Postage and Delivery	313.00
Printing and Copying	445.00
Professional Fees	277.50
Reconciliation Discrepancies	1,625.00
Testing - Water	444.00
Utilities - Electricity	9,929.68
Utilities - Telephone	568.79
Water Well Management	18,895.05
Total Expense	41,373.47
Net Ordinary Income	12,812.95
Net Income	**12,812.95**

Ranchview County Water District
Profit & Loss
December 2018 through December 2019

	Dec 18	Jan 19	Feb 19	Mar 19	Apr 19	May 19	Jun 19
Ordinary Income/Expense							
Income							
Association Dues	9,288.00	6,247.00	3,295.00	4,510.00	5,030.00	3,254.00	5,220.00
Interest Income	508.80	10.29	9.33	10.35	10.02	11.04	9.39
Late Fees	35.00	135.00	30.00	45.00	165.00	30.00	20.00
Total Income	9,831.80	6,392.29	3,334.33	4,565.35	5,205.02	3,295.04	5,249.39
Gross Profit	9,831.80	6,392.29	3,334.33	4,565.35	5,205.02	3,295.04	5,249.39
Expense							
Accounting Fees	400.00	400.00	400.00	400.00	400.00	400.00	400.00
Bank Fees - ACH	2.00	26.25	51.75	80.74	0.75	1.75	1.00
Bank Fees - Credit Card	128.99	88.99	68.99	68.99	68.99	68.99	68.99
Insurance Expense	1,101.00	0.00	0.00	0.00	0.00	0.00	0.00
office Supplies	0.00	0.00	0.00	102.98	219.95	12.29	0.00
Postage and Delivery	0.00	84.00	0.00	0.00	0.00	0.00	0.00
Printing and Copying	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Professional Fees	0.00	0.00	225.00	22.50	0.00	30.00	0.00
Reconciliation Discrepancies	1,078.26	75.00	0.00	0.00	1,550.00	0.00	0.00
Testing - Water	50.00	46.00	20.00	0.00	0.00	0.00	0.00
Utilities - Electricity	568.58	550.45	220.72	587.27	531.49	538.01	682.59
Utilities - Telephone	-45.24	46.72	46.71	46.71	46.71	46.60	46.60
Water Well Management	1,419.32	465.00	0.00	550.00	1,973.00	580.00	8,979.68
Total Expense	4,702.91	1,782.41	1,033.17	1,859.19	4,790.89	1,677.64	10,178.86
Net Ordinary Income	5,128.89	4,609.88	2,301.16	2,706.16	414.13	1,617.40	-4,929.47
Net Income	**5,128.89**	**4,609.88**	**2,301.16**	**2,706.16**	**414.13**	**1,617.40**	**-4,929.47**

Ranchview County Water District
Profit & Loss
December 2018 through December 2019

	Jul 19	Aug 19	Sep 19	Oct 19	Nov 19	Dec 19	TOTAL
Ordinary Income/Expense							
Income							
Association Dues	4,762.00	3,047.50	3,255.00	3,650.00	3,455.00	7,070.00	62,083.50
Interest Income	10.35	11.02	9.35	10.35	10.34	524.09	1,144.72
Late Fees	110.00	0.00	110.00	40.00	25.00	45.00	790.00
Total Income	4,882.35	3,058.52	3,374.35	3,700.35	3,490.34	7,639.09	64,018.22
Gross Profit	4,882.35	3,058.52	3,374.35	3,700.35	3,490.34	7,639.09	64,018.22
Expense							
Accounting Fees	400.00	400.00	400.00	400.00	400.00	400.00	5,200.00
Bank Fees - ACH	1.25	1.25	1.00	1.50	1.50	1.00	171.74
Bank Fees - Credit Card	68.99	108.99	68.99	68.99	68.99	68.99	1,016.87
Insurance Expense	0.00	0.00	0.00	2,567.00	0.00	0.00	3,668.00
office Supplies	14.83	25.28	0.00	75.50	0.00	0.00	450.83
Postage and Delivery	55.00	0.00	0.00	0.00	0.00	174.00	313.00
Printing and Copying	215.00	0.00	0.00	0.00	0.00	230.00	445.00
Professional Fees	0.00	0.00	0.00	0.00	0.00	0.00	277.50
Reconciliation Discrepancies	0.00	0.00	0.00	0.00	0.00	0.00	2,703.26
Testing - Water	26.00	50.00	256.00	22.00	0.00	24.00	494.00
Utilities - Electricity	1,491.51	1,469.07	1,500.35	1,303.31	679.13	375.78	10,498.26
Utilities - Telephone	46.60	47.12	47.12	49.26	49.32	49.32	523.55
Water Well Management	540.00	0.00	3,912.56	488.03	1,406.78	0.00	20,314.37
Total Expense	2,859.18	2,101.71	6,186.02	4,975.59	2,605.72	1,323.09	46,076.38
Net Ordinary Income	2,023.17	956.81	-2,811.67	-1,275.24	884.62	6,316.00	17,941.84
Net Income	**2,023.17**	**956.81**	**-2,811.67**	**-1,275.24**	**884.62**	**6,316.00**	**17,941.84**

Ranchview County Water District
Expenses by Vendor Detail
December 16, 2019 through January 15, 2020

Type	Date	Num	Memo	Account	Clr	Split	Amount	Balance
ACH Montly Invoice								
Check	12/30/2019	atuo	bank fee for o...	Bank Fees - ACH		Valley Bank - ...	1.00	1.00
Total ACH Montly Invoice							1.00	1.00
Century Link								
Check	01/03/2020	ONLINE	12132019	Utilities - Telephone		Valley Bank - ...	49.32	49.32
Total Century Link							49.32	49.32
Christie Killeen								
Check	01/01/2020	317	Jan 2020	Accounting Fees		Valley Bank - ...	400.00	400.00
Total Christie Killeen							400.00	400.00
Integrated Water Inc								
Check	01/08/2020	318	915388	Water Well Manage...		Valley Bank - ...	490.00	490.00
Check	01/08/2020	319	915341, 915300	Water Well Manage...		Valley Bank - ...	1,130.00	1,620.00
Total Integrated Water Inc							1,620.00	1,620.00
Northwestern Energy								
Check	01/06/2020	auto	12192019	Utilities - Electricity		Valley Bank - ...	373.55	373.55
Total Northwestern Energy							373.55	373.55
TransFirst LLC								
Check	12/30/2019	auto	bank fee for w...	Bank Fees - Credit ...		Valley Bank - ...	68.99	68.99
Total TransFirst LLC							68.99	68.99
TOTAL							**2,512.86**	**2,512.86**

Ranchview County Water District
Reconciliation Summary
Valley Bank - Bus Millenium Mkt, Period Ending 12/31/2019

	Dec 31, 19	
Beginning Balance		99,525.90
Cleared Transactions		
Deposits and Credits - 1 item	9.81	
Total Cleared Transactions		9.81
Cleared Balance		**99,535.71**
Register Balance as of 12/31/2019		99,535.71
Ending Balance		99,535.71

Ranchview County Water District
Reconciliation Summary
Valley Bank - Checking, Period Ending 12/31/2019

	Dec 31, 19	
Beginning Balance		23,516.86
Cleared Transactions		
Checks and Payments - 10 items	-1,723.09	
Deposits and Credits - 69 items	7,205.21	
Total Cleared Transactions	5,482.12	
Cleared Balance		**28,998.98**
Uncleared Transactions		
Deposits and Credits - 1 item	45.00	
Total Uncleared Transactions	45.00	
Register Balance as of 12/31/2019		**29,043.98**
New Transactions		
Checks and Payments - 2 items	-863.55	
Deposits and Credits - 25 items	3,780.00	
Total New Transactions	2,916.45	
Ending Balance		**31,960.43**

Ranchview County Water District
Reconciliation Summary
Farm Bureau Financial Services, Period Ending 11/18/2019

	Nov 18, 19	
Beginning Balance		159,483.55
Cleared Transactions		
Deposits and Credits - 1 item	514.07	
Total Cleared Transactions	514.07	
Cleared Balance		**159,997.62**
Register Balance as of 11/18/2019		159,997.62
Ending Balance		159,997.62

Ranchview County Water District
Expenses by Vendor Detail
December 16, 2019 through January 13, 2020

Type	Date	Num	Memo	Account	Clr	Split	Amount	Balance
ACH Montly Invoice								
Check	12/30/2019	atuo	bank fee for o...	Bank Fees - ACH		Valley Bank - ...	1.00	1.00
Total ACH Montly Invoice							1.00	1.00
Century Link								
Check	01/03/2020	ONLINE	12132019	Utilities - Telephone		Valley Bank - ...	49.32	49.32
Total Century Link							49.32	49.32
Christie Killeen								
Check	01/01/2020	317	Jan 2020	Accounting Fees		Valley Bank - ...	400.00	400.00
Total Christie Killeen							400.00	400.00
Dept of Health and Human Services								
Check	01/12/2020	320	18789	Testing - Water		Valley Bank - ...	24.00	24.00
Total Dept of Health and Human Services							24.00	24.00
Integrated Water Inc								
Check	01/08/2020	318	915388	Water Well Manage...		Valley Bank - ...	490.00	490.00
Check	01/08/2020	319	915341, 915300	Water Well Manage...		Valley Bank - ...	1,130.00	1,620.00
Total Integrated Water Inc							1,620.00	1,620.00
Northwestern Energy								
Check	01/06/2020	auto	12192019	Utilities - Electricity		Valley Bank - ...	373.55	373.55
Total Northwestern Energy							373.55	373.55
TransFirst LLC								
Check	12/30/2019	auto	bank fee for w...	Bank Fees - Credit ...		Valley Bank - ...	68.99	68.99
Total TransFirst LLC							68.99	68.99
TOTAL							**2,536.86**	**2,536.86**

Appendix S

Operations Information

RANCH VIEW MAINTENANCE

	WEST WELL (1)	EAST WELL (2)	IRR WELL	PUMP HOUSE
2018	10/26/18- Pulled pump and replace 3 lines	7/18/19- Pulled well found holes in pipes, replaced 3 sticks		1/5/18- Blown fuse on pump 1 control panne, replaced
				2/25/18- pump 1 tripped, reset
				6/11/18- irrigation VFD over voltage fault, reset
				6/22/18- reset heater coil on domestic well after alarm
				7/2/18- reset on well 1
				8/7/18- Install new mag starter pump 1
2019	6/14/19- New pump and motor		7/19/19- Replace pump and motor and 2 sticks	5/31/19- Wire in new irrigation pump
				7/15/2019- Adjust irrigation VFD
				10/28/19- Domestic pressure tank replaced

nw pipe is supplier

Notes from Intetraged Water Invoices - Non Typical work descriptions
Repeated problems or trends highlighted

Date	Description
10/28/2019	Replace pressure tank.
8/17/2019	Birds on power line disrupted power
6/14/2019	Furnish/Install Potable Pump
6/10/2019	Furnish/Install Irrigation Pump. Replaced Galvanized Drop Piping.
2/9/2019	Emergency call for low heat.
10/26/2018	Pulled pump and replaced lines. (Irrigation Well?)
9/30/2018	Found holes in well riser pipe. (Well # ?)
8/7/2018	Replace new starter on potable pump
7/2/2018	Reset emergency potable well
6/11/2019	Reset irrigation well #2 pump VFD with over-voltage fault.
4/29/2018	No pressure on potable response
2/10/2018	Low temperature in building alarm response
1/5/2018	Potable pump tripeed on. Found bad fuse on pump
12/21/2017	Low Temperature Alarm
11/1/2017	Repaired broken pipe to well #1 (Potable)
10/31/2017	Broken waterline inside pump house. Pressure switch replaced.
8/15/2017	NWE powerline work.
8/9/2017	Power outage. Birds on line.
8/2/2017	Two blown fuse lines. NWE called for repairs.
4/22/2017	Power outage. Reset pumps
7/18/2016	Power outage - After hours
6/17/2016	Water outage and resetting of drives
Jul-Aug (2016)	Major Irrigation Well #2 Retrofits: Hydrometrics Video'd Well, Okeefe Drilling "Airbusted", Wall Screenings Area, New 20 HP Pump, Replaced 40 HP Pump
11/6/2014	Fabricate and Install new domestic manifold & piping
7/29/2014	Re-install static measuring tube
7/14/2014	Remove and replace defective well clap
6/30/2014	Remove and replace 40 hp motor on irrigation pump
5/23/2014	Repair VFD problems
4/4/2014	Repaired electrical conduit on the nort irrigation well. Also pulled the pump on the new irrigation well & ordered a new pump
2/19/2014	Reset pumps after power outage
1/22/2014	Repaired the flush out pipe on the domestic side
12/6/2013	Removed old pressure tank
8/26/2013	Respond to power outage
5/6/2013	Respond to low level alarm & turn on back up well
4/17/2013	Reset VED after power outage

RANCH VIEW SAMPLING SCHEDULE AND COST

SAMPLE	SAMPLE FREQUENCY	SAMPLED BY	COST (2019 PRICE)	
			STATE LABS	ENERGY LABS
NITRATE NITRITE	YEARLY	12/31/2020	$26	$25
ARSENIC	EVERY 3 YEARS	12/31/2022	$25	$25
PHASE 2-5 INORGANICS	EVERY 3 YEARS	12/31/2022	$174	$100 (ARSENIC INCLUDED)
SYNTHETIC ORGANIC COMPOUNDS REGULATED	EVERY 3 YEARS	12/31/2022	> $1000	> $785
VOLATILE ORGANIC COMPOUNDS	EVERY 3 YEARS	12/31/2022	$168	$130
RAD GROSS ALPHA	EVERY 6 YEARS	12/31/2022	$90	$75
RADIUMS COMBINED	EVERY 9 YEARS	12/31/2025	$191	NOT AVAILABLE
NEW SAMPLES PER LETTER	EVERY 9 YEARS	12/31/2022	NOT AVAILABLE	> $1000

Montana Department of Environmental Quality
Small System Sample Siting Plan
For systems taking 40 or fewer routine bacteria samples per month

Revised Total Coliform Rule: Sample Site Plan

System Name: _____Ranchview Estates_____ PWSID: MT_____3782_____

Contact Name: _____Integrated Water, Inc._____ Phone Number: _____442-2949_____

A. Routine and Repeat Sample Locations

Routine Sample Sites Location/Address	**Repeat** Sample Sites Location/Address
X1. 1220 Angus, Helena, MT	1-1. 1220 Angus
	1-2. 1245 Angus
	1-3. 1335 Angus
	Alternate site location: Pumphouse
X2. 1245 Angus	2-1. 1245 Angus
	2-2. 1335 Angus
	2-3. 5825 Winter Wheat
	Alternate site location: Pumphouse
X3.1335 Angus	3-1. 1335 Angus
	3-2. 1245 Angus
	3-3. 1370 Ranchview
	Alternate site location:Pumphouse
X4.1370 Ranchview	4-1. 1370 Ranchview
	4-2. 1245 Angus
	4-3. 1370 Ranchview
	Alternate site location: Pumphouse
X5. Pumphouse	5-1. Pumphouse
	5-2. 1245 Angus
	5-3. 5825 Winter Wheat
	Alternate site location: Pumphouse

If the number of Routine samples needed to cover the distribution system requires more than five Routine sites, attach additional sheets as needed.

Routine Sample Rotation Schedule

Month	Routine Site(s)	Month	Routine Site(s)
January	1220 Angus	July	1245 Angus
February	1245 Angus	August	1335 Angus
March	1335 Angus	September	1370 Ranchview
April	1370 Ranchview	October	Pumphouse
May	Pumphouse	November	1220 Angus
June	1220 Angus	December	1245 Angus

B. System Map

- Please attach a map of this public water supply that **identifies** water system facilities (sources, storage, treatment, distribution and pressure zones) and sample point locations.

C. Guidelines for Sample Site Selection

Minimum Routine Sample Sites	
Service Connections	Samples Sites
1	1
2 to 10	2
11 to 100	3
101 to 500	4
501 ≤	5

- Plumbing should be inspected to ensure no cross-connection with non-potable water sources exist
- The sampling tap should be free of any aerators, strainers, hoses or water treatment devices
- Leaking taps that allow water to flow over the outside of the tap should be avoided
- Outside taps, swivel taps and combined hot and cold water faucets should be avoided.
- Routine sample sites should be accessible daily and throughout the entire year
- No routine sample site may be the last service connection from any dead end of the water distribution system
- Select repeat sample site locations that would help you isolate the problem if one should occur. Repeat sample sites no longer have to be located within five service connections both upstream and downstream of each routine sample site
- Small systems may, if necessary, collect repeat samples at one or more of the other routine sample sites if they are located within five service connections of the original coliform-positive routine sample site

Please return to: DEQ Public Water Supply Program

Montana Department of Environmental Quality
Small System Sample Siting Plan
For systems taking 40 or fewer routine bacteria samples per month

ATTN: RTCR Rule Manager
PO Box 200901, Helena, MT 59620-09901

Or email to **DEQRTCRLEVEL12@mt.gov**

INTEGRATED
Water, Inc.

A Division of Wolfe Water Management, Inc.

Montana state-certified water and wastewater operation

3920 McHugh Lane
Helena, Montana 59602

TO: Ranchview Estates HOA Board
FROM: Lee Wolfe, Integrated Water, Inc.
DATE: August 6, 2015
RE: Clean out and retrofit of the #2 irrigation well

The Board asked Integrated Water to take steps to improve the production from Irrigation Well #2 and downsize the pump to prevent cavitation and frequent pump motor failures. Over the period since the well was drilled, water production has declined from 400 gallons per minute (gpm) to 116 gpm. The 40 horsepower (HP) pump in well #2 was restricted with a valve to moderate production and protect the pump from overheating. The system relied on the old well, known as Well #1, to supply a majority of water for irrigation. Well #1, which produces 286 gpm, supplied the water to irrigate while the work on well #2 progressed.

The first step was to pull the burned out motor and pump from well #2 and take advantage of remaining motor warranty. Our supplier promptly sent us a replacement motor which we stored in the Ranchview pump house for possible use if full original production was restored from well #2.

Hydrometrics Engineering made a video of the well and we consulted with their hydrogeologist regarding various options to restore volume. The Hydrometric Engineers recommended we contact O'Keefe Drilling and have the well "airbursted" in the screened area and then cleaned out with air to prevent sand introduction into the distribution system. O'Keefe Drilling airbursted the screened area and cleaned the well out. O'Keefe Drilling recommended pumping the well gradually out to the ground to develop the formation around the screen.

We dropped a 20 HP pump to 124 feet and installed a transducer at 112 feet and an electronic meter on the open discharge. The transducer measured the static level while the meter measured the volume during the developing of the well. The variable frequency drive (VFD) controlled the #2 well pump under normal running conditions as this well is the lead well and the well #1 would have to be shut down to run well #2 any other way. (A variable frequency

drive is a "smart" well motor drive unit that makes a pump vary its speed in response to pressure.) The valve on the discharge side of the meter was restricted to 80 pounds per square inch (psi) to match the maximum psi in the system. Well #2 was allowed to run to the ground for two days to cover the heavy watering and low watering cycles as dictated by the watering schedule. The attached graphs show both the static level and the pumping rate during the break in well service.

We pulled the meter and the transducer from Well #2 and installed the 20 HP pump and two new 21 foot sticks of four-inch drop pipe as existing drop pipe had a small hole and the other was badly pitted. The 20 HP pump was sized as indicated by the data from the two- day pump test and hung at 138 feet. An operating static level of 96 feet leaves 42 feet of water above the pump as a cushion to help prevent future cavitation.

