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WATER SYSTEM FACILITY PLAN

FOR

REMINGTON RECREATIONAL WATER AND SEWER DISTRICT

SUBMITTED TO THE

IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY

DECEMBER 2019

WELCH-COMER
ENGINEERS | SURVEYORS

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REMINGTON RECREATIONAL WATER AND SEWER DISTRICT

PROJECT NO. 41317.00.0

SUBMITTED TO THE:

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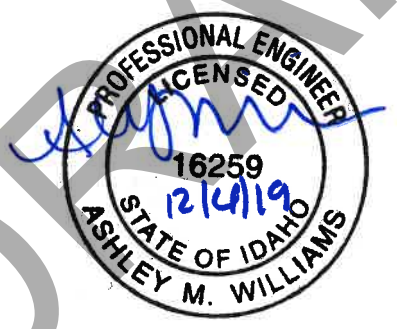

DECEMBER 2019

PREPARED BY:

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EXECUTIVE SUMMARY

The Remington Recreational Water and Sewer District has procured the services of Welch Comer & Associates, Inc. to complete a Water System Facility Plan for the District's water system. This plan reviews the current service area, expected growth of the system, analyzes the existing system components and their operation, and provides recommendations for system modifications and improvements necessary to serve existing customers. A summary of the major findings of this report is provided below.

The primary concern for the water system is a lack of capacity with significant deficiencies in source, storage and booster capacity with regard to current system demands. The system does not currently have capacity to provided recommended fire flows during the summer months and does not meet IDAPA redundancy requirements for source or booster pumps. The District serves an area that is seeing rapid growth and major system improvements will be necessary to serve the growing population.

The following is a summary of the existing system deficiencies with respect to current demands and the current IDAPA rules:

- Source: Approximately 589 gpm deficiency with respect to meeting current MDP with largest source offline.
- Booster Capacity: Approximately 1,195 gpm deficiency with respect to meeting current MDP and Fire Flow with largest pump offline.
- Storage: Approximately 250,200-gallon storage deficiency with respect to IDAPA rules.
- Distribution:
    - The distribution system saw a water loss of 15% from July 26, 2018 to July 25, 2019.
    - The existing system is not sufficient to provide the calculated current PHP, while maintaining a minimum pressure of 40 psi throughout the system.
    - The existing system does not appear to be capable of providing fire flows while maintaining MDP and a minimum pressure of 20 psi throughout the system.

Future demands were projected based on the anticipated growth rates (based on estimated growth rate). The system was then analyzed based on providing the projected 20 year demands along with Growth A, B, and C (varying degrees of buildout

within the District and growth to surrounding areas)[1] while complying with the IDAPA rules. The deficiencies noted above continue to grow in size into Growth A, B, and C.

Recommended source and distribution improvements were identified to address the deviancies. The storage deficiency is proposed to be addressed through the source and distribution improvements. The capital improvement plan is summarized on the following page.

[1] Growth A consists of buildout of existing boundary and current annexation commitments. Growth B consists projected growth at RAFN proof due date.

Capital Improvement Plan (Options)

	Improvements	Regulatory Req?	Notes	Current	Growth A
Option 1	Develop McCormick Well (1,600 gpm): $1,370,000	X		X	
	Upsize capacity of existing Well 1 (1,600 gpm): $833,000	X		X	
	New Transmission: $332,000	X		X	
			Total	$2,535,000	
Option 1a	Upsize capacity of existing Well 1 (1,600 gpm): $833,000	X		X	
	Develop New Well (1,600 gpm): $1,670,000	X		X	
	New Transmission: $332,000	X		X	
			Total	$2,835,000	
Option 1b	Develop two new wells (1,600 gpm): $3,102,000	X		X	
	New Transmission: $332,000	X		X	
			Total	$3,434,000	
Option 2	Develop McCormick Well (1,600 gpm): $1,370,000	X		X	
	525,000 Gallon Standpipe Reservoir: $1,661,000	X		X	
	Develop New Well (1,600 gpm): $1,670,000	X	by Year 5		X
	Transmission Upgrade: $332,000				X
			Total	$3,363,000	$1,670,000
Option 3	Develop McCormick Well (1,600 gpm): $1,370,000	X		X	
	220,000 Gallon Underground Reservoir: $642,000	X		X	
	Booster Pump Upgrade (add 1,000 gpm): $237,000	X		X	
	Develop New Well (1,600 gpm): $1,670,000	X	by Year 5		X
	Transmission Upgrade: $332,000			X	
			Total	$2,581,000	$1,670,000

	Improvements	Regulatory Req?	Notes	Current
On-Going	Fire Flow Transmission Upsize: $1,110,000	X		
	Depreciated Pipe Replacement: Cost Varies			
Maintenance	Re-seal Existing Storage Reservoir Roof: $20,000	X		X
	Add Pump to Waste Capability to Well 1: $20,000	X		X

Note: Growth A and Ongoing improvements have not been adjusted for inflation.

1. INTRODUCTION

1.1. PURPOSE

The Remington Recreational Water and Sewer District ("District") has authorized Welch Comer and Associates, Inc. to prepare this water system facility plan for the District's water system, located in Kootenai County, Idaho. The system (Idaho Department of Environmental Quality (IDEQ) PWS ID1280270) is owned and operated by the District. The purpose of this report is to identify existing and future sub-standard components of the system and to develop a facility plan to implement the improvements necessary to provide an adequate supply of water to its user for the next 20 years.

1.2. SCOPE

This report is intended to serve as the Facility Plan for the Remington water system.

This report will include the following:

- Population and Growth
  - Identify current service area
  - Project the size and location of future growth
- Demands
  - Review historic demands
  - Project future demands based on growth projections
- Source
  - Review current water rights
  - Review existing pump capacities and status
  - Evaluate capacity and condition of pumps
- Storage
  - Evaluate capacity and condition of storage
- Distribution System
  - Evaluate capacity and condition of existing system
- Hydraulic Model
  - Construction Based on current system conditions
  - Calibration based on field tests
  - Evaluation of current system to support

        - Current peak hour, maximum day, and average day demands
        - Projected peak hour, maximum day, and average day demands
    - Evaluate expansions and improvements to the system
- Financial
    - Identify potential capital improvements and opinions of probable cost

1.3. Project Responsibility

The District was organized in 1996 and currently serves 375 connections. The District is governed by a five-member board which meets monthly.

The District has demonstrated its financial capabilities by building a large cash reserve to help pay for the cost of required system improvements. Throughout the planning process, the District has also made a significant effort to work with Welch Comer Engineers to analyze a large number of improvement options to ensure that the most cost-effective improvements are in place to bring the water system into compliance while minimizing the financial impact these improvements have on its existing customers.

In order to finance any potential water improvement project, the District will need to secure some level of state or federal loans and/or grants. In addition, a vote of the existing service customers is required for the District to obligate debt for this improvement, which would most likely be a revenue bond or a LID (Local Improvement District). If land acquisition for the project is required, the appropriate state and local procedures will be followed.

2. EXISTING CONDITIONS

2.1. OWNERSHIP AND MANAGEMENT

The water system is owned by the Remington Recreational Water and Sewer District. The District is managed by a Board that meets monthly and daily operation is managed by Robert Kuchenski who is licensed by the Idaho Bureau of Occupational Licenses (IBOL) and holds a Drinking Water Distribution 2 (DWD2-14719) and Drinking Water Treatment 2 (DWT2-10956) licenses. The backup operator is Ian Kuchenski who is licensed as Drinking Water Distribution 1 (DWD1-21471).

2.2. SYSTEM BACKGROUND

The District is supplied by two groundwater wells pumping from the Rathdrum Prairie Aquifer. The water is pumped to a 100,000 gallon below ground concrete storage reservoir. Water is then pumped through booster pumps (within the well house building at the storage reservoir site) to the distribution system. The well house contains a backup sodium hypochlorite treatment system and two 150 HP emergency generators. The distribution system consists of approximately 126,000 lineal feet (LF) of water mains serving the community. All the system components (wells, booster pumps, and storage reservoir) are located on District property at 1642 E Shoshone Avenue. Refer to Figure 2-2 for a conceptual drawing of the system operation. The system currently serves 375 active connections, all of which are metered.

The District also purchased a third well with an existing 18-inch shaft in the mid 2000's but is yet to develop it. This well is expected to come online sometime in 2020.

The District serves mainly full-time residential customers with relatively large properties consisting of parcels that are 5-20 acres in size. Many of the connections use over 100,000 gallons per month during the summer with the largest connections using as much as 430,000 gallons in a single month.

Refer to Figure 2-1 for a map depicting the existing system. Refer to Figure 2-2 for a conceptual overview of the water system operation.

2.2.1. CURRENT BOUNDARIES

The Existing Service Area Map is provided as Figure 2-1. A large copy of this map is provided in Appendix A. The map shows the current service area (based on billed connections).

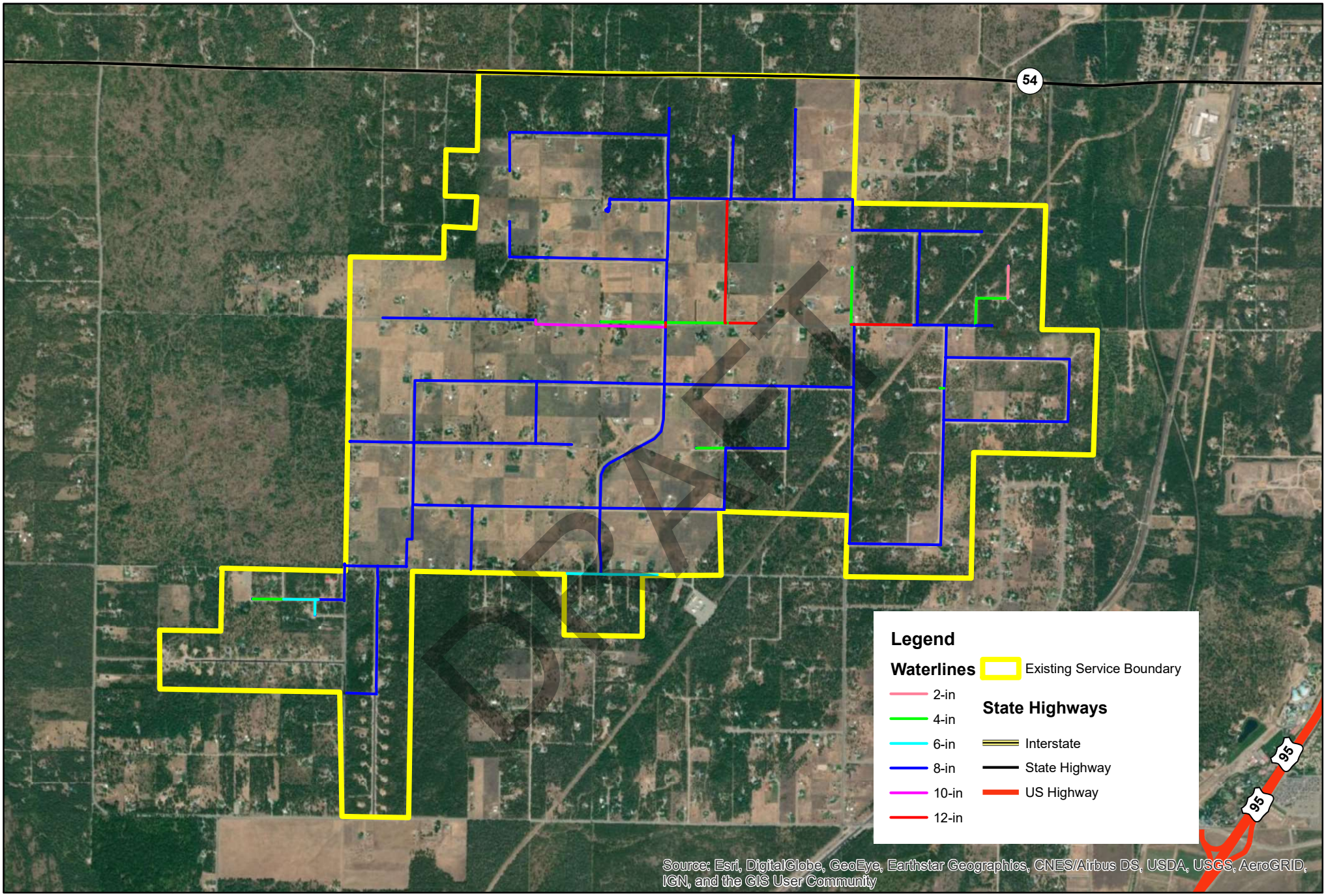
Also refer to Section 8 for a discussion of the existing environmental conditions.

2.3. EXISTING SERVICE AREA CHARACTERISTICS

2.3.1. CURRENT BOUNDARIES

All connections within the current service boundary are single-family residential connections on 5-20 acre lots. There are currently 375 service connections within the

District boundaries and IDEQ has approved the addition of 12 new connections, eight of which are just outside the current western service boundary. The District has also conditionally agreed to serve the subdivision two other large parcels of land just west of their current boundary once their system capacity deficits are addressed with regard to IDAPA rules. IDEQ has stated that no new connections will be approved until all system deficiencies are addressed (refer to Appendix I for this communication).



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Remington Water

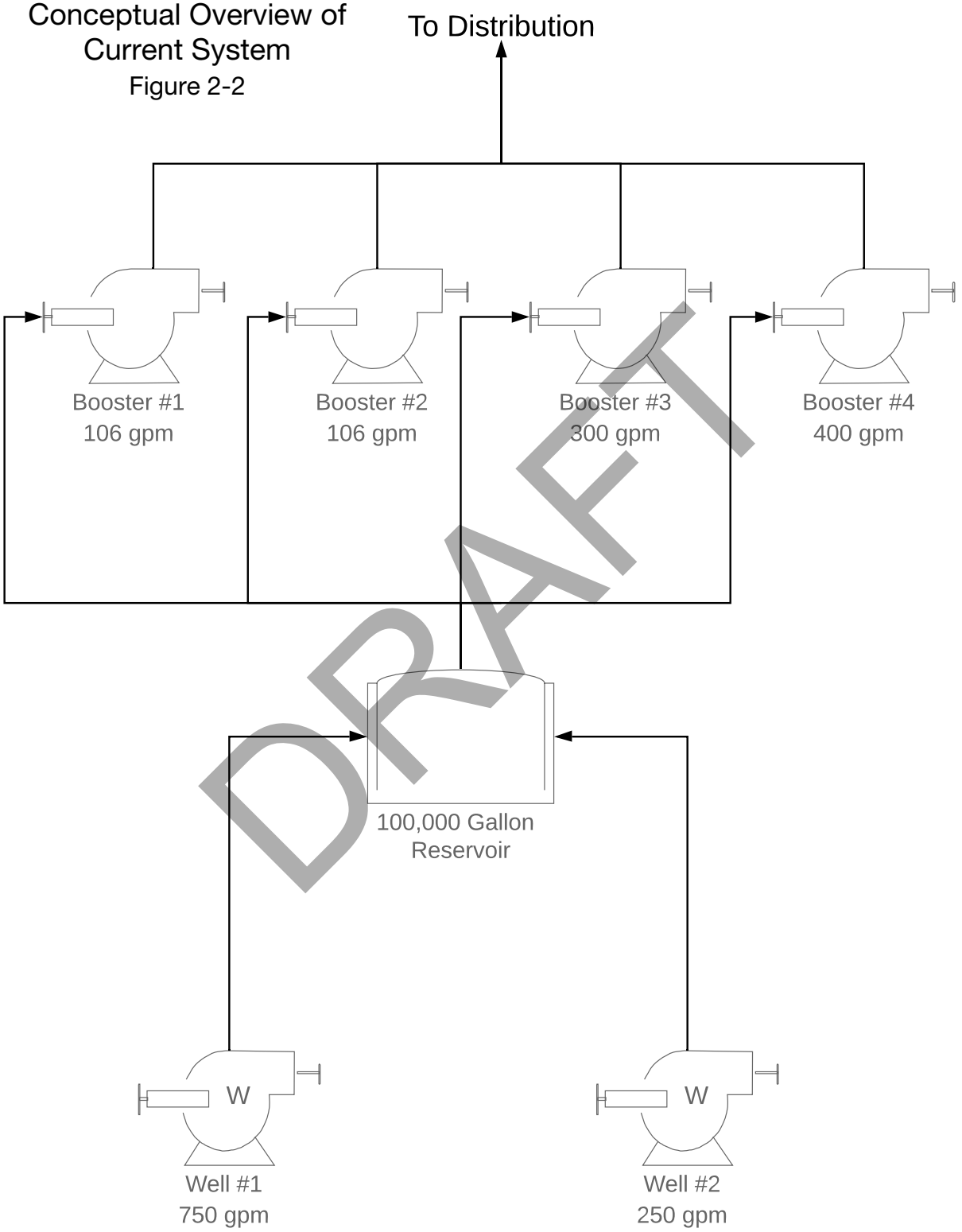
Existing Service Boundary

Figure 2-1

PROJECT NO.....41317
DRAWN BY.....DH
FILENAME.....Service Area
DATE.....11/25/19

Conceptual Overview of Current System

Figure 2-2



2.3.2. PLANNING AREA

Growth for the District water system is based on the maximum subdivision of existing parcels within the District's service area as well as the anticipated development of surrounding areas that are expected to be annexed into the District.

Refer to Section 3.1 for an in-depth discussion about projected growth rates.

2.4. WATER RATES

The current water rate structure consists of a base rate of $35.00 per month for up to 25,000 gallons of water, with a tiered overage rate. From 25,000-100,000 gallons, customers are billed $0.80 per 1000 gallons and for any use over 100,000 gallons, customers are billed $0.60 per 1000 gallons. The District offers a discounted monthly rate of $18.00 for inactive connections and assesses a charge of $18.00 monthly for unoccupied lots within the current District boundary. Meters are read monthly from April-October, with no readings occurring during the winter months. Table 2-1 summarizes the District's current rate structure.

Table 2-1: Rate Schedule

Billing Classification	Monthly Base Rate	Gallons Included in Base Rate	Overage Rate per 1,000 gallons (25,000-100-000 gallons)	Overage Rate per 1,000 gallons (25,000-100-000 gallons)
Residential (occupied)	$35	25,000	$0.80	$0.60
Vacant (No Meter Installed)	$18	--	--	--
Inactive	$18	--	--	--

The District is currently considering adjusting the overage rate schedule to help encourage water conservation and decrease system demand during peak times.

2.5. INVENTORY OF EXISTING FACILITIES

This section is intended to provide a basic system background and includes a general description of the existing facilities and their use. An extensive assessment of the system's capabilities is provided in Section 2.9.

2.5.1. SOURCE

The system is supplied by two production wells, Well No. 1 and Well No. 2, located at 1626 E Shoshone Ave. The District also owns a third well within its boundary that is not currently developed. Table 2-2 provides a summary of each well.

Table 2-2: Existing Sources

	Year Drilled[1]	Year Current Pump/ Motor Installed	Casing Dia. (inch)	Static Water Level (ft.)	Motor HP	Pump Model	Pump Operating Point (gpm)	Back-up Power Supply	Pump Type
Well 1	1970	1997	18	470	125	N/A	750	Two 150 HP Propane Generators	Submersible
Well 2	1998	1998	8	470	40	N/A	250		Submersible
McCormick Well	1969	N/A	18	470	N/A	N/A	N/A	N/A	N/A

Notes:

1. Based on well logs (included in Appendix C).
2. Pump production for Well 1 is based on operator observation. The pump curve for well 2 is available in Appendix C.

2.5.1.1. WATER RIGHTS

The District holds two water rights, one water right permit, and has one active water right application[2] for the diversion of ground water from the Rathdrum Prairie Aquifer, as can be seen in Table 2-3. Proof for the water right permit (95-9427) is due June 1, 2023. Copies of these water rights can be found in Appendix D.

In 2014 and 2015, the District took part of a regional planning effort by water purveyors in Kootenai County that utilize the Rathdrum Prairie Aquifer as their source of water. One primary objective of this group is to define a long range, coordinated plan for water service for the region. Each purveyor has defined their 30-year service boundary. An independent agency reviewed the boundaries to determine purveyor conflicts, and all conflicts have been resolved. A second objective of this group is to secure water rights in accordance with Idaho Code § 42-202 necessary to serve reasonably anticipated growth occurring within this boundary, referred to as RAFN (Reasonably Anticipated Future Need). The District filed its RAFN application in February of 2015, and the application included a 30-year planning period. Thus, the proof of beneficial use is due in 2045.

[2] Reasonably Anticipated Future Need application.

Table 2-3: Existing District Water Rights

Water Right No.	Basis	Beneficial Use	Period of Use	Priority Date	Diversion Rate
95-9457	License	Municipal	Jan. 1 to Dec. 31	11/14/1996	0.33 cfs
95-9458	License	Municipal	Jan. 1 to Dec. 31	12/12/1996	1.92 cfs
95-9427	Permit	Municipal	Jan. 1 to Dec. 31	10/18/2007	5.90 cfs
95-17118	Application-RAFN	Municipal	Jan. 1 to Dec. 31	02/19/2015	32 cfs
Maximum Diversion for License and Permit:					**8.15 cfs**

The District participated in the adjudication process and their original two water rights (95-9457 and 95-9458) have been confirmed/decreed.

2.5.1.2. WATER QUALITY AND TREATMENT

A 12% sodium hypochlorite solution is voluntarily injected through an LMI metering pump prior to the water entering pressure tanks. The sodium hypochlorite injection is flow proportional and is tied to the well pump initiation and will only engage when the well pump is running and producing water. The chlorine tank is vented to the outside through the pump house wall. The free chlorine residual is maintained between 0.1 to 0.2 mg/L.

The District follows sampling regulations stipulated by the Idaho Department of Environmental Quality (IDEQ). Drinking water quality testing was summarized and is included in Appendix E for reference. The levels of regulated contaminants were found to be below state and federal standards.

The Idaho DEQ has two monitoring violations listed for the District regarding routine sampling since the year 2000. The first violation was reported in 2017 regarding E. Coli monitoring. The District's operator reports that the District has never had an E. Coli contamination and the violation came about from a failure to report a sample result. The second violation was reported in 2018 regarding chlorine sampling. The District's operator reported that this violation happened when the sample analysis lab lost one of the routine samples.

2.5.2. STORAGE

The system has a 100,000-gallon below ground water storage reservoir that has been in service since 1991. The reservoir operates on a level transducer system that initiates well pumps and contains a float control system as a back-up. The well pumps are programmed to turn on when the water level in the tank reaches 5.7 feet. Both well pumps are programmed to shut down when the water level in the tank reaches the maximum operating level of 7 feet. Water is drawn from the reservoir by four booster pumps that are programmed to shut down if the water level in the tank reaches less 1.5 feet, making the bottom 1.5 feet of water in the storage tank unusable.

The storage tank is not capable of being isolated from the distribution system to allow the system to receive water directly from the wells. This was listed as a deficiency that needs to be addressed during the next system modification in the 2017 IDEQ Sanitary Survey.

The storage tank roof sealant is peeling off and needs to be stripped and resealed per the IDEQ Sanitary Survey.

Table 2-4: Existing Reservoirs

Reservoir	Date Constructed	Material	Type	Overflow Elevation (feet)[1]	Depth (feet)	Volume (gallons)
Main	1991	Concrete	In Ground	7	8	100,000

Top of Reservoir

Reservoir with Pump House

2.5.3. *BOOSTER STATIONS*

The system is supplied water by four booster pumps housed within the pump house located near the storage reservoir. Table 2-5 summarizes the basic pump information for each existing booster pump.

Table 2-5: Existing Booster Pumps

Booster Station	Pump	Year Current Pump/ Motor Installed	Horsepower	Pump Information	Estimated Capacity (gpm)
Main	#1	2007	10	Berkley 1.5 ZPLS	106
	#2	2007	10	Berkeley 1.5ZPLS	106
	#3	2007	20	Paco 25707	300
	#4	2004	30	Griswold R4GH30	400

Reservoir with Pump House

2.5.4. *DISTRIBUTION SYSTEM*

The following table provides an inventory of the system piping based on the WaterCad model of the current system.

Table 2-6: Summary of Existing Waterlines

Pipe Diameter	Material	Length (ft)
2-inch	Class 160 PVC	694
4-inch	Class 160 PVC	6,589
6-inch	Class 160 PVC	3,685
8-inch	Class 160 PVC	105,954
10-inch	Steel	2,852
12-inch	C900	6,532
Total		**126,306**

2.6. Sanitary Survey, Violations of Safe Drinking Water Act and Cross Connection Control

The sanitary survey for the system was completed by IDEQ on April 18, 2017 the District was found to be in substantial compliance with Idaho Rules for Public Drinking Water Systems. No significant deficiencies were identified during the survey.

However, the following deficiencies and requirements were listed in the Survey:

1. A source water sample tap needs to be installed for the wellfield prior to entry into the storage tank to meet the requirements for the Ground Water Rule. It is also recommended that a tap for each source be installed for potential future sampling.
2. At the next system modification, Well 1 must have a pump to waste capability installed.
3. The storage tank roof sealant must be stripped and resealed using NSF approved sealant.
4. It is recommended that the abandoned test well next to Well 2 be sealed and abandoned according to IDWR standards.

The complete sanitary survey can be found in Appendix B.

2.7. Hydraulic Modeling

2.7.1. Modeling Software

The hydraulic analysis of the water system was performed using the WaterCAD Water Distribution Modeling Software, Version 8.0, which was developed and distributed by Haestad Methods, Inc. The water system model layout is shown in Appendix F.

2.7.2. Model Construction

The base model used for analysis of the distribution system was supplied by the District's previous consulting engineer (Tate Engineering). The base model was then updated to accurately represent the system's current configuration and add recently annexed service areas. The elevations within the supplied model were verified with those available from Google Earth and it was found that there was approximately 50-65 feet of difference between the two values. The Google Earth elevation values were checked against several known surveyed points within the system boundary and found the Google Earth elevations to be within 1-2 feet of the actual elevations. For consistency purposes, all elevations within the model were replaced with elevations from Google Earth. It should be noted, however, that the elevations within Google Earth are considered accurate to ±10 feet systemwide. Therefore, the results of the model are subject to inaccuracies.

One of the major factors that affect the performance of a distribution system is the demand and the distribution of that demand. In WaterCAD, demand is assigned to

individual nodes throughout the system. In order to accurately model the pressure losses within the system, the demand distribution in the model must accurately represent that of the existing system. In order to establish the existing demand distribution, demand was added to each node based on the number of active equivalent dwelling units (EDU[3]) within the vicinity of that node. Because there are no commercial connections served by the District, EDUs were assigned to each parcel that currently has a meter (both active and inactive) on the basis that each parcel represented 1 EDU.

2.7.3. MODEL CALIBRATION

Once the model has been constructed, its accuracy should be tested through calibration. Calibration is the process of comparing model results to field observations and making any necessary adjustments to the model. System characteristics that often need to be adjusted include, but are not limited to, the following: demands, demand distribution, pipe characteristics, pump settings, elevations and valve settings. By adjusting these factors, the model can be adjusted to better represent the field conditions.

Observed pressures near the existing well and at the southern end of Winsome Road were utilized and compared to those predicted by the model. The pressures predicted in the model were found to be within 3 psi of those observed in the field by the systems operator.