We observed the pumping rate for several days during peak usage and measured static levels during that period to determine well stability. Under normal usage, well #2 produced 170 gpm at 78 psi, and maintained a 96 foot running static level. This is a 54 gpm increase over the 116 gpm the 40 HP pump was producing while it was malfunctioning. We adjusted the VFD on both wells to produce sufficient flow to maintain a constant 74 psi in the system during peak usage. Both wells now cycle off and on 3 times an hour as opposed to 16 times per hour before well rehabilitation. This adjustment will help the longevity of the pumps in both wells. Combined, the wells produce 456 gpm at 78 psi and 520 gpm at 68 psi. 68 psi and 78 psi trigger the 'on' and 'off' pressures in the VFD cycles.

The rehabilitation was a success, increasing the well output by 32% and maintaining constant pressure in the system during peak usage. The credit received from the warrantied 40 HP motor was $2,838.94 and the new 20 HP pump and motor cost $3,551.08. The difference of $712.14 is what the 20 HP pump actually cost Ranchview. The $2,838.94 is reflected on the invoice as a credit.



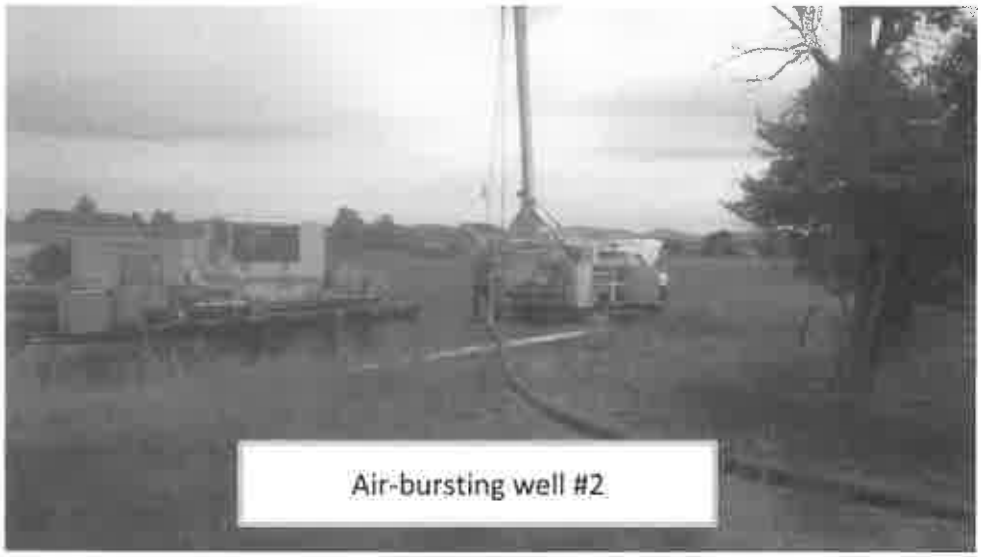
Installing new pump and pipe



New 20 HP pump



Badly-pitted pipe



Air-bursting well #2



Sand

Sand separator – during cleanout



Water meter on the wellhead during well development



Tripod and tent set up for video work

AirBurst Field Development Record Field Data

Contractor: O'Keefe Drilling Completion Date: 6/24/2015

Customer Name: Integrated Water Inc
Address: 3920 Mettugh Lane
City: Helena State: MT Zip: 59602
Contact Person: Lee Wolfe Title: President
Phone: 406-439-2487 Fax:

Well Identity:	Ranchview Estates #2	Well Diameter:	10 5/8"
Well Depth:	183'	Slot Size:	70
Static Level:	47'		
Casing Depth:	148'	Casing Diameter:	10"
Liner Depth:		Liner Diameter:	9 1/2"
Screen Depth:	152'-172'	Screen Diameter:	9 1/2"
Geo. Formation:		Screen Length:	20'

Well Performance Data - Prior to Airburst

Specific Cap:		Original Specific Cap:	
Pumping Rate:	180 GPM	Drawdown:	Sucking Air
Pumping Level:		Pump Setting:	

Well TV'd: YES: Date: 6/24/2015 NO:
Comments Well not keeping up with pump (40Hp - ?? GPM pump)
Beginning video and performance test by customer

Well Performance Data - *After* Airburst

Airgun Model:	5 1/2"	Ambient Temp:	
Chamber CU. IN:	80	New GPM:	
Operating PSI:	500-700-900	New SWL:	
Gas Source:		New PWL:	
Bursts Per Foot:	2	New DD:	
Bursts Per Minute:	2	New SC:	
Max Depth:	173'	Minimum Depth:	

Well TV'd YES Date NO
Comments Customer will provide after AirBurst performance test

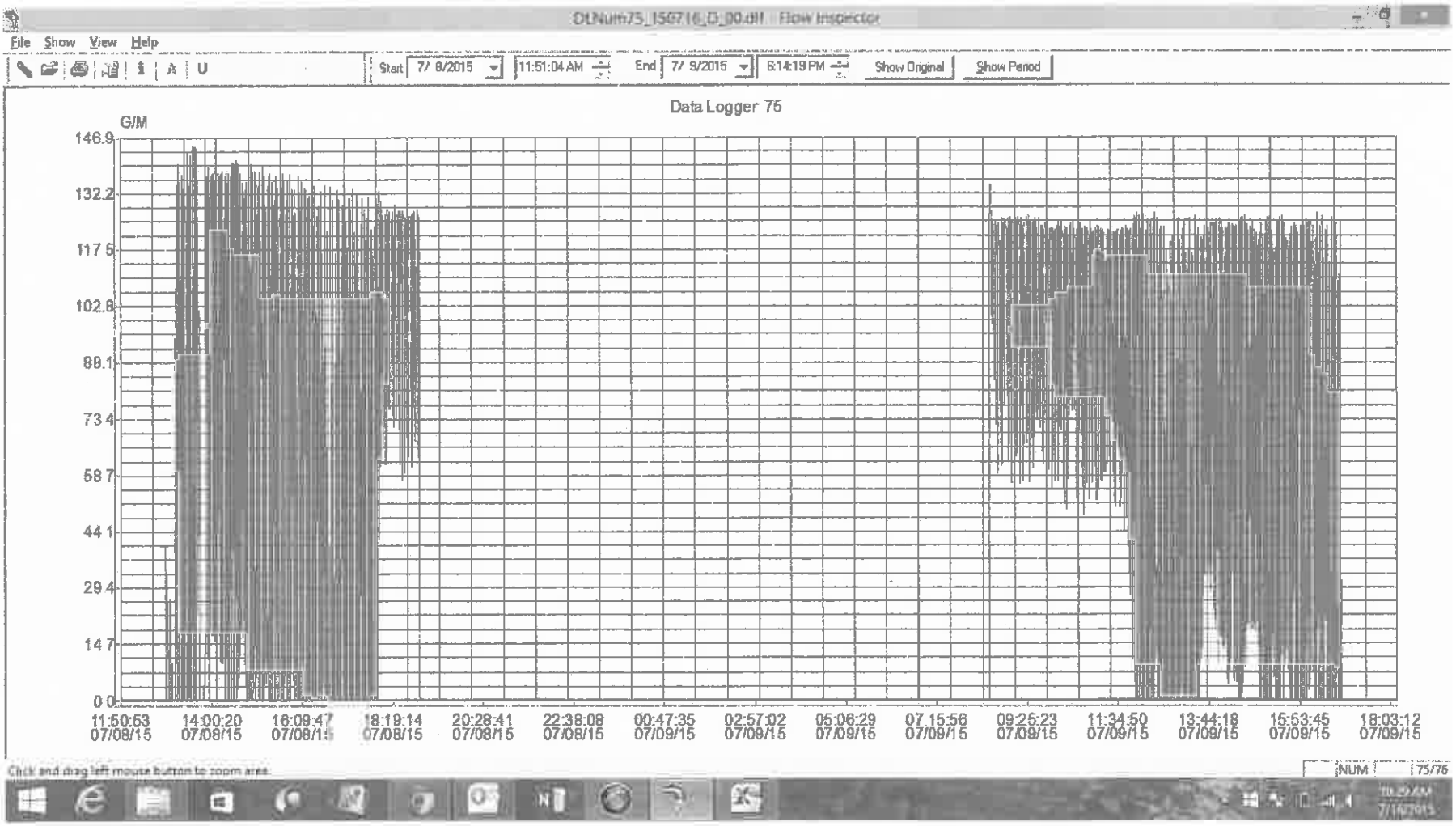
Submit to AirBurst Technology, LLC@ (262) 679-4620
Date Received:
wmcfrazier@netscape.net

2015

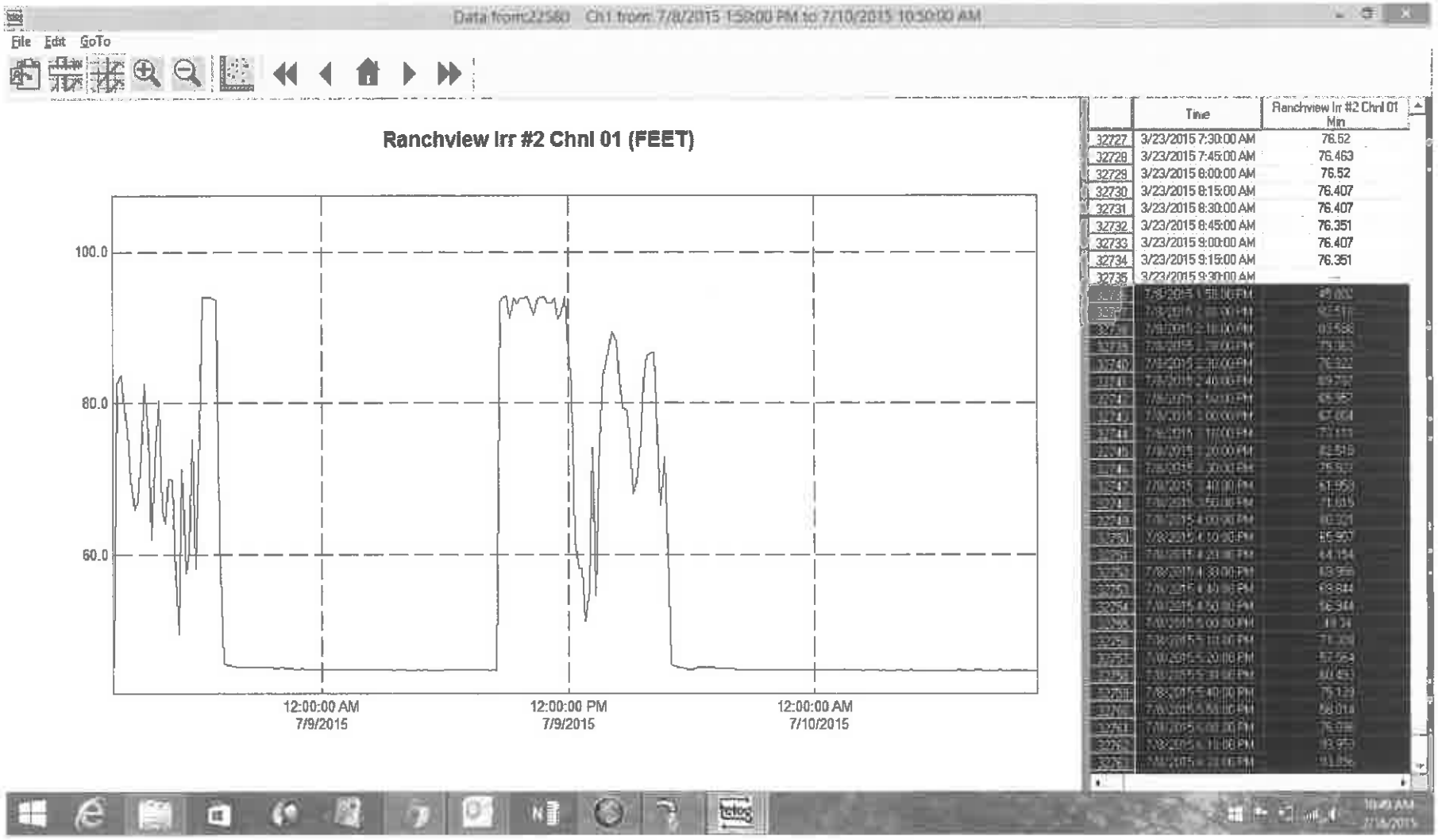
Graphs

O'Keefe Drilling data

INTEGRATED WATER, INC.



Well #2 GPM during development



Well #2 static levels during development

Appendix T

Nash Electric Proposal

NASH ELECTRIC

1821 MUNGER RD *CELL: 406-439-6274 EMAIL:NASHELECTRIC@GMAIL.COM*
HELENA MT 59602

09/09/2020

Ranchview HOA
All pricing is for budget purposes we will have to narrow scope for each task to get an exact price

IF EXISTING STARTERS ADPT

1. Potable water upgrades
   Install smart overloads on motor starters Symcom 777-HVR-P2 Budget number $1000.00 Each

   Lead Lag alternator relay will require the installation of lag pressure switch installation "by others". Budget number $1500.00

   w/ OLD STARTERS

   Hour and cycle meters installed in each motor starter Budget number $600.00 ea

2. Surge protection for building EATON SPD120480Y2KO 50k amps 480Y counter nema 4 enclosure with disconnect Budget number $2500.00

3. Datalogger for flowmeter Budget number $4000.00 for basic datalog
   Datalogger for flowmeter with pressure, hours, cycles, alarms, ect $7-10K

   & COM PLAN IN $10/MO

4. Non pot water VFD programming go through programming and verify proper control
5. Generator 35 KW industrial with 3r transfer switch natural gas $29,000.00 Budget - POT ONLY
   Generator 60 KW industrial with 3r transfer switch natural gas $42,000.00 Budget - POT + IRRIG.

6. VFD PROS 7.5 Hp Ct rated with transducer, installation, $2500.00 each
   - constant pressure control
   - saves energy
   - soft start soft stop
   - no water hammer
   - eliminates most of the pressure tanks

   VFD CONS
   Shortened motor life
   Future maintenance

   NEED A COUPLE PRESSURE TANKS - ELIMINATE AS THEY GO DOWN

Sincerely,

Jon Nash

Matthew Mudd

From: Jon Nash <nashelectric@gmail.com>
Sent: Tuesday, September 29, 2020 7:19 AM
To: Matthew Mudd
Subject: Re: Questions for Ranchview PER
Attachments: SPD120480Y2K.pdf

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

- Brief description of the installations actually done:
  - ie. there will be two new VFD's and a new pump control panel all to be placed on the east (or right) wall when you walk in…*Correct*
  - Lead lag programming, all touch screen, adjustable set points….alternating lead pumps to balance the run hours…? *Lead lag controls with hourmeters and cyclecounters I dont believe we are getting touchscreen at this point*

- Outdated and unused panels on the walls will be removed… *Correct*

- The installations will be installed per NEC standards…and others…? *NEC*

- The surge suppression/overload protection system will consist….[main features/specs/] *See attached spec sheet will be Nema 4 mounted outside next to switchgear and I will install a main breaker there to feed this unit*

- The new well No. 2 pump will be installed initially before the potable electrical and controls [verify] Will you help facilitate this? *Yes H & L drilling will be coming out in a couple weeks to test pump and determine best course of action*

- New flow meters will be installed and wired in…[It sounds like Marty is on Board to plumb these in] *We will also need Marty to tap water line for the new lag pressure switch*

I think the well needs figured out first and then we can do the rest

On Tue, Sep 29, 2020 at 6:00 AM Matthew Mudd <mmudd@greatwesteng.com> wrote:

> Hi Jon:
>
> For the PER text, that I am wrapping up, I need to beef up some of my language a bit on what is proposed for the electrical/control upgrades. Can you help with expanding the following explanations:
>
> - Brief description of the installations actually done:

    - ie. there will be two new VFD's and a new pump control panel all to be placed on the east (or right) wall when you walk in…
    - Lead lag programming, all touch screen, adjustable set points….alternating lead pumps to balance the run hours…?

- Outdated and unused panels on the walls will be removed…

- The installations will be installed per NEC standards…and others…?

- The surge suppression/overload protection system will consist….[main features/specs/]

- The new well No. 2 pump will be installed initially before the potable electrical and controls [verify] Will you help facilitate this?

- New flow meters will be installed and wired in…[It sounds like Marty is on Board to plumb these in]

If you could shoot me a response with some additional language, I would appreciate it.

Thanks,

Matthew Mudd, PE | Project Manager

Great West Engineering, Inc.

PO Box 4817

2501 Belt View Drive

Helena, MT 59604

DIRECT: 406.495.6196

FAX: 406.449.8631

OFFICE: 406.449.8627

www.greatwesteng.com



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Jon Nash
Nash Electric
1821 Munger Rd
Helena, Mt 59602

406-439-6274 Cell

Technical Data **TD01005025E**

Effective June 2010
Supersedes October 2009

Eaton's SPD Series for mounting external to electrical distribution equipment



Contents

Description	Page
Introduction	2
Applications	2
Features	2
Standards and certifications	2
Feature package options	3
Enclosure options, dimensions, and weights	3
Performance data	4
Specifications	9
Catalog number selection	10
Technical support information	10

Powering Business Worldwide

Introduction

Eaton's SPD Series surge protective devices

Eaton's SPD Series surge protective devices are the latest and most advanced UL® 1449 3rd Edition certified surge protectors. Units are available integrated within Eaton electrical assemblies, including panelboards, switchboards, motor control centers, switchgear, and bus plugs. Sidemount versions of the SPD Series are also available for installation external to an electrical assembly. Application of SPD Series units throughout a facility will ensure that equipment is protected with the safest and most reliable surge protective devices available.

Applications

SPD Series units are available in all common voltages and configurations and also in a variety of surge current capacity ratings from 50 through 400 kA. Three feature package options are also available to choose from. The breadth of the SPD Series' features, options, and configurations ensures that the correct unit is available for all electrical applications, including service entrances, distribution switchboards, panelboards, and point-of-use applications.

Features

- Uses thermally protected metal oxide varistor (MOV) technology
- 20 kA nominal discharge current (I_n) rating (maximum rating assigned by UL)
- 50 through 400 kA surge current capacity ratings
- Three feature package options
- 200 kA short-circuit current rating (SCCR)
- 10-year warranty

Standards and certifications

- UL 1449 3rd Edition listed device
- Canadian Standards Association® (CSA®)



SPD Series sidemount unit mounted externally to an Eaton panelboard

Feature package options

The SPD Series provides users with the option of selecting between three feature packages. These feature packages are the basic, standard, and standard with surge counter. The proper feature package can be selected based on the requirements of the application or specification.

Table 1. Feature Package Comparison

Feature	Basic	Standard	Standard with Surge Counter
Surge protection using thermally protected MOV technology	✔	✔	✔
Dual-colored protection status indicators for each phase	✔	✔	✔
Dual-colored protection status indicators for the neutral-ground protection mode	✔	✔	✔
Audible alarm with silence button		✔	✔
Form C relay contact		✔	✔
EMI/RFI filtering, providing up to 50 dB of noise attenuation from 10 kHz to 100 MHz		✔	✔
Surge counter with reset button			✔

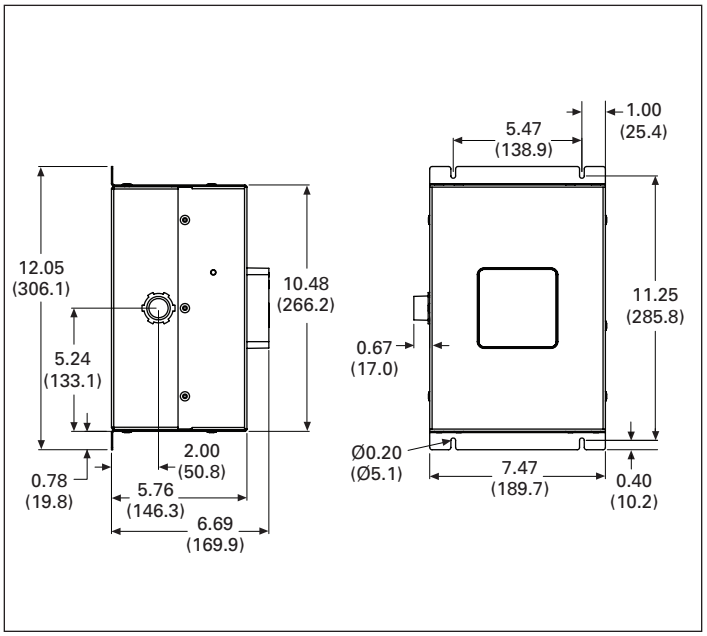


Figure 2. 250–400 kA Units in a NEMA 1 Rated Enclosure, Weight = 13.5 lbs

Enclosure options, dimensions, and weights

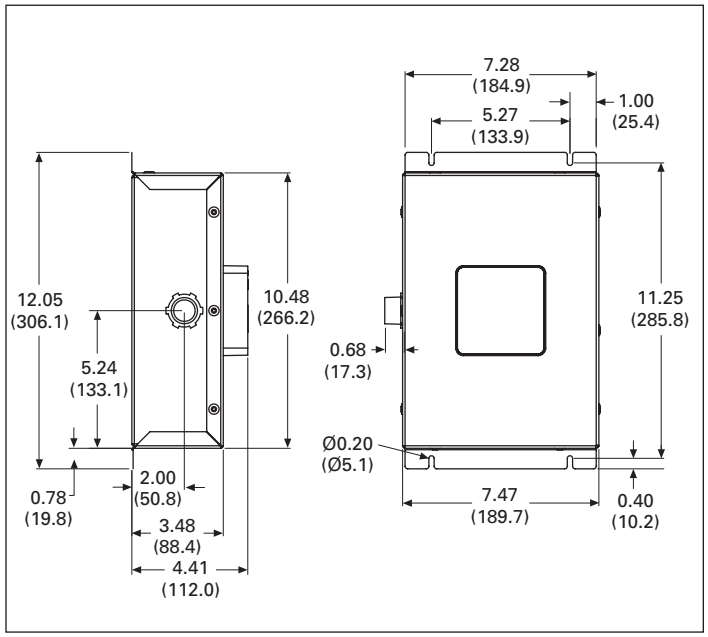


Figure 1. 50–200 kA Units in a NEMA® 1 Rated Enclosure, Weight = 6.8 lbs

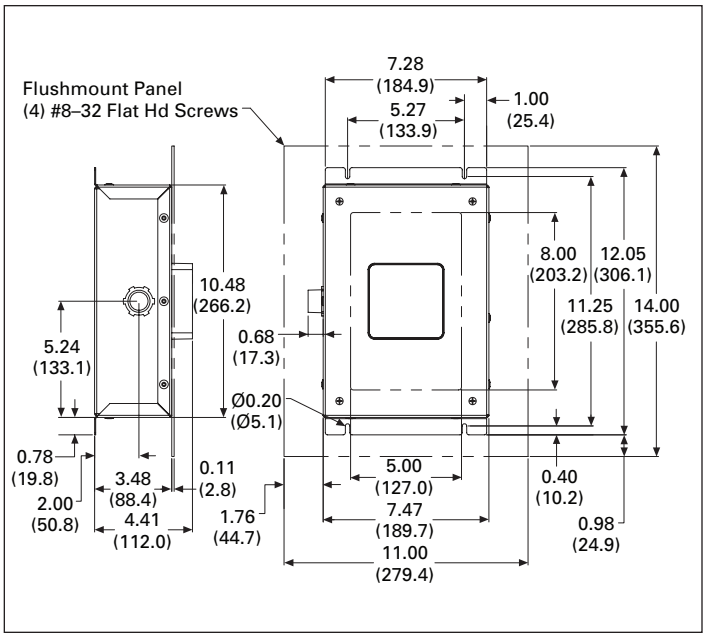


Figure 3. 50–200 kA Units in a NEMA 1 Rated Flushmount Enclosure, Weight = 6.8 lbs

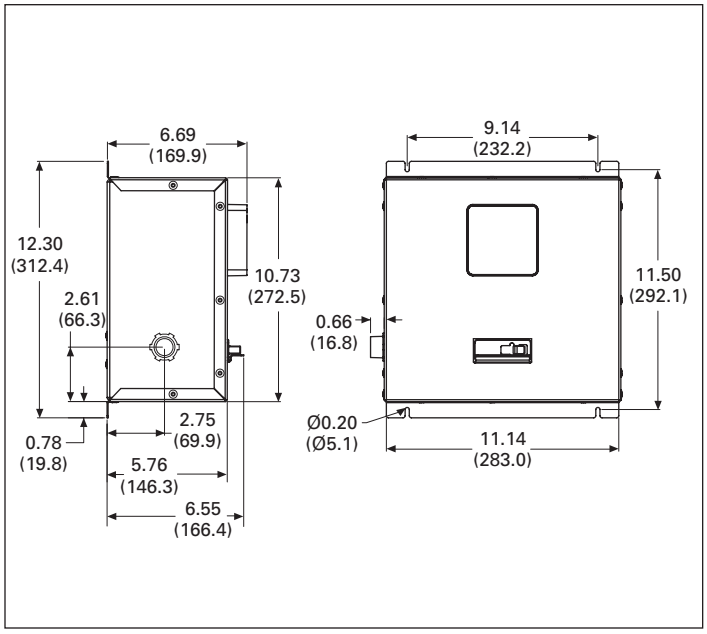


Figure 4. 50–400 kA Units in a NEMA 1 Rated Enclosure with Internal Disconnect, Weight = 14.7 lbs

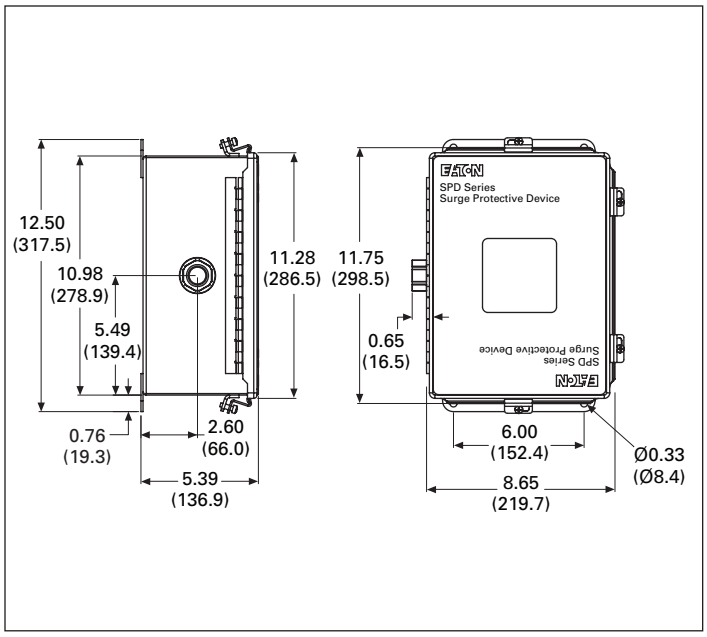


Figure 5. 50–200 kA Units in a NEMA 4 or 4X Rated Enclosure, Weight = 14.6 lbs

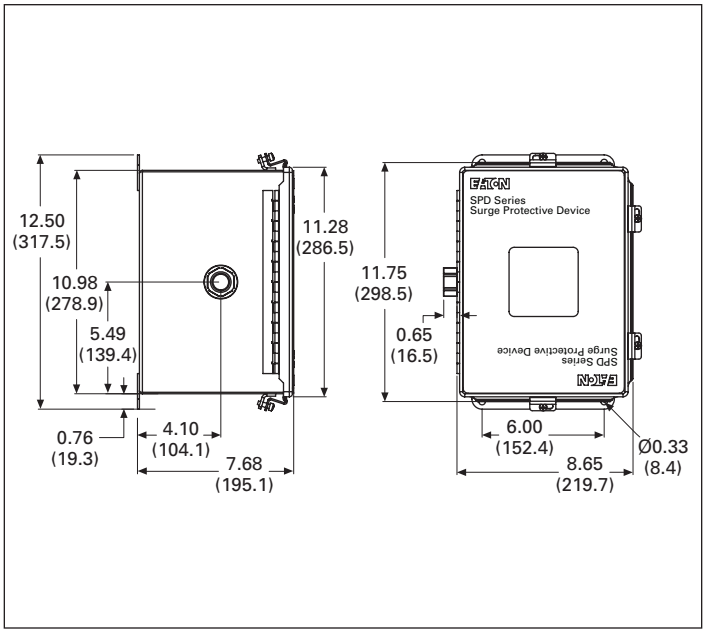


Figure 6. 250–400 kA Units in a NEMA 4 or 4X Rated Enclosure, Weight = 14.6 lbs

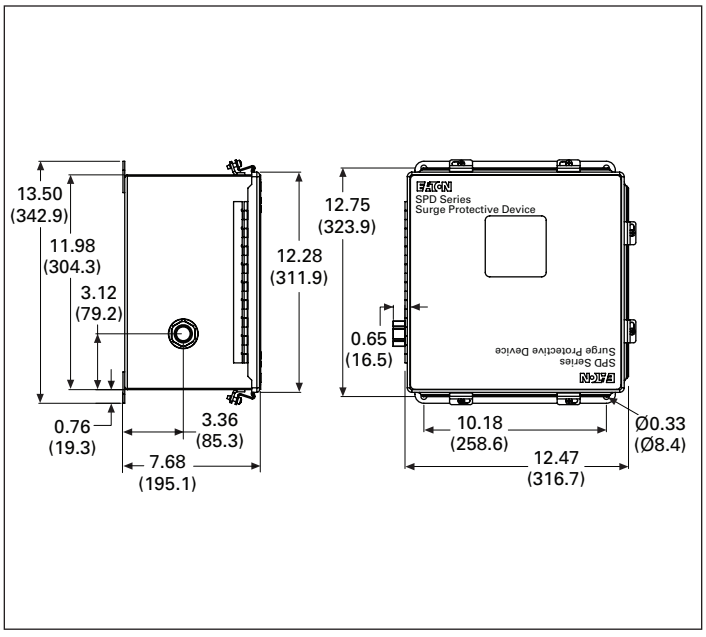


Figure 7. 50–400 kA Units in a NEMA 4 or 4X Rated Enclosure with Internal Disconnect, Weight = 27.5 lbs

Performance data

ANSI/UL 1449 3rd Edition voltage protection ratings

In the tables on the following pages, voltage protection rating (VPR) data is included for all sidemount units, but varies based upon the feature package and enclosure option. VPR values for units containing the basic feature package are found on the left-hand side of each page. Tables on the right-hand side of the page contain VPR values for units containing the standard or standard with surge counter feature package.

VPR data for units in a NEMA 1 enclosure without an internal disconnect (catalog number ends with K or L)

Table 2. 50 kA Unit VPR (Cat. No. Ends with 1K or 1L)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	700	1200	700	1200
208Y and 220Y	700	1200	700	1200
400Y and 480Y	1200	2000	1200	2000
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	2000	N/A	2500
600D	N/A	2500	N/A	2500
240H	700	1200	700	1200

Table 3. 80–100 kA Unit VPR (Cat. No. Ends with 1K or 1L)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	700	700	700	1200
208Y and 220Y	700	700	700	1200
400Y and 480Y	1200	1200	1200	2000
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	2000	N/A	2500
600D	N/A	2500	N/A	2500
240H	700	700	700	1200

Table 4. 120–200 kA Unit VPR (Cat. No. Ends with 1K or 1L)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	700	700	700	1200
208Y and 220Y	700	700	700	1200
400Y and 480Y	1200	1200	1200	2000
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	2000	N/A	2500
600D	N/A	2500	N/A	2500
240H	700	700	700	1200

Table 5. 250–300 kA Unit VPR (Cat. No. Ends with 1K or 1L)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	700	700	700	1000
208Y and 220Y	700	700	700	1000
400Y and 480Y	1200	1200	1200	1800
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	1800	N/A	2000
600D	N/A	2500	N/A	2500
240H	700	700	700	1000

Table 6. 400 kA Unit VPR (Cat. No. Ends with 1K or 1L)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	700	700	700	1000
208Y and 220Y	700	700	700	1000
400Y and 480Y	1200	1200	1200	1800
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	1800	N/A	2000
600D	N/A	2500	N/A	2500
240H	700	700	700	1000

Table 7. 50 kA Unit VPR (Cat. No. Ends with 2K, 2L, 3K, or 3L)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	700	1200	700	1200
208Y and 220Y	700	1200	700	1200
400Y and 480Y	1200	2000	1200	2500
600Y	1500	1500	1500	2500
240D	N/A	1000	N/A	1000
480D	N/A	2500	N/A	2500
600D	N/A	3000	N/A	2500
240H	700	1200	700	1200

Table 8. 80–100 kA Unit VPR (Cat. No. Ends with 2K, 2L, 3K, or 3L)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	700	800	700	1200
208Y and 220Y	700	800	700	1200
400Y and 480Y	1200	1200	1200	2500
600Y	1500	1500	1500	2500
240D	N/A	1000	N/A	1000
480D	N/A	2500	N/A	2500
600D	N/A	3000	N/A	2500
240H	700	800	700	1200

Table 9. 120–200 kA Unit VPR (Cat. No. Ends with 2K, 2L, 3K, or 3L)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	600	800	600	1000
208Y and 220Y	600	800	600	1000
400Y and 480Y	1200	1200	1200	1800
600Y	1500	1500	1500	2500
240D	N/A	1000	N/A	1000
480D	N/A	2500	N/A	2500
600D	N/A	2500	N/A	2500
240H	700	800	700	1200

Table 10. 250–300 kA Unit VPR (Cat. No. Ends with 2K, 2L, 3K, or 3L)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	600	800	600	1000
208Y and 220Y	600	800	600	1000
400Y and 480Y	1000	1200	1000	1800
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	1800	N/A	2000
600D	N/A	2500	N/A	2500
240H	600	800	600	1000

Table 11. 400 kA Unit VPR (Cat. No. Ends with 2K, 2L, 3K, or 3L)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	600	700	600	1000
208Y and 220Y	600	700	600	1000
400Y and 480Y	1000	1200	1000	1800
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	1800	N/A	2000
600D	N/A	2500	N/A	2500
240H	600	800	600	1000

VPR data for units in a NEMA 1 enclosure with an internal disconnect (catalog number ends with M)

Table 12. 50 kA Unit VPR (Cat. No. Ends with 1M)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	800	1200	700	1500
208Y and 220Y	800	1200	700	1500
400Y and 480Y	1500	2500	1200	2500
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	2000	N/A	2500
600D	N/A	2500	N/A	2500
240H	800	1200	700	1500

Table 13. 80–100 kA Unit VPR (Cat. No. Ends with 1M)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	800	800	700	1500
208Y and 220Y	800	800	700	1500
400Y and 480Y	1500	1500	1200	2500
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	2000	N/A	2500
600D	N/A	2500	N/A	2500
240H	800	800	700	1500

Table 14. 120–200 kA Unit VPR (Cat. No. Ends with 1M)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	800	800	700	1500
208Y and 220Y	800	800	700	1500
400Y and 480Y	1500	1500	1200	2500
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	2000	N/A	2500
600D	N/A	2500	N/A	2500
240H	800	800	700	1500

Table 15. 250–300 kA Unit VPR (Cat. No. Ends with 1M)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	800	800	700	1500
208Y and 220Y	800	800	700	1500
400Y and 480Y	1200	1200	1200	2000
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	1800	N/A	2000
600D	N/A	2500	N/A	2500
240H	800	800	700	1500

Table 16. 400 kA Unit VPR (Cat. No. Ends with 1M)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	800	800	700	1500
208Y and 220Y	800	800	700	1500
400Y and 480Y	1200	1200	1200	2000
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	1800	N/A	2000
600D	N/A	2500	N/A	2500
240H	800	800	700	1500

Table 17. 50 kA Unit VPR (Cat. No. Ends with 2M or 3M)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	800	1200	700	1500
208Y and 220Y	800	1200	700	1500
400Y and 480Y	1200	2000	1200	2500
600Y	1500	1500	1500	2500
240D	N/A	1000	N/A	1000
480D	N/A	2500	N/A	2500
600D	N/A	3000	N/A	2500
240H	800	1200	700	1500

Table 18. 80–100 kA Unit VPR (Cat. No. Ends with 2M or 3M)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	800	900	700	1200
208Y and 220Y	800	900	700	1200
400Y and 480Y	1200	1200	1200	2500
600Y	1500	1500	1500	2500
240D	N/A	1000	N/A	1000
480D	N/A	2500	N/A	2500
600D	N/A	3000	N/A	2500
240H	800	900	700	1200

Table 19. 120–200 kA Unit VPR (Cat. No. Ends with 2M or 3M)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	800	900	700	1200
208Y and 220Y	800	900	700	1200
400Y and 480Y	1200	1200	1200	2500
600Y	1500	1500	1500	2500
240D	N/A	1000	N/A	1000
480D	N/A	2500	N/A	2500
600D	N/A	2500	N/A	2500
240H	800	900	700	1200

Table 20. 250–300 kA Unit VPR (Cat. No. Ends with 2M or 3M)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	700	900	700	1200
208Y and 220Y	700	900	700	1200
400Y and 480Y	1200	1200	1000	2000
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	1800	N/A	2000
600D	N/A	2500	N/A	2500
240H	700	900	700	1200

Table 21. 400 kA Unit VPR (Cat. No. Ends with 2M or 3M)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	700	900	700	1200
208Y and 220Y	700	900	700	1200
400Y and 480Y	1200	1200	1000	2000
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	1800	N/A	2000
600D	N/A	2500	N/A	2500
240H	700	900	700	1200

VPR data for units in a NEMA 4 or 4X enclosure without an internal disconnect (catalog number ends with N or P)

Table 22. 50 kA Unit VPR (Cat. No. Ends with 1N or 1P)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	700	1200	700	1200
208Y and 220Y	700	1200	700	1200
400Y and 480Y	1200	2000	1000	2000
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	2000	N/A	2500
600D	N/A	2500	N/A	2500
240H	700	1200	700	1200

Table 23. 80–100 kA Unit VPR (Cat. No. Ends with 1N or 1P)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	700	800	700	1200
208Y and 220Y	700	800	700	1200
400Y and 480Y	1200	1200	1000	2000
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	2000	N/A	2500
600D	N/A	2500	N/A	2500
240H	700	800	700	1200

Table 24. 120–200 kA Unit VPR (Cat. No. Ends with 1N or 1P)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	700	800	700	1200
208Y and 220Y	700	800	700	1200
400Y and 480Y	1200	1200	1000	2000
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	2000	N/A	2500
600D	N/A	2500	N/A	2500
240H	700	800	700	1200

Table 25. 250–300 kA Unit VPR (Cat. No. Ends with 1N or 1P)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	700	800	700	1200
208Y and 220Y	700	800	700	1200
400Y and 480Y	1200	1200	1200	2000
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	1800	N/A	2000
600D	N/A	2500	N/A	2500
240H	700	800	700	1200

Table 26. 400 kA Unit VPR (Cat. No. Ends with 1N or 1P)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	700	800	700	1200
208Y and 220Y	700	800	700	1200
400Y and 480Y	1200	1200	1200	2000
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	1800	N/A	2000
600D	N/A	2500	N/A	2500
240H	700	800	700	1200