It is important to note the variation in the observed and model predicted results may be attributed to the following factors:

- Inaccuracy in the measuring equipment.
- The actual operating characteristics of the system during the time pressure was measured are unknown. These include:
  - Demand and demand distribution
  - Water levels in reservoirs
  - Pump status and discharges
- Service locations where measurements were taken were higher or lower in elevation than the main, and the size and condition of the services could contribute some errors.

The Haestad Methods "Water Distribution Modeling, First Edition," gives guidelines for acceptable calibration levels. The reference states that for master planning of small systems (systems with smaller than 24-inch pipe), *"The model should accurately predict hydraulic grade line (HGL) to within 5-10 feet at calibration data*

[3] EDU will be defined and discussed in greater detail in Section 2.8.1.

points during fire flow tests and to the accuracy of the elevation and pressure data during normal demands."

The American Water Works Association (AWWA) "Modeling, Analysis and Design of Water Distribution Systems" reference states that *"A key use of a calibrated model is to determine relative differences in the results of various actions. In other words, it is not so much that the model has been precisely calibrated, but rather that it can be used as a basis for comparison; thus, it is the differential values that become important."*

Following the Haestad recommendations for master planning the pressure data obtained from the model should be as accurate as the data gathered from the field. The difference between the field results and the model results may be attributed to errors in data collection, the difference in demand estimated for each location, and the actual pipe roughness. Because the predicted pressures are within an acceptable range of the observed pressures, and because it would not be practical to precisely track demand at each junction and roughness of each pipe in the system, the model was accepted as calibrated at this point.

Since the model results are only as accurate as the elevations entered into the model, as previously discussed, a measure of caution should be used when applying the model results. As more accurate elevation information becomes available from additional surveys within the system, the elevation information in the model should be updated to achieve the most accurate results.

2.8. Existing System Demand

The District does not have a set schedule for reading the well production meters, but the readings generally happen every 1-4 days throughout the year. Individual consumption meters are read monthly from April 15-October 15 and are not read the other five months of the year. Meter data for this report was provided by the District for July 16, 2018- July 15, 2019.

The total production for the system was determined by summing the metered gallons produced by the wells for the year of data provided. Likewise, the total consumption was determined by summing the metered gallons consumed for the year of meter data provided. It should be noted that there were several customer meter readings throughout the year that showed a negative consumption rate for the given month. These data points were excluded from the analysis. Theoretically, the metered production and the metered consumption should match. However, there is always a discrepancy between production and consumption. This difference is known as system loss and will be further discussed in Section 2.9.5.1.

The annual production and metered consumption, based on data for the period discussed above (July 2018 to July 2019), is as follows:

- Total Production: 103,129,000 gallons
- Total Metered Consumption: 87,447,000 gallons

2.8.1. EQUIVALENT DWELLING UNIT (EDU)

The term "equivalent dwelling unit" or EDU will be used extensively throughout this document. An EDU is defined in The Idaho Rules for Public Drinking Water Systems – IDAPA 58. Title 01, chapter 8 as a unit of measure that standardizes all land use types (housing, retail, office, etc.) to the level of demand created by a single-family detached housing unit within a water system. The demand for one EDU is equivalent to the amount of water provided to the average single-family detached housing unit within a water system. For example, if a typical single-family household within a given system uses 300 gallons per day (i.e. one EDU equals 300 gpd) and a particular commercial connection uses 600 gallons per day, that commercial connection would account for 2 EDUs within that system

Individual account information was provided by the District for July 16, 2018 through July 15, 2019. The meters are read monthly from April 15th-October 15th with no reading occurring from November-March. Meters are typically read on the 15th of each month. The consumption quantities included in this report are based on the twelve months of data provided by the District.

During this time period, the average daily metered water use per active residential connection was 673 gallons. Therefore, on an average use basis, 1 EDU for the system is 673 gallons per day.

Table 2-7: Summary of Existing Connections and EDUs

	Total Current Connections	Total Current EDUs
Residential	375[1]	375[1]
Vacant	12	12
Total System	387	387

Notes:
[1]The number of EDUs used for calculating ADD was 356. This represents the average number of active service connections throughout the year, as the total connections varied widely during this time period.

2.8.2. AVERAGE DAILY PRODUCTION (ADP)

The average day production is the average volume of water produced by a given system calculated over the course of a year and is often expressed on a per EDU basis. System losses throughout the distribution system have a direct effect on the demand a system experiences. For instance, the demand at a given service connection is equal to the water that particular user consumes whereas the demand at the

production wells includes the actual consumption as well as the system loss. Systems that experience significant loss will exhibit a significant difference between production and consumption demands. Therefore, it is important to recognize the difference and use the appropriate demand for each analysis. The District's system does not experience significant loss, but it still has some impact on the analysis. Thus, the demand used within this report will be based on production and will therefore include system losses. Average Day Production (ADP) will be presented on a gallons per day per EDU basis.

The following ADP values are based on the production well meter data provided by the District from July 16, 2018 through July 15, 2019 and use 356 service connections as the average number of active dwellings during this period. This value has been used throughout this report and associated analyses:

- ADD = 673 gallons per day per EDU
- ADP = 794 gallons per day per EDU

2.8.3. MAXIMUM DAILY PRODUCTION (MDP)

Maximum Day Production (MDP) is the maximum gallons of water produced in one day over a period of one year. During peak production periods, the District takes production meter reading every one to four days. To calculate the maximum daily production, the total water produced between readings was divided by the total number of hours between readings. This number was then multiplied by 24 to generate a maximum daily production value. The total production for that day was then divided by the number of active service connections on the day peak production occurred, to calculate the MDP per EDU.

Therefore, this report will use the following MDP value:

- MDD = 2,355 gallons per day per EDU
- MDP = 2,629 gallons per day per EDU

2.8.4. PEAK HOUR PRODUCTION (PHP)

Peak hour production (PHP) is the maximum gallons of water produced in one hour over a period of one year and is generally reported in gallons per minute. Equation 5-1 (provided below) from the Washington Design Manual (Washington Department of Health, 2009) was used to estimate the peak hour production. The peak hour production was calculated based on MDP rather than MDD. The peak hour demand can be calculated using MDD.

It should be noted that the District's operator mentioned that he believes the calculated PHP value is too high, as he has observed the current system operating within required pressure levels during peak times. However, due to lack of usable data, Equation 5-1 will be used for all system planning. The District may review these

numbers again in the future when further data is available to confirm the actual peak hour.

Equation 5-1:

PHP = (MDD/1440) x [(C x N) + F] + 18

Where:

PHP = Peak Hourly Production, (gallons per minute)

C = Coefficient Associated with Ranges of EDUs

N = Number of EDUs

F = Factor Associated with Ranges of EDUs

MDD = Maximum Day Demand, (gallons per day/EDU)

A peak hour demand of 1,518 gallons per minute was calculated by applying the following values to Equation 5-1:

- C = 1.8 (for an EDU range of 251 to 500)
- N = 356 EDUs
- F = 125 (for an EDU range of 251 to 500)
- MDP = 2629 gallons per day per EDU

Application of Equation 5-1 yields the following, which will be used within this report:

- PHD = 1,271 gallons per minute
- PHP = 1,518 gallons per minute

2.8.5. Fire Flow Requirements

The District is located within the Timberlake Fire Protection District. The fire flow requirement for the entire existing system is 1,000 gallons per minute for a duration of 2 hours. It should be noted, however, that future developments may be required to provide a larger fire flow requirement depending on the type of buildings proposed. Therefore, fire flow requirements for new development will be determined on a case by case basis. For planning purposes, the requirement noted above has been utilized in this report.

2.9. Existing System Analysis

2.9.1. Analysis Criteria

The system analysis of source, storage, distribution, and treatment was performed in accordance with the IDEQ Rules for Public Drinking Water Systems,

IDAPA 58.01.08. In addition, the Washington Design Manual is referenced as a design guide.

Table 2-8 on the following page outlines the performance and design criteria used within this report to analyze the various system components.

Table 2-8: Analysis Criteria

System Component	Analysis and Design Criteria	Reference/Rule
Source	1. A community water system shall have a minimum of two sources and the total source capacity, with any source out of service, should be capable of producing either the PHD or the MDD plus equalizing storage 2. A community water system that uses surface water shall be designed such that plant design capacity (MDD plus equalization storage or PHD) can be maintained with any component out of service. 3. The capacity of a public drinking water system shall be at least 800 gallons per day per residence provided the system has equalization storage sufficient to compensate for peak hour demand. 4. New source and booster pumps are required to have dedicated standby-power or standby-storage sufficient to pressurize the system for a minimum of eight hours during a power outage.	IDAPA Section 501.17 Ground Water Source Redundancy IDAPA Section 501.03 IDAPA Section 552.01 Quantity and Pressure Requirements. IDAPA Section 501.07 Reliability and Emergency Operation
Booster Stations	1. Each booster station shall contain not less than two (2) pumps with capacities such that peak hour demand, or a minimum of the maximum day demand plus equalization storage, can be satisfied with any pump out of service. 2. Pumping systems supporting fire flow capacity must be able to provide maximum day demand plus fire flow with the largest pump out of service.	IDAPA Section 541.04 Booster Pumps AND IDAPA Section 501.18 Redundant Fire Flow Capacity
Equalization Storage	1. ES = (peak hour demand – Qs)*(150 min) but in no case less than zero Where: ES = Equalizing storage component in gallons peak hour demand = Peak hourly demand, in gpm. Qs = Sum of all installed and active source of supply capacities, except emergency with the largest source offline, in gpm.	WSDOH Water System Design Manual: Equation 9-1 IDAPA Section 003.16
Standby Storage	1. SS = 8 hours x ADP Where: ADP = Average Day Production	IDAPA Section 501.07 Reliability and Emergency Operation
Fire Suppression Storage	1. FSS = (FF) * (tm) Where: FF = Required fire flow rate, expressed in gpm tm = Duration of FF rate, expressed in minutes	WSDOH Water System Design Manual: Equation 9-4
Distribution System	1. Water systems shall maintain a minimum pressure of forty (40) psi throughout the distribution system, during peak hour demand conditions, excluding fire flow. 2. Water systems shall maintain a minimum pressure of twenty (20) psi throughout the distribution system, during maximum day demand conditions, including fire flow.	IDAPA 552 .01 Quantity and Pressure Requirements IDAPA 552 .01 Quantity and Pressure Requirements

2.9.2. SOURCE

The "Reliability and Emergency Operation" rule requires new sources to have either standby power or standby storage sufficient to provide 8 hours of average day production plus fire flow in the event of a power outage. The District has two propane generators to provide standby power in the case of a power outage.

The "Ground Water Source Redundancy" rule requires systems with all existing sources constructed prior to July 1, 1985 to have a minimum of two sources and a total source capacity capable of producing the MDP with any source out of service upon substantially modifying the system after July 2002. As can be seen in Table 2-9, the system's current source capacity is deficient by 589 gpm to supply the MDP plus Equalization Storage with the largest source offline.

Table 2-9: Source Capacity Analysis – MDP with Largest Source Offline

Source Capacity (gpm)	EDUs	Current MDP + Equalization Storage (gpd)	Available Source Capacity with Largest Source Down (gpd)	Source Capacity Surplus or Deficit (-) (gpd)	Source Capacity Surplus or Deficit (-) (gpm)
Production Wells Well No. 1 (250 gpm) Well No. 2 (800 gpm)	387	1,207,722	360,000	-847,722	-589

Table 2-10: Source Capacity Analysis - MDP Plus Fire Flow Over Two Hours Based on Current Demand

	Existing Conditions (Gallons)
EDUs	387
MDP	84,792
Fire Flow	120,000
Total Draw	204,792
Available Source	120,000
Available Storage	100,000
System Surplus or Deficit (-)	
GPM Equivalent	

In the current system configuration, this does not apply because the well pumps are not capable of pumping directly to the system. Thus, the analysis in Table 2-10 is not applicable for the current system. Fire flow capacity will be discussed in the booster pump capacity analysis.

2.9.3. *BOOSTER STATION*

Per the IDAPA rules, if the water system is designed to support fire flow, each booster station is required to have sufficient capacity such that either the PHP or the MDP plus fire flow can be supplied with any pump out of service. As can be seen in Table 2-11, the current system has a booster deficit of 1,195 gpm to supply MDP and fire flow with the largest pump offline.

Table 2-11: Booster Capacity Analysis – MDP and Fire Flow with Largest Pump Offline Based on Current Demand

Booster Pump Capacity (gpm)	Zone Served by Booster	Zone Served by Booster (No. of EDUs)	Current MDP (gpm)	Current Fire Flow Requirement (gpm)	Available Booster Capacity (gpm)	Booster Capacity Surplus or Deficit (-) (gpm)
Booster Pump 1 (106 gpm) Booster Pump 2 (106 gpm) Booster Pump 3 (300 gpm) Booster Pump 4 (400 gpm)	Main	387	707	1,000	512	-1,195

2.9.4. *STORAGE*

The storage requirements for the water system will be discussed within this section. Storage within a system is broken into the following components:

- Operating Storage (OS)
- Dead Storage (DS)
- Equalizing Storage (ES)
- Standby Storage (SS)
- Fire Suppression Storage (FSS)

Each of these components will be discussed in the following sections. These sections include the Washington Design Manual recommended equations for estimating the minimum requirements for each storage type and any IDAPA rules applying to storage requirements. It is important to note that the storage components are additive and cannot be nested, per the IDAPA rules.

The system currently has a single, underground reservoir. Refer to Table 2-4 for more information on the current reservoir.

2.9.4.1. *OPERATING STORAGE (OS)*

Operating storage is the volume of water used from the time the pump(s) feeding the reservoir turn off until it turns back on. This volume is usually determined by one of two things; the manufactures specifications on how frequently the pump can cycle, or the minimum water level change in the tank required by the pump control sensors.

The storage reservoir (total depth of 7 feet) is fed by the system's two production wells. The wells turn on when the water level drops below 5.7 feet. Both wells turn off when the water level in the reservoir reaches 7 feet. Thus, the current operating storage of the storage reservoir is 1.3 vertical feet of the reservoir, or approximately 18,571 gallons.

2.9.4.2. DEAD STORAGE (DS)

Dead storage is calculated as the volume of water not available to all customers at a minimum pressure of 20 pounds per square inch (psi), as required by IDEQ. The District's reservoir feeds the main water system through a booster system. The booster pumps are set to shut down if the water in the reservoir reaches a level of 1.5 feet to avoid draining the reservoir and burning out the pump motors. Thus, the dead storage for the reservoir is 1.5 vertical feet or 21,429 gallons.

2.9.4.3. EQUALIZING STORAGE (ES)

Equalizing storage is required in the event that peak hour productions for the water system cannot be met by the source capacity. Equalizing storage was determined using Equation 9-1 (below) from the Washington Design Manual:

Equation 9-1:

ES = (peak hour production – Qs)*(150 min) but in no case less than zero

Where:

ES = Equalizing storage component in gallons

peak hour production = Peak hourly production, in gpm.

Qs = Sum of all installed and active source of supply capacities, except emergency, with largest source offline[4], in gpm.

Equation 9-1 was used to estimate the minimum equalizing storage requirements. If water use records indicate values for equalizing storage that are different from those determined by Equation 9-1, actual records should be used. Since existing records are not sufficient to determine peak hour production, Equation 9-1 was utilized for this analysis.

[4] IDEQ's definition of Equalization Storage indicates maximum pumping capacity should be used. Maximum pumping capacity is defined as the pumping capacity minus the largest source.

As shown in Table 2-12 below, depending on the zone, equalization storage is required.

Table 2-12: Equalization Storage Requirements Based on Current Demand

	EDUs	Total Available Source Capacity (gpm)	PHP (gpm)	Equalization Storage Required (gallons)
Storage Reservoir	387	250	1,518	190,217

2.9.4.4. STANDBY STORAGE (SS)

Standby storage should be provided for in the event that one or more of the water system's sources fail, or if unusual conditions impose higher demands than anticipated. The existing water system is served by two propane generators and therefore does not require standby storage.

2.9.4.5. FIRE SUPPRESSION STORAGE (FSS)

If fire flow is to be provided, storage reservoirs must be capable of delivering fire flows in accordance to standards made by the local fire protection authority. A minimum pressure of 20 psi must be maintained throughout the system during fire flow conditions. The minimum fire suppression storage for a system is estimated using Equation 9-4 (below) from the Design Manual.

Equation 9-4:

$FSS = (FF) * (t_m)$

Where:

FF = Required fire flow rate, expressed in gpm

t_m = Duration of FF rate, expressed in minutes

The system is served by the Timber Lake Fire Protection District. Based on communication with Division Fire Chief Brandon Hermenet the fire flow requirement for this system is 1,000 gallons per minute for 2 hour, or 120,000 gallons. Thus, the fire suppression storage requirement for the storage reservoir is 120,000 gallons.

2.9.4.6. TOTAL STORAGE

Table 2-13 below provides a summary of the current storage requirements as have been discussed above. It is important to note that the various storage requirements are additive and cannot be nested. As noted above, standby storage is not required due to the presence of propane generators to power the system in the case of a power outage.

Table 2-13: Storage Requirements Based on Current Demand

	EDUs	Dead Storage (gallons)	Operating Storage (gallons)	Equalization Storage (gallons)	Standby Storage (gallons)	Fire Suppression Storage (gallons)	Total Storage Required (gallons)	Total Storage Available (gallons)	Storage Surplus or Deficit (-) (gallons)
Storage Reservoir	387	18,571	21,429	190,217	0	120,000	350,217	100,000	-250,217

2.9.5. DISTRIBUTION SYSTEM

A hydraulic analysis of the existing distribution system was completed for the current demands using the WaterCAD model. This analysis was used to identify required system improvements and allow for the identification of any special operational needs. The following modeling scenarios were run:

1. Scenario 1 – Steady state analysis with PHP throughout the system under the condition where all equalizing storage volume has been depleted and assuming that all sources, except emergency, are under normal operation. The objective is to maintain a minimum pressure of 40 psi at each node.[5]
2. Scenario 2 – Steady state analysis with MDP throughout the system under the condition where all equalization and fire suppression storage volume has been depleted and assuming all sources, except emergency, are under normal operation. The objective is to maintain a minimum pressure of 20 psi at each node.[6]

2.9.5.1. MODEL ANALYSIS BASED ON CURRENT DEMANDS

The above scenarios were run in the model based on the current demands and the various facilities were modeled based on current configurations and capacities. A complete set of results can be found in Appendix F.

Scenario 1: (PHP, Maintain 40 psi Throughout the System)

The objective of this scenario is to maintain a minimum pressure of 40 psi during PHP under the condition where all equalizing storage has been depleted and the well and boosters are operating as normal. The following is a summary of the operating conditions modeled in this scenario:

- Sources operating:
  - Well 1 and 2 both on (1000 gpm)

[5] Based on IDAPA 58.01.08-Idaho Rules for Public Drinking Water Systems, Subsection 552.01.b: part v)

[6] Based on IDAPA 58.01.08-Idaho Rules for Public Drinking Water Systems, Subsection 552.01.b: part i

- Reservoir levels:
    - Storage Reservoir: Emptied to 1.5 feet. (Reservoir does not have capacity to store OS+ES so the tank was effectively emptied for this scenario)
- Boosters operating:
    - All current booster pumps operating (912 gpm)

The results of this scenario show that the existing distribution system is not sufficient to supply the calculated peak hour productions at a minimum pressure of 40 psi anywhere within the system. This is likely due to the estimated required peak hour production for the system (1,518 gpm) being met by only 912 gpm available from the booster pumps.

Scenario 2: (MDP + FF, Maintain 20 psi Throughout the System)

The objective of this scenario is to provide fire flows and maximum day productions while maintaining a minimum pressure of 20 psi under the condition where all equalizing and fire suppression storage has been depleted and the well and boosters are operating as normal. This models the system at the end of a fire at any given node. The following is a summary of the operating conditions modeled in this scenario:

- Sources operating:
    - Well 1 and 2 both on (1000 gpm)
- Reservoir levels:
    - Emptied to 1.5 feet. (Reservoir does not have capacity to store OS+ES+FS so the tank was effectively emptied for this scenario)
- Boosters operating:
    - All current booster pumps were operating (912 gpm)

The results of this scenario show that the existing distribution system is sufficient to supply the current maximum day productions at a minimum pressure of 20 psi. However, it is important to note that none of the fire hydrants can meet the minimum fire flows while maintaining these pressures. The fire flows available range between 315-625 gpm. This indicates that if fire flows were required in the system, the pressure would likely drop below 20 psi in the majority of the system.

2.9.5.2. SYSTEM LOSS

System loss may be in the form of “lost” water or “unaccounted” for water. Water is lost when leaks occur in distribution lines or when there is unauthorized use or illegal service connections. Unaccounted for water is a result of accounting errors, inaccurate source or customer meters, and/or water leaving the system for unmetered usage such as flushing of mains and fire flows. For most water systems, system loss is

between 10 and 20 percent of the total water supplied to the system[7]. AWWA's Leak Detection and Accountability Committee gave a recommendation of 10 percent for system loss in 1996.

System loss for the system was calculated as the difference between total metered production (103,129,000 gallons) and total metered consumption (87,447,000 gallons) for the year of data provided.

- System Loss = 16,682,000 gallons (15% of total production)

While the system loss is within the acceptable ranges listed above, the District should seek opportunities to remedy known leaks or meter errors.

2.9.6. Operation and Maintenance Concerns

The significant operation and maintenance concerns for the operator are addressed in the system improvements described in this report.

2.10. Existing System Deficiencies

This section summarizes the source, booster, storage, and distribution system deficiencies determined in the above analysis under current system demands.

- Source:
  - Approximately 589 gpm deficiency with respect to meeting current MDP plus Equalization Storage with largest source offline.
  - Per the DEQ Sanitary Survey, a source sample tap must be installed for the wellfield prior to entry into the storage tank.
  - Per the DEQ Sanitary Survey, Well 1 must have pump to waste capability installed at the next modification to the system.
  - Per the DEQ Sanitary Survey, it is recommended that the abandoned test well next to Well 2 be sealed and abandoned according to IDWR standards.
- Booster Capacity:
  - Approximately 1,195 gpm deficiency with respect to meeting MDP and Fire Flow with largest pump offline.
- Storage:
  - Approximately 250,217 gallons deficiency.
  - Per the DEQ Sanitary Survey, the storage reservoir sealant must be stripped and resealed using an NSF approved sealant.

[7] Civil Engineering Reference Manual, Sixth Edition, Michael R. Lindeburg, 1992.

- Distribution:
  - The current distribution system suffered from approximately 15% loss.
  - The existing system is not sufficient to distribute the calculated PHP and maintain a minimum pressure of 40 psi throughout the system.
  - The existing system does not appear to be capable of providing fire flows while maintaining MDP and a minimum pressure of 20 psi throughout the system.

These deficiencies can be improved by a series of recommended improvements, which are identified in Section 4.

3. FUTURE CONDITIONS

3.1. GROWTH PROJECTIONS

The District is currently reviewing potential expansion of their service boundary and an increase to their total service connections. This growth is expected to occur through the splitting of parcels within their existing boundary and the annexation of properties outside their current boundary. The District has already received annexation commitments from multiple property owners located just west of their boundary and are talking with other water districts in the region about the possibility of taking over their systems.

According to U.S. Census data, the population in Kootenai County has increased from approximately 140,000 in 2010 to 155,000 in 2017. This equates to an annual growth rate of approximately 2 percent. However, with much of the property in the Coeur d'Alene and Hayden areas already developed and a recent push rural living, it is expected that the Athol area will grow at a faster rate than the county average. The Kootenai Metropolitan Planning Organization (KMPO) estimates the growth rates for Rathdrum and Spirit Lake (two neighboring communities) to be around 3.5%. With the District's aspirations to grow and the current influx of people to the north Idaho region, it is reasonable to expect the District to grow at an equivalent rate. Also, with the number of committed annexations waiting for the system capacity to increase before they are allowed to be developed, it is expected that immediate growth may occur even faster once the system's deficiencies are resolved.

Therefore, it has been estimated that the District will see 6% growth for the first 3 years after system improvements are completed and 3.5% growth after year 3. The more aggressive initial growth rate is to approximate the annexation of pending developments within a short timeframe. The growth rate utilized after this period is consistent with more gradual growth within the District, consistent with the KMPO projection.

The current number of EDUs was determined in Section 2.8.1 based on actual consumption data provided by the District. The estimated growth rates mentioned above were applied to the current EDUs for the system to project growth.

The District's growth is anticipated to occur in multiple growth categories, which have been added to the projections to categorize the type of growth anticipated. These are described below:

- Buildout of Existing Boundary and Committed Annexations– This assumes that each of the existing lots within the current district boundary are split into the maximum number of 5 acre lots (the minimum lot size allowed by Panhandle Health for homes with on-site drain fields), as well as the buildout of the current annexation commitments. This considered Growth A for the purposes of this report. Refer to Figure 3-1 for an overview of this growth.

- Reasonably Anticipated Future Need (RAFN)– The District has submitted a RAFN Application as part of their growth strategy. The proof of water use is due to Idaho Department of Water Resources in 2045 to secure water rights from the Rathdrum Prairie Aquifer. Growth within this category is assumed to occur outside the current District Boundaries and is discussed further in Section 3.5.

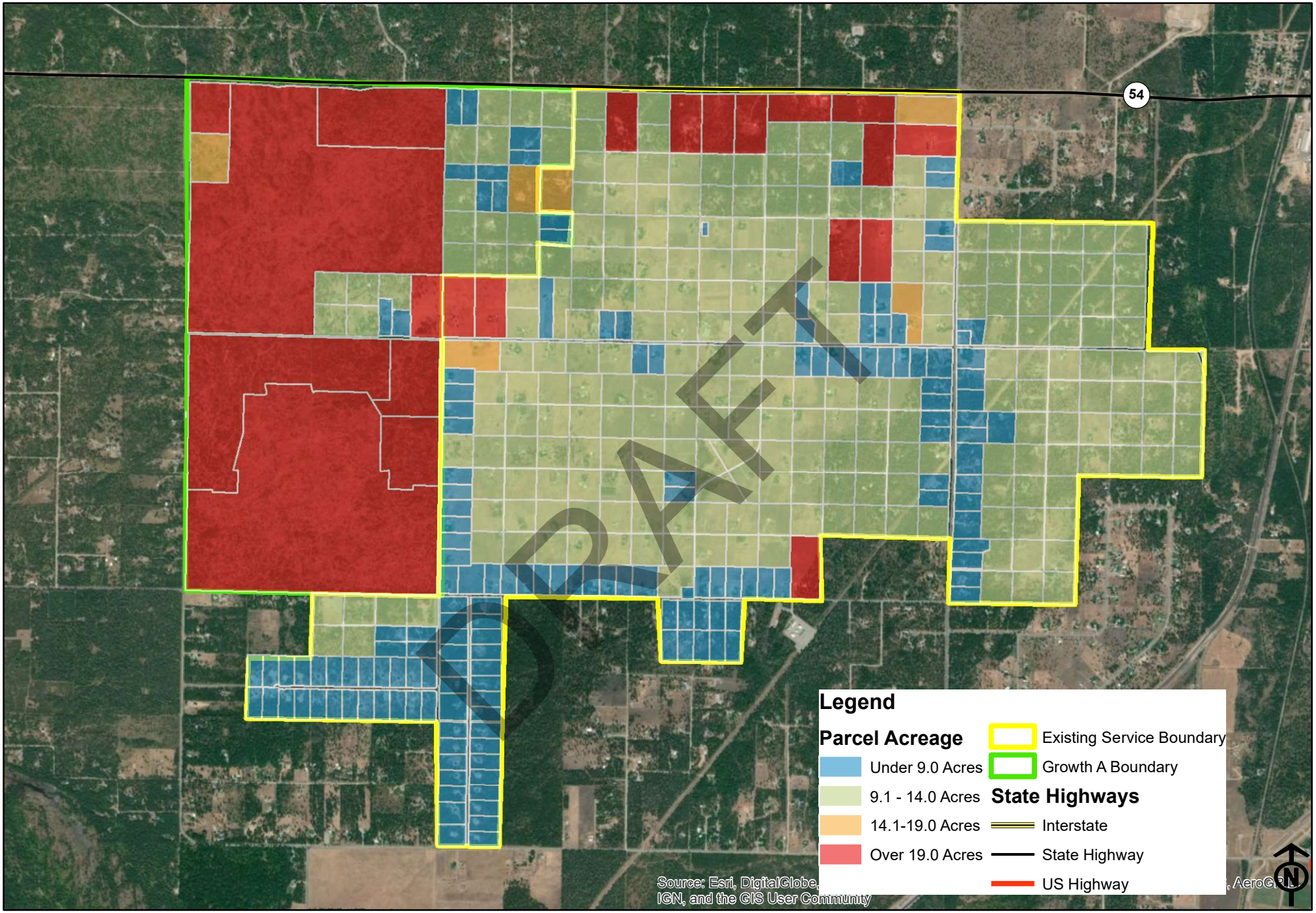
It is possible that these two will occur simultaneously. For the purposes of this analysis, the following growth categories have been developed:

- Growth A – Buildout of Existing Boundary and Committed Annexations
- Growth B – RAFN Proof Date
- Growth C – RAFN Area Buildout

Table 3-1 below summarizes the current and projected future EDUs for the District's system based on the District's growth rate and the growth categories discussed above.