Table 27. 50 kA Unit VPR (Cat. No. Ends with 2N, 2P, 3N, or 3P)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	900	1500	700	1500
208Y and 220Y	900	1500	700	1500
400Y and 480Y	1200	2000	1000	2500
600Y	1500	1500	1500	2500
240D	N/A	1000	N/A	1000
480D	N/A	2500	N/A	2500
600D	N/A	3000	N/A	2500
240H	900	1500	700	1500

Table 28. 80–100 kA Unit VPR (Cat. No. Ends with 2N, 2P, 3N, or 3P)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	900	900	700	1500
208Y and 220Y	900	900	700	1500
400Y and 480Y	1200	1200	1000	2500
600Y	1500	1500	1500	2500
240D	N/A	1000	N/A	1000
480D	N/A	2500	N/A	2500
600D	N/A	3000	N/A	2500
240H	900	900	700	1500

Table 29. 120–200 kA Unit VPR (Cat. No. Ends with 2N, 2P, 3N, or 3P)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	900	900	700	1500
208Y and 220Y	900	900	700	1500
400Y and 480Y	1200	1200	1000	2500
600Y	1500	1500	1500	2500
240D	N/A	1000	N/A	1000
480D	N/A	2500	N/A	2500
600D	N/A	2500	N/A	2500
240H	900	900	700	1500

Table 30. 250–300 kA Unit VPR (Cat. No. Ends with 2N, 2P, 3N, or 3P)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	800	900	700	1500
208Y and 220Y	800	900	700	1500
400Y and 480Y	1200	1200	1000	2000
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	2000	N/A	2000
600D	N/A	2500	N/A	2500
240H	800	900	700	1500

Table 31. 400 kA Unit VPR (Cat. No. Ends with 2N, 2P, 3N, or 3P)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	800	900	700	1500
208Y and 220Y	800	900	700	1500
400Y and 480Y	1200	1200	1000	2000
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	2000	N/A	2000
600D	N/A	2500	N/A	2500
240H	800	900	700	1500

VPR data for units in a NEMA 4 or 4X enclosure with an internal disconnect (catalog number ends with O or Q)

Table 32. 50 kA Unit VPR (Cat. No. Ends with 1O or 1Q)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	800	1200	700	1500
208Y and 220Y	800	1200	700	1500
400Y and 480Y	1200	2000	1000	2000
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	2000	N/A	2500
600D	N/A	2500	N/A	2500
240H	800	1200	700	1500

Table 33. 80–100 kA Unit VPR (Cat. No. Ends with 1O or 1Q)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	800	900	700	1500
208Y and 220Y	800	900	700	1500
400Y and 480Y	1200	1200	1000	2000
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	2000	N/A	2500
600D	N/A	2500	N/A	2500
240H	800	900	700	1500

Table 34. 120–200 kA Unit VPR (Cat. No. Ends with 1O or 1Q)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	800	900	700	1500
208Y and 220Y	800	900	700	1500
400Y and 480Y	1200	1200	1000	2000
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	2000	N/A	2500
600D	N/A	2500	N/A	2500
240H	800	900	700	1500

Table 35. 250–300 kA Unit VPR (Cat. No. Ends with 1O or 1Q)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	800	900	700	1500
208Y and 220Y	800	900	700	1500
400Y and 480Y	1200	1500	1200	2000
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	1800	N/A	2000
600D	N/A	2500	N/A	2500
240H	800	900	700	1500

Table 36. 400 kA Unit VPR (Cat. No. Ends with 1O or 1Q)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	800	900	700	1500
208Y and 220Y	800	900	700	1500
400Y and 480Y	1200	1500	1200	2000
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	1800	N/A	2000
600D	N/A	2500	N/A	2500
240H	800	900	700	1500

Table 37. 50 kA Unit VPR (Cat. No. Ends with 2O, 2Q, 3O, or 3Q)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	900	1500	700	1500
208Y and 220Y	900	1500	700	1500
400Y and 480Y	1200	2000	1000	2500
600Y	1500	1500	1500	2500
240D	N/A	1000	N/A	1000
480D	N/A	2500	N/A	2500
600D	N/A	2500	N/A	2500
240H	900	1500	700	1500

Table 38. 80–100 kA Unit VPR (Cat. No. Ends with 2O, 2Q, 3O, or 3Q)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	900	900	700	1500
208Y and 220Y	900	900	700	1500
400Y and 480Y	1200	1200	1000	2500
600Y	1500	1500	1500	2500
240D	N/A	1000	N/A	1000
480D	N/A	2500	N/A	2500
600D	N/A	2500	N/A	2500
240H	900	900	700	1500

Table 39. 120–200 kA Unit VPR (Cat. No. Ends with 2O, 2Q, 3O, or 3Q)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	900	900	700	1500
208Y and 220Y	900	900	700	1500
400Y and 480Y	1200	1200	1000	1800
600Y	1500	1500	1500	2500
240D	N/A	1000	N/A	1000
480D	N/A	2500	N/A	2500
600D	N/A	2500	N/A	2500
240H	900	900	700	1500

Table 40. 250–300 kA Unit VPR (Cat. No. Ends with 2O, 2Q, 3O, or 3Q)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	800	900	700	1500
208Y and 220Y	800	900	700	1500
400Y and 480Y	1200	1200	1000	2000
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	2000	N/A	2000
600D	N/A	2500	N/A	2500
240H	800	900	700	1500

Table 41. 400 kA Unit VPR (Cat. No. Ends with 2O, 2Q, 3O, or 3Q)

	Protection Mode			
Voltage Code	**L-N**	**L-G**	**N-G**	**L-L**
240S	800	900	700	1500
208Y and 220Y	800	900	700	1500
400Y and 480Y	1200	1200	1000	2000
600Y	1500	1500	1200	2500
240D	N/A	1000	N/A	1000
480D	N/A	2000	N/A	2000
600D	N/A	2500	N/A	2500
240H	800	900	700	1500

Specifications

Table 42. SPD Series Specifications

Description	Specification
Surge capacity ratings available	50, 80, 100, 120, 160, 200, 250, 300, 400 kA per phase
Nominal discharge current (I_n)	20 kA
Short-circuit current rating (SCCR)	200 kA
SPD type	Basic feature package = Type 1 (can also be used in Type 2 applications) Standard and Standard with Surge Counter feature packages = Type 2
Single split phase voltages available	120/240
Three-phase wye system voltages available	120/208, 127/220, 230/400, 277/480, 347/600
Three-phase delta system voltages available	240, 480, 600
Input power frequency	50/60 Hz
Power consumption (basic units): 208Y, 220Y, 240S, 240D, and 240H voltage codes 400Y, 480Y, and 480D voltage codes 600Y and 600D voltage codes	 0.5W 1.1W 1.3W
Power consumption (standard and standard with surge counter units): 208Y, 220Y, 240S, 240D, and 240H voltage codes 400Y, 480Y, and 480D basic voltage codes 600Y and 600D voltage codes	 0.6W 1.7W 2.1W
Protection modes	Single split phase . . . . . L-N, L-G, N-G, L-L Three-phase wye . . . . . L-N, L-G, N-G, L-L Three-phase delta. . . . . L-G, L-L Three-phase high-leg delta. . . . L-N, L-G, N-G, L-L
Maximum continuous operating voltage (MCOV): 240S, 208Y, 220Y, and 240H MCOV 400Y and 480Y MCOV 600Y MCOV 240D MCOV 480D MCOV 600D MCOV	 150 L-N, 150 L-G, 150 N-G, 300 L-L 320 L-N, 320 L-G, 320 N-G, 640 L-L 420 L-N, 420 L-G, 420 N-G, 840 L-L 320 L-G, 320 L-L 640 L-G, 640 L-L 840 L-G, 840 L-L
Ports	1
Operating temperature	–40°F through 122°F (–40°C through 50°C)
Operating humidity	5% through 95%, noncondensing
Operating altitude	Up to 16,000 ft (5000m)
Seismic withstand capability	Meets or exceeds the requirements specified in IBC® 2006, CBC 2007, and UBC® Zone 4
Enclosure dimensions and weights	Refer to **Figures 1–7** for enclosure dimensions and weights
Form C relay contact ratings	150 Vdc or 125 Vac, 1A maximum
Form C relay contact logic	Power ON, normal state—NO contact = open, NC contact = closed Power OFF or fault state—NO contact = closed, NC contact = open
EMI/RFI filtering attenuation	Up to 50 dB from 10 kHz to 100 MHz
Agency certifications and approvals	UL 1449 3rd Edition listed device; CSA listed UL 1283 (Type 2 SPDs only)
Warranty	10 years

Catalog number selection

Table 43. SPD Series Catalog Number Configuration for Units Mounted External to Electrical Distribution Equipment

SPD050480Y3N

SPD 250 480D 2 K

Series	kA Rating	Voltage Code	Feature Package	Application—Sidemount Units
SPD = Surge protective device	**050** = 50 kA per phase **080** = 80 kA per phase **100** = 100 kA per phase **120** = 120 kA per phase **160** = 160 kA per phase **200** = 200 kA per phase **250** = 250 kA per phase **300** = 300 kA per phase **400** = 400 kA per phase	**240S** = 120/240 single split-phase **208Y** = 120/208 wye (4W + G) **220Y** = 127/220 wye (4W + G) **400Y** = 230/400 wye (4W + G) **480Y** = 277/480 wye (4W + G) **600Y** = 347/600 wye (4W + G) **240D** = 240 delta (3W + G) **480D** = 480 delta (3W + G) **600D** = 600 delta (3W + G) **240H** = 240 delta high leg (4W + G) on 'B' phase ①	**1** = Basic **2** = Standard **3** = Standard + surge counter	**K** = NEMA 1 enclosure **L** = NEMA 1 flushmount enclosure ② **M** = NEMA 1 enclosure with internal disconnect **N** = NEMA 4 enclosure **O** = NEMA 4 enclosure with internal disconnect **P** = NEMA 4X enclosure (304 stainless steel) **Q** = NEMA 4X enclosure with internal disconnect (304 stainless steel)

Example: SPD250480D2K = SPD Series, 250 kA per phase, 480D voltage, standard feature package, housed in NEMA 1 enclosure

① Please consult the factory for 240 delta high leg (4W + G) applications with high leg on 'C' phase.

② NEMA 1 flushmount units are available in 50–200 kA ratings only.

Technical support information

If you have any questions or need additional information, please contact the Eaton Technical Resource Center at 800-809-2772, option 4, option 2. You may also submit inquiries via e-mail: surgeprotection@eaton.com.

Appendix U

Pump Curves

GRUNDFOS

S i D

PRO ECT:	R n ie W er Di ri	UNIT TAG:		UANTITY:	
		TYPE OF SERVICE:	Potable Well 1		
REPRESENTATIVE:		SUBMITTED BY:		DATE:	
ENGINEER:	Gre We Engineering	APPROVED BY:		DATE:	
CONTRACTOR:		ORDER NO.:		DATE:	



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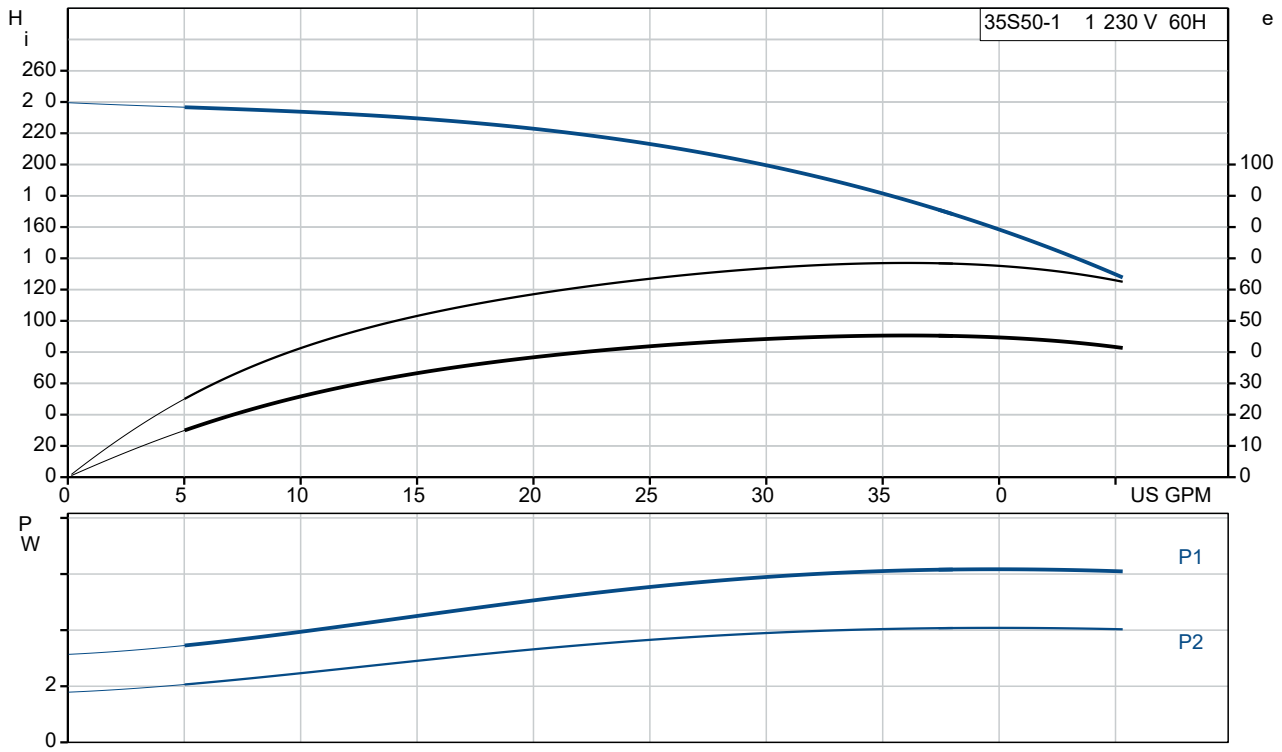
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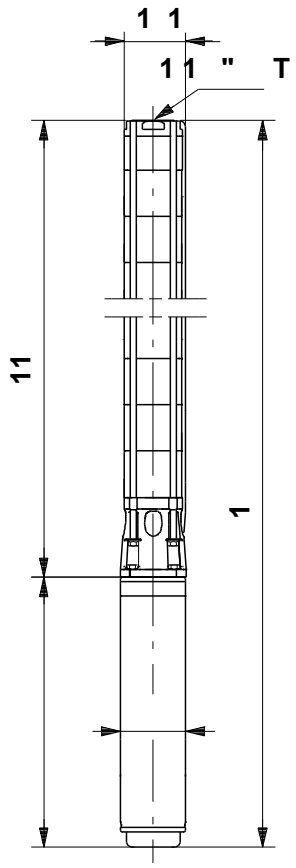
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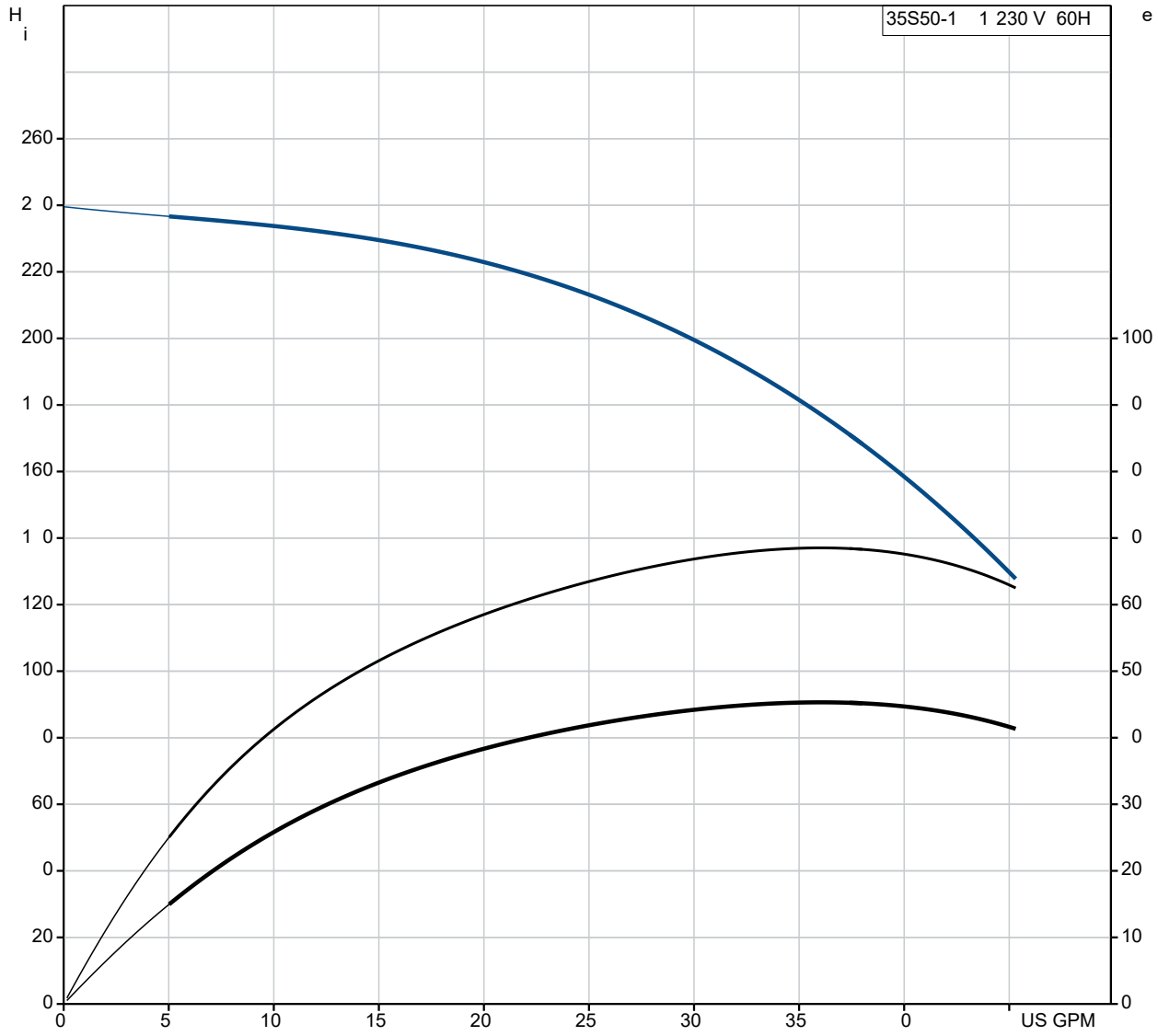
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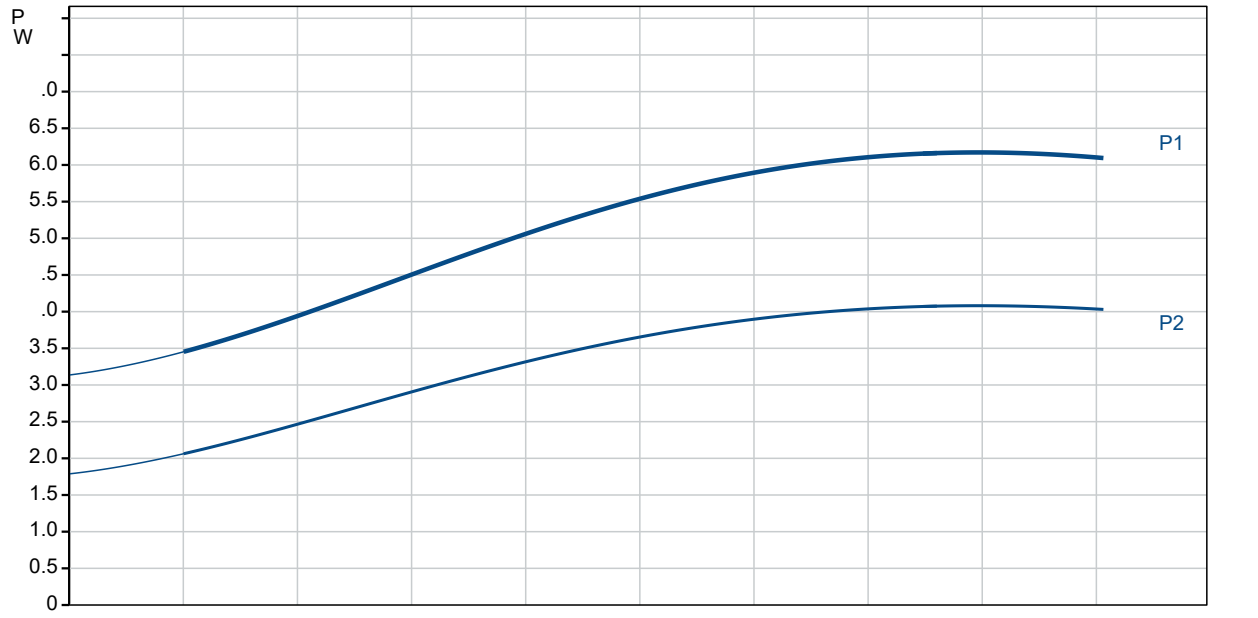
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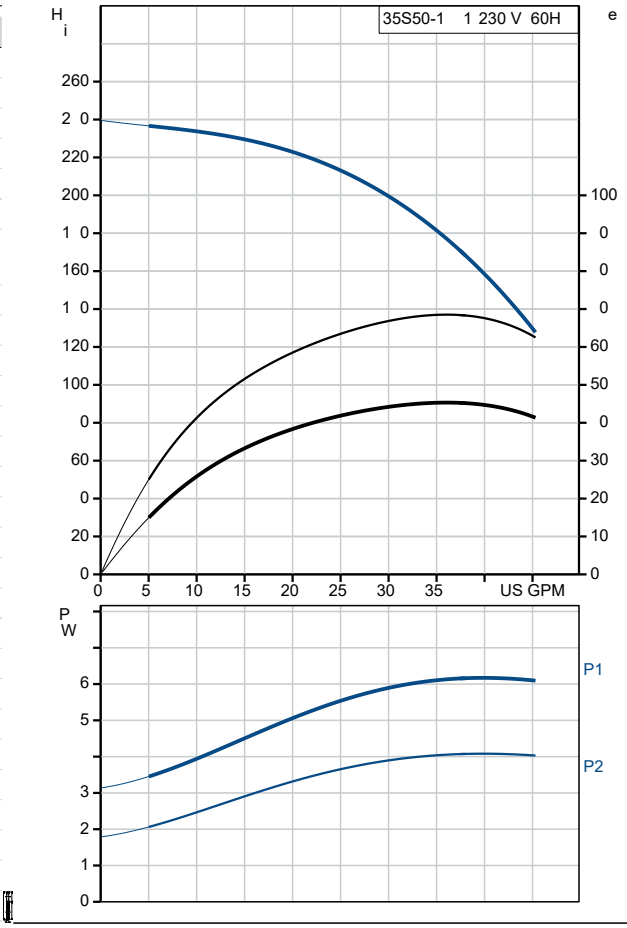