Table 3-1: Summary of Future EDUs

Current EDUs	10-Year (2029)		Growth A (est. 2035)		20-Year (2039)		Growth B (2045)		Growth C (est. 2070)	
	EDU	Population	EDU	Population	EDU	Population	EDU	Population	EDU	Population
387	586	1,071	707	1,782	827	2,085	1,017	2,562	2,948	7,429



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Remington Water

Growth A Parcel Map

Figure 3-1

Sources:

PROJECT NO.....41317
DRAWN BY.....DH
FILENAME.....Growth A Parcels
DATE.....11/25/19

3.2. Demand Forecast

The estimates for future demands are based on the assumption that the demand per EDU will remain constant throughout the growth period (refer to Section 2.8.1 for a discussion on the EDU determination).

Table 3-2 below shows the estimated future demand for the 20-year, Growth A and Growth B growth periods. These demands have been used for the purposes of this report. It should be recognized that growth and demand have been estimated and will not likely occur exactly as shown.

Table 3-2: Summary of Projected Future Demands

	EDUs	ADP (gpd)	MDP (gpd)	PHP (gpm)
Current	387	213	707	1,518
10-Year Growth	586	323	1,071	2,142
Growth A	707	390	1,291	2,494
20-Year	827	456	1,510	2,845
Growth B	1,017	560	1,857	3,399
Growth C	2,948	1,625	5,383	9,041

3.3. Future System Analysis

3.3.1. Source

The future source analysis is based on providing the projected MDP for the entire system with the largest source offline. These are the same criteria that were used in the analysis of the existing source capacity in Section 2.9.2. Source requirements were based on the projected number of EDUs and the associated demand as presented in Section 3.2. Table 3-3 provides a summary of the analysis. As can be seen, the current source capacity is deficient to serve projected growth based on providing MDP with the largest source offline.

Table 3-3: Source Capacity Analysis –
MDP with Largest Pump Offline Based on Future Demand

Source Capacity (gpm)	Growth Phase	EDU	MDP + Equilization (gpd)	MDP (gpm)	Available Source Capacity with Largest Source Down (gpd)	Source Capacity Surplus or Deficit (-) (gpd)	Source Capacity Surplus or Deficit (-) (gpm)
Production Wells (1000 gpm)	Current	387	1,207,722	839	360,000	-847,722	-589
	10-Year	586	1,713,125	1,190	360,000	-1,353,125	-940
	Growth A	707	2,082,985	1,447	360,000	-1,722,985	-1197
	20-Year	827	2,451,712	1,703	360,000	-2,091,712	-1453
	Growth B	1017	3,033,422	2,107	360,000	-2,673,422	-1857
	Growth C	2948	7,750,921	5,383	360,000	-7,390,921	-5133

Table 3-4: Source Capacity Analysis - MDP Plus Fire Flow Over Two Hours Based on Future Demands

	Existing Conditions (Gallons)	10-Year	Growth A	20-Year	Growth B	Growth C
EDUs	387	586	707	827	1017	2948
MDP	84,792	128,486	154,904	1,630	222,793	645,910
Fire Flow	120,000	120,000	120,000	120,000	120,000	120,000
Total Draw	204,792	248,486	274,904	121,630	342,793	765,910
Available Source	120,000	120,000	120,000	120,000	120,000	120,000
Available Storage	100,000	100,000	100,000	100,000	100,000	100,000
System Surplus or Deficit (-)	15,208	(28,486)	(54,904)	98,370	(122,793)	(545,910)
GPM Equivalent	127	(237)	(458)	820	(1,023)	(4,549)

As mentioned in Section 2-9, in the current system configuration, this does not apply because the well pumps are not capable of pumping directly to the system. Thus, the analysis above is not applicable to the system. Fire flow capacity will be discussed in the booster pump capacity analysis.

3.3.2. BOOSTER STATION

Per the IDAPA rules, each booster station is required to have sufficient capacity such that either the PHP or the MDP plus fire flow can be supplied with any pump out of service. Under the conditions of this analysis, MDP + FF controls for the first 6 years. In year 7 PHP surpasses MDP + FF and controls booster capacity sizing from that point forward.

Table 3-5: Booster Capacity Analysis –
MDP +FF or PHP with Largest Pump Offline Based on Future Demands

Zone Served by Booster	Growth Phase	Zone Served by Booster (No. of EDUs)	MDP + FF (gpm)	PHP (gpm)	Available Booster Capacity (gpm)	Booster Capacity Surplus or Deficit (-) (gpm)
Main	Current	387	1,707	1,540	512	-1,195
	10-Year	586	2,071	2,142	512	-1,630
	Growth A	707	2,291	2,494	512	-1,982
	20-Year	827	2,510	2,845	512	-2,333
	Growth B	1017	2,857	4,047	512	-3,535
	Growth C	2948	6,383	9,041	512	-8,529

3.3.3. STORAGE

The future storage analysis was performed based on the same analysis criteria and will evaluate the same storage components as the current storage analysis. Storage requirements for the system were evaluated based on the projected number of EDUs and associated demands as presented in Section 3.2.

Table 3-6 below summarizes the future storage analysis for the District's system. As with the current storage situation, the future storage deficiency continues to grow significantly if no changes are made. However, the addition of new source and/or booster capacity can significantly decrease the deficit values.

Table 3-6: Storage Capacity Analysis Based on Future Demands

Growth Phase	EDUs	Operating Storage (gallons)	Dead Storage (gallons)	Equalization Storage (gallons)	Standby Storage (gallons)	Fire Suppression Storage (gallons)	Total Storage Required (gallons)	Total Storage Available (gallons)	Storage Surplus or Deficit (-) (gallons)
Current	387	18,571	21,429	190,217	0	120,000	350,217	100,000	-250,217
10-Year	586	18,571	21,429	283,794	0	120,000	443,794	100,000	-343,794
Growth A	707	18,571	21,429	336,631	0	120,000	496,631	100,000	-396,631
20-Year	827	18,571	21,429	389,306	0	120,000	549,306	100,000	-449,306
Growth B	1,017	18,571	21,429	472,408	0	120,000	632,408	100,000	-532,408
Growth C	2948	18,571	21,429	1,488,483	0	120,000	1,648,483	100,000	-1,548,483

3.3.4. Distribution System

Typically, distribution modeling is not conducted for the growth scenario because the location is unknown. However, the location of Growth A is relatively known for the District and therefore has been modeled[8]. Any revision to these growth scenarios or new developments will require hydraulic modeling. We recommend that prior to approving growth (new developments or significant change to the growth scenarios presented here), the District require the developer to fund an analysis of the impacts to the distribution system.

3.3.4.1. Model Analysis Based On Future Demands (Growth A)

The scenarios discussed in Section 2.9.5 were run in the model based on the future demands, and the various facilities were modeled based on current configurations and capacities. A complete set of results can be found in Appendix F.

Scenario 1: (PHP, Maintain 40 psi Throughout the System)

The objective of this scenario is to maintain a minimum pressure of 40 psi during PHP under the condition where all equalizing storage has been depleted and the well and boosters are operating as normal. The following is a summary of the operating conditions modeled in this scenario:

- Sources operating:
  - Well 1 and 2 on (1000 gpm)
- Reservoir levels:
  - Emptied to 1.5 feet (the storage reservoir does not have capacity to meet OS+ES so the reservoir was effectively drained)
- Boosters operating:
  - All current booster pumps operating (912 gpm)

The results of this scenario show that the existing distribution system is not sufficient to supply the Growth A peak hour productions at a minimum pressure of 40 psi anywhere in the system. It should be noted that the PHP used in this analysis was calculated using the calculated value from Section 2.8.4 and could be revised if the District is able to supply data showing actual peak hour demands for the system.

Scenario 2: (MDP + FF, Maintain 20 psi Throughout the System)

The objective of this scenario is to provide fire flows and maximum day productions while maintaining a minimum pressure of 20 psi under the condition where all equalizing and fire suppression storage has been depleted and the well and boosters are operating as normal. This models the system at the end of a fire at any

[8] Growth C was modeled at a conceptual level to determine a "skeleton" of needed infrastructure. This is discussed in Section 4.2.

given node. The following is a summary of the operating conditions modeled in this scenario:

- Sources operating:
  - Well 1 and 2 both on (1000 gpm)
- Reservoir levels:
  - Emptied to 1.5 feet. (Reservoir does not have capacity to store OS+ES+FS so the tank was effectively emptied for this scenario)
- Boosters operating:
  - All current booster pumps were operating (912 gpm)

The results of this scenario show that the existing distribution system is not sufficient to supply the growth A maximum day productions at a minimum pressure of 20 psi. It is also important to note that the current system cannot provide the recommended fire flow to any fire hydrants within the system at growth A.

3.4. Analysis Results (Through Growth A)

This section summarizes the current source, booster, storage and distribution system deficiencies determined in the above analysis under Growth A system demands.

- Source - The following deficiencies were identified with respect to meeting MDP with largest source offline:
  - Current: 589 gpm
  - Growth A: 1,275 gpm
- Booster Capacity-The following deficiencies were identified with respect to meeting the greater of MDP + FF or PHP with largest pump offline:
  - Current: 1,195 gpm
  - Growth A: 1,982 gpm
- Storage: The following deficiencies were identified assuming no system upgrades have been made.
  - Current: 190,217 gallons
  - Growth A: 396,632 gallons
- Distribution:
  - The existing system is not sufficient to provide growth A PHP and maintain a minimum pressure of 40 psi throughout the system.
  - The existing system does not appear to be capable of providing fire flows while maintaining MDP and a minimum pressure of 20 psi throughout the system.

These deficiencies can be improved by a series of recommended improvements, which are identified in Section 4.

3.5. Reasonably Anticipated Future Need (RAFN) Analysis (Growth B and C)

As mentioned previously, in 2014 and 2015, the District took part of a regional planning effort by water purveyors in Kootenai County that utilize the Rathdrum Prairie Aquifer as their source of water. One primary objective of this group is to define a long range, coordinated plan for water service for the region. Each purveyor has defined their 30-year service boundary. An independent agency reviewed the boundaries to determine purveyor conflicts, and all conflicts have been resolved. A second objective of this group is to secure water rights in accordance with Idaho Code § 42-202 necessary to serve reasonably anticipated growth occurring within this boundary, referred to as RAFN. The study was prepared by the Idaho Water Resources Research Institute (IWRRI), dated December 2014 (Revised April 2015), "Rathdrum Prairie Aquifer Future Water Demand".

In 2015, the District filed an application for a RAFN water right with the Idaho Department of Water Resources (IDWR) for an additional 32 cfs water right. The application was based upon the findings in the IWRRI report published in December 2014. However, the revised report, published in April 2015, lowered the anticipated future water demand from 37.91 cfs to 27.35 cfs. Since the release of the final report, several existing water systems that were located within the District's RAFN boundary have communicated that they are not interested in joining the District and therefore must be subtracted from the anticipated demand. According to IWRRI, reduction of demand can be calculated by the same proportion of reduction in service area. The excluded water systems make up approximately 30 percent of the total RAFN area. Therefore, after reducing the anticipated demand by 30 percent, the current, corrected estimate of total water demand at the RAFN Application proof due date is 19.15 gpm based on the IWRRI report.

For the purpose of this report, a separate analysis of future capacity needs for the RAFN area was completed. In this RAFN analysis, the areas served by water districts that are currently not interested in joining the District were removed from the RAFN area and all remaining properties within the RAFN boundary were divided into the maximum number of 5-acre parcels. The following assumptions were utilized: (1) all properties not currently served by a water system would join the District and (2) full buildout of the RAFN area would occur. Refer to Figure 3-2 for an overview of this growth.

Water demand within the RAFN area was calculated based on water use rates found in Section 2.8 of this report, utilizing the maximum service connections estimated. This analysis resulted in a total water demand of 20.2 cfs at full buildout of the RAFN area.

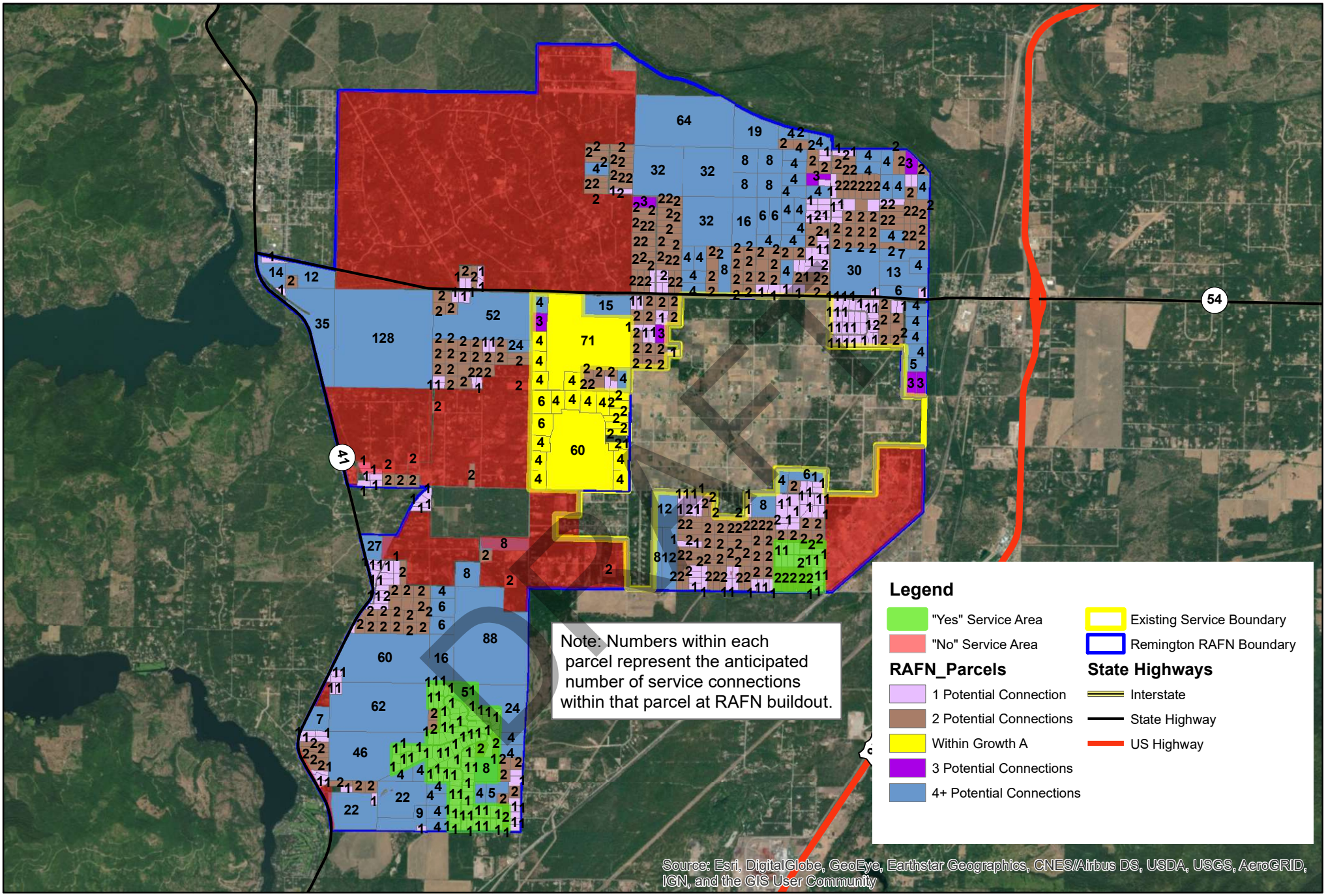
It should be noted that the District currently holds water two rights for a total of 2.25 cfs and a water right permit for 5.9 cfs. The remaining RAFN area also included

two existing water systems, Elkhorn Ranch and Eight-Mile Prairie Homeowners Association, that currently hold water rights for 1 cfs and 0.31 cfs, respectively. These water rights must be subtracted from the future demands listed above to determine additional water rights needed for the RAFN area. It is also important to note that based on the growth rates used for the purpose of this report (refer to Section 3.1), it is not expected that the District's water demand will reach levels projected by either of the previously mentioned analysis methods by the RAFN water right proof date in 2045.

Table 3-7 compares the results of the IWRRI report to the results of analysis completed for this report.

Table 3-7: RAFN Demand Comparison

Source	Phase	Service Connections	MDP (cfs)	PHD (cfs)	Additional Water Rights Needed (cfs)
IWRRI	Original IWRRI Report (2045)	2,377	14.5	27.4	17.9
IWRRI	IWRRI Report minus Existing Water Systems (30%)	1,664	10.2	19.2	9.7
WSP	Full Buildout of Remaining RAFN Area	2,960	12.0	20.2	10.7



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RAFN Service Boundary

Figure 3-2

PROJECT NO.....41317
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FILENAME.....Service Area
DATE.....11/25/19

4. Capital Improvement Plan

System deficiencies were identified in the previous analysis sections. This section presents the estimated cost of each improvement and illustrates potential phasing of improvements. Refer to Appendix G for the Engineer's Opinion of Probable Project Costs. Also refer to Section 8 for a discussion of the environmental impacts of each improvement presented.

4.1. Development and Evaluation of Improvements

As previously mentioned, the District has deficiencies in all major water system categories. Potential improvement options have been combined to create several alternatives to address these deficiencies.

4.1.1. Source Alternatives

4.1.1.1. Develop McCormick Well

In order to comply with the IDAPA Groundwater Source Redundancy Rule, the District must add source capacity. The source capacity deficiency for the system is approximately 589 gallons per minute based on current maximum day demand plus equalization storage. The District has already acquired the existing McCormick well and has plans to install a new 1,600 gpm well pump that is capable of pumping into existing storage or straight to the system. The District plans on installing the new well pump and distribution line to connect the McCormick well to the existing system within the next year. In order to supply power to the new pump, Kootenai Electric will also have to extend 3-phase power to the McCormick Well site. The estimated cost of this improvement is approximately $1,370,000. This estimate does not include the transmission line to connect the well to the existing system.

Environmental impacts associated with this option can be found in Section 8.2.1.1.

4.1.1.2. Upsize Pump for Well 1

The District can add capacity to the system by upsizing the pump and motor at Well 1. The existing well casing is 18" and could potentially house a much larger pump with the capability to produce 1,600 gpm or more. In order for this improvement to make a significant impact on the system's current deficits, the new well pump would also be required to have the ability to pump directly to the system which would require a reconfiguration of the current piping setup. In order to power the larger motor, it is likely that the District would have to upgrade the power transformer at the existing well site. In order to evaluate whether the existing casing is capable of housing the upsized pump, it is recommended that an alignment test and well video be completed prior to design. The estimated cost of this improvement is approximately $833,000.

Environmental impacts associated with this option can be found in Section 8.2.1.2.

4.1.1.3. NEW WELL

The District can eliminate the existing storage and booster deficit by adding a second new 1,600 gpm well that is capable of pumping directly to the system. It is believed that there is currently enough room to add a third well at the existing well site. Test pumping would need to be completed within the existing wells to determine whether the existing wells would be impacted by adding a third well of this size in the vicinity of the existing wells. The District will also have to upgrade the power transformer on site to serve the addition of a third well pump. The estimated cost of this improvement is approximately $1,670,000.

Environmental impacts associated with this option can be found in Section 8.2.1.3.

4.1.1.4. NO IMPROVEMENT

As mentioned previously, the District currently has significant deficiencies in source capacity. Source capacity is required before the District can add additional connections, based on the substantial modification trigger discussed in DEQ's communication with the District about a moratorium. Thus, if additional connections are sought within the District (or in annexed parcels located outside the District), system improvements will need to occur. Additionally, if no improvements are made, the system is not able to reliably meet customer demand.

Environmental impacts associated with this option can be found in Section 8.2.1.4.

4.1.2. STORAGE ALTERNATIVES

4.1.2.1 STANDPIPE RESERVOIR

One solution to the District's storage deficit is to add a standpipe reservoir to the distribution system. This improvement would allow for gravity fed water distribution for the entire existing service area and increase the overall reliability of the system while also significantly decreasing the current booster deficit.

There are two proposed locations for a standpipe location. The first potential location is along the northern district boundary, directly north of the west end of East Teton Rd. This location would require a 90 feet tall, 525,000-gallon reservoir and the addition of approximately 1,000 LF if transmission pipe to serve the existing system. The second potential location for the reservoir is in the northwest corner of the committed Growth A annexation area. This elevation of this location is about 15 feet higher than that of the first location which would allow the for a smaller, 80-foot-tall, 450,000-gallon reservoir and would offer better service to a major growth area for the District. However, it would also require the addition of over 8,000 LF of transmission pipe to connect to the existing system. With either location, any future service connection over elevation 2,520 feet would require additional booster pumping to meet the minimum 40 psi service pressure. The estimated cost of the standpipe reservoir is

$1,443,500 for the 450,000-gallon reservoir or $1,661,000 for the 525,000-gallon reservoir. This cost does not include the transmission pipe required to connect to existing system.

Environmental impacts associated with this option can be found in Section 8.2.2.1.

4.1.2.2 Ground-Level Storage

The District's existing well site may have sufficient area that could be utilized to build an additional 220,000-gallon ground level storage tank. This option would require minimal piping to connect to the existing system and allow the District to meet anticipated storage needs through Growth A. However, the proposed location is also the location of future Well 4 and it could be difficult to fit both on the property currently owned by the District. This may require the acquisition of additional land in the future and would increase the District's reliance on booster pumping to maintain pressure. This option would also require the immediate addition of booster capacity to meet IDAPA rules. The estimated cost of this improvement is approximately $642,000.

Environmental impacts associated with this option can be found in Section 8.2.2.2.

4.1.2.3 No Improvement

The District currently has a storage deficit and cannot meet the required storage capacity needs based on IDAPA Rules. However, the District can avoid adding storage to the system through the Growth A scenario by adding two 1,600 gpm wells that pump directly to the system.

Environmental impacts associated with this option can be found in Section 8.2.2.3.

4.1.3. Booster Alternatives

4.1.3.1 Booster Pumps for Standpipe Storage Scenario

The addition of standpipe storage would decrease the systems reliance on booster pumping and decrease the overall current booster deficit. If sources are added as discussed in Section 4.1.1, additional booster pump capacity is not necessary under this scenario, through Growth A.

4.1.3.2 Booster Pumps for Underground Storage Scenario

The addition of underground storage in the system's current configuration would also require the addition of booster capacity. The District would have to increase booster capacity by nearly 600 gpm to meet current demand and nearly 950 gpm to meet estimated Growth A demand (assuming sources are added to the system as discussed above in Section 4.1.1). The estimated cost of this improvement is approximately $237,000 (for 950 gpm additional capacity).

Environmental impacts associated with this option can be found in Section 8.2.3.1.

4.1.3.3 No Improvement

Although no improvement is not reasonable under the current system configuration, the District can avoid adding booster capacity to the system through the Growth A scenario by adding two 1,600 gpm wells that pump directly to the system.

Environmental impacts associated with this option can be found in Section 8.2.3.2.

4.1.4. Distribution Alternatives

4.1.4.1 New Transmission Main for Increased Source Production

In order to provide the capacity to transport the increased flows from the addition of two 1,600 gpm wells, new transmission piping must be installed to avoid over-pressurizing the system and minimize head loss from pipe friction. Once the new sources are online, piping around the existing well site could see flows as high as 2,500 gpm with the largest pump offline. Issues related to the increase water flows can be addressed through completing a transmission pipe loop between E Teton Rd and E White Cloud Rd and connecting it to the existing well site with approximately 2,000 feet of 12-inch pipe. This improvement would also set up the District well for western expansion that is expected within the next few years. The estimated cost of this improvement is $332,000.

Environmental impacts associated with this option can be found in Section 8.2.4.1.

4.1.4.2 Upsize Water Mains for Fire Flow

The hydraulic model has identified several areas within the current service area that it does not appear will be able to meet recommended fire flows, even after the two new sources are added (if the District were to select this option). In order to increase flow capacity, sections of water main within these areas must be replaced. The estimated length of pipe that needs to be replaced and upsized for fire flow capacity is 7,000 LF and would cost approximately $1,155,000. However, these improvements are not critical to overall system performance and can be completed over time.

Environmental impacts associated with this option can be found in Section 8.2.4.1.

4.1.4.3 Transmission to Serve Annexation Properties

Transmission main will need to be extended into the new development areas in order for the District to serve the properties that have committed to annexing into the District. Hydraulic modeling shows that the new transmission main must have a minimum diameter of 10-inches to serve the 46 service connections associated with

the Growth A scenario. However, the annexation area is large enough to divide into over 200 parcels over time, so it is recommended that transmission mains are upsized to at least 12-inch PVC to support future growth. The cost of these improvements depends on the location of the growth and should be paid for by the developer.

Environmental impacts associated with this option can be found in Section 8.2.4.1.

4.1.4.4 NO IMPROVEMENTS

Under this improvement option, all transmission pipe would remain as is, with no major improvements. This would likely be sufficient if the District does not significantly increase source capacity and does not supply adequate fire protection to some of their existing service connections. However, with the existing system's deficits and District's desire to grow, the transmission main must be upsized to meet future demand. Therefore, it is impractical for the District to choose the "no improvement" option.

Environmental impacts associated with this option can be found in Section 8.2.4.2.