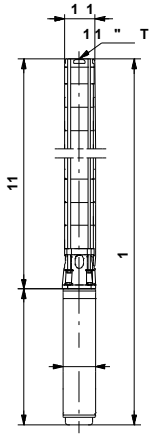
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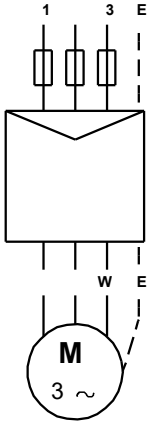
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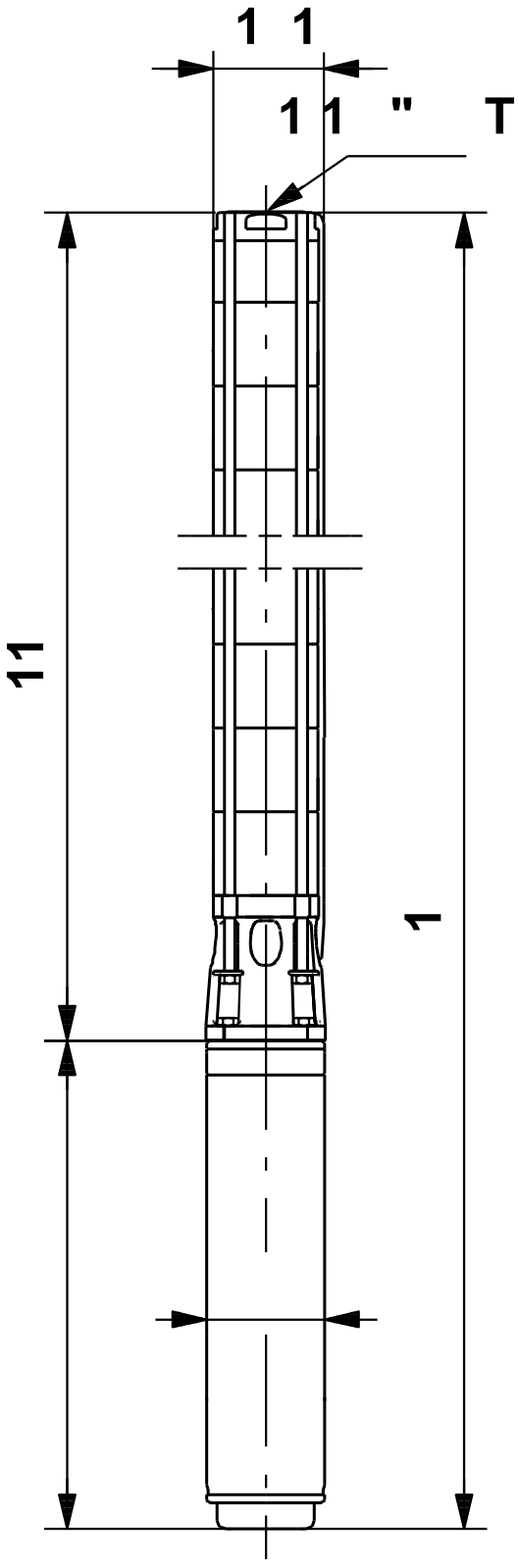
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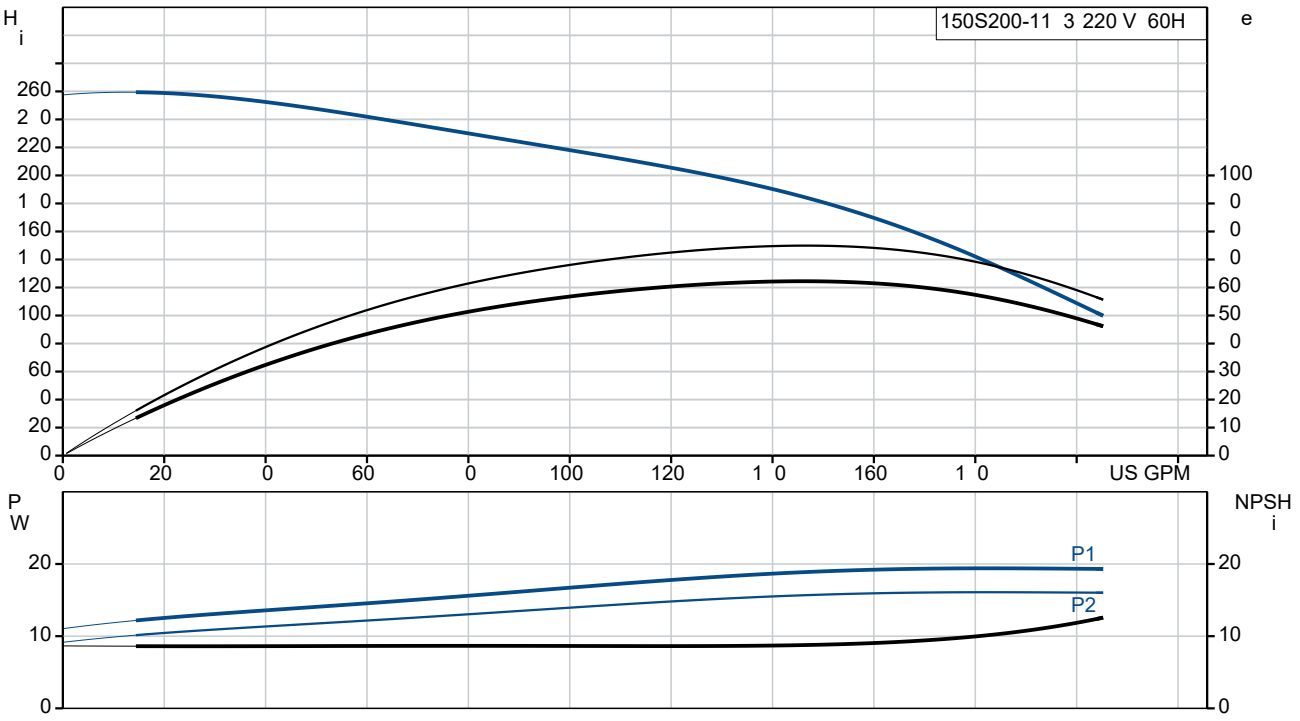
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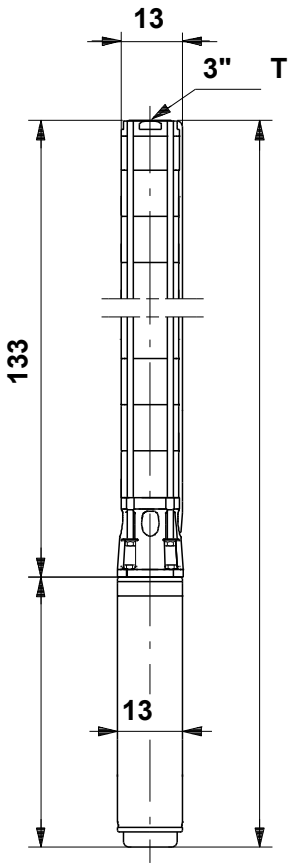
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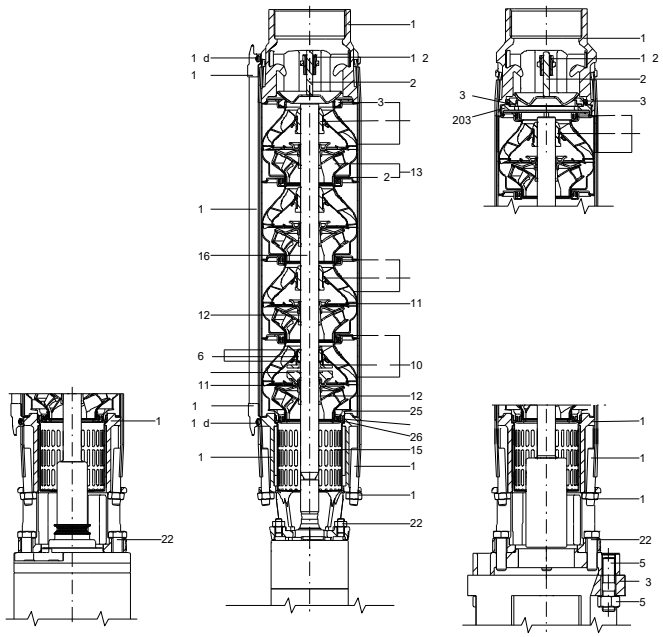
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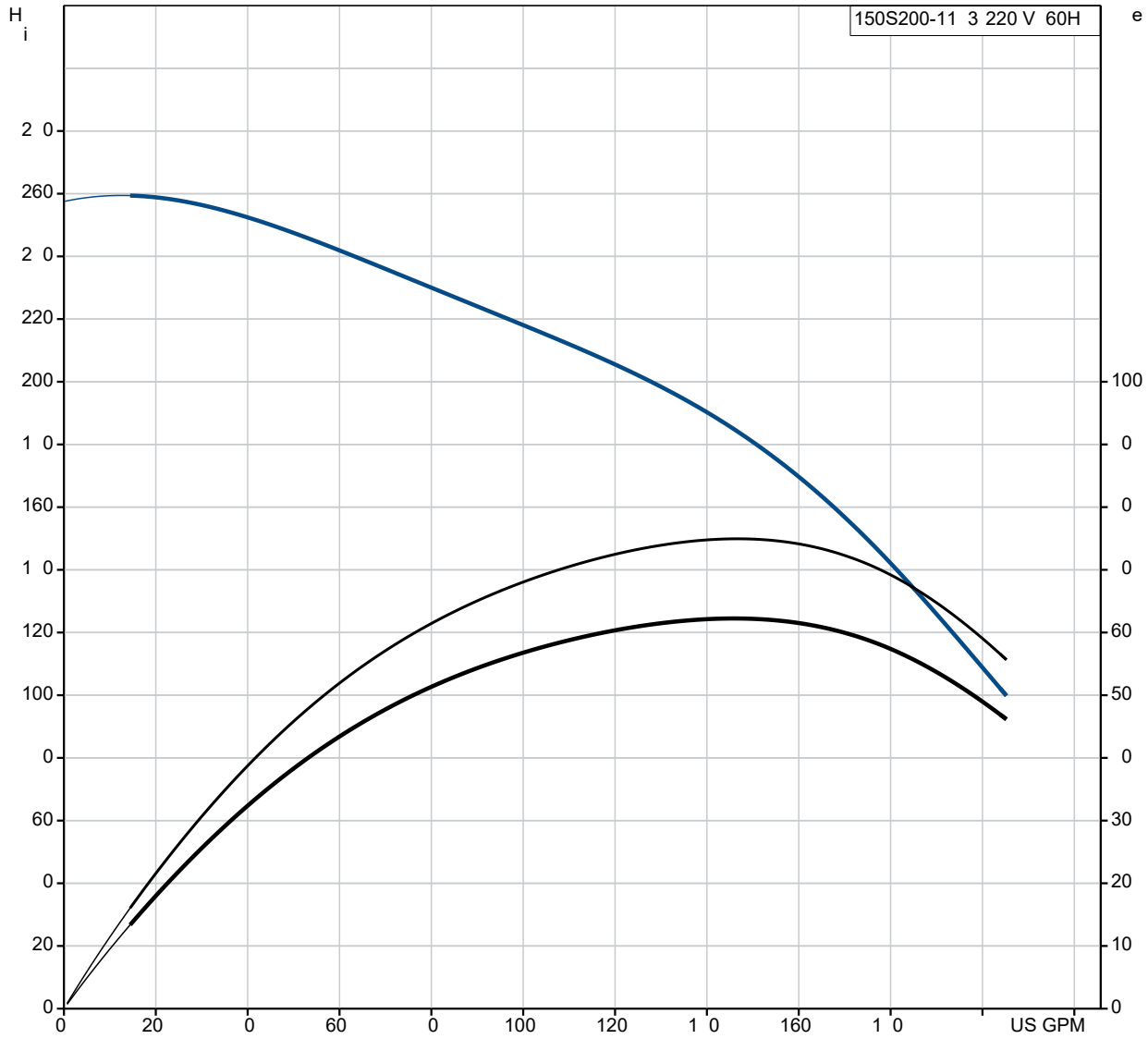
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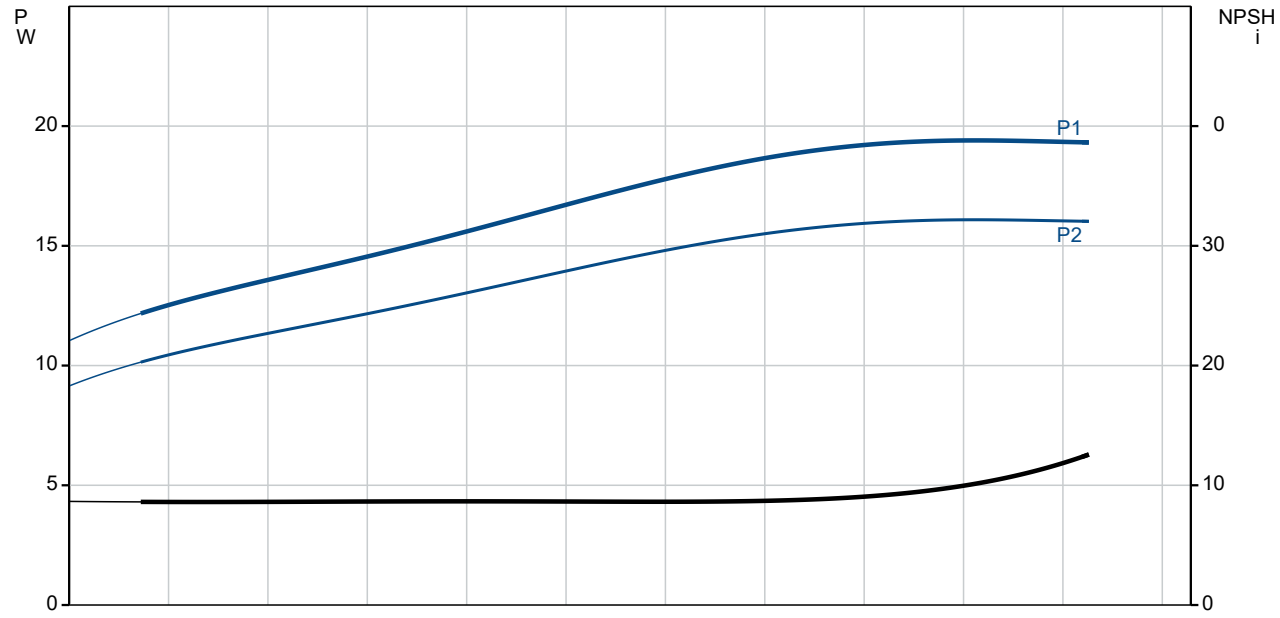
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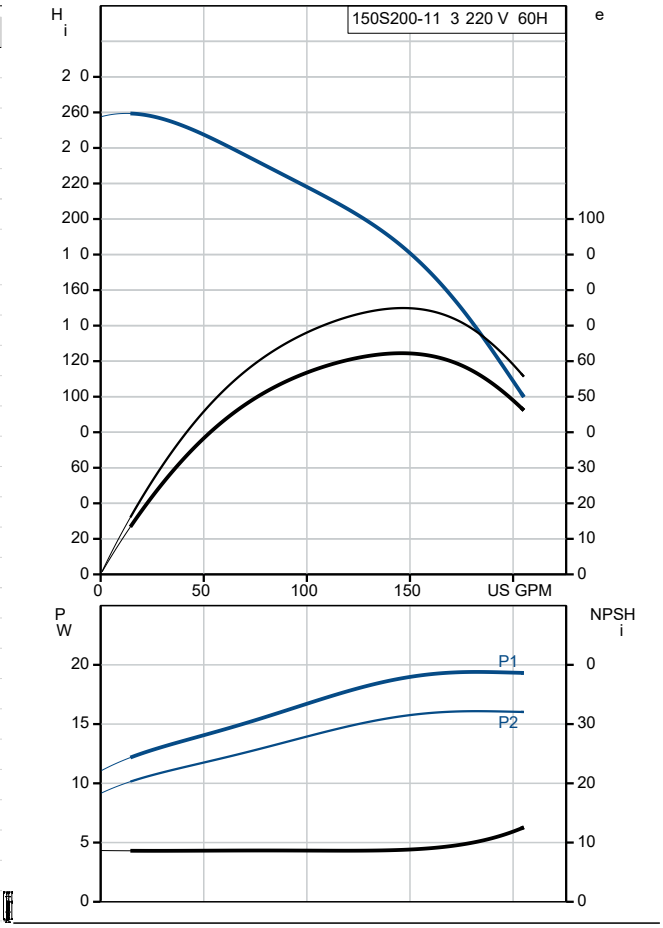