4.1.5 IMPROVEMENT OPTIONS

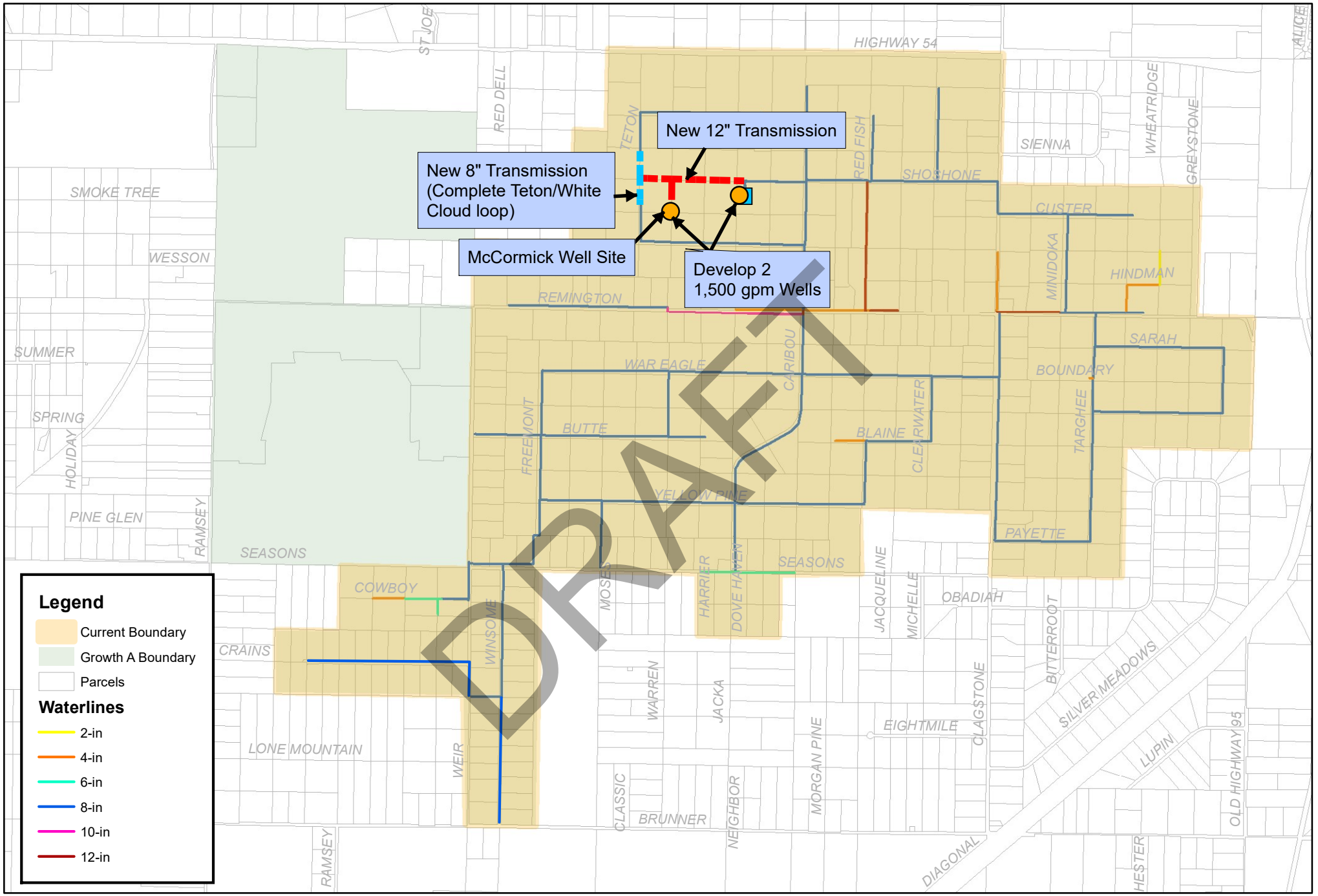
The previously discussed alternatives have been combined into several alternatives, providing the basis for the District's capital improvement plan (Table 4-1) and are shown in Figures 4-1 through 4-3.

Table 4-1: Capital Improvement Plan (Options)

	Improvements	Regulatory Req?	Notes	Current	Growth A
Option 1	Develop McCormick Well (1,600 gpm): $1,370,000	X		X	
	Upsize capacity of existing Well 1 (1,600 gpm): $833,000	X		X	
	New Transmission: $332,000	X		X	
			Total	$2,535,000	
Option 1a	Upsize capacity of existing Well 1 (1,600 gpm): $833,000	X		X	
	Develop New Well (1,600 gpm): $1,670,000	X		X	
	New Transmission: $332,000	X		X	
			Total	$2,835,000	
Option 1b	Develop two new wells (1,600 gpm): $3,102,000	X		X	
	New Transmission: $332,000	X		X	
			Total	$3,434,000	
Option 2	Develop McCormick Well (1,600 gpm): $1,370,000	X		X	
	525,000 Gallon Standpipe Reservoir: $1,661,000	X		X	
	Develop New Well (1,600 gpm): $1,670,000	X	by Year 5		X
	Transmission Upgrade: $332,000				X
			Total	$3,363,000	$1,670,000
Option 3	Develop McCormick Well (1,600 gpm): $1,370,000	X		X	
	220,000 Gallon Underground Reservoir: $642,000	X		X	
	Booster Pump Upgrade (add 1,000 gpm): $237,000	X		X	
	Develop New Well (1,600 gpm): $1,670,000	X	by Year 5		X
	Transmission Upgrade: $332,000			X	
			Total	$2,581,000	$1,670,000

	Improvements	Regulatory Req?	Notes	Current
On-Going	Fire Flow Transmission Upsize: $1,110,000	X		
	Depreciated Pipe Replacement: Cost Varies			
Maintenance	Re-seal Existing Storage Reservoir Roof: $20,000	X		X
	Add Pump to Waste Capability to Well 1: $20,000	X		X

Note: Growth A and Ongoing improvements have not been adjusted for inflation.



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System Improvement Option 1

Figure 4-1

Sources:

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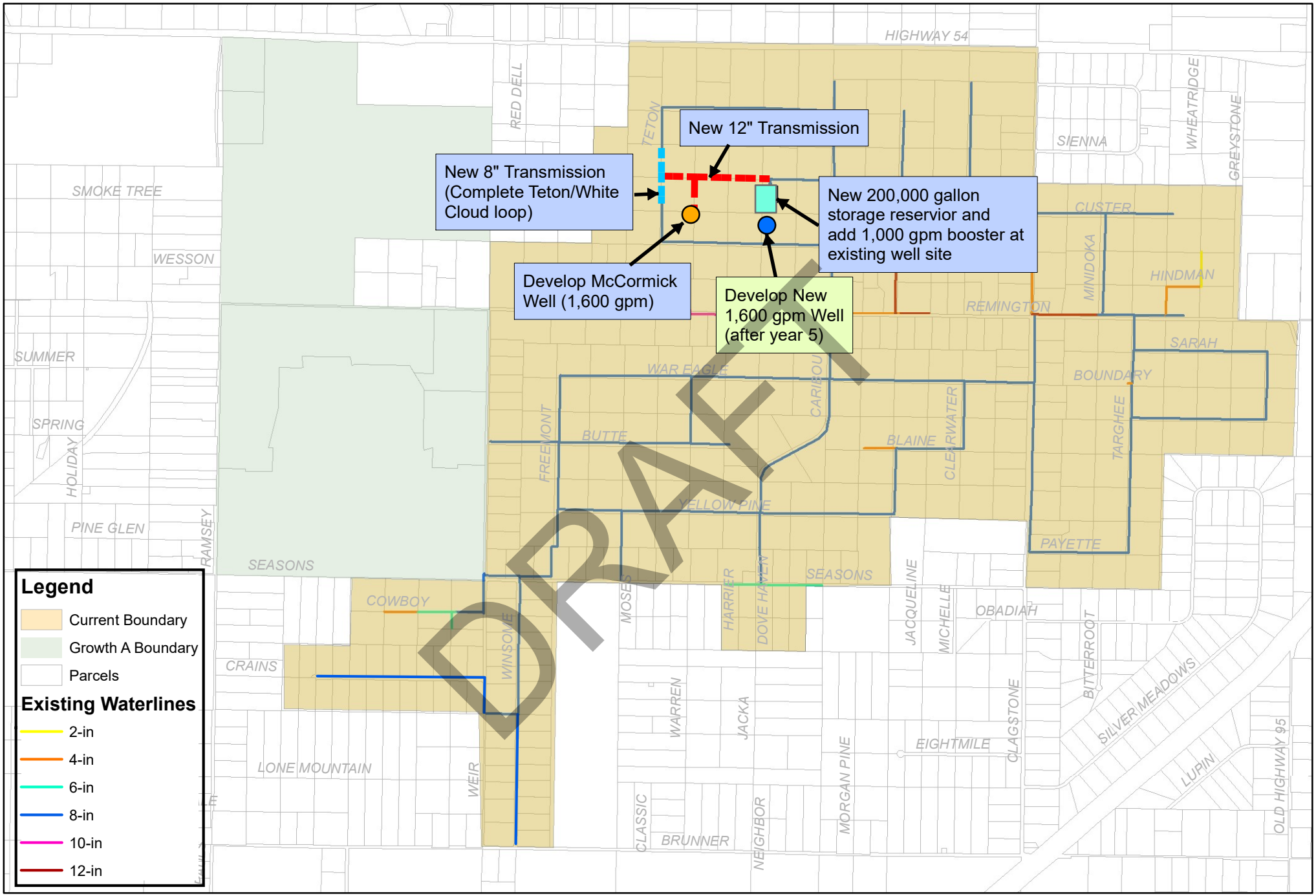
FILENAME.....System Improvemetns
DATE.....11/25/19



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System Improvement Option 2
Figure 4-2

Sources:

PROJECT NO.....41317
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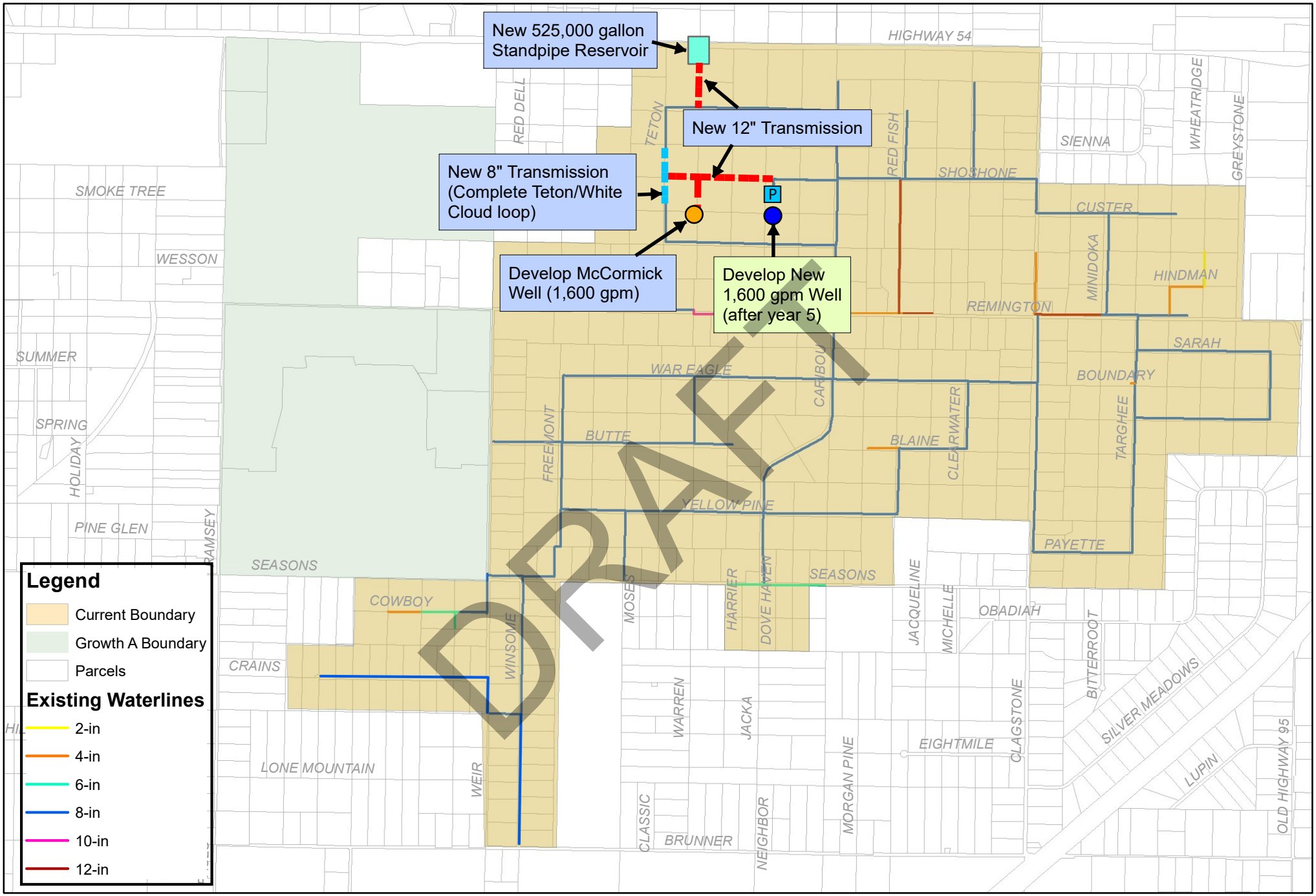
FILENAME.....System Improvemetns
DATE.....11/25/19



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System Improvement Option 3

Figure 4-3

Sources:

PROJECT NO.....41317
DRAWN BY.....DH
FILENAME.....System Improvemetns
DATE.....11/25/19

4.2. RAFN IMPROVEMENTS

Based on the RAFN analysis described in Section 3.5, the following system improvements have been developed to demonstrate what the District may need to serve the RAFN area at buildout. It is recommended that the RAFN be served as two separate systems, due to the geography of the RAFN area and location of existing water systems that have stated they are not interested in joining the District. This would include a main system and a southern satellite system. Recommended upgrades for each of these systems are described below.

The main system, which includes the existing Remington water system, will serve a majority of the RAFN area, with a projected 2,322 service connections at buildout. The peak hour production for the RAFN area is estimated to be 7,212 gpm, based on current water use patterns within the District's existing system. The following improvements are recommended to serve this demand:

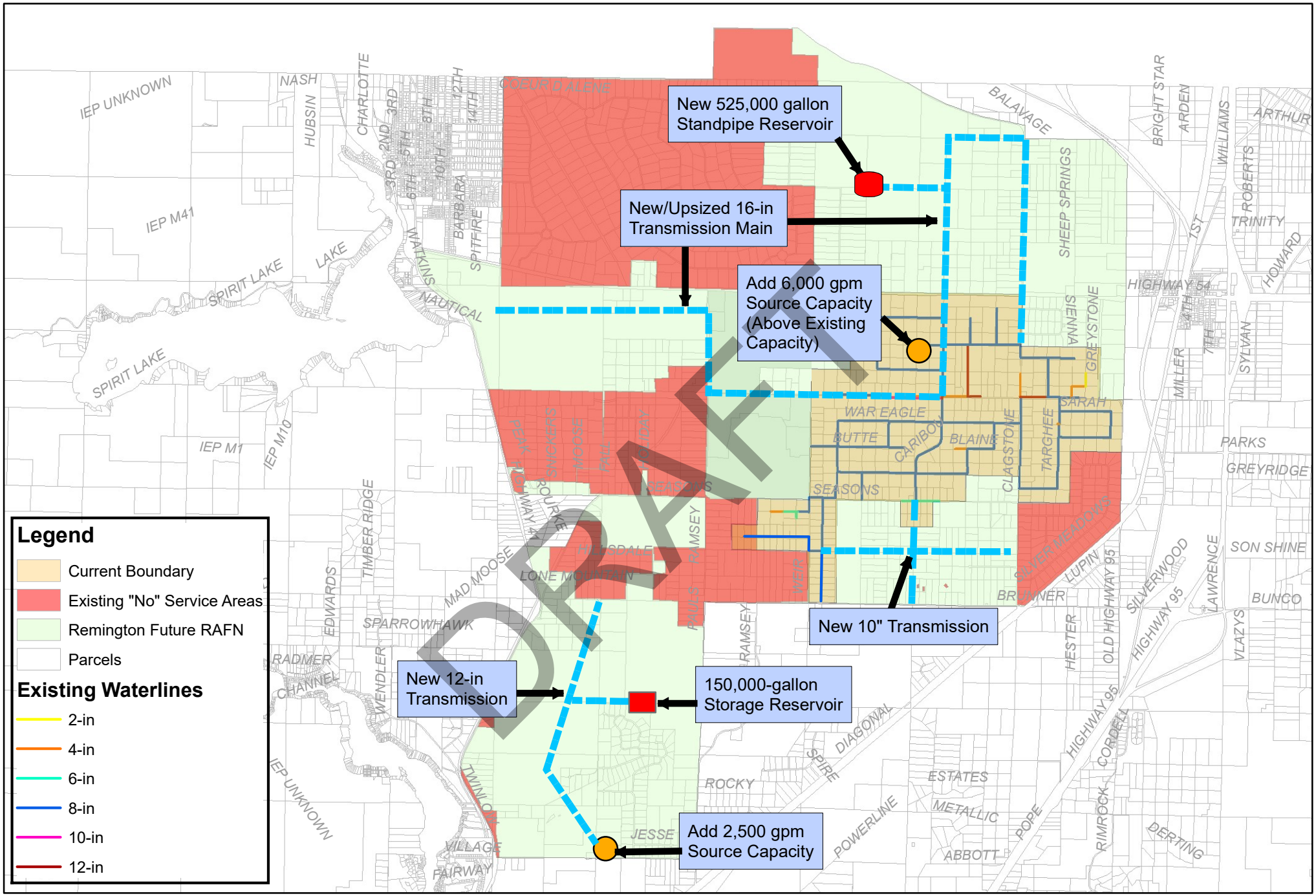
- Add a total of five new 1,600 gpm sources to the existing system, including two new wells at the existing well site, development of the McCormick well, and two new wells west of the existing district boundary to serve this demand.
- Install a 16" transmission main that connects the existing system to each of the growth areas within the main system due to the increased volume of water required to serve the increased population.
- Add a standpipe reservoir to the main system to increase system reliability.
- The westernmost portion of the project RAFN growth area is at a significantly higher elevation than the existing system. Add a new booster station near the western boundary of the "Growth A" map to maintain minimum water pressures in these areas.

The proposed satellite system lies southwest of the existing District boundary and is projected to contain around 630 service connections at buildout. The two systems are separated by several water systems that are not interested in joining the District, as well as Round Mountain. For this reason, it is much more economically feasible to develop this area as a satellite system. This area also contains the Elkhorn Ranch Homeowners Association which has expressed interest in joining the District and currently has a developed water system capable of serving 125 connections. Based on current water demands within the District, it is estimated the PHP at buildout will reach 2,264 gpm. The following improvements are recommended to serve this demand:

- Three new 1,100 gpm wells near the existing Elkhorn wells.
- Install a 12" main transmission running north-south with smaller lines branching off to feed local connections.
- Add a 150,000-gallon storage reservoir on the slopes of Round Mountain near the existing Elkhorn reservoir to allow for gravity feed to the system.

- Due to large variations in elevation throughout the satellite area, pressure reducing valves will likely need to be installed in the norther portion of the system and boosting will be required if development spreads up the slopes of Round Mountain.

The improvements necessary for the RAFN area are shown in Figure 4-4.



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RAFN System Improvements

Figure 4-4

Sources:

PROJECT NO.....41317
DRAWN BY.....DH
FILENAME.....System Improvemetns
DATE.....11/25/19

4.3. Sustainability Review

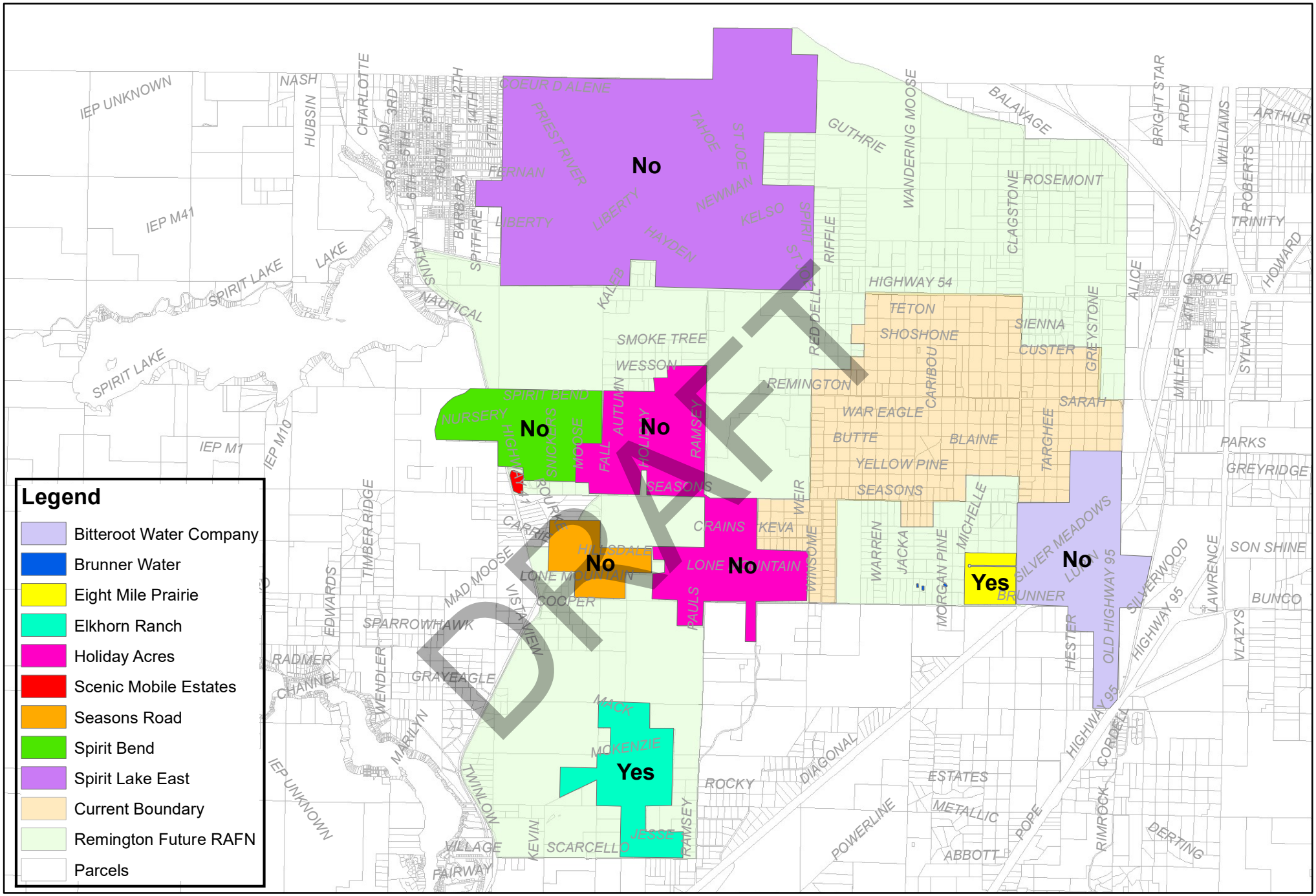
4.3.1. Consumption Based Pricing

The District currently includes a set base amount of water in their base monthly pricing (25,000 gallons per month) and charges an extra fee for consumption over the base use. The overage fees are currently minimal and do not significantly penalize abundant water use. The District is considering amending the overage fees to encourage lower water use during peak periods and decrease overall system demand.

4.3.2. Consolidation with Other Water Systems

As part of their RAFN application, the District discussed potential consolidation with eight neighboring water systems that fall within their RAFN growth boundary. Of the eight systems, Elkhorn Ranch and Eight Mile Prairie are the only two that showed interest in consolidating with the District once transmission lines were extended reasonably close to those systems. The systems consulted are shown in Figure 4-5.

The District is also working with the developer of a neighboring to annex the new development into the District's system once the District has capacity to serve new connections. Prior to these discussions, the developer had been considering the creation of a new public water system to serve this area.



Remington Water

System Consloidation Map

Figure 4-5

Sources:

PROJECT NO.....41317
DRAWN BY.....DH
FILENAME.....System Consolidation
DATE.....11/25/19

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4.3.3. *High-Efficiency Lighting*

New buildings or building expansions for the source and booster improvements will need new lighting. High efficiency lighting can reduce energy consumption within the building. Energy-efficient lights (such as LEDs) typically use approximately 25-80 percent less energy compared to traditional incandescent and can last 3-25 times longer. The District will likely utilize high-efficiency lighting as part of the building projects.

4.3.4. *Variable Frequency Drive Pumps*

The well pumps discussed previously have been proposed to pump to pressure, or directly into the system. VFDs can be utilized in these situations to allow the pumps to gradually "ramp up" to meet appropriate demands. This will be critical to the ability of the wells to pump directly to distribution without over pressurizing the system, while maintaining the capability to serve rising demands from future growth. The cost estimates for the well improvements have included VFDs.

4.3.5. *Energy Efficient Motors*

The District will likely choose NEMA approved motors to power the new source pumps to minimize the additional costs associated with increasing the systems source capacity.

4.3.6. *Supervisory Control and Data Acquisition System (SCADA)*

If it is financially feasible, the District's operator has expressed interest in installing a SCADA system to help monitor the water system. The current system has minimal monitoring capability, making it difficult to accurately track system use and monitor operations. Based on the systems current configuration, operation without a SCADA system is manageable. However, if the recommended system upgrades are put into place and two new sources are able to pump directly to distribution, a SCADA system may be integral in ensuring the system is able to operate effectively and efficiently.

4.3.7. *Source Protection Benefits*

Both of the District's current wells and their storage reservoir are protected by chain link fences and the District has plans to extend the main fence to enclose their entire property at the existing well site. Any additional wells that are drilled at this location would fall inside this property boundary and be sufficiently protected by the fence extension.

4.3.8. *Use of Recycled Materials*

The improvements currently proposed may not be suitable for the use of recycled materials, given the longevity of useful life the District intends for these improvements.

4.4. Final Screening of Principal Alternatives

4.4.1. Capital Costs and Financing Plan

For the purpose of comparison, the estimated project cost for each improvement option (Option 1, Option 1a, Option 1b, Option 2 and Option 3) was included in Table 4-1. Detailed cost estimates can be found in Appendix G. Option 3 is the lowest cost option initially. However, based on the growth projection used for this report, this option would require the addition of another source after seven years, requiring the District to fund another major improvement in the near future. Each of the options listed under Option 1 would be cheaper through the Growth A scenario presented above.

4.4.2. Operation and Maintenance Costs

The operation and maintenance (O&M) associated with adding source capacity may be minor when considering this option provides a redundant well source and is not anticipated to run concurrently with the other wells, initially. The costs are anticipated to be minor when the well is utilized as a full-time capacity source. The distribution options are not anticipated to increase operation costs.

A comparative analysis has been developed (Table 4-2) to compare the improvement options to assist with decision-making. Each cost category was evaluated independently for each option. The overall O&M cost was estimated based on the individual cost categories for each option.

Table 4-2: Operation and Maintenance Cost Comparison

Cost Category	Option 1	Option 2	Option 3
Power	High	Low	Moderate
Treatment (Chlorination)	--	--	Low
Operator	Moderate	Moderate	High
Administration	Moderate	Low	High
Maintenance	Moderate	Low	High
Overall	Moderate	Low	High

4.4.3. Cost Escalation Factors for Energy Use

The increase in energy use costs for the additional sources is expected to be minimal in the short term. Under current demand, the District's smallest well pump can sufficiently supply the system for approximately nine months of the year. Therefore, it is anticipated that only one of the additional sources will only run at peak times during the summer months through an energy efficient VFD motor. While the system's reliance on the larger sources is likely to increase as the District grows, the increased energy consumption costs are very unlikely to outpace the cost of adding a storage reservoir capable of providing gravity distribution.