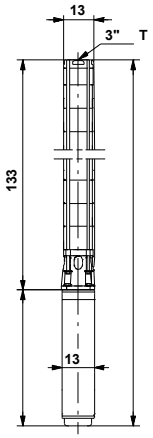
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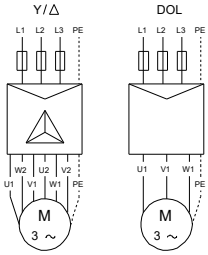
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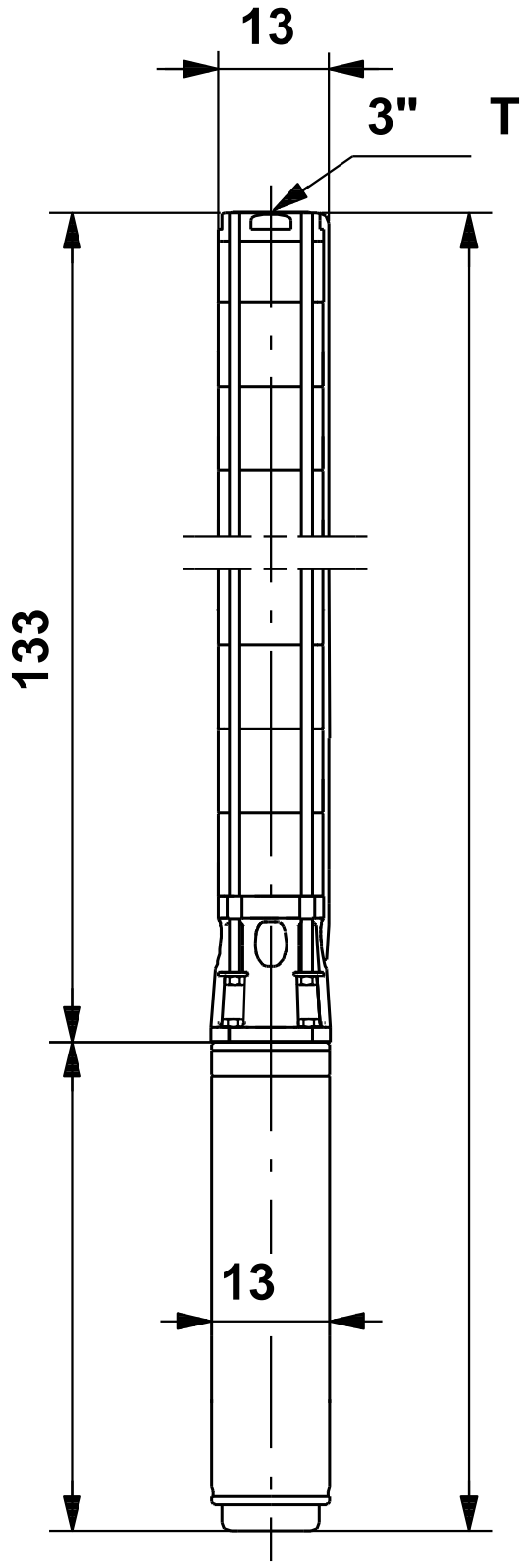
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Appendix V

DEQ-SRF-DNRC Feedback on Potential New Well

Matthew Mudd

From: Smith, Mark <marks@mt.gov>
Sent: Friday, September 25, 2020 10:18 AM
To: Matthew Mudd
Cc: Fraser, Denver; Kroon, Ashley; McDunn, John; Campbell, Terry
Subject: Re: Ranchview Water PER Question

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.
Good Morning, Matt,

Basically, a backup potable well (option 2) would be a DWSRF eligible project. A well used for irrigation only would not be eligible, and would not require DEQ review as you mention. Some of my additional thoughts are below.

1. Does the system currently disinfect the drinking water supply? I'm somewhat assuming that given the location, these wells are shallow and have a static level less than 25 feet bgs(?).

2. The existing irrigation system would be considered non-potable, and connection to the drinking water system would be a cross connection. I think at the very least that proposing backflow prevention would require a deviation(s). (I don't know what our historical position on this has been, given the unknown water quality, etc. of the irrigation wells.)

Do you have a sense of the construction, materials and water quality of the irrigation wells? Do or could they meet current DEQ 1 design standards - is there sufficient information available to review and determine this?

It seems like you've already considered most of this, and I've copied others in the event anyone has any additional input. I hope this is of some help to you for now. Thanks.

Mark

From: Matthew Mudd <mmudd@greatwesteng.com>
Sent: Thursday, September 24, 2020 10:30 AM
To: Smith, Mark
Subject: [EXTERNAL] RE: Ranchview Water PER Question

Yep. No problem. Thanks Mark.

Matthew Mudd, PE | Project Manager

Great West Engineering, Inc.
PO Box 4817
2501 Belt View Drive
Helena, MT 59604

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FAX: 406.449.8631

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[facebook.com]

From: Smith, Mark <marks@mt.gov>
Sent: Thursday, September 24, 2020 10:25 AM
To: Matthew Mudd <mmudd@greatwesteng.com>
Subject: Re: Ranchview Water PER Question

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.
Hi Matt - sorry for the delay. But yes, I did receive your email and had given some thought to possible scenarios, but just haven't been able to reply. We're still pretty slammed (sorry) but hopefully I can follow up with you in a day or two. Thanks.

Mark

From: Matthew Mudd <mmudd@greatwesteng.com>
Sent: Thursday, September 24, 2020 9:53 AM
To: Smith, Mark
Subject: [EXTERNAL] RE: Ranchview Water PER Question

Hi Mark:

I just wanted to see if you received this email. I can follow with a call for further discussion if it helps.

Thanks,

Matthew Mudd, PE | Project Manager

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2501 Belt View Drive
Helena, MT 59604

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[facebook.com]

From: Matthew Mudd
Sent: Tuesday, September 22, 2020 7:11 AM
To: Smith, Mark <marks@mt.gov>
Subject: Ranchview Water PER Question

Good Morning Mark:

I'm working on a Water PER for the Ranchview Water District and have a couple of DEQ review and funding related questions .

Some brief background: The District (PWS PWSID: MT0003782) is in the north Helena Valley and has 107 lots. It converted from a WUA to a District in 2018. The subdivision was originally constructed in the early 90s. The water system is supplied by a separate potable and non-potable (irrigation) system with separate wells (2 well each) and separate distribution lines. The current wells are all located on the south side of the subdivision. Through our PER research, we found that most of the issues can be remedied with electrical/control upgrades at the pump house, that existing pipe sizes/conditions appear to be sufficient. The users do experience some periodic low pressures at the north side lots (both in their potable and irrigation) at some peak instantaneous times where demands start to outpace the pumps. We are looking at a new north well to maintain pressures and act as additional redundant backup. The new well options considered are either an irrigation system only (option 1) or a primarily-irrigation supply (that can act as a backup potable) built to DEQ-1 standards.

In addition to a new well, they would need to install some transmission lines to extend to the existing lines.

My understanding is that an irrigation only system would not require DEQ review and associated drilling requirements. Costs may be less, but the project would have to be privately financed. An irrigation well, built to DEQ-1 standards, could be used as a backup well. A new potable well could also be financed by SRF. I think to be a "backup potable" well, the piping could either be plumbed into the irrigation system now with valves and a backflow prevention system, or the well could be plumbed into the potable system at a future date.

[I know I have dealt with this related question before when I looked at the Ten Mile water system that has an old unused well and considered connecting to their potable system. When discussed with DEQ, the question was if it was originally constructed to DEQ standards]

Question:
Please confirm my understanding about the level of DEQ review for each option. Can you confirm how DEQ and SRF would look at the option for a new irrigation well (backup potable) option 2? Being they are a District now, is an option 2 well project eligible for SRF loan funding? Any other recommendations or considerations are appreciated as well.

This information will be useful to reference in the PER.

Thanks,

Matthew Mudd, PE | Project Manager

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Matthew Mudd

From: Burgoyne, Andy <JBurgoyne@mt.gov>
Sent: Friday, October 9, 2020 1:54 PM
To: Matthew Mudd
Cc: Crum, Heidi; Richards, Hoyt
Subject: Ranchview New North Well - Request for Input/Comment

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Matthew,

This email is in response to your request for information on the DNRC process regarding the project you described.

- Before accepting or approving any application or proposal, the proponent would be required to demonstrate they have obtained permits and/or authorization from all the appropriate agencies or necessary parties regarding the project.
- The proponent may apply for a Land Use License for temporary access for construction purposes, but the decision to grant the license is dependent on favorable unit review which includes MEPA (environmental analysis). As such, a decision to grant the license regarding the project is not a certainty.
- The DNRC does not issue easements for access to entities that do not hold fee title to the land served by the easement, nor do we grant access easements for the intended purpose disclosed.
- The application for a Land Use License could also include access for maintenance and operation, but again favorable unit review is necessary and not guaranteed. Also, this license would be on a 10 year license term. Renewals would be subject to the discretion of DNRC and are also not guaranteed.
- Utility companies could apply for an easement corridor, typically less than 20-foot in width, for the sole purpose of laying buried utilities to the proposed facility, however this requires unit review, MEPA, and Montana Board of Land Commissioners approval. This is also not guaranteed. Valuation for an easement is based on the full fair market land value (per acre) x the acres to be encumbered.
- Valuation for the Land Use License would be derived through our valuation process. See below:

-Application Fees Application fees are required per 36.2.1003 for all new licenses, renewing licenses, and assignments of licenses.

-Application fees are non-refundable. $50 Application fee for navigable waterway use or $25 Application fee for all other uses

-Minimum Fees-Under no circumstance should a license be issued for less than the minimum fee: $150 annual fee for navigable waterway use or $200 one-time fee -other uses

-Fee structure methods include: Land Value Rate, Market Base Rate, Fee Schedule or Percentage of Gross determination.

-If it is determined there is a competitive market for the land use, a competitive bid process can be used to capture the full market value of the land.

If you should have further questions, please feel free to contact Heidi Crum or myself. Thank you.

Andy Burgoyne
Trust Land Program Manager-Central Land Office
(406) 458-3517
JBurgoyne@mt.gov


MONTANA
DNRC

Matthew Mudd

From: Gates, Russ <RGates@mt.gov>
Sent: Thursday, October 8, 2020 1:55 PM
To: Matthew Mudd
Subject: RE: Input for Ranchview Water PER - Potential New Well

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Matt,

Sorry for the late reply – I have been busy with childcare issues more than usual this week.

In general, if the situation meets the criteria outlined in statute, then you should be able to use the form. However, based on the definition for public water supply in 75-6-102(14), the redundant well form would only work for the drinking water supply wells. 85-2-402(16) also states that the redundant well must be required by a state or federal agency, and that only 1 well may be used at a time, so I'm not sure if the scenarios you described would qualify.

If the proposed well does not meet the requirements for a redundant well, they would have to apply for a change to add an additional point of diversion. The primary application would be a Form 606, plus the relevant addendums as required. The change process does not allow for any expansion of a water right, such as increased flow rate or volume, but it sounds like that is not anticipated from your description.

As for closures, the Helena Valley falls within the Upper Missouri Basin Closure (Legislative), and there is a Closed Groundwater Area on the edge of East Helena, but I am not aware of any compact closures for the area.

Please feel free to contact me if you have any additional questions.

Russ

From: Matthew Mudd <mmudd@greatwesteng.com>
Sent: Friday, October 2, 2020 10:35 AM
To: Gates, Russ <RGates@mt.gov>
Subject: [EXTERNAL] Input for Ranchview Water PER - Potential New Well

Hello Russ:

I have posed similar water right questions for other recent studies with potential new wells I have worked on. (i.e. Ten Mile/Pleasant Valley, Buffalo Trail), and would like to reach out for input on the referenced project.

We are completing a study for the Ranch view Water District located in the Helena Valley North Valley. One of the alternatives we are looking at for the District is the option of drilling a new well on the north side of the subdivision to act as either redundant backup irrigation only well (option S-5a) or drill as a redundant irrigation well (Potable backup capability) well (Option S-5b). The well would be used to maintain periodic low pressures in the higher elevation areas, and during peak demands that result in lower pressures. The options are described in more detail below.:

- Alt. S-5a: New North Well (Irrigation only). A new north well as an irrigation-only system would not require DEQ review and associated drilling requirements. The transmission main would directly connect to the irrigation main in Lariat Road from the new well.

- Alt. S-5b: New North Well (Irrigation and potable backup). An irrigation well, built to DEQ-1 standards, could be used as a backup well. The well could either be completed and constructed as plumbed into both the potable and irrigation system piping with appropriate backflow to act as an immediate backup potable pump, or the well piping could be plumbed into the potable system at a future date.

- See attached exhibit for potential new well location and concept. See also attached exhibit of the existing system (showing the existing wells to the south)

Overall, we do not expect the annual demands to increase with a new well (either potable or irrigation). We also believe that the usage will still be under the combined water rights cap. According to the analysis on latest demands vs. water rights, we show the following:

Ranchview Estates
Water Rights Summary

Water Right #	Priority Date	Purpose/Use	Diversion Means	Maximum Flow Rate (gpm)	Maximum Volume (ac-ft)	Actual Usage (July 2019 – July 2020)
41I 88721-00	1994	Multiple Domestic	Wells	130	25	17
		Lawn and Garden			85	116
41I 89787-00	1994	Lawn and Garden	Well	290	83.75	
			Total	**420**	**193.75**	**133**

Can you please let me know what forms and process the District would need to do in order to drill a new well for either of the options described above? Considering that the District demands would not be increased and the water would be used from the nearby aquifer, would a Redundant Well Construction Notice (Form 635) then only need to be filed if the project meets the requirements listed under MCA 85-2-402(16)? Also, for my information, it the Helena Valley located within a compact closure?

Please confirm, so I can capture in the study for if/when the District chooses to move forward with this project.

Thanks,

Matthew Mudd, PE | Project Manager

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DWSRF PROJECT PRIORITY LIST SURVEY

Proposed water system improvement needs, excluding operation, maintenance, and growth development.

NAME OF COMMUNITY OR SYSTEM:_____

COUNTY OR COUNTIES:_____

POPULATION OF SERVICE AREA:_____

MEDIAN HOUSEHOLD INCOME FOR SERVICE AREA: $_____

CURRENT AVERAGE MONTHLY RESIDENTIAL WATER RATE:_____

CURRENT AVERAGE MONTHLY RESIDENTIAL SEWER RATE:_____

CURRENT AVERAGE MONTHLY RESIDENTIAL SOLID WASTE RATE:_____

Name & Title of Contact Person: _____

Address: _____

_____

Telephone: (406)-_____ Fax: (___)_____

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Please provide the following information:

1. **A brief description of the project. As a guideline, do not exceed approximately 200 words.**

2. **Provide an estimated project budget, including potential funding sources. Include engineering, legal, and administrative costs in addition to construction related costs. Please provide a break out of these costs. Include other funding sources.**

3. **What is the reason for the project? What compliance issue is being addressed? For drinking water projects, are there supply, treatment, distribution, or storage problems? Again, limit your response to approximately 200 words.**

4. **Provide the following information as an indication of your readiness to proceed:**

   a) Project Schedule – Include REASONABLE milestone dates for: PER completion (allow sufficient time for SRF review of draft and final document and EA process), COMPLETE draft plan and spec submittal to the SRF program, bid advertisement (allow sufficient time for SRF review of draft and final plans and specs), bid opening, construction start and finish. DEQ may adjust these schedules to make them more realistic, if necessary.

   b) Has a planning document or preliminary engineering report been prepared? Submitted? Approved?

c) Has an engineer been hired?

d) Has a design contract been executed? What date did design begin?

e) Have plans and specifications been prepared and submitted to the SRF program?

f) Has a bond resolution been adopted?

g) Are rates and charges in place to allow for additional debt service? If so, submit user rate ordinance for final rates including debt service, O&M and coverage (if required).

h) Are there any outstanding legal issues that could potentially delay construction start? Please explain in detail.

i) If land purchase, lease, right-of-way or other land acquisition is required prior to design and construction, what is the status of these processes and what issues remain to be addressed?

5. **Has a county water and/or sewer district been formed? Do you anticipate the formation of an RSID? Do you anticipate the issuance of Revenue or General Obligation Bonds? What type of loan security are you planning? Please limit your response to approximately 200 words.**

Appendix W

Bynum Water Tank Analysis

PART FOUR

Water Storage

PART FOUR

WATER STORAGE

I. GENERAL

The Bynum Water District currently has no water storage. Users are served by individual onsite wells with hydropneumatic tanks.

In general, water storage can be thought of as satisfying three different needs. These are: 1) operational storage; 2) emergency storage; and 3) fire suppression storage. DEQ 1 requires that storage facilities have sufficient capacities to meet domestic demand and where protection is provided, fire flow demands. The following will discuss these needs in relation to the Bynum Water District.

II. EVALUATION OF REQUIRED WATER STORAGE

a. General Storage Requirements

Operational storage serves to provide supplemental flows to the water supply during peak periods. Whenever peak hourly demands exceed available flows from the supply, the difference must be provided with flows from storage. Elevated storage also serves to equalize pressures. When water mains are undersized or their interiors are badly corroded, line pressures drop dramatically in areas remote from pumps during peak demand periods.

Elevated storage is important to a community because should a power loss or a pump failure occur, a water supply is still available. In the case of Bynum Water District, there is no existing public water system; therefore in the event of a power or pump failure, users in the District would be without water, which represents a serious public health and safety risk.

The length of time that storage flows should be available is dependent on the following:

- How long the plant is out of service.
- The time of year and day the plant is out of service.
- How much the users control their water use during emergency periods.

b. DEQ Storage Sizing Requirements

DEQ 1 requires the following, "The minimum allowable storage must be equal to the average daily demand for a 24-hour period plus fire flow demand (fire flow times duration) where fire protection is provided."

c. Storage for Fire Protection

Insurance Services Office (ISO) is a national independent agency that reviews fire protection capabilities of individual communities and assigns them a rating. This rating is then used by insurance companies to establish premiums. One of the factors analyzed by ISO is whether or not the fire protection system can provide adequate flows in particular areas to suppress fires. These flows, which may be provided by water supplies and/or storage reservoirs, are in addition to the peak daily flows required by the community. Examples of some other factors of interest to ISO that are unrelated to the water system are: is the Fire Suppression Force full-time or volunteer; type and condition of the fire suppression equipment; degree of training provided; etc.

Typical fire flows required for residential areas range from 500 to 1500 gpm and are based on the spacing between buildings. The following is a summary of the ISO recommended fire flows for residential buildings.

Distance Between Buildings (ft)	Needed Fire Flow (gpm)
Over 100	500
31-100	750
11-30	1000
Less than 11	1500

Distances between residential buildings in Bynum are generally greater than 100 feet. ISO and Uniform Fire Code recommended flows are not the only factor considered in determining adequate fire flows for a community. The Community's current and future fire equipment capabilities must be considered. To determine the Community's current and future capabilities, the Teton County Fire Chief was contacted. They indicated that 500 gpm was an appropriate fire flow design for the community and they strongly support the project (see Appendix R for a letter from the Teton County Fire Chief). As recommended by ISO and the Uniform Fire Code, this flow should be provided for a minimum duration of two hours.

d. DEQ Storage Sizing Calculations

For the purposes of the storage evaluation we will consider two scenarios. Storage volume requirements will be determined for a system that provides fire protection storage and a system that does not. We will utilize 500 gpm as the fire flow in the appropriate scenario. Therefore, total storage requirements according to DEQ requirements are calculated as follows:

Fire Protection Storage Provided

Fire Storage Required: 500 gpm x 120 min. = 60,000 gallons

Design Average Day Demand:	19,600 gallons
Total Storage Requirement:	**79,600 gallons**

Fire Protection Storage NOT Provided

Design Average Day Demand:	19,600 gallons
Total Storage Requirement:	**19,600 gallons**

III. RECOMMENDED IMPROVEMENTS

a. Alternatives Evaluation

The following is a discussion of the alternatives and subsequent recommended improvements. Six alternatives were evaluated for improvements to the storage component of the system. Three alternatives provide storage for fire protection, and three alternatives do not. All of the alternatives involve the construction of a water storage tank on a nearby hill at an elevation sufficient to provide system pressures. Approximately 1,700 feet of transmission main is required to connect the tank to the proposed distribution system. The six alternatives are as follows:

- **Alternative #1 – Construct 80,000 gallon On-grade Steel Storage Tank**

  Alternative #1 consists of constructing a new 80,000 gallon on-grade steel tank. This alternative provides storage for fire protection. A cost estimate for Alternative #1 is included in Table 4-1.

  The cost estimate includes the necessary site work and foundation for the tank, necessary valving and piping on the tank site and construction of an access road. The tank site will also have a valve structure (manhole) which houses a pressure transducer for reading the tank level. The manhole will also house a remote telemetry unit for relaying the tank level to the well site. Electrical power will need to be run to the site to power the telemetry unit and transducer. The estimate also includes costs for a geotechnical investigation needed for the tank design. These costs are common and similar for all the tank alternatives except the above ground steel tanks which have foundation construction as part of the site work. The buried tank alternatives only require excavation for the site work.

TABLE 4-1
WATER STORAGE ALTERNATIVE #1
80,000 GALLON STEEL TANK - FIRE FLOW SYSTEM
OPINION OF PROBABLE COSTS
BYNUM WATER DISTRICT WATER SYSTEM IMPROVEMENTS

ITEM	QUANTITY	UNITS	UNIT PRICE	TOTAL COST
Mobilization	1	LS	$15,000.00	$15,000
Construct Access Road	1	LS	$5,000.00	$5,000
Site Work	1	LS	$30,000.00	$30,000
New Tank Construction	80,000	Gal	$1.40	$112,000
Valves, Fittings, Misc. Appurtenances	1	LS	$7,500.00	$7,500
Valve Structure	1	LS	$15,000.00	$15,000
Landscaping	1	LS	$2,000.00	$2,000
Electrical	1	LS	$15,000.00	$15,000
Geotechnical Investigations	1	LS	$2,500.00	$7,500
Subtotal				$209,000
Engineering, Legal & Admin (25%)				$52,300
Contingency (10%)				$20,900
Total				**$282,200**

- **Alternative #2 – Construct 80,000 gallon Buried Concrete Storage Tank**

Alternative #2 consists of constructing a new 80,000 gallon buried concrete tank. This alternative provides storage for fire protection. A cost estimate for Alternative #2 is included in Table 4-2.

TABLE 4-2
WATER STORAGE ALTERNATIVE #2
80,000 GALLON CONCRETE TANK - FIRE FLOW SYSTEM
OPINION OF PROBABLE COSTS
BYNUM WATER DISTRICT WATER SYSTEM IMPROVEMENTS

ITEM	QUANTITY	UNITS	UNIT PRICE	TOTAL COST
Mobilization	1	LS	$25,000.00	$25,000
Construct Access Road	1	LS	$5,000.00	$5,000
Site Work	1	LS	$20,000.00	$20,000
New Tank Construction	80,000	Gal	$3.00	$240,000
Valves, Fittings, Misc. Appurtenances	1	LS	$7,500.00	$7,500
Valve Structure	1	LS	$15,000.00	$15,000
Landscaping	1	LS	$2,000.00	$2,000
Electrical	1	LS	$15,000.00	$15,000
Geotechnical Investigations	1	LS	$7,500.00	$7,500
Subtotal				$337,000
Engineering, Legal & Admin (25%)				$84,300
Contingency (10%)				$33,700
Total				**$455,000**

- **Alternative #3 – Construct Four 20,000 gallon Buried Fiberglass Tanks (Total 80,000 gallons)**

Alternative #3 consists of constructing four, 20,000 gallon buried fiberglass tanks. This alternative provides storage for fire protection. There are some additional costs associated with the additional piping and valving required to manifold the tanks together that is included in the valves and fittings cost line item. A cost estimate for Alternative #3 is included in Table 4-3.

TABLE 4-3
WATER STORAGE ALTERNATIVE #3
80,000 GALLONS - FOUR 20,000 GALLON FIBERGLASS TANKS - FIRE FLOW SYSTEM
OPINION OF PROBABLE COSTS
BYNUM WATER DISTRICT WATER SYSTEM IMPROVEMENTS

ITEM	QUANTITY	UNITS	UNIT PRICE	TOTAL COST
Mobilization	1	LS	$10,000.00	$10,000
Construct Access Road	1	LS	$5,000.00	$5,000
Site Work	1	LS	$20,000.00	$20,000
New Tank Construction (4 tanks)	80,000	Gal	$2.50	$200,000
Valves, Fittings, Misc. Appurtenances	1	LS	$10,000.00	$10,000
Valve Structure	1	LS	$15,000.00	$15,000
Landscaping	1	LS	$2,000.00	$2,000
Electrical	1	LS	$15,000.00	$15,000
Geotechnical Investigations	1	LS	$5,000.00	$5,000
Subtotal				$282,000
Engineering, Legal & Admin (25%)				$70,500
Contingency (10%)				$28,200
Total				**$380,700**

- **Alternative #4 – Construct 20,000 gallon Buried Concrete Storage Tank**

Alternative #4 consists of constructing a new 20,000 gallon buried concrete tank. This alternative does not provide storage for fire protection. A cost estimate for Alternative #4 is included in Table 4-4

TABLE 4-4
WATER STORAGE ALTERNATIVE #4
20,000 GALLON CONCRETE TANK - NON-FIRE FLOW SYSTEM
OPINION OF PROBABLE COSTS
BYNUM WATER DISTRICT WATER SYSTEM IMPROVEMENTS

ITEM	QUANTITY	UNITS	UNIT PRICE	TOTAL COST
Mobilization	1	LS	$10,000.00	$10,000
Construct Access Road	1	LS	$5,000.00	$5,000
Site Work	1	LS	$5,000.00	$5,000
New Tank Construction	20,000	Gal	$3.50	$70,000
Valves, Fittings, Misc. Appurtenances	1	LS	$5,000.00	$5,000
Valve Structure	1	LS	$10,000.00	$10,000
Landscaping	1	LS	$2,000.00	$2,000
Electrical	1	LS	$15,000.00	$15,000
Geotechnical Investigations	1	LS	$5,000.00	$5,000
Subtotal				$127,000
Engineering, Legal & Admin (25%)				$31,800
Contingency (10%)				$12,700
Total				**$171,500**

Alternative #5 – Construct 20,000 gallon Above Grade Steel Storage Tank

Alternative #5 consists of constructing a new 20,000 gallon above grade steel tank. This alternative does not provide storage for fire protection. A cost estimate for Alternative #5 is included in Table 4-5.

TABLE 4-5
WATER STORAGE ALTERNATIVE #5
20,000 GALLON STEEL TANK - NON-FIRE FLOW SYSTEM
OPINION OF PROBABLE COSTS
BYNUM WATER DISTRICT WATER SYSTEM IMPROVEMENTS

ITEM	QUANTITY	UNITS	UNIT PRICE	TOTAL COST
Mobilization	1	LS	$10,000.00	$10,000
Construct Access Road	1	LS	$5,000.00	$5,000
Site Work	1	LS	$20,000.00	$20,000
New Tank Construction	20,000	Gal	$2.50	$50,000
Valves, Fittings, Misc. Appurtenances	1	LS	$5,000.00	$5,000
Valve Structure	1	LS	$10,000.00	$10,000
Landscaping	1	LS	$2,000.00	$2,000
Electrical	1	LS	$15,000.00	$15,000
Geotechnical Investigations	1	LS	$5,000.00	$5,000
Subtotal				$122,000
Engineering, Legal & Admin (25%)				$30,500
Contingency (10%)				$12,200
Total				**$164,700**

- **Alternative #6 – Construct 20,000 gallon Buried Fiberglass Storage Tank**

Alternative #6 consists of constructing a new 20,000 gallon buried fiberglass tank. This alternative does not provide storage for fire protection. A cost estimate for Alternative #6 is included in Table 4-6.

TABLE 4-6
WATER STORAGE ALTERNATIVE #6
20,000 GALLON FIBERGLASS TANK - NON-FIRE FLOW SYSTEM
OPINION OF PROBABLE COSTS
BYNUM WATER DISTRICT WATER SYSTEM IMPROVEMENTS

ITEM	QUANTITY	UNITS	UNIT PRICE	TOTAL COST
Mobilization	1	LS	$10,000.00	$10,000
Construct Access Road	1	LS	$5,000.00	$5,000
Site Work	1	LS	$10,000.00	$10,000
New Tank Construction	20,000	Gal	$2.50	$50,000
Valves, Fittings, Misc. Appurtenances	1	LS	$5,000.00	$5,000
Valve Structure	1	LS	$10,000.00	$10,000
Landscaping	1	LS	$2,000.00	$2,000
Electrical	1	LS	$15,000.00	$15,000
Geotechnical Investigations	1	LS	$5,000.00	$5,000
Subtotal				$112,000
Engineering, Legal & Admin (25%)				$28,000
Contingency (10%)				$11,200
Total				**$151,200**

b. Operations and Maintenance Costs

In addition to capital costs, annual operation and maintenance (O&M) costs must be evaluated for a 20-year planning period. An evaluation of each alternative's estimated O&M costs and the assumptions made in computing the costs are presented in the following tables. O&M costs will be evaluated on a relative basis so that the six storage alternatives can be compared on a present worth basis. Unit prices for coating of the tanks presented in the following tables are based on quotes from a Montana based coating contractor. Manhours for labor were estimated as follows:

Weekly 30-minute inspection of tank,
= 30 min. * 52 weeks/yr = 26 Hours/Year

Miscellaneous labor for repairs and maintenance (Valves, piping, controls, etc.) = 14 Hours/Year

Total labor per year = 26 + 14 = 40 Hours/Year

It is expected that the interior of steel tanks will require recoating twice and the exterior will require recoating once over the twenty year planning period. Concrete and fiberglass alternatives will not require recoating over the twenty year planning period. Estimated capital costs for recoating tanks were brought back to present worth dollars and distributed over a 20-year period using a 6% rate of return and standard interest formulas. The annual O&M costs also include amortizing the costs of cleaning the tank on five year intervals. There are also power costs for running the telemetry unit and a spare parts and repair budget.

Alternative #1 consists of constructing a new 80,000 gallon above grade steel tank. Table 4-7 presents estimated annual O & M costs and the assumptions used in arriving at the costs. The O&M line items for recoating and cleaning must be managed as a reserve for the District, because recoating will only be completed every ten years and cleaning every five years. The District needs to put this money away on annual basis so that the funds are available when these maintenance items are needed.

TABLE 4-7
WATER STORAGE ALTERNATIVE #1
80,000 GALLON STEEL TANK - FIRE FLOW SYSTEM
OPINION OF PROBABLE ANNUAL O&M COSTS
BYNUM WATER DISTRICT WATER SYSTEM IMPROVEMENTS

ITEM	QUANTITY	UNITS	UNIT PRICE	TOTAL COST
Labor	40	HR	$15.00	$600
Spare Parts/Repair		LS	$300.00	$300
Power		LS	$400.00	$400
Tank Cleaning Annual Amortization [1]			$400.00	$400
Tank Recoating Annual Amortization [2]		LS	$1,600.00	$1,600
Total				**$3,300**

[1] Tank cleaning amortization is based on cleaning tank every five years
[2] Tank recoating amortization is based on recoating tank interior every ten years and recoating tank exterior every twenty years

Alternative #2 consists of constructing a new 80,000 gallon buried concrete tank. Table 4-8 presents estimated annual O & M costs and the assumptions used in arriving at the costs.

TABLE 4-8
WATER STORAGE ALTERNATIVE #2
80,000 GALLON CONCRETE TANK - FIRE FLOW SYSTEM
OPINION OF PROBABLE ANNUAL O&M COSTS
BYNUM WATER DISTRICT WATER SYSTEM IMPROVEMENTS

ITEM	QUANTITY	UNITS	UNIT PRICE	TOTAL COST
Labor	40	HR	$15.00	$600
Spare Parts/Repair		LS	$300.00	$300
Power		LS	$400.00	$400
Tank Cleaning Annual Amortization [1]		LS	$400.00	$400
Total				**$1,700**

[1] Tank cleaning amortization is based on cleaning tank every five years

Alternative #3 consists of constructing four new 20,000 gallon fiberglass tanks. Table 4-9 presents estimated annual O & M costs and the assumptions used in arriving at the costs.

TABLE 4-9
WATER STORAGE ALTERNATIVE #3
80,000 GALLON - FOUR 20,000 GALLON FIBERGLASS TANKS
FIRE FLOW SYSTEM
OPINION OF PROBABLE ANNUAL O&M COSTS
BYNUM WATER DISTRICT WATER SYSTEM IMPROVEMENTS

ITEM	QUANTITY	UNITS	UNIT PRICE	TOTAL COST
Labor	40	HR	$15.00	$600
Spare Parts/Repair		LS	$300.00	$300
Power		LS	$400.00	$400
Tank Cleaning Annual Amortization [1]		LS	$400.00	$400
Total				**$1,700**

[1] Tank cleaning amortization is based on cleaning tank every five years

Alternative #4 consists of constructing a new 20,000 gallon buried concrete tank. Table 4-10 presents estimated annual O & M costs and the assumptions used in arriving at the costs.

TABLE 4-10 WATER STORAGE ALTERNATIVE #4 20,000 GALLON CONCRETE TANK - NON-FIRE FLOW SYSTEM OPINION OF PROBABLE ANNUAL O&M COSTS BYNUM WATER DISTRICT WATER SYSTEM IMPROVEMENTS				
ITEM	**QUANTITY**	**UNITS**	**UNIT PRICE**	**TOTAL COST**
Labor	40	LS	$15.00	$600
Spare Parts/Repair		LS	$300.00	$300
Power		LS	$400.00	$400
Tank Cleaning Annual Amortization [1]		LS	$300.00	$300
Total				**$1,600**

[1] Tank cleaning amortization is based on cleaning tank every five years

Alternative #5 consists of constructing a new 20,000 gallon above grade steel tank. Table 4-11 presents estimated annual O & M costs and the assumptions used in arriving at the costs.

TABLE 4-11 WATER STORAGE ALTERNATIVE #5 20,000 GALLON STEEL TANK - NON-FIRE FLOW SYSTEM OPINION OF PROBABLE ANNUAL O&M COSTS BYNUM WATER DISTRICT WATER SYSTEM IMPROVEMENTS				
ITEM	**QUANTITY**	**UNITS**	**UNIT PRICE**	**TOTAL COST**
Labor	40	HR	$15.00	$600
Spare Parts/Repair		LS	$300.00	$300
Power		LS	$400.00	$400
Tank Cleaning Annual Amortization [1]		LS	$300.00	$300
Tank Recoating Annual Amortization [2]		LS	$800.00	$800
Total				**$2,400**

[1] Tank cleaning amortization is based on cleaning tank every five years

[2] Tank recoating amortization is based on recoating tank interior every ten years and recoating tank exterior every twenty years

Alternative #6 consists of constructing a new 20,000 gallon fiberglass tank. Table 4-12 presents estimated annual O & M costs and the assumptions used in arriving at the costs.

TABLE 4-12
WATER STORAGE ALTERNATIVE #6
20,000 GALLON FIBERGLASS TANK - NON-FIRE FLOW SYSTEM
OPINION OF PROBABLE ANNUAL O&M COSTS
BYNUM WATER DISTRICT WATER SYSTEM IMPROVEMENTS

ITEM	QUANTITY	UNITS	UNIT PRICE	TOTAL COST
Labor	40	HR	$15.00	$600
Spare Parts/Repair		LS	$300.00	$300
Power		LS	$400.00	$400
Tank Cleaning Annual Amortization [1]		LS	$300.00	$300
Total				**$1,600**

[1] Tank cleaning amortization is based on cleaning tank every five years

c. Comparative Evaluation of Alternatives

This section compares the six storage tank alternatives described in the previous section. The goal of this comparative evaluation is the selection of a single alternative to be recommended for implementation. Cost effectiveness, performance and environmental impacts will all be considered in comparing the alternatives and making the final recommendation for implementation. The alternatives analysis is broken down into two comparisons; one for tanks providing fire flow volume and another for the tanks which do not provide fire flow.

d. Cost Effectiveness

Table 4-13 presents the capital, O&M, and present worth costs for each of the storage alternatives. It was assumed that new tank construction would have a forty year life and would have a salvage value of approximately 50% of its construction cost at the end of twenty years. From the table, it can be seen that Alternative 1 has the lowest present worth cost for a tank which provides fire flow, so it was ranked the best with Alternative 3 being ranked second best and Alternative 2 ranked the lowest because of the high capital costs. Alternative 6 has the lowest capital cost for non-fire flow tanks but all of the non-fire flow alternatives were very close on cost so Alternatives 4, 5, and 6 were ranked equally on this comparison.

TABLE 4-13 STORAGE TANK ALTERNATIVES PRESENT WORTH ANALYSIS						
ITEM	**ALTERNATIVE #1 80,000 GALLON STEEL TANK**	**ALTERNATIVE #2 80,000 GALLON CONCRETE TANK**	**ALTERNATIVE #3 FOUR 20,000 GALLON FIBERGLASS TANKS**	**ALTERNATIVE #4 20,000 GALLON CONCRETE TANK**	**ALTERNATIVE #5 20,000 GALLON STEEL TANK**	**ALTERNATIVE #6 20,000 GALLON FIBERGLASS TANK**
Capital Costs	$282,200	$455,000	$380,700	$171,500	$164,700	$151,200
Annual O&M Costs	$3,300	$1,700	$1,700	$1,600	$2,400	$1,600
20-Year Salvage Value	$90,000	$150,000	$130,000	$55,000	$55,000	$50,000
Present Worth of Salvage Value (6%)	$28,000	$47,000	$41,000	$17,000	$17,000	$16,000
Present Worth of Annual O&M Cost (6%)	$37,900	$19,500	$19,500	$18,400	$27,500	$18,400
Present Worth Cost	**$292,100**	**$427,500**	**$359,200**	**$172,900**	**$175,200**	**$153,600**

e. Environmental Considerations

All of the alternatives will disturb a relatively similar and small amount of ground on the proposed tank site above Bynum. No significant adverse impacts are anticipated by implementation of any of the alternatives. Environmental resources are discussed in Chapter One and Appendix G which contains the Environmental Checklist.

f. Operations and Maintenance Considerations

The above grade steel tank alternatives are inferior from an operations and maintenance perspective. First, they require recoating of the interiors every 10 to 15 years and recoating of the exterior every 20 years. This requires the District to set aside funds annually so that funds are available when recoating is required. Second, the above grade steel tanks are highly susceptible to damage from ice particularly when installed for very small communities such as Bynum because of the low turnover volume in the winter. The concrete and fiberglass tanks will not require recoating during the twenty year planning period and being buried addresses the freezing issue. In addition, both concrete and fiberglass tanks are both considered to have a longer service life than steel tanks.

g. Recommendations

Table 4-14 presents a comparative ranking of each the fire flow alternatives based on the evaluation previously presented. Table 4-15 presents a comparative ranking of each the non-fire flow alternatives based on the evaluation previously presented. Each alternative is given a rating of plus (+), minus (-), or neutral (0). A plus indicates a positive rating for the category when compared to other alternatives, a neutral rating indicates that the alternative is neither strong nor weak in the category being considered when compared to other alternatives, and a minus means the alternative is weak in this category.