4.4.4. *PRESENT WORTH ANALYSIS*

A "present worth" analysis consists of comparing various alternatives on an "apples to apples" basis. This is typically done by computing 20 years of O&M expenses to a present worth value, assuming 3 percent interest. Then the present value of O&M is added to the estimated capital project cost, in order to determine the "present worth" value with which to compare alternatives. The O&M expenses were evaluated comparatively in Section 4.4.2. This is included along with the estimated capital costs to provide a comparative present worth analysis below in Table 4-3.

Table 4-3: Present Worth Analysis

	Cost Category	Option 1	Option 2	Option 3
Operations and Maintenance	Overall O&M Comparison	Moderate	Low	High
Capital Cost	Upfront Improvement Costs	$2,534,000 to $3,327,000	$3,196,000	$2,355,000
	Growth A Improvement Costs	N/A	$1,992,000	$1,619,000
	Total Capital Cost	$2,534,000 to $3,327,000	$5,188,000	$3,974,000

Note: Option 1 capital cost depends on which sources are developed.

The present worth analysis shows Option 1 with the lowest upfront cost and moderate level of O&M expenses. The other two options are either high capital cost or higher O&M cost.

4.4.5. *RELIABILITY OF SUPPLY SOURCE*

The system operator has reported that the existing source is capable of supplying current peak day demand without seeing significant drops in pressure. However, this is with all existing source and booster pumps operating and no fire flow required. If any pump went offline or a fire flow were needed, the current source would not be able to meet demand. The addition of new source capacity provides the necessary redundancy for the current system demand while satisfying IDAPA regulations.

4.4.6. *ALTERNATIVE COMPARISON (ENVIRONMENTAL)*

Refer to Section 8.3 for the environmental comparison analysis of each alternative.

4.5. RECOMMENDED ALTERNATIVE DESCRIPTION

In consideration of the information presented in this section, the following improvements are recommended to address the deficiencies identified in Section 2 and 3, as outlined by Option 1, with the ongoing distribution improvements shown in Table 4-1:

- Short-Term Improvements:

- Increase Source Capacity: Develop two new sources, in one of the combinations presented in Option 1, 1a, or 1b, that are capable of pumping to the distribution system. One of these wells will increase the systems source capacity and eliminate the current booster deficit. The second source will provide the source redundancy required by IDAPA regulations. The decision about which combination of wells to develop should be made once alignment testing and test pumping have been completed on both existing well shafts.
- New Transmission Line: Extending 12-inch transmission to the west of the existing well site will help address issued cause by the potential increased water flows from the added source capacity and will give the District the start of a transmission main to serve westward expansion. The loop between the dead ends at the end of E Teton Rd and E White Cloud will also need to be completed to connect the new 12-inch transmission to the existing system. This loop will increase system performance and help eliminate the risk of over pressurization from increased system capacity.

- Maintenance Improvements (Required with any system modification):
  - Reseal Reservoir Roof: Remove the existing sealant and reseal the reservoir roof with NSF approved sealant.
  - Well 1 Pump to Waste: Modify Well 1 piping to all of pump to waste if necessary.
- Ongoing Improvements:
  - Replace Depreciated Water Main: as the system gets older, existing pipe will need to be replaced to minimize system loss and transmission problems.
- Long-Term Improvements:
  - Upsize Transmission for Fire Flow: this will improve with fire flow delivery in areas that do not currently meet recommended fire flows.
  - Standpipe Storage: this will increase system capacity and reliability as the District increases service connections.

4.5.1. Estimated Costs and Potential Funding for Recommended Option

The estimated cost of the short-term improvements identified above total between $2,535,000 and $3,434,000, depending on which combination of source improvements are chosen (Option 1, 1a, or 1b). The fire flow pipe upsize long-term improvement mentioned above is estimated to add approximately $892,000 to the cost.

The District is considering forming a Local Improvement District (LID) to cover the costs of these system upgrades (refer to Section 5.2 for a discussion of this

funding mechanism). Under the proposed LID option, the existing service connections would be required to cover the costs associated with bringing the existing system into compliance with IDAPA regulations. The remaining costs associated with upsizing the improvements to add system capacity would then be spread over 320 future connections made available by the improvements. Table 4-4 shows the estimated cost breakdown for the recommended improvement options. Estimated costs of bringing the existing system into compliance were based on adding two 800 gpm sources and the transmission upgrades associated with the increased source capacity (refer to Appendix G for cost estimate for these improvements).

Table 4-4: LID Funding Breakdown

	Improvement Option 1	Improvement Option 1a	Improvement Option 1b
Total Project Cost	$2,535,000	$2,835,000	$3,434,000
Total Estimated Cost for Compliance	$1,367,000	$1,367,000	$1,367,000
Total Cost for Existing Connections	$1,367,000	$1,367,000	$1,367,000
Less District Cash Reserves	($700,000)	($700,000)	($700,000)
Cost to Existing Connections	$667,000	$667,000	$667,000
Cost per Current Connection (387 Connections)	**$1,724**	**$1,724**	**$1,724**
Total Cost to Future Connections	$2,535,000	$2,835,000	$3,434,000
Less Cost for Existing Connections	($1,367,000)	($1,367,000)	($1,367,000)
Cost to Future Connections	$1,168,000	$1,468,000	$2,067,000
Cost per Future Connection (320 Connections)	**$3,651**	**$4,588**	**$6,460**

5. FUNDING SOURCES

The following table shows potential funding sources that may be explored for the Remington Recreational Water and Sewer District water system improvements.

Table 5-1: Financing Options

Federal Options
USDA – RD Grant/Loan
State Options
IDEQ Loan
ICDBG – Block Grant (LMI Income Survey)
Other Options
Bank Loan
District Options
Revenue Bond
LID

We recommend a staff-level meeting be held with representatives from the agencies listed above to discuss potential funding packages.

5.1. STATE AND FEDERAL FUNDING SOURCES

5.1.1. USDA – RURAL DEVELOPMENT LOAN

Rural development funds are allocated for rural systems for communities with a population of 10,000 or less. Funding is provided by Federal Budget Appropriation and distributed to applicants for repair, improvement or expansion of water facilities. The application for this funding is open and can be applied for at any time.

5.1.2. IDEQ LOAN

The primary source of loan assistance for improvements to the water system is through the IDEQ Loan funds are allocated on the basis of a statewide priority list. Letters of Interest for this funding are due in January. The statewide priority list is published in March and finalized offers are typically mailed in June or July.

5.1.3. BANK LOAN

Interest rates on bank loans have come down to the point they can be very competitive with federal and state loans. The other advantage to this funding is the significantly reduced "red tape" typically required with state or federal sourced funds.

5.1.4. IDAHO DEPARTMENT OF COMMERCE (IDOC)-IDAHO COMMUNITY DEVELOPMENT BLOCK GRANT (ICDBG)

These grants are available for assistance to Idaho cities and counties with a population of less than 50,000. The purpose of this type of grant is to aid the

development of public infrastructure and housing in order to support and stimulate economic diversification and growth. Funds received from the U.S. Department of Housing and Urban Development are allocated into the six available grant types. The maximum amount that an IDOC grant would cover would be 30 percent of the total project costs, requiring a minimum 70 percent match from the community. The 2019 deadline for Block Grant application is past so the District would have to wait for the 2020 grant cycle to apply for funding.

5.2. Local Match Funding

5.2.1. Revenue Bond

A revenue bond is formed by an election of resident voters within the District. A simple majority (50%) is required to pass the bond. The bond is repaid by user fees (revenue) generated by the utility. Vacant lots cannot be charged for the bond costs under a revenue bond.

5.2.2. LID

A Local Improvement District (LID) is formed by public hearing process, rather than an election. A LID bond is repaid by assessments against real property, which is benefited by the public improvement. Any owner of property which is proposed to be assessed under the LID, regardless of residency, has the right to support or object to formation of the LID. This factor could make the proposal more democratic to out-of-state property owners who cannot vote in an election. If 60 percent of the property owners within the LID object to the LID formation, then the District cannot proceed without resubmitting the LID after 6 months' time, or without appeal to the Board of County Commissioners.

All property owners have two options regarding financing the LID. Each property owner can either pay the amount of the LID assessment in full after completion of the project and prior to finalization of the assessment roll, or the owner can choose to amortize the amount at a set interest rate for a fixed number of years (typically 10 to 20 years). An LID assessment, which is amortized, becomes a lien on the property as security for repayment of the assessment. Or in the case of leased property, a promissory note will be written for the assessment. Refer to Table 5-2 for the LID procedures per Idaho Code.

Table 5-2: LID Process per Idaho Code

1.	LID Initiated By Resolution
2.	Resolution Of Intent To Create The LID
3.	Notice Of Hearing Published And Mailed To Property Owners
4.	Public Hearing To Consider Protests And Support
5.	Ordinance Creating LID Adopted
6.	Engineer Authorized To Prepare Plans And Bidding Documents
7.	Construction Phase
8.	Prepare Final Costs And Assessment Roll
9.	Notice Of Final LID Hearing
10.	Hearing On Objections To Assessment Roll
11.	Confirmation Of Assessment Roll
12.	Notice Of Final Assessment To Property Owners
13.	30-Day Pre-payment Period
14.	Assessments Not Pre-Paid Will Be Amortized At LID Bond Term And Rate

6. PUBLIC PARTICIPATION

This section will be completed after the District holds a public meeting presenting the Facility Plan, anticipated in late winter or early spring, 2020.

7. Selected Alternative Description and Implementation Requirements

This section will be completed after the public participation component is complete.

8. Environmental Review Information

8.1. Existing Environmental Conditions

The District is located approximately two miles west of the City of Athol in Kootenai County, Idaho. The northern border of the system is Highway 54 and the District covers an area of 7.5 square miles. The District serves only single-family residences on parcels ranging in size from 5 to 20 acres. The system and service area are generally located in Sections 13, 17, 18, 19, 20, 24, 25, 26 and 30, Township 53N, Range 3W and 4W.

The service area is located in the valley between the Selkirk Mountains and Coeur d'Alene Mountains and area consists of generally flat land that has been mostly cleared of timber. The elevation of the system varies from 2,430 feet near the southern boundary to 2,560 feet at the northwest boundary. The service area consists entirely of residential development.

For the purpose of the environmental review, an Area of Potential Effect (APE) and a Proposed Project Planning Area (PPPA) have been developed. These areas delineate the expected effect area and project planning area. For the District, the APE/PPPA will consist of the existing service areas as well as approximately 1,100 acres of land directly west of the District boundary that the District is working toward serving in the near future. As is implied, the APE and PPPA are one in the same for the District and proposed project. This boundary is delineated on a map (Environmental Review Area) in Appendix H-1. It is important to note the RAFN area was not included in the APE and PPPA at this time. The improvements discussed in this report are anticipated to serve the area in Growth A. Future improvements will likely be authorized or analyzed in further detail at a future date.

8.1.1. Physical Aspects (Physiography, Topography, Geology and Soils)

The existing topography is relatively flat throughout the service area. In general, the area gently slopes downward from north to south with the high point being in the northeast corner of the district. There is no surface water within or adjacent to the APE/PPPA. Refer to Appendix H-2 for a topographical map.

The Geologic Map of Coeur d'Alene, Idaho Quandrangle (Lewis et. al, 2002) was consulted to determine the geologic information for the Association. This map can be found in Appendix H-2. In addition, Appendix H-2 provides an enlarged version of the above map for the Association. The types of rock present are:

- Catastrophic Flood Deposits and Reworked Outwash-Channel Gravel, undivided (Pleistocene)
- Catastrophic Flood Deposits and Reworked Outwash- Gravels of Spirit Lake, younger (Pleistocene)
- Catastrophic Flood Deposits and Reworked Outwash- Gravels of Spirit Lake, Older (Pleistocene)

Detailed descriptions of these deposits and bedrock can be found in Appendix H-2. A portion of the normal fault and detachment fault of the Purcell-Coeur d Alene Fault (not active) goes through the District, which can be seen on the larger scale map.

The soils in the area are mapped as mostly gravelly and cobbly silt loam by the USDA Soil Survey. These soils are generally well drained and have a moderate shrink-swell potential. All of the soils in the District have a low possibility of erosion due to minimal slopes and the moderate grain size. A Natural Resources Conservation Service, Web Soil Survey map and soil descriptions are provided in Appendix H-2. In addition, the erosion potential survey is included in Appendix H-2.

8.1.2. Surface and Ground Water Hydrology

8.1.3. Surface Water

There is no surface water in or adjacent to the District. The nearest surface water in the area is Spirit Lake which is about 2.5 miles west of the future annexation area.

8.1.4. Ground Water

The entire project area is within the source area for the Spokane Valley-Rathdrum Prairie Aquifer, with a majority of the district located over the aquifer, as can be seen in the map of the Aquifer in Appendix H-3. The Aquifer is classified as a sole source aquifer by the US Environmental Protection Agency (EPA). A sole source aquifer classification indicates that the aquifer supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer. Discussion of water quality and water rights is included in Section 2.5.1.2 and 2.5.1.1, respectively.

8.1.5. Fauna, Flora and Natural Communities

The area is mostly farmland with some areas of trees and is home to many wildlife species. A list of endangered, threatened, and candidate species for Kootenai County was obtained from the US Fish and Wildlife Services website and is included in Appendix H-4. Threatened species include the following: Yellow-Billed Cuckoo, Spalding's Catchfly, Canada Lynx.

8.1.6. Housing, Industrial and Commercial Development

The residences served by the system are single-family dwellings with a small portion of the connections being seasonal customers. Many of the parcels within the district are used for farming or raising livestock and require heavy irrigation during the summer months. The zoning designation for the area is designated by Kootenai County. The entire APE/PPPA is zoned as rural. Refer to the zoning map included in Appendix H-5.

8.1.7. *Cultural Resources*

There are no known historic resources within the District. The nearest historic resource is located in Spirit Lake, approximately 3 miles west of the APE/PPPA. A search of the Kootenai County, Idaho sites listed on the National Register of Historic Places, provided in Appendix H-6, shows the sites in the District.

The District is approximately 26 miles north of the Coeur d'Alene Tribal Reservation Boundary, as shown in the Tribal Boundary map in Appendix H-6.

8.1.8. *Utility Use*

The utilities used by the system are power provided by Kootenai Electric Cooperative.

8.1.9. *Floodplains and Wetlands*

FEMA (Federal Emergency Management Agency) has determined floodplain boundaries which are found in the Flood Insurance Rate Maps (FIRMs). These boundaries were utilized to determine if the District was in the floodplain. According to the FIRM, the District is in an area of minimal flood hazard. Refer to Appendix H-7 for the FEMA floodplain mapping for the service areas.

United States Fish and Wildlife Service provides a National Wetlands Inventory database[9]. A map of wetlands within the project area was prepared using the database and is included in Appendix H-7. As can be seen on the map there is one very small area designated as wetland in the northeast corner of the APE/PPPA of the District.

8.1.10. *Wild and Scenic Rivers*

The nearest designated Wild and Scenic River is a segment of the Saint Joe River approximately 65 miles to the southeast of the District. Therefore, no designated Wild and Scenic Rivers are located within the APE/PPPA. A map of the Wild and Scenic Rivers in the United States can be found in Appendix H-8 as well as an enlargement of this map to show the District and the designated segment of the Saint Joe River.

8.1.11. *Public Health and Water Quality Considerations*

As mentioned in Section 2.5.1.2, the water quality of the system is monitored according to IDEQ rules and regulations. The levels of regulated contaminants were below state and federal standards.

[9] The dataset represents the extent, approximate location and type of wetlands and deepwater habitats in the US. Refer to http://www.fws.gov/wetlands/Data/Wetlands-Geodatabase-User-Caution.html for more information on the geodatabse.

Panhandle Health District regulates the division of properties in the District's area. They have set the minimum parcel size for parcels using septic drain fields to five acres. This applies to all properties within the District as there is no sanitary sewer available.

8.1.12. Prime Agricultural Farmlands Protection

Prime agricultural classification is provided as part of the USDA Soil Survey conducted for the soil information in Section 8.1.1. According to the Soil Survey, *"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."* Nearly all of the District contains soils listed as prime farmland if irrigated and farmland of statewide importance. These soils are present in approximately 99 percent of the overall area. Maps of the USDA Soil Survey information for the District are provided in Appendix H-8.

8.1.13. Proximity to Sole Source Aquifer

The nearest sole source aquifer is the Spokane Valley-Rathdrum Prairie Aquifer (see Appendix H-3 for a map of the Aquifer), and the District is within the source area, with a majority. The Aquifer is classified as a sole source aquifer by the US Environmental Protection Agency. A sole source aquifer classification indicates that the aquifer supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer.

8.1.14. Land Use and Development

The District is zoned as rural. The zoning map for the APE/PPPA can be found in Appendix H-5. The designated land use in the area consists of country with small areas of transitional and suburban designation. The land use map for the APE/PPPA can be found in Appendix H-5.

8.1.15. Precipitation, Temperature and Prevailing Winds

The following climate information for the District was obtained from weather.com, based on monthly averages:

- Average Annual Temperature High – 56.4 °F
- Average Annual Temperature Low – 34.9 °F
- Average Annual Precipitation – 24.61 inches
- Average Annual Snow Fall – 37.8 inches[10]

[10] Average annual climate for the District was obtained from Western Regional Climate Center, for the Bayview Model Basin station (1948-2005).

The prevailing wind in the area (Coeur d'Alene) is North-Northeast, according to the Western Regional Climate Center.

8.1.16. AIR QUALITY AND NOISE

The State of Idaho has been delegated authority to regulate air quality through the EPA and the Clean Air Act. The State Implementation Plan provides the rules and regulations to maintain acceptable air quality standards within the state and site-specific plans delineating areas that do not meet air quality standards. Areas that do not meet specific air quality standards are known as Nonattainment Areas. A map showing Nonattainment Areas and Areas of Concern for the State of Idaho is provided in Appendix H-10. The District is not located in a Nonattainment Area or an area of concern. The Pinehurst Non-Attainment Area and Area of Concern is located approximately 35 miles from the District. Noise from the existing facilities is not disruptive and has not been an issue for the residents.

8.1.17. ENERGY PRODUCTION AND CONSUMPTION

The District currently meters individual water consumption with service meters at all connections monthly (except during the winter months). Users are charged a base rate which includes an allotted amount of water. Additional fees are charged for water use in excess of the base allotment of water.

8.1.18. SOCIOECONOMIC PROFILE

The system serves a population of approximately 975[11] residents through 387 EDUs. The population of the current service area has been growing consistently and the District has plans to grow significantly in the years to come. The majority of the homes served by the District are single family dwelling units on large parcels of land. Although no socioeconomic data is available specifically for this project planning area, the US Census Bureau reports that 10.6 percent of the population in Kootenai County is below the poverty level. The median household income in 2017 was reported as $53,189.

8.2. ENVIRONMENTAL IMPACTS FOR PROPOSED ALTERNATIVES

8.2.1. SOURCE

8.2.1.1. DEVELOP MCCORMICK WELL

The primary environmental impacts associated with developing the McCormick Well include constructing a well house and installation of a pump in the existing well. The installation of the improvements would impact the following existing environmental conditions:

[11] Average persons per household for 2013-2017 for Kootenai County multiplied by the number of residential EDUs equaling an approximate population.

- Physical aspects (minor long-term impact due to excavation for the new well house),
- Socioeconomics of the area (increased user rates will provide improved service over the long-term),
- Water quality (minor short-term impact to water quality due to ground disturbance, to be mitigated through appropriate best management practices (BMPs)),
- Flora and fauna (minor short-term impact due to construction activity),
- Air quality (minor short-term impact due to construction activity),
- Energy (improved overall system efficiency), and
- Public health (positive impact to system service and reliability in the long-term).

The majority of these impacts is expected to be short-term and is not anticipated to create long-term, indirect or cumulative impacts.

The improvement option associated with these environmental impacts can be found in Section 4.1.1.1.

8.2.1.2. UPSIZED PUMP FOR WELL 1

The primary environmental impacts associated with upsizing the pump at Well 1 include constructing an installation of a new pump and installation of a well cover at the existing well. The installation of the improvements would impact the following existing environmental conditions:

- Socioeconomics of the area (increased user rates will provide improved service over the long-term),
- Water quality (minor short-term impact to water quality due to ground disturbance, to be mitigated through appropriate best management practices (BMPs)),
- Flora and fauna (minor short-term impact due to construction activity),
- Air quality (minor short-term impact due to construction activity),
- Energy (increased energy supply to power the upsized pump motor), and
- Public health (positive impact to system service and reliability in the long-term).

The majority of these impacts is expected to be short-term and is not anticipated to create long-term, indirect or cumulative impacts.

The improvement option associated with these environmental impacts can be found in Section 4.1.1.2.

8.2.1.3. NEW WELL

The primary environmental impacts associated with installation of a new well consist of drilling for the new well. The installation of the improvements would impact the following existing environmental conditions:

- Physical aspects (minor long-term impact due to excavation for the new well and well house),
- Socioeconomics of the area (increased user rates will provide improved service over the long-term),
- Water quality (minor short-term impact to water quality due to ground disturbance, to be mitigated through appropriate best management practices (BMPs)),
- Flora and fauna (minor short-term impact due to construction activity),
- Air quality (minor short-term impact due to construction activity),
- Energy (improved overall system efficiency), and
- Public health (positive impact to system service and reliability in the long-term).

The majority of these impacts is expected to be short-term and is not anticipated to create long-term, indirect or cumulative impacts.

The improvement option associated with these environmental impacts can be found in Section 4.1.1.2.

8.2.1.4. NO IMPROVEMENTS

Since there would be no action taken to improve the current system, there would be no environmental impacts due to new construction. However, the current wells are not large enough to serve the system during a maximum day condition (with the largest well out of service). It is possible that some customers may not receive optimum service during this situation. If the deficiency is not addressed, the District would have no potential for growth or expansion without first improving the well source capacity.

8.2.2. STORAGE

8.2.2.1 STANDPIPE RESERVOIR

The primary environmental impacts associated with installing a new storage reservoir is associated with temporary disturbance due to construction activities. The improvement would impact the following existing environmental conditions:

- Physical aspects (minor long-term impact due to excavation for the new storage tank),
- Socioeconomics of the area (increased user rates will provide improved

service over the long-term),

- Water quality (minor short-term impact to water quality due to ground disturbance, to be mitigated through appropriate best management practices (BMPs)),
- Cultural resources (potential impact due to installation in new, undisturbed areas),
- Flora and fauna (minor short-term impact due to construction activity),
- Air quality (minor short-term impact due to construction activity),
- Energy (improved overall system efficiency), and
- Public health (positive impact to system service and reliability in the long-term).

The majority of these impacts is expected to be short-term and is not anticipated to create long-term, indirect or cumulative impacts.

The improvement option associated with these environmental impacts can be found in Section 4.1.2.1.

8.2.2.2 GROUND LEVEL STORAGE

The primary environmental impacts associated with installing a new ground level storage reservoir is associated with temporary disturbance due to construction activities. The improvement would impact the following existing environmental conditions:

- Physical aspects (minor long-term impact due to excavation for the new storage tank),
- Socioeconomics of the area (increased user rates will provide improved service over the long-term),
- Water quality (minor short-term impact to water quality due to ground disturbance, to be mitigated through appropriate best management practices (BMPs)),
- Cultural resources (potential impact due to installation in new, undisturbed areas),
- Flora and fauna (minor short-term impact due to construction activity),
- Air quality (minor short-term impact due to construction activity), and
- Public health (positive impact to system service and increased reliability in situations where fire flow may be required).

The majority of these impacts is expected to be short-term and is not anticipated to create long-term, indirect or cumulative impacts.

The improvement option associated with these environmental impacts can be found in Section 4.1.2.2.

8.2.2.3 No Improvements

Since there would be no action taken to improve the current system, there would be no environmental impacts due to new construction. This improvement can be avoided in the near-term by increasing sources capacity and pumping directly to the system. However, at some point in the future, additional storage will likely be necessary if the District continues to grow.

8.2.3. Booster

8.2.3.1. Replace and Upsize

The primary environmental impacts associated with replacing and upsizing the existing booster pumps is associated with temporary disturbance due to replacement. There is also the possibility that a new pump house or pump house expansion would have to be built to house the upsized/new booster pumps. The improvement would impact the following existing environmental conditions:

- Physical aspects (minor long-term impact due to excavation for the new pump house),
- Socioeconomics of the area (increased user rates will provide improved service over the long-term),
- Water quality (minor short-term impact to water quality due to ground disturbance, to be mitigated through appropriate best management practices (BMPs)),
- Flora and fauna (minor short-term impact due to construction activity),
- Air quality (minor short-term impact due to construction activity),
- Energy (improved overall system efficiency), and
- Public health (positive impact to system service and reliability in the long-term).

The majority of these impacts is expected to be short-term and is not anticipated to create long-term, indirect or cumulative impacts.

The improvement option associated with these environmental impacts can be found in Section 4.1.3.1.

8.2.3.2. No Improvements

Since there would be no action taken to improve the current system, there would be no environmental impacts due to new construction. This improvement can be

avoided in the near-term by increasing source capacity and pumping directly to the system. However, at some point in the future, additional booster capacity will likely be necessary if the District continues to grow. This is especially true if the growth occurs in areas above the current system's hydraulic grade line.

8.2.4. DISTRIBUTION

8.2.4.1. NEW TRANSMISSION MAIN FOR INCREASED SOURCE PRODUCTION

The primary environmental impacts associated with this improvement consist of trench excavation for approximately 3,200 linear feet of new waterline. The installation of the improvement would impact the following existing environmental conditions:

- Physical Aspects (short-term impact for the waterline installation),
- Socioeconomics of the area (increased user rates will provide improved service over the long-term),
- Water Quality (minor short-term impact to water quality due to ground disturbance, to be mitigated through appropriate best management practices (BMPs)),
- Flora and fauna (minor short-term impact due to construction activity),
- Air quality (minor short-term impact due to construction activity),
- Energy (minor positive impact to energy consumption required by pumping due to reduced system losses), and
- Public health (positive impact to system service and reliability in the long-term).

The majority of these impacts is expected to be short-term and is not anticipated to create long-term, indirect or cumulative impacts.

The improvement option associated with these environmental impacts can be found in Section 4.1.4.1.

8.2.4.2. UPSIZE UNDERSIZED TRANSMISSION PIPE

The primary environmental impacts associated with this improvement consist of trench excavation for approximately 6,800 linear feet of waterline replacement. The installation of the improvement would impact the following existing environmental conditions:

- Physical Aspects (short-term impact for the waterline installation),
- Socioeconomics of the area (increased user rates will provide improved service over the long-term),
- Water Quality (minor short-term impact to water quality due to ground disturbance, to be mitigated through appropriate best management practices (BMPs)),

- Flora and fauna (minor short-term impact due to construction activity),
- Air quality (minor short-term impact due to construction activity),
- Energy (minor positive impact to energy consumption required by pumping due to reduced system losses), and
- Public health (positive impact to system service and fire flow capabilities in the long term).

The majority of these impacts is expected to be short-term and is not anticipated to create long-term, indirect or cumulative impacts.

The improvement option associated with these environmental impacts can be found in Section 4.1.4.2.

8.2.4.3. TRANSMISSION TO SERVE ANNEXATION PROPERTIES

The primary environmental impacts associated with this improvement consist of trench excavation for approximately 8,000 linear feet of new waterline. The installation of the improvement would impact the following existing environmental conditions:

- Physical Aspects (short-term impact for the waterline installation),
- Socioeconomics of the area (increased user rates will provide improved service over the long-term),
- Water Quality (minor short-term impact to water quality due to ground disturbance, to be mitigated through appropriate best management practices (BMPs)),
- Flora and fauna (minor short-term impact due to construction activity),
- Air quality (minor short-term impact due to construction activity),
- Energy (minor positive impact to energy consumption required by pumping due to reduced system losses), and
- Public health (positive impact to system service and reliability in the long-term).

The majority of these impacts is expected to be short-term and is not anticipated to create long-term, indirect or cumulative impacts.

The improvement option associated with these environmental impacts can be found in Section 4.1.4.3.

8.2.4.4. NO IMPROVEMENTS

Since there would be no action taken to improve the current system, there would be no environmental impacts from new construction. However, the current transmission line is not capable of handling the size of water flows the source upgrades being considered will produce. This could result in pipe breaks and/or over

pressurization of service connections so it is impractical to improve the source capacity without upsizing required pipe sections.

8.2.5. ALTERNATIVE COMPARISON

An additional comparison of the alternatives has been included in Appendix H-11. This comparison highlights the major impacts anticipated for each alternative discussed above.

8.2.6. REFERENCES

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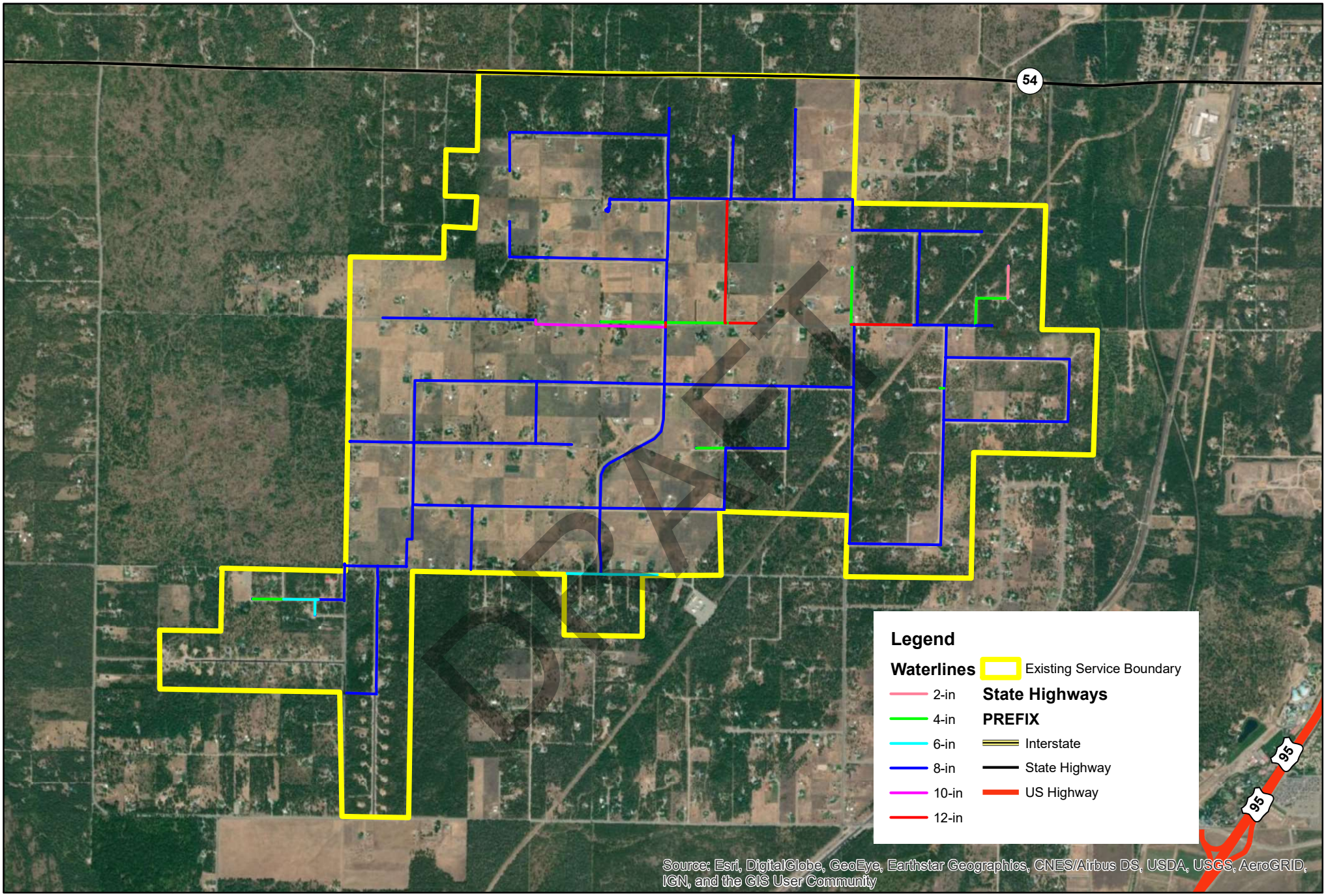
APPENDIX A:
Maps



WELCH-COMER ENGINEERS | SURVEYORS
www.welchcomer.com 208-664-9382

Remington Water

Existing Service Boundary

PROJECT NO.....41317
DRAWN BY.....DH
FILENAME.....Service Area
DATE.....11/25/19

APPENDIX B:

2012 Sanitary Survey & Fire District Communication

WELCH-COMER
ENGINEERS | SURVEYORS

STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

2110 Ironwood Parkway, Coeur d'Alene, ID 83814 (208) 769-1422

C. L. "Butch" Otter, Governor
John Tippits, Director

May 9, 2017

Mr. Robert Kuchenski
Remington Water District
PO Box 468
Athol, ID 83801
bob@inbtegritywater.net

Subject: **Sanitary Survey of PWS 1280270, Remington Water District**

Mr. Robert Kuchenski:

Thank you for your assistance in conducting the sanitary survey of the Remington Water District water system on April 18, 2017. I found the water system to be in substantial compliance with the Idaho Rules for Public Drinking Water Systems. It will continue with its **approved** designation.

No significant deficiencies were identified at the time of the survey; however, the following additional requirements must be met. Please submit the requested documents or a plan of correction (POC) for these requirements within 30 days of receipt of this letter that will list the dates when compliance will be achieved. The POC is a simple narrative document that lists the deficiencies and additional requirements, how they will be corrected, and the date by which corrections will be completed. Please allow yourself adequate time to address the problems so that time extensions will not be necessary.

Requirements:

1. A source water sample tap needs to be installed for the wellfield prior to entry into the storage tank to meet the requirements of the Ground Water Rule. It is recommended a tap for each source be available as well for potential future sampling.
2. Well #1 does not have pump to waste capability. At the next modification to the system, well #1 will be required to have a means of pump to waste.
3. The storage tank roof sealant is peeling from the concrete roof and needs to be stripped and resealed using an NSF approved sealant.
4. The abandoned test well next to well #2 is recommended to be sealed and abandoned according to IDWR standards.
5. Any major modification to the system requires engineered plans be submitted to the DEQ for review and approval prior to the changes being made. At that time any existing requirements will need to be completed to bring the water system into compliance with current standards.

Recommendations:

1. The DEQ recommends the valves in distribution be exercised annually.
2. The DEQ recommends the storage tank be inspected and cleaned every 5 years.

If you have any questions regarding this survey, please do not hesitate to contact me at the DEQ in Coeur d'Alene. We are located at 2110 Ironwood Parkway; phone 208 769-1422.

Sincerely,

Jean Felker

Jean Felker
Drinking Water Analyst
Jean.Felker@deq.idaho.gov

File in TRIM: ID1280270 Remington Water District

IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER SUPPLY REPORT
2017

PWS NUMBER: **ID1280270**
SYSTEM: **REMINGTON WATER DISTRICT**
OWNERSHIP: Remington Water District
INFORMATION OBTAINED FROM: Robert & Ian Kuchenski, Operators
LOCATION: Athol, Idaho
COUNTY: Kootenai County
INSPECTOR: Jean Felker DATE: 4/18/2017
NUMBER OF CONNECTIONS: 320 POPULATION SERVED: 800

FIELD SURVEY DATA

The Remington Water District (District) is a District owned water system located approximately 2.5 miles west of the City of Athol in Kootenai County, Idaho. The drinking water for the Remington Water District is supplied by two drilled wells pumping from the Rathdrum Prairie Aquifer, which were determined to be a wellfield on the 2001 sanitary survey. The water system consists of two drilled wells, one well house building and pressure tanks, sodium hypochlorite treatment, one 100,000 gallon below ground concrete storage tank, two 150 HP generators, and distribution mains serving the community. All system components are located on District property located at the end of Shoshone Avenue. The system serves 320 connections and approximately 800 people.

The GWUDI (Ground Water Under Direct Influence of Surface Water) assessment was completed on April 29, 1999 and determined that no surface water is influencing the ground water sources. No existing ground water problems were identified by the Source Water Assessment reports. Source Water Assessment reports for both wells were written on January 8, 2002. Potential contaminant information was updated on September 13, 2016 and November 1, 2016.

The water system operation is overseen by Integrity Water, Inc; Mr. Robert Kuchenski, Designated Operator, and his son, Ian Kuchenski, Back-up Operator. Both were on site at the time of the survey.

Source

Well #1 is located across the street to the north of the storage tank and pump house at 1626 East Shoshone Avenue. It was drilled in 1969 to a depth of 540 feet. The 18-inch well casing extends approximately 24 inches above the ground surface and is properly sealed, well vents are properly screened, and meets all currently required setbacks and minimum distances as required by the Idaho Department of Environmental Quality (DEQ). A stainless steel well screen was set between 510 and 540 feet. The static water level at the time of drilling was 470 feet. The

cement grout surface seal is 25 feet deep. It produces approximately 800 gallons per minute. Well #1 does not have pump to waste capability.

Well #2 is located east of the pump house at 1626 Shoshone Avenue and was drilled in 1998 to a depth of 554 feet. The 8-inch well casing extends approximately 24 inches above the ground surface and is properly sealed, well vents are properly screened, and meets all currently required setbacks and minimum distances as required by the DEQ. The well screen is set from 539 feet to 554 feet below the surface. The static water level at the time of drilling was 460 feet. The bentonite clay surface seal is 100 feet deep. It produces approximately 250 gallons per minute. Well #2 has flow to waste capability.

Both wells pump directly to the storage tank where the booster pumps draw water from the storage tank and out to distribution. There is no sample tap prior to the storage tank and no means of isolating the storage tank from distribution. The smooth nosed sample tap in the pump house provides a sample point for the storage tank. It is required that the wellfield have a means to draw a source water sample as required by the Ground Water Rule. Since voluntary disinfection using sodium hypochlorination solution injection is in use, the operator understands and must comply with how to pull a raw water sample by discontinuing the chlorination, flushing to waste until no chlorine residual is detected and then taking the sample.

A 12% sodium hypochlorite solution (Hasa Chlor) is injected prior to the four 81-gallon pressure tanks. The LMI metering pump was located next to the solution tank and appeared to be operating properly without losing prime. The sodium hypochlorite injection is flow proportional and is tied to the well pump initiation, and will only engage when the well pump is running and producing water. The chlorine tank is vented to the outside through the pump house wall. The free chlorine residual is maintained between 0.1 to 0.2 mg/L.

The operator, Bob Kuchenski, stated the four pressure tanks are used as a buffer and for back up pressure for the system. The current system of booster pumps is capable of providing pressure to the distribution system. The two 10 HP VFD pumps alternate to provide pressure to distribution and are set to lead/lag during the summer months with demand. The 20 HP Baldor pump is used during high demand during the summer months or for fire flow. The system maintains pressure of 68 psi. The pressure tanks can be individually isolated so they can be drained and repaired as needed. The pressure switches are set to initiate the booster pumps to provide water from the storage tank to serve distribution. The booster pumps have an automatic cut off in case the level of water available in the storage tank becomes too low due to well failure.

The pressure gauges and flow meters were working at the time of the survey. The threaded taps in the pump house are all equipped with vacuum breakers. There were no toxic or hazardous materials noted on site at the well lot and pump house at the time of the survey. The pump house contained adequate lighting, drainage, ventilation and heat. The pump house was securely locked to prevent unauthorized entry and the well lots are completely fenced and secured with a locking gate. Well logs are on file for both wells.

Storage

The water system contains a 100,000 gallon below ground concrete storage tank in service since 1991. The storage tank is located partially under and adjacent to the pump house on the wellfield lot. The storage tank is not capable of being isolated from the distribution system to allow the system to provide well to pressure flow. It has flow to waste capability and a 24 mesh screened vent.

The storage tank operates on a level transducer system to initiate the well pumps to supply water to the storage tank. There is also a back-up float system. At 1.5 feet all booster pumps are set to shut down to avoid draining the storage tank and burning out the pumps. The on and off set points are determined by season and water consumption to avoid stagnant water stored within the storage tank.

The hatch is located inside of the pump house and was in good condition. The storage tank interior appeared very clean and clear as viewed from the hatch. It is unknown when the storage tank was last cleaned and inspected. The DEQ recommends the storage tank be inspected and cleaned every five years.

The storage tank roof sealant is peeling from the concrete roof and needs to be removed and resealed using an NSF approved sealant. There did not appear to be any deep cracks visible that would indicate a potential contamination source for the stored water. It was also discussed by the operator during the survey that the District Board was considering extending the roof over the exposed storage tank area and enclosing it within the pump house.

Distribution

The system currently serves approximately 320 homes, all of which are metered. The distribution lines consist of 4- to 12-inch PVC pipe, with approximately 50 fire hydrants within the distribution system. There are three air relief valves within the distribution lines located on Spirit Loop, Teton, and Spear Road. All water mains that provide fire flow have a diameter of at least 6 inches. The DEQ recommends that all valves and main lines be flushed annually. The distribution system contains dead end lines and per the operator, they are being flushed semiannually. It is required that any dead end lines be flushed once every 6 months. The Operator stated there is only one dead end line in distribution and it is flushed twice per year.

If at any time there is a depressurization event, the water system operator must provide public notification to its users within 24 hours, disinfect or flush the system, collect bacteriological samples and also notify the DEQ. If pressure drops below 30 psi the automated Sensaphone system calls the operator to notify of pressure loss.

There has been one interruption of service including pressure loss due to electrical maintenance work at the pump house. This occurred on June 24, 2016 for approximately two hours. Proper notice, disinfection and coliform sampling was completed as required.

The water system has installed two 150 HP propane powered generators which can supply power to the system in the event of a power outage. Six 1,000 gallon propane tanks are installed underground next to the pump house. The generators have the capacity to provide power to support fire flow in an emergency.

A cross connection control program and by laws related to its enforcement are in place as required by the Rules (IDAPA 58.01.08.552.06). The Remington Water District is actively enforcing its cross connection control program. The operator stated there are no commercial businesses on the system.

The water system must ensure that cross connections do not exist or are isolated from the potable water system by an approved backflow prevention assembly. Backflow prevention assemblies shall be inspected and tested annually for functionality by an Idaho licensed tester, as specified in Subsection 552.06.c. Annual backflow testing of all backflow assemblies installed on underground sprinkler systems within distribution is required. Since the time of the last survey, the minimum requirements of a Cross Connection Control program have been revised to include the following: "Assemblies that cannot pass annual tests or those found to be defective shall be repaired, replaced or isolated within 10 business days. If the failed assembly cannot be repaired, replaced or isolated within 10 business days, water service to the failed assembly shall be discontinued."

Annual backflow testing of all backflow assemblies installed on underground sprinkler systems within distribution is required. Ian Kuchenski, back up operator for Remington Water District, stated these requirements are being met. An annual survey is sent out each year to the homeowners to identify and update any new potential cross connection sources within distribution.

A written total coliform sampling plan is required which lists five sampling locations throughout the distribution system. The current sampling locations include: Kuchenski, Mellick, Harsh, Lynch and Bremmel residences. According to coliform sampling requirements, the total coliform sampling plan must represent the entire distribution system. This is completed by alternating sampling locations throughout the distribution system. Once written, the sampling plan must be followed to the best of the operator's abilities; each alternating location must be written on the coliform sample lab submittal form along with the free chlorine residual from that site.

The DEQ recommends that all frost free hydrants on the water system have an atmospheric vacuum breaker installed to prevent cross connection contamination; and that at no time are frost free hydrants left in the open position when connected to garden hoses where attachments on the hose regulate flow. As a reminder, atmospheric vacuum breakers should be removed during winter months to avoid freezing and possible water line breakage.

Financial & Managerial Capacity

The water system is owned by the Remington Water District that is overseen by a Board which meets monthly. The water system is current on their drinking water fees with DEQ. The

designated operator is Robert Kuchenski who is licensed by the Idaho Bureau of Occupational Licenses (IBOL) and holds a Drinking Water Distribution 2 (DWD2-14719) and Drinking Water Treatment 2 (DWT2-10956) licenses that expires in February 2018. The backup operator is Ian Kuchenski who is licensed as Drinking Water Distribution 1 (DWD1-21471) which expires in July 2018.

All service connections are metered and billed at $35 for the first 25,000 gallons per month.

The DEQ recommends an operation and maintenance manual be provided for the drinking water system. Operation and maintenance manuals should include daily operating instructions, trouble shooting, operator safety procedures, location of valves and other key system features, parts lists and order forms, and information for contacting the water system operator. Per the operator, the water system has an operational and maintenance manual on site.

Monitoring Schedule

The Remington Water District is required to collect one total coliform sample each month from distribution. Also, a monthly operating report which reports the free chlorine residuals recorded at least twice per week should be submitted to the DEQ by the 10th day of the following month.

Please remember to frequently check the online Public Water System Switchboard to keep updated on what monitoring is due and what has been credited as completed for this year. If you have any questions, please contact the DEQ at your earliest convenience.
http://www.deq.idaho.gov/water-quality/drinking-water/pws-switchboard.aspx

Distribution:

Total Coliform – 1 routine sample per month from distribution per RTCR plan
Lead and Copper – 10 routine samples per 3 years from distribution
DBP – 2 routine samples per year from distribution sites designated (TTHM & HAA5)

Wells 1 & 2:

Arsenic – 1 sample per 9 years
Fluoride – 1 sample every 9 years
IOC Group – 1 sample per 9 years
Sodium – 1 sample every 3 years
Nitrate – 1 sample per year
Nitrite – 1 sample per 9 years
Rads – R226 & R228 & R6&8 – 1 sample every 9 years
Rads – Gross Alpha & Uranium – 1 sample every 6 years
Uranium – 1 sample per 6 years
VOC Group – 1 sample per 6 years

Drinking Water Protection Plan and Source Water Assessment

A Source Water Assessment report for well 1 was written on January 8, 2002. Potential contaminant information was updated on September 13, 2016.

The table below shows the susceptibility for well 1 according to the Source Water Assessment Report.

Hydrologic Sensitivity	High Sensitivity
System Construction	Moderate Susceptibility
IOCs	Moderate Susceptibility
VOCs	Moderate Susceptibility
SOCs	Moderate Susceptibility
Microbial	Low Susceptibility
Final Susceptibility	Moderate

A Source Water Assessment report for well 2 was written on January 8, 2002. Potential contaminant information was updated on November 1, 2016. The table below shows the susceptibility for well 2 according to the Source Water Assessment Report.

Hydrologic Sensitivity	High Sensitivity
System Construction	Moderate Susceptibility
IOCs	Moderate Susceptibility
VOCs	Moderate Susceptibility
SOCs	Moderate Susceptibility
Microbial	Low Susceptibility
Final Susceptibility	Moderate

The Source Water Assessment reports can be found at
http://www.deq.idaho.gov/water-quality/source-water/assessments/

The water system does not appear to have a Drinking Water Protection Plan prepared by the DEQ or Idaho Rural Water Association. Source water protection (synonymous with the term drinking water protection) is a voluntary effort a community can implement to help prevent contamination of the source water that supplies its public water system. The drinking water protection plan outlines the management tools local committees can use to protect drinking water sources, and describes the implementation of regulatory and/or non-regulatory management practices. The Drinking Water Protection Plan builds upon the work completed in the Source Water Assessment.

1) Regulatory tools include items such as zoning ordinances, overlay districts, or site plan review requirements;
2) Non-regulatory tools include items such as educational or pollution prevention activities and implementation of Best Management Practices;
3) Every plan should also include a public education and information component.

DEQ recommends that the water system pursue a Drinking Water Protection Plan to establish further protective measures against contamination in the watershed. John Jose, Drinking Water Protection Specialist may be contacted at 208-769-1422 for further information regarding development of a plan.

Conclusions and Recommendations

The Remington Water District was found to be in substantial compliance with the Idaho Rules for Public Drinking Water Systems. No significant deficiencies were identified during the survey.

Listed below is a summary of requirements and recommendations identified during the survey inspection. Please consult with DEQ staff within 30 days of receipt of this report on the water system's plan to correct the issues below by submitting a written plan of correction (POC). The POC is a simple narrative document that lists the deficiencies and additional requirements, how they will be corrected, and the date by which correction will be completed. Please afford yourself adequate time to address the problems so that time extensions will not be necessary.

Deficiencies and Requirements:

1. A source water sample tap needs to be installed for the wellfield prior to entry into the storage tank to meet the requirements of the Ground Water Rule. It is recommended a tap for each source be available as well for potential future sampling.
2. Well #1 does not have pump to waste capability. At the next modification to the system, well #1 will be required to have a means of pump to waste.
3. The storage tank roof sealant is peeling from the concrete roof and needs to be stripped and resealed using an NSF approved sealant.
4. The abandoned test well next to well #2 is recommended to be sealed and abandoned according to IDWR standards.
5. Prior to any material modifications to your existing water system, preliminary plan and specification engineering reports are required to be submitted to the DEQ for review and approval. At that time any existing requirements will need to be completed to bring the water system into compliance with current standards.

Recommendations:

1. The DEQ recommends the valves in distribution be exercised annually.
2. The DEQ recommends the storage tank be inspected and cleaned every 5 years.
3. Any major modification to the system requires engineered plans be submitted to the DEQ for review and approval prior to the changes being made.

Photographic Documentation

Name of Facility: REMINGTON WATER DISTRICT

Inspector(s): Jean Felker

Inspection Date: Tuesday, April 18, 2017

Purpose of Inspection: Sanitary Survey

Publish Date: Tuesday 18 April 2017

Table of Photographs:

Photograph 1: Two new 150 HP propane powered generators

Photograph 2: Six underground propane tanks - 1000 gallons each

Photograph 3: Storage tank roof showing signs of peeling of sealant

Photograph 4: Storage tank roof

Photograph 5: Flow to waste from pump house.

Photograph 6: Control panels

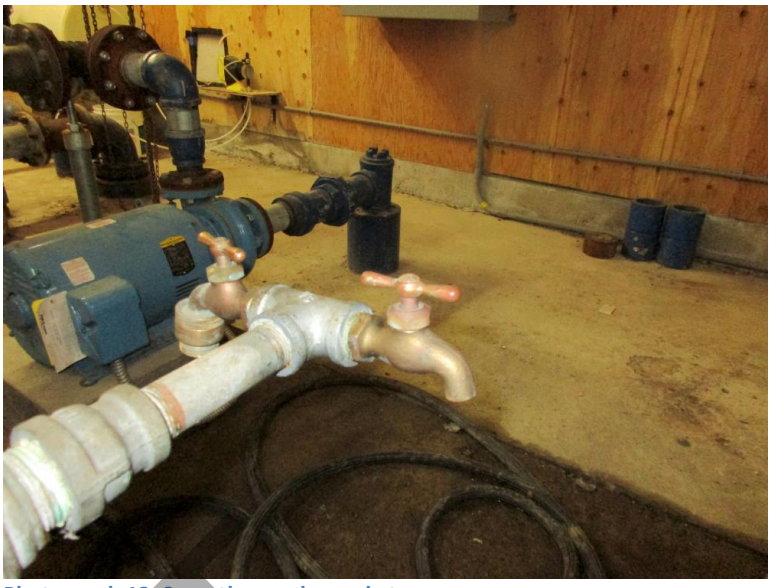
Photograph 7: Four pressure tanks for buffer and back up pressure for system

Photograph 8: 10 HP Baldor booster pump

Photograph 9: Two 10 HP booster pumps

Photograph 10: Storage tank hatch inside pump house

Photograph 11: 20 HP booster pump used during peak summer demand



Photograph 12: Smooth nosed sample tap

Photograph 13: Sodium hypochlorite injection

Photograph 14: LMI metering pump

Photograph 15: Chlorine tank vent to outside.

Photograph 16: Inside view of hatch into storage tank

Photograph 17: Control panels, Sensaphone panel for emergency contact

Photograph 18: Control panels inside pump house

Photograph 19: Well 2 well tag

Photograph 20: Well 2 located on the fenced storage tank and pump house lot.