Unlike a numbered ranking system, this rating system allows the same score in a particular category for various alternatives. In some categories it is difficult to distinguish between the relative merits of each alternative. In this way, the true strengths and weaknesses of each alternative become apparent. The plus and minus scores are added and the results indicated in the total. The higher the positive score the more favorable the rating. A weighted rating system may be applied to this system if desired. It is important to recognize the limitations of any rating system. The ratings in Table 4-14 and 4-15 are not used as the final determination in plan selection. They are used as tools that are combined with professional judgment to arrive at a recommended plan.

Alternative #3 was selected as the preferred fire flow alternative. The District felt that the recoating, freezing, and service life issues associated with the Steel Tank (Alternative 1) outweighed the fact that this it was the lowest cost

alternative. Alternative 3 was felt to have similar service life and operational advantages as the concrete tank alternative while at a lower cost. In addition, the four tanks under Alternative #3 will provide the District with additional operational flexibility for periodic cleaning and maintenance activities.

TABLE 4-14
BYNUM WATER DISTRICT
FIRE FLOW STORAGE ALTERNATIVES
COMPARATIVE RANKING TABLE

Ranking Criteria	Alternative #1 80,000 Gallon Steel Tank	Alternative #2 80,000 Gallon Concrete Tank	Alternative #3 4-20,000 Gallon Fiberglass Tanks
Cost Effectiveness	+	-	0
Environment	0	0	0
Operation and Maintenance	0	+	+
Service Life	0	+	+
Total	**+1**	**+1**	**+2**

Alternative 6 (20,000 gallon fiberglass tank) was selected as the preferred non-fire flow alternative. Again, both Alternative 6 and Alternative 4(20,000 gallon concrete tank) were superior to Alternative 5 (steel tank) from an operations and service life perspective. Alternative 6 was chosen because of the ease of installation and lower capital cost in relationship to the concrete tank. However, if the District elects to proceed with a non-fire flow system a concrete tank should be reexamined during the design phase since Alternatives 4 and 6 are so close in this comparison.

TABLE 4-15 BYNUM WATER DISTRICT NON-FIRE FLOW STORAGE ALTERNATIVES COMPARATIVE RANKING TABLE			
Ranking Criteria	**Alternative #4 20,000 Gallon Concrete Tank**	**Alternative #5 20,000 Gallon Steel Tank**	**Alternative #6 20,000 Gallon Fiberglass Tank**
Cost Effectiveness	0	0	0
Environment	0	0	0
Operation and Maintenance	+	-	+
Service Life	+	0	+
Total	**+2**	**-1**	**+2**

In regards to selection of the fire flow versus non-fire flow system, the District has elected to construct a fire flow system, if an acceptable funding package can be assembled to finance the project. Chapter Six discusses financing scenarios for both fire flow and non-fire flow systems.

Appendix X

Well Bid Tab Reference

ITEM II
BIDDER'S PROPOSAL

1. In compliance with your request for quotes dated 1/6/2014 and subject to all the conditions thereof, the undersigned Clay Hamer (hereinafter called "Bidder") doing business as Red Tiger Drilling Inc., proposes to furnish and complete work required by the Contract Documents for the construction of all structures listed at the prices shown for each bid item on the Bid Schedule. Any total cost found inconsistent with the unit cost when the bids are examined will be deemed in error and corrected to agree with the unit cost which shall be considered correct.

2. The undersigned Bidder does hereby declare and stipulate that this proposal is made in good faith, without collusion or connection with any other person or persons bidding for the same work, and that it is made in pursuance of and subject to all the terms and conditions of the Notice and Instructions to Bidders, the Contract, the Detailed Specifications, and the Plans pertaining to the work to be done, all of which have been examined by the undersigned.

3. All the various phases of work enumerated in the Detailed Specifications with their individual jobs and overhead, whether specifically mentioned, included by implication or appurtenant thereto, are to be performed by the Bidder under one of the items listed in the Bid Schedule, irrespective of whether it is named in said list.

4. Payment for work performed will be in accordance with the Bid Schedule, subject to changes as provided for in the Contract.

5. The Bidder will submit a schedule and execute the Contract within 10 days after notification of Contract award.

6. It is understood that time is of the essence in this Contract and the Bidder agrees to commence within 5 days after the Notice to Proceed and complete work within 30 calendar days.

7. The undersigned Bidder agrees to complete the Work in accordance with the Contract Documents within the specified completion time, for the following price(s):

Bid Schedule

Item No.	Description	Estimated Quantity	Unit	Unit Price	Total Estimated Price
1	Mobilization	1	LS		3,550.00
2	Drill Well	300	LF	27.50	8,250.00
3	Temporary Surface Casing	1	EA	7,197.00	7,197.00
4	Steel Well Casing	300	LF	15.00	4,500.00
5	Perforate Steel Well Casing	40	LF	35.50	1,420.00
6	Well Development, Pump Test, Aquifer Test	30	HR	300.00	9,000.00
7	Well Completion	1	EA	21,908.50	21,908.50
TOTAL BID					55,825.50

In Words: Fifty five Thousand Eight Hundred Twenty Five Dollars & Fifty Cents.

Submitted on January 6, 20 14.

If Bidder is An Individual:

By: _____
(SEAL)

Name (typed or printed): _____

Doing business as: _____

Business address: _____

Phone No.: _____ Fax No.: _____

If Bidder is A Partnership:

Partnership Name: _____

By: _____
(SEAL)

Name (typed or printed): _____

Business address: _____

Phone No.: _____ Fax No.: _____

If Bidder is A Corporation:

Corporation Name: Red Tiger Drilling INC.

State of Incorporation: Montana

Type (General Business, Professional, Service, Limited Liability): Limited Liability

By: Troy Hauser

Name (typed or printed): Troy Hauser

Title: President

(SEAL)

Attest McKenzie Woodland McKenzie Woodland

Business address: P.O. Box 659 Manhattan, Montana 59741

Phone No.: (406)284-6916 Fax No.: (406)284-4063

Date of Qualification to do business is _____

If Bidder is A Joint Venture:

Joint Venturer 1:

Name: _____

By: _____
(SEAL)

Name (typed or printed): _____

Title: _____

Business address: _____

ITEM II
BIDDER'S PROPOSAL

1. In compliance with your request for quotes dated December 13, 2013 and subject to all the conditions thereof, the undersigned Shawn Tomey Owner, Heh Drilling Inc. (hereinafter called "Bidder") doing business as Heh Drilling Inc, proposes to furnish and complete work required by the Contract Documents for the construction of all structures listed at the prices shown for each bid item on the Bid Schedule. Any total cost found inconsistent with the unit cost when the bids are examined will be deemed in error and corrected to agree with the unit cost which shall be considered correct.

2. The undersigned Bidder does hereby declare and stipulate that this proposal is made in good faith, without collusion or connection with any other person or persons bidding for the same work, and that it is made in pursuance of and subject to all the terms and conditions of the Notice and Instructions to Bidders, the Contract, the Detailed Specifications, and the Plans pertaining to the work to be done, all of which have been examined by the undersigned.

3. All the various phases of work enumerated in the Detailed Specifications with their individual jobs and overhead, whether specifically mentioned, included by implication or appurtenant thereto, are to be performed by the Bidder under one of the items listed in the Bid Schedule, irrespective of whether it is named in said list.

4. Payment for work performed will be in accordance with the Bid Schedule, subject to changes as provided for in the Contract.

5. The Bidder will submit a schedule and execute the Contract within 10 days after notification of Contract award.

6. It is understood that time is of the essence in this Contract and the Bidder agrees to commence within 5 days after the Notice to Proceed and complete work within 30 calendar days.

7. The undersigned Bidder agrees to complete the Work in accordance with the Contract Documents within the specified completion time, for the following price(s):

Bid Schedule

Item No.	Description	Estimated Quantity	Unit	Unit Price	Total Estimated Price
1	Mobilization	1	LS	1,000.00	1,000.00
2	Drill Well	300	LF	45.00	13,500.00
3	Temporary Surface Casing	1	EA	4,000.00	4,000.00
4	Steel Well Casing	300	LF	25.00	7,500.00
5	Perforate Steel Well Casing	40	LF	20.00	800.00
6	Well Development, Pump Test, Aquifer Test	30	HR	275.00	8,250.00
7	Well Completion	1	EA	19,000	19,000.00
TOTAL BID					54,050.00

In Words: fifty four thousand fifty and 00/100 dollars

Submitted on January 3, 2014.

If Bidder is An Individual:

By: _____
(SEAL)

Name (typed or printed): _____

Doing business as: _____

Business address: _____

Phone No.: _____ Fax No.: _____

If Bidder is A Partnership:

Partnership Name: _____

By: _____
(SEAL)

Name (typed or printed): _____

Business address: _____

Phone No.: _____ Fax No.: _____

If Bidder is A Corporation:

Corporation Name: Heh Drilling Inc.

State of Incorporation: Montana

Type (General Business, Professional, Service, Limited Liability): General Business

By: Sharon Toney

Name (typed or printed): Sharon Toney

Title: Owner
(SEAL)

Attest Meg Hossler

Business address: P.O. Box 919, 415D Hwy 12 E, East Helena, MT 59635

Phone No.: 406-227-7435 Fax No.: 406-227-8949

Date of Qualification to do business is 01/14/1991

If Bidder is A Joint Venture:

Joint Venturer 1:

Name: _____

By: _____
(SEAL)

Name (typed or printed): _____

Title: _____

Business address: _____

Phone No.: _____ Fax No.: _____

Joint Venturer 2:

Name: _____

By: _____
(SEAL)

Name (typed or printed): _____

Title: _____

Business address: _____

Phone No.: _____ Fax No.: _____

Phone and FAX Number, and Address for receipt of official communications:

Phone No.: _____ FAX No.: _____

(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)

ITEM II
BIDDER'S PROPOSAL

1. In compliance with your request for quotes dated 12-12-2013 and subject to all the conditions thereof, the undersigned _____ Lindsay Drilling Co., Inc. (hereinafter called "Bidder") doing business as _____, proposes to furnish and complete work required by the Contract Documents for the construction of all structures listed at the prices shown for each bid item on the Bid Schedule. Any total cost found inconsistent with the unit cost when the bids are examined will be deemed in error and corrected to agree with the unit cost which shall be considered correct.

2. The undersigned Bidder does hereby declare and stipulate that this proposal is made in good faith, without collusion or connection with any other person or persons bidding for the same work, and that it is made in pursuance of and subject to all the terms and conditions of the Notice and Instructions to Bidders, the Contract, the Detailed Specifications, and the Plans pertaining to the work to be done, all of which have been examined by the undersigned.

3. All the various phases of work enumerated in the Detailed Specifications with their individual jobs and overhead, whether specifically mentioned, included by implication or appurtenant thereto, are to be performed by the Bidder under one of the items listed in the Bid Schedule, irrespective of whether it is named in said list.

4. Payment for work performed will be in accordance with the Bid Schedule, subject to changes as provided for in the Contract.

5. The Bidder will submit a schedule and execute the Contract within 10 days after notification of Contract award.

6. It is understood that time is of the essence in this Contract and the Bidder agrees to commence within 5 days after the Notice to Proceed and complete work within 30 calendar days.

7. The undersigned Bidder agrees to complete the Work in accordance with the Contract Documents within the specified completion time, for the following price(s):

Bid Schedule

Item No.	Description	Estimated Quantity	Unit	Unit Price	Total Estimated Price
1	Mobilization	1	LS		$2000
2	Drill Well	300	LF	35	10,500
3	Temporary Surface Casing	1	EA		3000
4	Steel Well Casing	300	LF	15	4500
5	Perforate Steel Well Casing	40	LF	10	400
6	Well Development, Pump Test, Aquifer Test	30	HR	200	6000
7	Well Completion	1	EA		$20,500
TOTAL BID					$46,900

In Words: forty-six thousand, nine hundred

(Conditions & Concerns Attached)

Submitted on 1-2, 2014.

If Bidder is An Individual:

By: _____
(SEAL)

Name (typed or printed): _____

Doing business as: _____

Business address: _____

Phone No.: _____ Fax No.: _____

If Bidder is A Partnership:

Partnership Name: _____



LINDSAY DRILLING

P.O. Box 67, Clancy, Mt. 59634
water@lindsaydrilling.com
406-933-5511/ Fax – 406-933-8140

RE: Forest Park Estates New Water Supply Well

Conditions and Concerns

1. Could not find reference to controls for the pump

2. Could not find the distance to power or what voltage is to be supplied. We assumed power at the well to size the submersible wire to 6/3 ground.

3. Plumbness and alignment is to be based on Water Well contractor construction rule 36.21.669

4. The fact that we cannot tell the exact length of the pump test (8 hrs. or 24 hrs) and not being paid for the installation or removal of pumping equipment raises the cost substantially.

Terry Lindsay

By: _____
(SEAL)

Name (typed or printed): _____

Business address: _____

Phone No.: _____ Fax No.: _____

If Bidder is A Corporation:

Corporation Name: Lindsay Drilling Co., Inc.

State of Incorporation: Montana

Type (General Business, Professional, Service, Limited Liability): General

By: Terry Lindsay

Name (typed or printed): Terry Lindsay

Title: Pres.

Attest: Linda Lindsay

LINDA LINDSAY NOTARIAL SEAL STATE OF MONTANA
NOTARY PUBLIC for the State of Montana (SEAL)
Residing at Clancy, Montana
My Commission Expires June 6, 2014

Business address: P.O. Box 67 Clancy, MT. 59634

Phone No.: 406-933-5511 Fax No.: _____

Date of Qualification to do business is Jan, 1976

If Bidder is A Joint Venture:

Joint Venturer 1:

Name: _____

By: _____
(SEAL)

Name (typed or printed): _____

Title: _____

Business address: _____

Phone No.: _____ Fax No.: _____

Joint Venturer 2:

Name: _____

By: _____
(SEAL)

Name (typed or printed): _____

Title: _____

Business address: _____

Phone No.: _____ Fax No.: _____

Phone and FAX Number, and Address for receipt of official communications:

Phone No.: _____ FAX No.: _____

(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)

Appendix Y

Water System Valuation

Major Components and Estimated Replacement Costs

Ranchview Estates Water Supply System

October 2016

Major Components	Estimated Useful Life	Estimated Remaining Life	Current Replacement Costs	Total Replacement Costs
Automated Call-out System			**$750**	$750
Pump House				
Replacement of Pump House Building with heat, plus estimate for flow meters, sand strainers and other appurtenances.			$60,000	$60,000
Pressure Tank #1 (3-31-11)	20	18	$1,200	
Pressure Tank #2 (8-6-08)	20	15	$1,200	
Pressure Tank #3 (5-4-04)	20	11	$1,200	
Pressure Tank #4 (5-31-99)	20	6	$1,200	
Pressure Tank #5 (3-31-11)	20	18	$1,200	
Pressure Tank #6 (8-6-08)	20	15	$1,200	
Pressure Tank #7 (5-7-04)	20	6	$1,200	
Pressure Tank #8 (looks new)	20	?	$1,200	
Pressure Tank #9 (5-31-99) OFF	20	6	$1,200	
Pressure Tank #10 (Looks older)	20	?	$1,200	
Pressure Tank #11	20	?	$1,200	

(Looks older)				
Pressure Tank #12 (Looks Older)	20	?	$1,200	
Pressure Tank #13 (Looks Newer)	20	?	$1,200	
Pressure Tank #14 (12-11-2000)	20	7	$1,200	
Pressure Tank #15 (12-11-2000)	20	7	$1,200	
Pressure Tank #16 (3-31-99)	20	6	$1,200	
Pressure Tank Sub Total:				**$19,200**
Variable Frequency Drives:				
Domestic Well #1 (date installed)	N/A		$3,500	
Domestic Well #2 (date installed)	N/A		$3,500	
Irrigation Well #1 (2012)	20	19	$8,000	
Irrigation Well #2 (2012)	20	19	$8,000	
Frequency Drive Sub Total:				**$23,000**
Domestic Wells:				
Domestic Well #1				
Well Replacement	50	?	$55,000	
Pump: (installed 1997) Pull and replace 7.5hp pump -- $1,100 + $2,200	20	4	$5,100	
Domestic Well #2	50	?		
Well Replacement			$55,000	
Pump: (installed 1997) Pull and replace 7.5hp pump - $1,100 + $2,200	20	4	$5,100	
Irrigation Wells:				
Irrigation Well #1:		?		
Well Replacement	50		$55,000	
Pump: (installed 2009)Pull and replace 40hp pump - $1,100 + $6,000	20	16	$10,650	
Irrigation Well #2:				
Well Replacement	50	?	$55,000	

Pump: (installed 2012) Pull and replace pump 25hp pump - $1,100 + $3,500	20	19	$6,900	
Well Replacement Cost Sub Total				**$220,000**
Pump Replacement Cost Sub Total				**$27,750**
Ranch View Subdivision:				
Main Supply Line (date installed)(replacement of 665 feet of 6 inch line at $100 per lineal foot costs $66,500; replacement of 905 feet of 4 inch line with 6 inch line at $100 per lineal foot costs without asphalt $90,500)	50		$157,000	
Branch Supply Lines (date installed) (replacement of 8,610 feet of 4 inch line with 6 inch line at $100 per lineal foot cost without asphalt)	50		$861,000	
Cost to remove and replace asphalt, concrete and fencing (assumes 10% of 4 inch and 3 inch lines will be affected – 9,515 lineal feet times 10% times $70 per lineal foot costs =$66,605)			$66,605	
Main and Branch Line Sub Total				**$1,084,605**
TOTAL COSTS:				**$1,435,305**

Notes: The following changes from the September 2013 estimates were made in this updated estimate:

1. Added costs related to replacing the pump house and associated equipment.

2. Increased the estimate for pressure tanks to account for both the cost of the tank and the plumbing and installation costs for each tank.

3. Increased pump setting costs to reflect updated estimated costs for setting, replacement valves, etc.

4. Increased estimate on all main and branch lines to $100 per lineal foot to reflect likely requirement by MDEQ to have minimum of 6" main/branch delivery pipe size.

5, Increased asphalt cost to reflect current costs.

Thanks to Alden Beard for his generous help in reviewing and commenting on the estimates in this document. But any errors or omissions in the revised document are my fault – not his!

Appendix Z

Irrigation System Upsize Cost Estimate

ALTERNATIVE D-2 IRRIGATION MAIN UPSIZE (3" TO 6")
OPINION OF PROBABLE COST (SOUTH TO LARIAT RD., 1,100 FT)
RANCHVIEW WATER DISTRICT

#	BID ITEM	QTY	UNITS	UNIT PRICE	TOTAL
1	6" PVC Water	1,100	LF	$ 50.00	$ 55,000
2	6" Fittings (Horizontal/Vertical Bends, Tees, Crosses)	6	EA	$ 1,000.00	$ 6,000
3	6" Gate Valves and Box	4	EA	$ 2,200.00	$ 8,800
4	Reconnections to Existing (6" to 3")	6	EA	$ 1,000.00	$ 6,000
5	Type A (Asphalt) Resurfacing	1,200	SY	$ 50.00	$ 60,000
	Subtotal				**$ 136,000**
	Mobilization		10%		$ 14,000
	Contingency		15%		$ 20,000
	Construction Subtotal				**$ 170,000**
	Engineering		20%		$ 34,000
	Legal & Administrative		2%		$ 3,400
	TOTAL				**$ 207,400**

[1] Estimated unit costs are based upon estimates from suppliers and bid tabs for similar projects throughout Montana.