Photograph 21: Overflow-flow to waste for reservoir, screened and splash plate

Photograph 22: Screen on reservoir flow to waste

Photograph 23: Screen on storage tank flow to waste

Photograph 24: View of pump house and top of storage tank

Photograph 25: Well 1 located across street from pump house

Photograph 26: View of pump house storage tank and well 2 lot

APPENDIX C:

Well Logs & Pump Curves

WELCH-COMER
ENGINEERS | SURVEYORS

H2O Well
Mike Galante
Remington Rec. Water Dist. Well #2

Well #2 Pump Curve

Goulds Turbine Pump Selection ver: 6.02
08/25/00

PUMP DATA SHEET
Goulds Turbine 60 Hz

Selection file: (untitled)
Catalog: TURB60.MPC v 1.6.1

Curve: 3016

Design Point: Flow: 225 US gpm
Head: 502 ft

Pump: TURBINE - 3600 Size: 6CHC; (7 stages)
Speed: 3450 rpm Dia: 4.22 in

Limits: Temperature: --- °F Sphere size: 0.22 in
Pressure: 420 psi_g Power: --- bhp

Specific Speed: Ns: 2160 Nss: ---

Dimensions: Suction: --- in Discharge: --- in

Vertical Turbine: Bowl Dia: 5.88 in Max Lateral: 0.38 in
Thrust K Factor: 2.1

Motor: 50 hp Speed: 3600 Frame: 326TS
NEMA Standard TEFC Enclosure
sized for Max Power on Design Curve

Fluid: Water
Temperature: 60 °F
SG: 1
Viscosity: 1.122 cP
Vapor pressure: 0.2568 psi_a
Atm pressure: 14.7 psi_a

NPSHa: --- ft

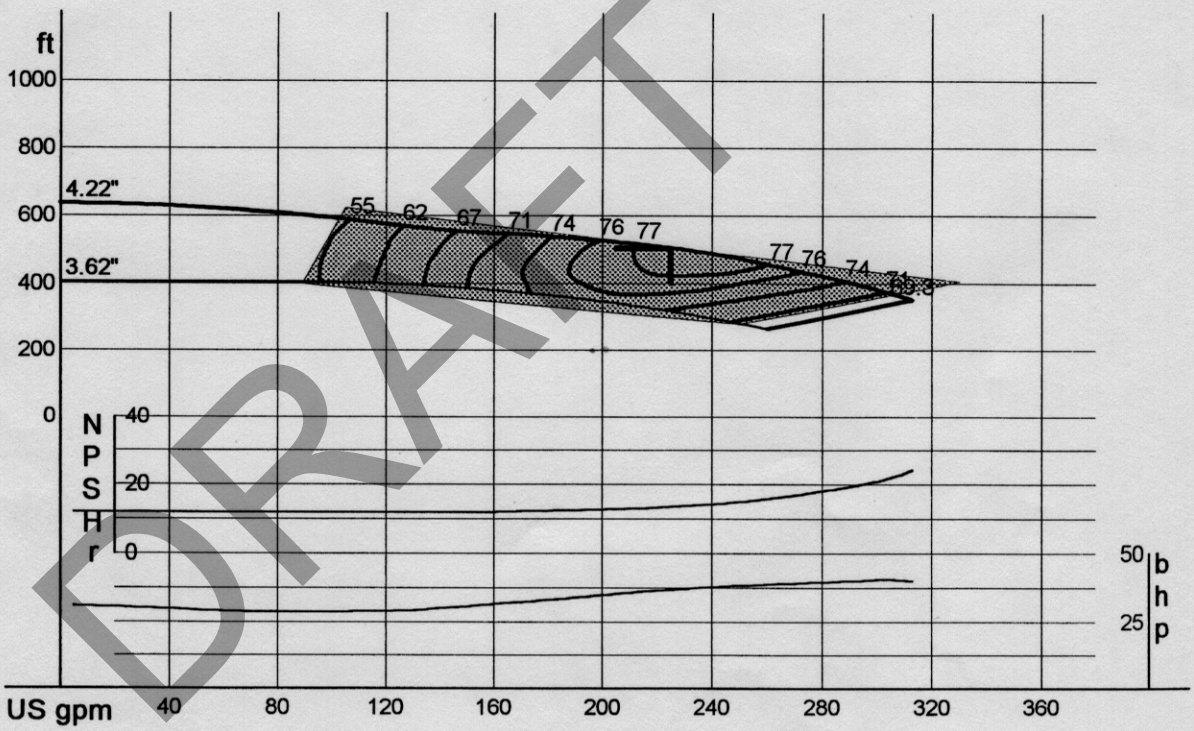
Piping:
System: ---
Suction: --- in
Discharge: --- in

Suction Size-4" Discharge Sizes-3",4"

---- Data Point ----
Flow: 225 US gpm
Head: 505 ft
Eff: 77.6%
Power: 36.9 bhp
NPSHr: 13.7 ft

-- Design Curve --
Shutoff Head: 637 ft
Shutoff dP: 276 psi
Min Flow: - US gpm
BEP: 78% eff
@ 233 US gpm
NOL Pwr: 40.6 bhp
@ 304 US gpm

-- Max Curve --
Max Pwr: 40.6 bhp
@ 304 US gpm



--- PERFORMANCE EVALUATION ---

Flow US gpm	Speed rpm	Head ft	Pump %eff	Power bhp	NPSHr ft	Motor %eff	Motor hp	Hrs/yr	Cost /kW
270	3450	440	76.2	39.3	16.9				
225	3450	505	77.6	36.9	13.7				
180	3450	539	73.8	33.2	12.5				
135	3450	563	64.1	29.8	12				
90	3450	599	46.9	28.9	12				

USE TYPEWRITER OR BALL POINT PEN

State of Idaho
Department of Reclamation

WELL DRILLER'S REPORT

RECEIVED
JAN 30 1970
Department of Reclamation

State law requires that this report be filed with the State Reclamation Engineer within 30 days after completion or abandonment of the well.

1. WELL OWNER L. B. Brown
Name SAN FRANCISCO RANCH
Address ATHOL IDAHO
Owner's Permit No. none 96-69-N-1

2. NATURE OF WORK
☒ New well #3 ☐ Deepened ☐ Replacement
☐ Abandoned (describe method of abandoning)

3. PROPOSED USE
☐ Domestic ☒ Irrigation ☐ Test
☐ Municipal ☐ Industrial ☐ Stock

4. METHOD DRILLED
☒ Cable ☐ Rotory ☐ Dug ☐ Other

5. WELL CONSTRUCTION
Diameter of hole 18 inches Total depth 540 feet
Casing schedule: ☒ Steel ☐ Concrete

Thickness	Diameter	From	To
.375 inches	18 inches	+2 feet	510 feet
____ inches	____ inches	____ feet	____ feet
____ inches	____ inches	____ feet	____ feet
____ inches	____ inches	____ feet	____ feet
____ inches	____ inches	____ feet	____ feet

Was a packer or seal used? ☒ Yes ☐ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch
Size of perforation ____ inches by ____ inches

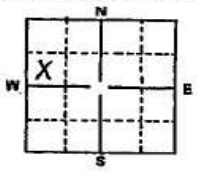
Number	From	To
____ perforations	____ feet	____ feet
____ perforations	____ feet	____ feet
____ perforations	____ feet	____ feet

Well screen installed? ☒ Yes ☐ No
Manufacturer's name JOHNSON
Type IRRIGATOR Model No. ARMCO IRON
Diameter 16 Slot size 150 Set from 510 feet to 540 feet
Diameter ___ Slot size ___ Set from ____ feet to ____ feet

Gravel packed? ☐ Yes ☒ No Size of gravel ____
Placed from ____ feet to ____ feet

Surface seal? ☒ Yes ☐ No To what depth 25 feet
Material used in seal ☒ Cement grout ☐ Puddling clay

6. LOCATION OF WELL
Sketch map location must agree with written location.



96

County KOOTENAI
SW ¼ NW ¼ Sec. 18, T. 53 (N)S, R. 3 E(W)

7. WATER LEVEL
Static water level 470 feet below land surface
Flowing? ☐ Yes ☒ No G.P.M. flow ____
Temperature ____ ° F. Quality GOOD
Artesian closed-in pressure ____ p.s.i.
Controlled by ☐ Valve ☐ Cap ☐ Plug

8. WELL TEST DATA
NO TEST MADE
☐ Pump ☐ Bailer ☐ Other

Discharge G.P.M.	Draw Down	Hours Pumped

9. LITHOLOGIC LOG

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
18	0	2	TOP SOIL		X
18	2	34	GRAVEL 4" MINUS		X
18	34	96	GRAVEL 6" MINUS		X
18	96	130	GRAVEL 4" MINUS SOME CLAY		X
18	130	143	GRAVEL 4" MINUS COMPACTED		X
18	143	171	GRAVEL 6" MINUS LOOSE		X
18	171	196	GRAVEL 6" MINUS SOME CLAY		X
18	196	197	BOULDER		X
18	197	224	GRAVEL 6" MINUS		X
18	224	226	GRAVEL 6" MINUS SOME CLAY		X
18	226	241	GRAVEL 10" MINUS		X
18	241	261	BOULDERS		X
18	261	319	GRAVEL 4" MINUS		X
18	319	326	BOULDER		X
18	326	346	FINE GRAVEL ½" MINUS		X
18	346	355	PEA GRAVEL LOOSE		X
18	355	372	FINE GRAVEL ½" MINUS		X
18	372	391	GRAVEL 1" MINUS CEMENTED		X
18	391	393	BOULDER		X
18	393	403	GRAVEL 5" MINUS		X
18	403	408	GRAVEL 6" MINUS CEMENTED		X
18	408	427	GRAVEL 4" MINUS		X
18	427	435	GRAVEL 1" MINUS		X
18	435	447	GRAVEL 2" MINUS		X
18	447	467	GRAVEL 3" MINUS		X
18	467	470	GRAVEL 10" MINUS SOMEWAY		X
18	470	481	GRAVEL 12" MINUS	X	
18	481	487	GRAVEL 4" MINUS	X	
18	487	496	GRAVEL 6" MINUS	X	
18	496	527	GRAVEL 2" MINUS	X	
18	527	532	GRAVEL 4" MINUS TIGHT	X	
18	532	540	GRAVEL 2" MINUS	X	

10.
Work started SEPT 24-69 finished DEC 31-69

11. DRILLER'S CERTIFICATION
This well was drilled under my supervision and this report is true to the best of my knowledge.

HOLMAN DRILLING CORP 108
Driller's or Firm's Name Number
E 3410 9TH SPOKANE WASH
Address
Arnold E. Holman JAN 13-70
Signed By Date

RECEIVED

Form 238-7 3/95 AUG 26 1998
Starships Consulting and Management Services
NORTHERN REGION IDWR Corrected Copy

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

Use Typewriter or Ballpoint Pen

77895

Office Use Only
Inspected by_____
Twp____Rge____Sec____
____1/4____1/4____1/4
Lat: : : Long: : :

1. DRILLING PERMIT NO. 96-96-N-0286-000
Other IDWR No. _____

2. OWNER **Well Number:**
Name REMINGTON /ROCKY MTN LAND 676
Address PO BOX 2028
City CDA State ID Zip 83816-202

3. LOCATION OF WELL by legal description
sketch map location must agree with written location

POSTED

Twp. 53 ☑ North or ☐ South
Rge. 03 ☐ East or ☑ West
Sec. 18 1/4 NW 1/4 SW 1/4
Gov't Lot 3 County KOOTENAI
Lat: : : Long: : :
Address of Well Site SHAMROCK RANCH
City ATHOL
(Give at least name of road + Distance to Road or Landmark)
_____ Blk. _____ Sub. Name _____

4. USE:
☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☒ Other Subdivision

5. TYPE OF WORK check all that apply (Replacement, etc.)
☑ New Well ☐ Modify ☐ Abandonment ☐ Other _____

6. DRILL METHOD
☑ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other _____

7. SEALING PROCEDURES

SEAL/FILTER PACK Material	From	To	AMOUNT Sacks or Pounds	METHOD
BENTONITE	0	100	15 SACKS	SLURRY / DRY

Was drive shoe used? ☑ Y ☐ N Shoe Depth(s) 540
Was drive shoe seal tested? ☐ Y ☐ N How? _____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
8	+2	-540	.250	STEEL	☑	☐	☑	☐

Length of Headpipe 5' 7" Length of Tailpipe _____

9. PERFORATIONS/SCREENS
☐ Perforations Method _____
☑ Screens Screen Type JOHNSON 15' 8" 80 SL

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
539	554	80	0	8	SCREEN	☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
460 ft. below ground Artesian pressure _____ lb.
Depth flow encountered _____ ft. Describe access port or control devices: _____

53N 3W 18

11. WELL TESTS:
☐ Pump ☐ Bailer ☑ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
30+ GPM /AIR			

Water Temp. _____ Bottom Hole Temp _____
Water Quality test or comments: _____
Depth first Water encountered _____

12. LITHOLOGIC LOG:(Describe repairs or abandonment)

Bore Diam	From	To	Remarks: Lithology, Water Quality, Temperature	Water Y	Water N
12	0	2	TOPSOIL	☐	☑
12	2	57	3/4 Gravel Coarse Sand	☐	☑
12	57	59	BOULDER	☐	☑
12	59	100	Gravels	☐	☑
10	100	130	Gravels Sand Coarse	☐	☑
10	130	200	3/4 Gravels	☐	☑
10	200	230	Large gravels	☐	☑
10	230	320	Gravels With Sand	☐	☑
10	320	400	Gravels Large	☐	☑
10	400	490	Gravels	☐	☑
10	490	540	Gravels	☑	☐
10	540	554	Gravels	☑	☐
	0	0	2) 8" K-Packers	☐	☐

RECEIVED
AUG 26 1998
NORTHERN REGION IDWR

Completed Depth 554' (Measurable)
Date: Started 3/9/98 Completed 3/31/98

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name H20 WellService, Inc. Firm No. 448
Firm Official _____ Date 3/31/98
and
Supervisor or Operator _____ Date 3/31/98
(Sign Once if Firm Official and Operator)

(Jim McLeslie)

USE TYPEWRITER OR BALL POINT PEN

State of Idaho
Department of Reclamation

WELL DRILLER'S REPORT

State law requires that this report be filed with the State Reclamation Engineer within 30 days after completion or abandonment of the well.

RECEIVED
JAN 30 1970
Department of Reclamation

1. WELL OWNER
Name SAN FRANCISCO RANCH
RFD (C. B. Brown agent)
Address ATHOL IDAHO
Owner's Permit No. 96.7030

2. NATURE OF WORK 96-70-N-5
☒ New well #2 ☐ Deepened ☐ Replacement
☐ Abandoned (describe method of abandoning)

3. PROPOSED USE
☐ Domestic ☒ Irrigation ☐ Test
☐ Municipal ☐ Industrial ☐ Stock

4. METHOD DRILLED
☒ Cable ☐ Rotory ☐ Dug ☐ Other

5. WELL CONSTRUCTION
Diameter of hole 18 inches Total depth 540 feet
Casing schedule: ☒ Steel ☐ Concrete

Thickness	Diameter	From	To
.375 inches	18 inches	+2 feet	510 feet
____ inches	____ inches	____ feet	____ feet
____ inches	____ inches	____ feet	____ feet
____ inches	____ inches	____ feet	____ feet
____ inches	____ inches	____ feet	____ feet

Was a packer or seal used? ☒ Yes ☐ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch
Size of perforation ____ inches by ____ inches

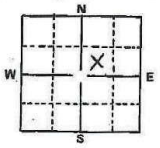
Number	From	To
____ perforations	____ feet	____ feet
____ perforations	____ feet	____ feet
____ perforations	____ feet	____ feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name JOHNSON
Type IRRIGATOR Model No. ARMOR IRON
Diameter 16 Slot size 150 Set from 510 feet to 540 feet
Diameter ___ Slot size ___ Set from ___ feet to ___ feet

Gravel packed? ☐ Yes ☒ No Size of gravel ____
Placed from ____ feet to ____ feet

Surface seal? ☒ Yes ☐ No To what depth 25 feet
Material used in seal ☒ Cement grout ☐ Puddling clay

6. LOCATION OF WELL
Sketch map location must agree with written location.



96

County KOOTENAI
SE ¼ NE ¼ Sec. 13 T. 53 N/S R. 4 E/W
B.M.

7. WATER LEVEL
Static water level 470 feet below land surface
Flowing? ☐ Yes ☒ No G.P.M. flow ____
Temperature ____ ° F. Quality GOOD
Artesian closed-in pressure ____ p.s.i.
Controlled by ☐ Valve ☐ Cap ☐ Plug

8. WELL TEST DATA
NO TEST MADE
☐ Pump ☐ Bailer ☐ Other

Discharge G.P.M.	Draw Down	Hours Pumped

9. LITHOLOGIC LOG

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
18	0	2	TOP SOIL		X
18	2	22	GRAVEL 4" MINUS		X
18	22	25	BOULDER		X
18	25	41	GRAVEL 4" MINUS		X
18	41	84	GRAVEL 2" MINUS SOME CLAY		X
18	84	108	GRAVEL 4" MINUS SOME CLAY		X
18	108	155	GRAVEL 1" MINUS " "		X
18	155	175	GRAVEL 3" MINUS " "		X
18	175	193	GRAVEL 1" MINUS SOME CLAY		X
18	193	203	GRAVEL 2" MINUS CLEAN		X
18	203	206	GRAVEL CEMENTED		X
18	206	227	GRAVEL 1" MINUS COMPACTED		X
18	227	230	GRAVEL 4" MINUS		X
18	230	264	GRAVEL 2" MINUS LOOSE		X
18	264	287	GRAVEL + BOULDERS TO 12"		X
18	287	313	GRAVEL 4" MINUS		X
18	313	344	GRAVEL 1" MINUS LOOSE		X
18	344	375	GRAVEL 2" MINUS		X
18	375	380	BOULDER		X
18	380	409	GRAVEL 2" MINUS		X
18	409	412	BOULDER		X
18	412	422	GRAVEL 2" MINUS		X
18	422	430	GRAVEL + BOULDERS TO 12"		X
18	430	439	GRAVEL 2" MINUS		X
18	439	445	GRAVEL 4" MINUS SOME CLAY		X
18	445	456	GRAVEL 2" MINUS + CLAY		X
18	456	464	GRAVEL 1" MINUS CLEAN		X
18	464	479	GRAVEL 1" MINUS + CLAY		X
18	479	482	BOULDERS	X	
18	482	489	GRAVEL 8" MINUS	X	
18	489	503	GRAVEL 2" MINUS	X	
18	503	509	BOULDERS	X	
18	509	540	GRAVEL [illegible] MINUS	X	

10.
Work started April 30 1969 finished August 19 1969

11. DRILLER'S CERTIFICATION
This well was drilled under my supervision and this report is true to the best of my knowledge.

Holman Drilling Corp. 168
Driller's or Firm's Name Number
E 3410 9th Ave Spokane Wn
Address
Signed By Date JAN 5 1970

USE ADDITIONAL SHEETS IF NECESSARY

EXISTING WELL DRILLER'S REPORT

Pump Performance Datasheet

Customer	:	Quote number	:
Customer reference	:	Size	: 1-1/2 x 2 x 9L (B1-1/2ZPL)
Item number	: Default	Stages	: 1
Service	:	Based on curve number	: 5036
Quantity	: 1	Date last saved	: 20 Sep 2019 5:58 PM

Operating Conditions

Flow, rated	: 98.44 USgpm
Differential head / pressure, rated (requested)	: 207.9 ft
Differential head / pressure, rated (actual)	: 207.9 ft
Suction pressure, rated / max	: 0.00 / 0.00 psi.g
NPSH available, rated	: Ample
Frequency	: 60 Hz

Performance

Speed, rated	: 3550 rpm
Impeller diameter, rated	: 7.75 in
Impeller diameter, maximum	: 9.00 in
Impeller diameter, minimum	: 7.19 in
Efficiency	: 53.91 %
NPSH required / margin required	: 15.69 / 0.00 ft
Ns (imp. eye flow) / Nss (imp. eye flow)	: 546 / 4,226 US Units
MCSF	: 40.59 USgpm
Head, maximum, rated diameter	: 253.5 ft
Head rise to shutoff	: 21.27 %
Flow, best eff. point	: 98.54 USgpm
Flow ratio, rated / BEP	: 99.90 %
Diameter ratio (rated / max)	: 86.11 %
Head ratio (rated dia / max dia)	: 62.75 %
Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00
Selection status	: Acceptable

Liquid

Liquid type	: --Water
Additional liquid description	:
Solids diameter, max	: 0.00 in
Solids concentration, by volume	: 0.00 %
Temperature, max	: 68.00 deg F
Fluid density, rated / max	: 1.000 / 1.000 SG
Viscosity, rated	: 1.00 cP
Vapor pressure, rated	: 0.00 psi.a

Material

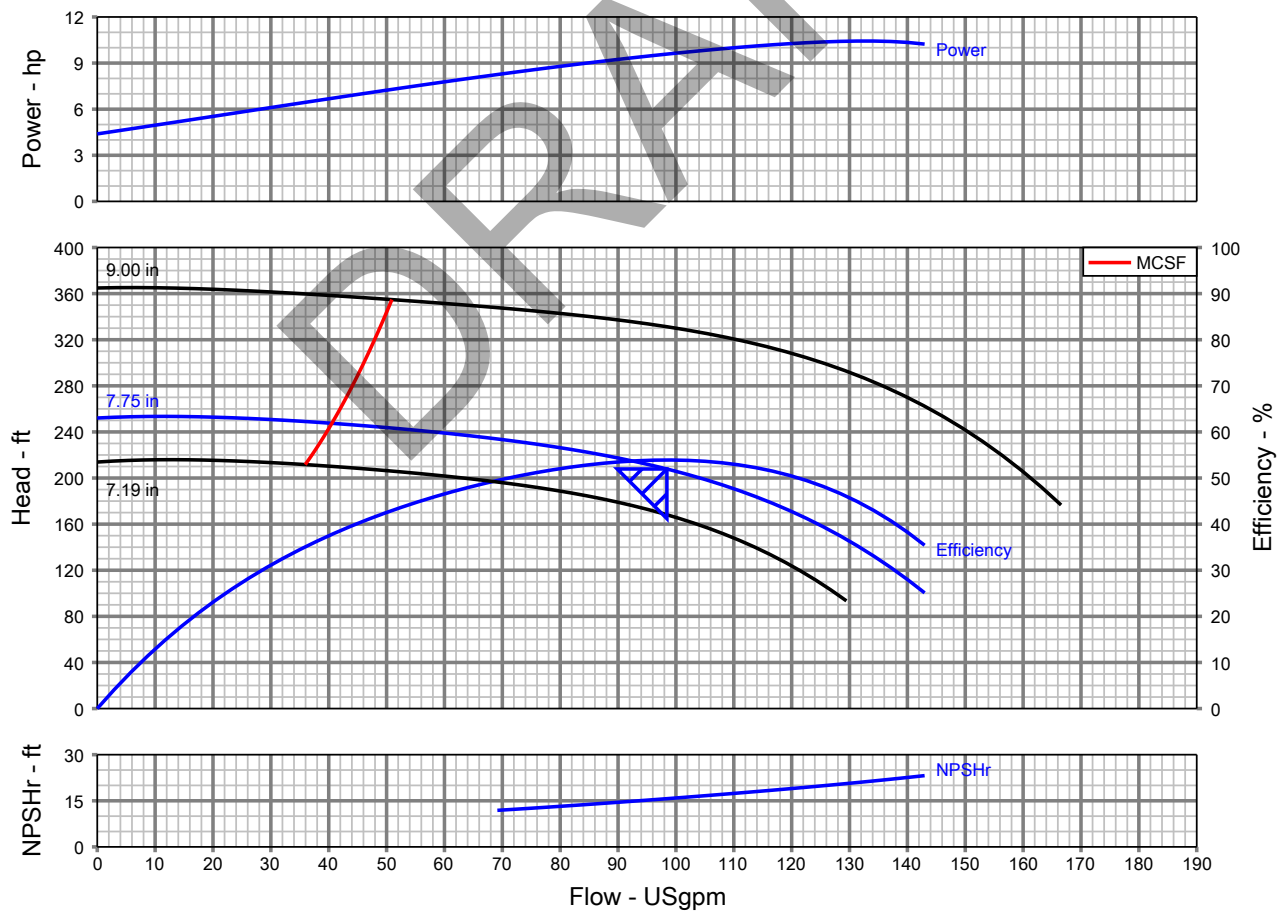
Material selected	: Not specified

Pressure Data

Maximum working pressure	: 109.7 psi.g
Maximum allowable working pressure	: 250.0 psi.g
Maximum allowable suction pressure	: N/A
Hydrostatic test pressure	: N/A

Driver & Power Data (@Max density)

Driver sizing specification	: Rated power
Margin over specification	: 0.00 %
Service factor	: 1.00
Power, hydraulic	: 5.17 hp
Power, rated	: 9.58 hp
Power, maximum, rated diameter	: 10.44 hp
Minimum recommended motor rating	: 10.00 hp / 7.46 kW



Pump Performance Datasheet

Customer	:	Quote number	:
Customer reference	:	Size	: 1-1/2 x 2 x 9L (B1-1/2ZPL)
Item number	: Default	Stages	: 1
Service	:	Based on curve number	: 5036
Quantity	: 1	Date last saved	: 20 Sep 2019 6:03 PM

Operating Conditions

Flow, rated	: 100.2 USgpm
Differential head / pressure, rated (requested)	: 215.8 ft
Differential head / pressure, rated (actual)	: 215.8 ft
Suction pressure, rated / max	: 0.00 / 0.00 psi.g
NPSH available, rated	: Ample
Frequency	: 60 Hz

Performance

Speed, rated	: 3550 rpm
Impeller diameter, rated	: 7.88 in
Impeller diameter, maximum	: 9.00 in
Impeller diameter, minimum	: 7.19 in
Efficiency	: 54.00 %
NPSH required / margin required	: 15.95 / 0.00 ft
Ns (imp. eye flow) / Nss (imp. eye flow)	: 546 / 4,226 US Units
MCSF	: 41.62 USgpm
Head, maximum, rated diameter	: 263.0 ft
Head rise to shutoff	: 21.25 %
Flow, best eff. point	: 100.2 USgpm
Flow ratio, rated / BEP	: 99.99 %
Diameter ratio (rated / max)	: 87.50 %
Head ratio (rated dia / max dia)	: 65.43 %
Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00
Selection status	: Acceptable

Liquid

Liquid type	: --Water
Additional liquid description	:
Solids diameter, max	: 0.00 in
Solids concentration, by volume	: 0.00 %
Temperature, max	: 68.00 deg F
Fluid density, rated / max	: 1.000 / 1.000 SG
Viscosity, rated	: 1.00 cP
Vapor pressure, rated	: 0.00 psi.a

Material

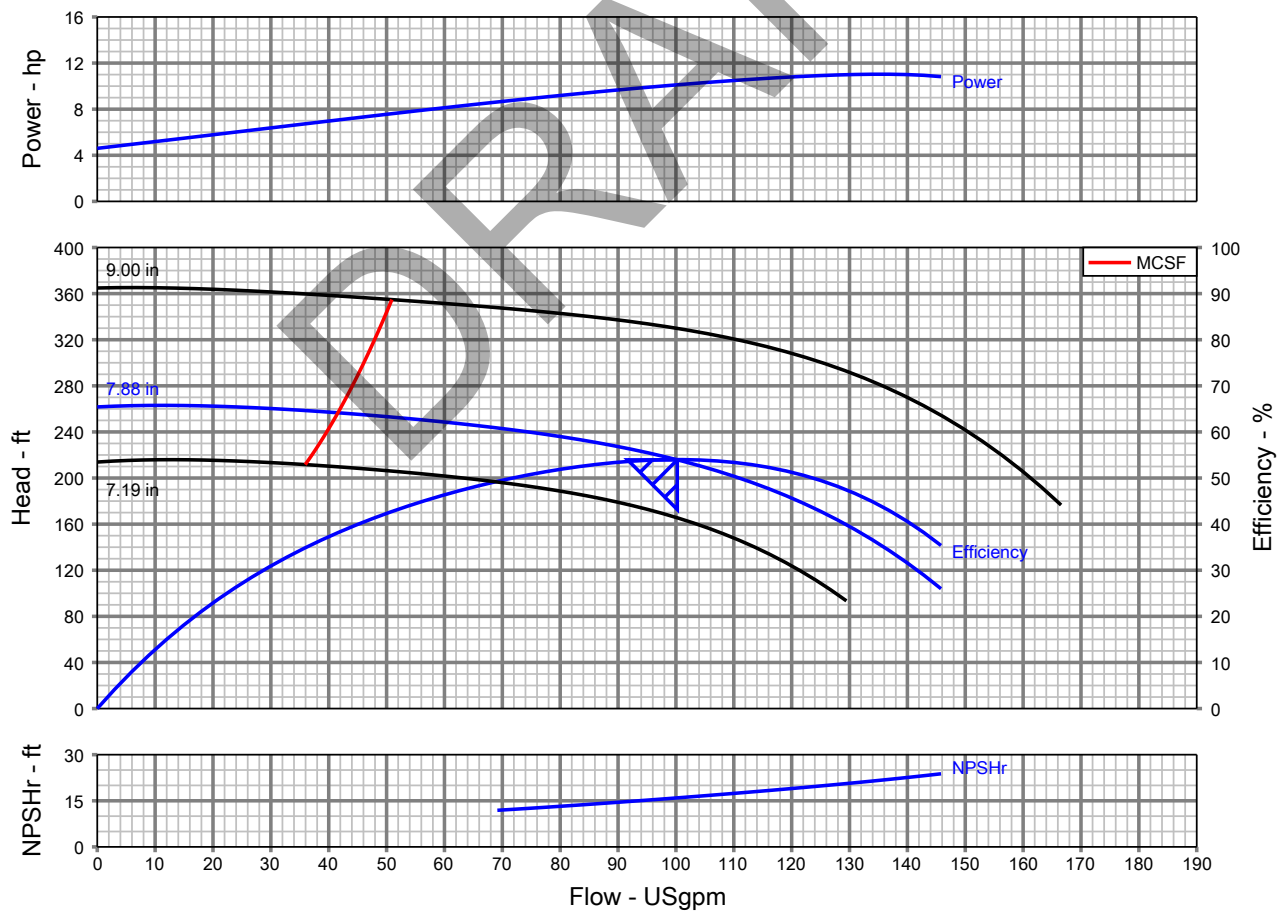
Material selected	: Not specified

Pressure Data

Maximum working pressure	: 113.9 psi.g
Maximum allowable working pressure	: 250.0 psi.g
Maximum allowable suction pressure	: N/A
Hydrostatic test pressure	: N/A

Driver & Power Data (@Max density)

Driver sizing specification	: Rated power
Margin over specification	: 0.00 %
Service factor	: 1.15 (used)
Power, hydraulic	: 5.46 hp
Power, rated	: 10.12 hp
Power, maximum, rated diameter	: 11.03 hp
Minimum recommended motor rating	: 10.00 hp / 7.46 kW



Pump Performance Datasheet

Customer	:	Project	: 687518
Customer ref. / PO	:	Model	: 25707 LC
Tag Number	: 001	Stages	: 1
Service	:	Based on curve number	: RC1960-SS Rev 0
Quantity	: 1	Date last saved	: 09/20/2019 6:40 PM

Operating Conditions

Flow, rated	: 431.3 USgpm
Differential head / pressure, rated (requested)	: 166.8 ft
Differential head / pressure, rated (actual)	: 166.8 ft
Suction pressure, rated / max	: 0.00 / 0.00 psi.g
NPSH available, rated	: Ample
Frequency	: 60 Hz

Performance

Speed, rated	: 3530 rpm
Impeller diameter, rated	: 6.80 in
Impeller diameter, maximum	: 7.10 in
Impeller diameter, minimum	: 4.90 in
Efficiency	: 83.89 %
NPSH required / margin required	: 27.04 / 0.00 ft
Ns (imp. eye flow) / Nss (imp. eye flow)	: 1,476 / 6,133 US Units
MCSF	: 162.5 USgpm
Head, maximum, rated diameter	: 194.7 ft
Head rise to shutoff	: 16.70 %
Flow, best eff. point	: 432.3 USgpm
Flow ratio, rated / BEP	: 99.76 %
Diameter ratio (rated / max)	: 95.77 %
Head ratio (rated dia / max dia)	: 88.17 %
Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00
Selection status	: Acceptable

Liquid

Liquid type	: Cold Water
Additional liquid description	:
Solids diameter, max	: 0.00 in
Solids concentration, by volume	: 0.00 %
Temperature, max	: 68.00 deg F
Fluid density, rated / max	: 1.000 / 1.000 SG
Viscosity, rated	: 1.00 cP
Vapor pressure, rated	: 0.34 psi.a

Material

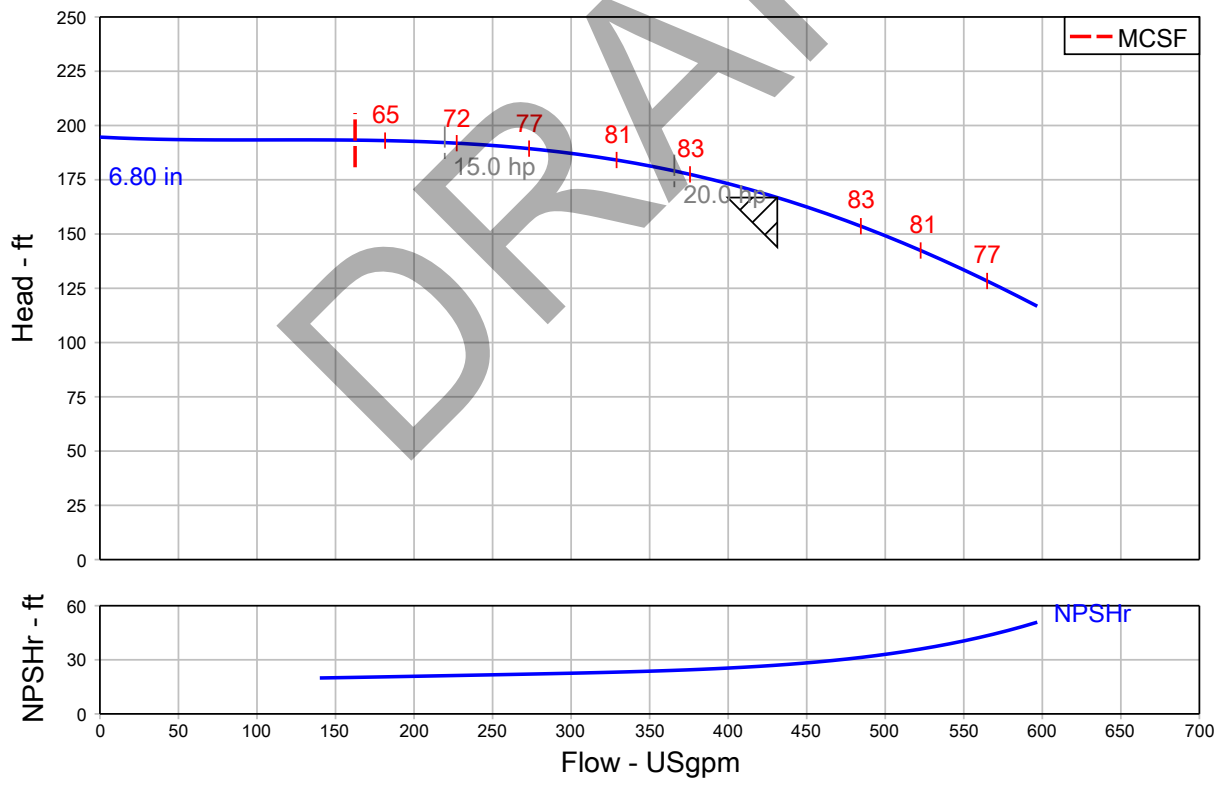
Material selected	: Cast iron

Pressure Data

Maximum working pressure	: 84.24 psi.g
Maximum allowable working pressure	: 175.0 psi.g
Maximum allowable suction pressure	: 175.0 psi.g
Hydrostatic test pressure	: 263.0 psi.g

Driver & Power Data (@Max density)

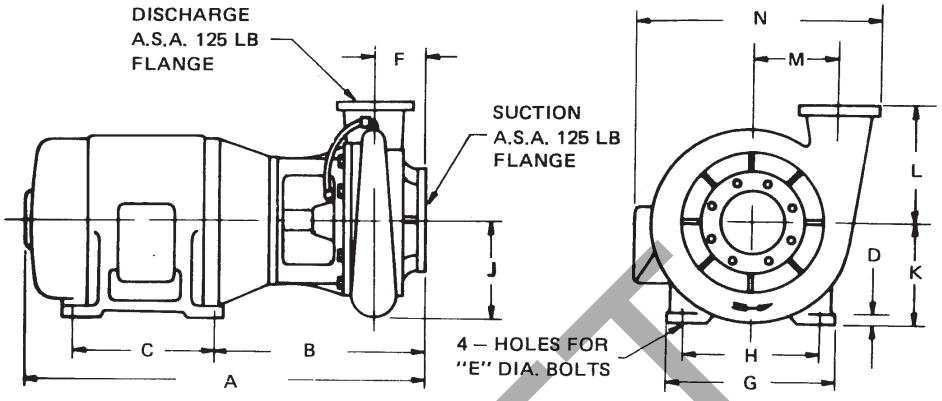
Motor sizing specification	: Max power (non-overloading)
Margin over specification	: 0.00 %
Service factor	: 1.00
Power, hydraulic	: 18.16 hp
Rated power (based on duty point)	: 21.65 hp
Max power (non-overloading)	: 24.29 hp
Nameplate motor rating	: 25.00 hp / 18.64 kW



Griswold Industrial Pumps

CENTRIFUGALS Dimensions

G Series



NOTES: 1. Dim. 'N' is overall width including pump and motor. 2. Dim. 'A', 'G', and 'N' may vary depending on make of motor.

PUMP MODEL	MOT HP	PHASE	MOTOR FRAME	DISCH	SUCT	DIMENSIONS IN INCHES												
						A	B	C	D	E	F	G	H	J	K	L	M	N
R2GH-5-S	5	1	184JM	2	3	21 1/8	9 7/8	4 1/2	3/8	3/8	3 5/8	9	7 1/2	6	4 1/2	6 1/8	4 3/4	14 11/16
R2GH-75-S	7 1/2	1	213JM	2	3	23	10 3/8	5 1/2	5/8	3/8	3 5/8	10 1/2	8 1/2	6	5 1/4	6 1/8	4 3/4	16
R2GH-5-T	5	3	182JM	2	3	21 1/8	9 7/8	4 1/2	3/8	3/8	3 5/8	9	7 1/2	6	4 1/2	6 1/8	4 3/4	14 11/16
R2GH-75-T	7 1/2	3	184JM	2	3	21 1/8	9 7/8	4 1/2	3/8	3/8	3 5/8	9	7 1/2	6	4 1/2	6 1/8	4 3/4	14 11/16
R2GH-10-T	10	3	213JM	2	3	23	10 3/8	5 1/2	5/8	3/8	3 5/8	10 1/2	8 1/2	6	5 1/4	6 1/8	4 3/4	16
R2GH-15-T	15	3	215JM	2	3	24 1/2	10 3/8	7	5/8	3/8	3 5/8	10 1/2	8 1/2	6	5 1/4	6 1/8	4 3/4	16
R2GH-20-T	20	3	254JM	2	3	28 1/2	12	8 1/4	5/8	1/2	3 5/8	12 3/8	10	6	6 1/4	6 1/8	4 3/4	17 11/16
R4GH-30-T	30	3	284JP	4	5	34 5/16	13 13/16	9 1/2	3/4	1/2	4 1/8	13 7/8	11	8 1/8	7	7 3/4	6 7/16	21 3/4
R4GH-40-T	40	3	286JP	4	5	35 13/16	13 13/16	11	3/4	1/2	4 1/8	13 7/8	11	8 1/8	7	7 3/4	6 7/16	21 3/4
R4GH-50-T	50	3	324JP	4	5	32 7/8	14 13/16	10 1/2	13/16	5/8	4 1/8	15 7/8	12 1/2	8 1/8	8	7 3/4	6 7/16	24 1/2
R4GH-60-T	60	3	326JP	4	5	34 3/8	14 13/16	12	13/16	5/8	4 1/8	15 7/8	12 1/2	8 1/8	8	7 3/4	6 7/16	24 1/2
R4GH-75-T	75	3	364JP	4	5	36	15 7/16	11 1/4	1	5/8	4 1/8	17 3/4	14	8 1/8	9	7 3/4	6 7/16	26 9/16
R3GL-5-S	5	1	184JM	3	4	21 1/16	9 13/16	4 1/2	3/8	3/8	3 3/8	9	7 1/2	7 3/8	4 1/2	8 1/2	5 13/16	16 1/2
R3GL-75-S	7 1/2	1	213JM	3	4	22 15/16	10 5/16	5 1/2	5/8	3/8	3 3/8	10 1/2	8 1/2	7 3/8	5 1/4	8 1/2	5 13/16	17 13/16
R3GL-5-T	5	3	182JM	3	4	21 1/16	9 13/16	4 1/2	3/8	3/8	3 3/8	9	7 1/2	7 3/8	4 1/2	8 1/2	5 13/16	16 1/2
R3GL-75-T	7 1/2	3	184JM	3	4	21 1/16	9 13/16	4 1/2	3/8	3/8	3 3/8	9	7 1/2	7 3/8	4 1/2	8 1/2	5 13/16	16 1/2
R3GL-10-T	10	3	213JM	3	4	22 15/16	10 5/16	5 1/2	5/8	3/8	3 3/8	10 1/2	8 1/2	7 3/8	5 1/4	8 1/2	5 13/16	17 13/16
R2GM-5-S	5	1	184JM	2	3	20 3/4	9 1/2	4 1/2	3/8	3/8	3 3/8	9	7 1/2	5 7/8	4 1/2	6 1/16	4 13/16	14 3/4
R2GM-75-S	7 1/2	1	213JM	2	3	22 5/8	10	5 1/2	5/8	3/8	3 3/8	10 1/2	8 1/2	5 7/8	5 1/4	6 1/16	4 13/16	16
R2GM-5-T	5	3	182JM	2	3	20 3/4	9 1/2	4 1/2	3/8	3/8	3 3/8	9	7 1/2	5 7/8	4 1/2	6 1/16	4 13/16	14 3/4
R2GM-75-T	7 1/2	3	184JM	2	3	20 3/4	9 1/2	4 1/2	3/8	3/8	3 3/8	9	7 1/2	5 7/8	4 1/2	6 1/16	4 13/16	14 3/4
R2GM-10-T	10	3	213JM	2	3	22 5/8	10	5 1/2	5/8	3/8	3 3/8	10 1/2	8 1/2	5 7/8	5 1/4	6 1/16	4 13/16	16

Griswold Industrial Pumps

CENTRIFUGALS Performance

G Series

SINGLE-STAGE CENTRIFUGAL PUMPS
FLANGED CONNECTIONS • 3500 RPM

Basic Pump Model	Motor HP	Disc. Size	Suct. Size	CAPACITIES IN U.S. GALLONS PER MINUTE TOTAL HEAD IN FEET 40	50	60	70	80	90	100	120	140	160	180	200	220	240	260	Shut-Off Head Feet
R2GM5	5	2	3				190	185	175	160	125	55							145
R2GM75	7½	2	3								195	175	140	90					195
R2GM10	10	2	3									205	195	170	140	95			240
R2GH5	5	2	3	235	225	215	200	180	160	135									118
R2GH75	7½	2	3		280	270	260	250	235	220	185	130							152
R2GH10	10	2	3			310	300	290	280	270	240	205	160	50					180
R2GH15	15	2	3								310	285	265	235	190	120			232
R2GH20	20	2	3									325	300	280	255	220	175	105	271
R3GL3	5	3	4		275	255	235	210	185	150									122
R3GL75	7½	3	4				300	280	265	245	195	140							163
R3GL10	10	3	4							300	265	225	180						196

Basic Pump Model	Motor HP	Disc. Size	Suct. Size	TOTAL HEAD IN FEET 50	60	80	100	120	140	160	180	200	220	240	260	280	300	320	Shut-Off Head Feet
R3GM10	10	3	4	430	410	365	315	180											122
R3GM15	15	3	4			485	450	400	340	250									170
R3GM20	20	3	4					480	435	380	300								200
R3GM25	25	3	4							490	445	380	300						240
R3GM30	30	3	4									475	410	330	200				266
R3GM40	40	3	4												480	420	325		320
R4GM15	15	4	5	640	615	550	480	400	280										153
R4GM20	20	4	5		705	665	605	550	470	360	210								188
R4GM25	25	4	5			710	690	630	570	490	400	280							210
R4GM30	30	4	5					705	655	590	510	430	310						237
R4GM40	40	4	5							710	685	630	550	470	360				280
R4GM50	50	4	5										715	680	600	520	410	150	325
R4GH30	30	4	5		935	890	825	740	620	390									164
R4GH40	40	4	5				960	920	860	770	630	400							196
R4GH50	50	4	5						970	940	880	780	650	400					238
R4GH60	60	4	5								970	950	890	790	600				267
R4GH75	75	4	5										975	960	920	830	680	460	324

CONSULT PERFORMANCE CURVES FOR MAXIMUM SUCTION LIFTS DETERMINED BY NPSH CHARACTERISTICS.

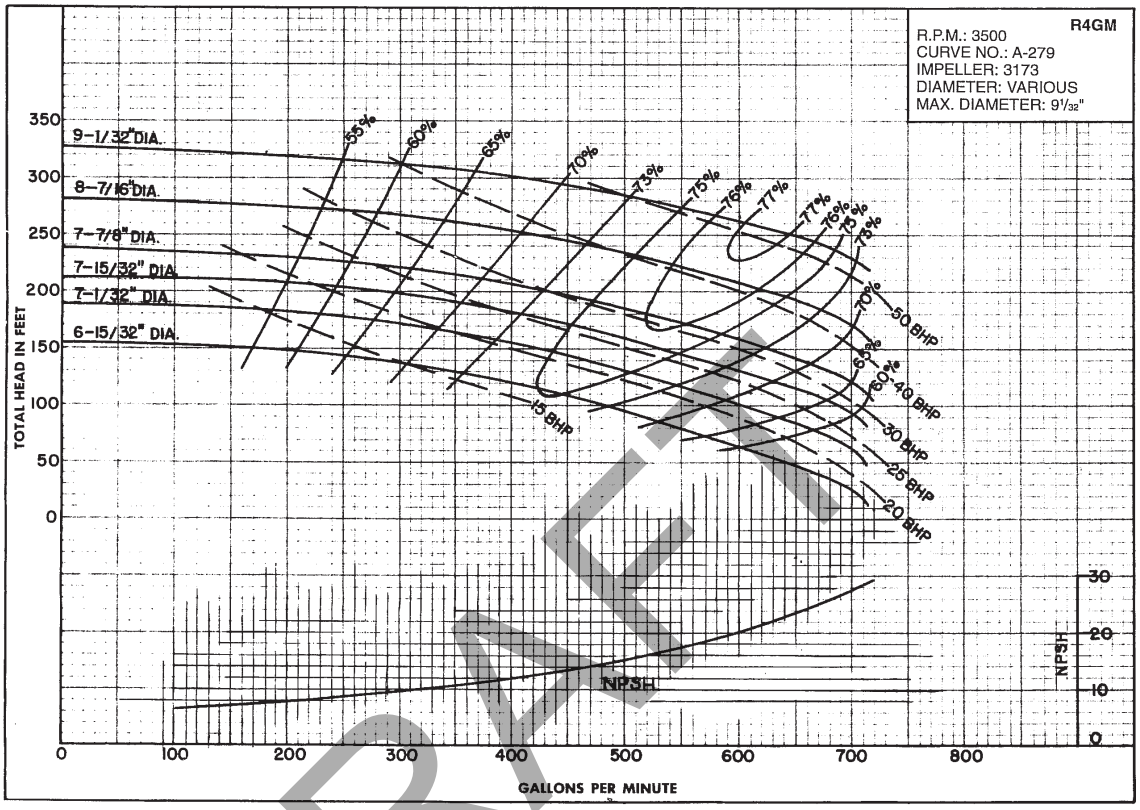
If the operating head remains constant, check performance curves for the possibility of using a smaller motor.

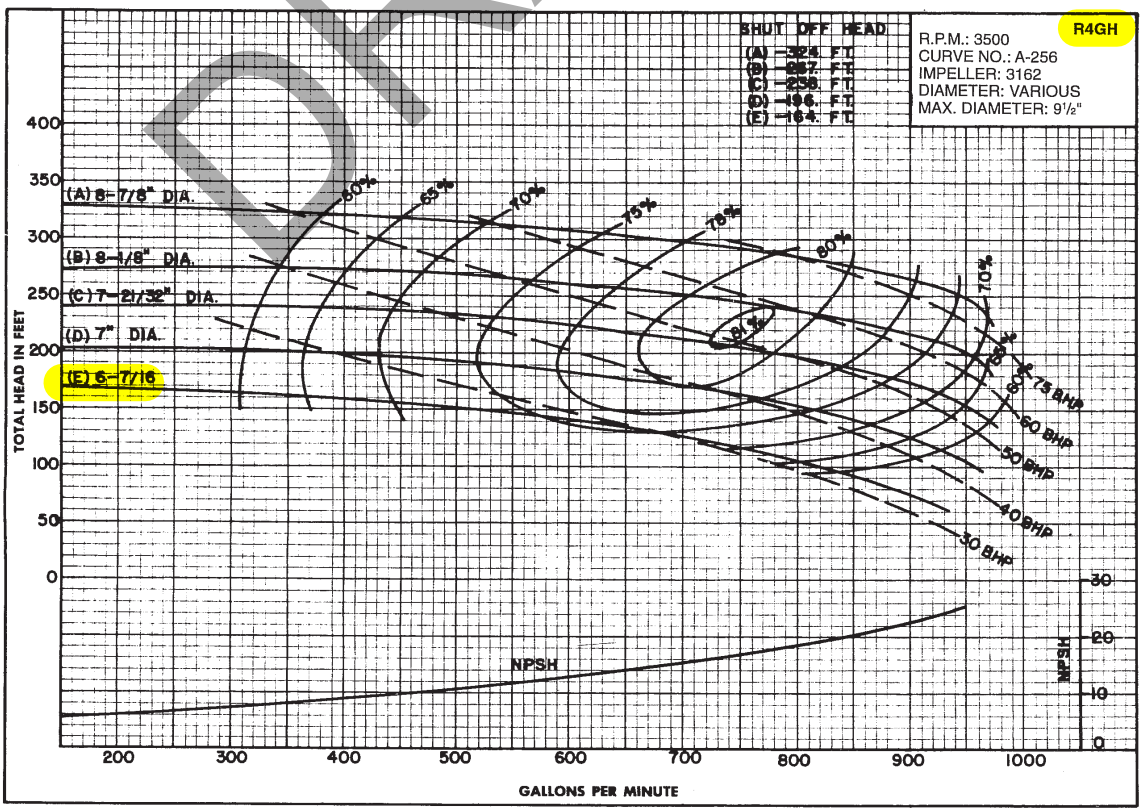
While the capacities quoted are based on tests of typical pumps, and are given in good faith, they do NOT represent GUARANTEED PERFORMANCES. Please refer to factory if Certified Performance Curve is required.

Griswold Industrial Pumps

CENTRIFUGALS Performance Curve

R4GM and R4GH





APPENDIX D:

Water Rights

State of Idaho
Department of Water Resources

Water Right License

WATER RIGHT NO. 95-09457

Priority: November 14, 1996 Maximum Diversion Rate: 0.33 CFS

It is hereby certified that REMINGTON RECREATIONAL WATER DIST
PO BOX 2788
HAYDEN LAKE ID 83835 has complied with the terms and conditions of the permit, issued pursuant to Application for Permit dated December 12, 1996 and has submitted Proof of Beneficial Use on January 28,2002. An examination indicates that the works have a diversion capacity of 2.25 cfs of water from:

SOURCE
GROUND WATER

and a water right has been established as follows:

BENEFICIAL USE	PERIOD OF USE	DIVERSION RATE
MUNICIPAL	01/01 to 12/31	0.33 CFS

LOCATION OF POINT(S) OF DIVERSION:

GROUND WATER	L3 (SW1/4NW1/4SW1/4) Sec. 18, Twp 53N, Rge 03W, B.M.	KOOTENAI County
GROUND WATER	L2 (SW1/4SW1/4NW1/4) Sec. 18, Twp 53N, Rge 03W, B.M.	KOOTENAI County

CONDITIONS OF APPROVAL

1. Place of use is within the service area of Remington Recreational Water District as provided for under Idaho law. The place of use is generally located within Sections 17, 18, 19, and 20 of Township 53 N, Range 03W and Sections 13 and 24 of Township 53 N, Range 04W.
2. A map depicting the place of use boundary for this water right at the time of this approval is attached to this document for illustration purposes.
3. The issuance of this right does not grant any right-of-way or easement across the land of another.
4. This right authorizes the diversion of ground water within the Rathdrum Prairie Ground Water Management Area (RPGWMA). Use of water under this right shall be subject to the provisions of the management plan approved by the director for the RPGWMA.
5. After specific notification by the department, the right holder shall install a suitable measuring device or shall enter into an agreement with the department to determine the amount of water diverted from power records and shall annually report the information to the department.
6. The following rights are diverted through point(s) of diversion described above: 95-9457 and 95-9458.

This license is issued pursuant to the provisions of Section 42-219, Idaho Code. The water right confirmed by this license is subject to all prior water rights and shall be used in accordance with Idaho law and applicable rules of the Department of Water Resources.

Signed and sealed this 20th day of February, 2008.

for DAVID R. TUTHILL, JR.
Director

State of Idaho
Department of Water Resources

Water Right License

WATER RIGHT NO. 95-09457

State of Idaho
Department of Water Resources

Water Right License

WATER RIGHT NO. 95-09458

Priority: December 12, 1996 Maximum Diversion Rate: 1.92 CFS

It is hereby certified that REMINGTON RECREATIONAL WATER DIST
PO BOX 2788
HAYDEN LAKE ID 83835 has complied with the terms and conditions of the permit, issued pursuant to Application for Permit dated December 12, 1996 and has submitted Proof of Beneficial Use on January 28, 2002. An examination indicates that the works have a diversion capacity of 2.25 cfs of water from:

SOURCE
GROUND WATER

and a water right has been established as follows:

BENEFICIAL USE	PERIOD OF USE	DIVERSION RATE
MUNICIPAL	01/01 to 12/31	1.92 CFS

LOCATION OF POINT(S) OF DIVERSION:

GROUND WATER	L2 (SW1/4SW1/4NW1/4) Sec. 18, Twp 53N, Rge 03W, B.M.	KOOTENAI County
GROUND WATER	L3 (SW1/4NW1/4SW1/4) Sec. 18, Twp 53N, Rge 03W, B.M.	KOOTENAI County

CONDITIONS OF APPROVAL

1. Place of use is within the service area of Remington Recreational Water District as provided for under Idaho law. The place of use is generally located within Sections 17, 18, 19, and 20, of Township 53N, Range 03W and Sections 13 and 24 of Township 53N, Range 04W.

2. A map depicting the place of use boundary for this water right at the time of this approval is attached to this document for illustration purposes.

3. This right authorizes the diversion of ground water within the Rathdrum Prairie Ground Water Management Area (RPGWMA). Use of water under this right shall be subject to the provisions of the management plan approved by the director for the RPGWMA.

4. After specific notification by the department, the right holder shall install a suitable measuring device or shall enter into an agreement with the department to determine the amount of water diverted from power records and shall annually report the information to the department.

5. The following rights are diverted through point(s) of diversion described above: 95-9457 and 95-9458.

This license is issued pursuant to the provisions of Section 42-219, Idaho Code. The water right confirmed by this license is subject to all prior water rights and shall be used in accordance with Idaho law and applicable rules of the Department of Water Resources.

Signed and sealed this 6th day of March, 2008.

Gary Spackman

for DAVID R. TUTHILL, JR.
Director

State of Idaho
Department of Water Resources

Water Right License

WATER RIGHT NO. 95-09458

4000 0 4000 8000 Feet

N

Remington Recreational Water District

Sections

State of Idaho
Department of Water Resources

Permit to Appropriate Water

NO. 95-09427

Priority: October 18, 2007 Maximum Diversion Rate: 5.90 CFS

This is to certify, that REMINGTON WATER DISTRICT
PO BOX 468
ATHOL ID 83801

has applied for a permit to appropriate water from:
Source: GROUND WATER
and a permit is APPROVED for development of water as follows:

BENEFICIAL USE	PERIOD OF USE	RATE OF DIVERSION
MUNICIPAL	01/01 to 12/31	5.90 CFS

LOCATION OF POINT(S) OF DIVERSION:
GROUND WATER L2 (SW¼NW¼) Sec. 18, Twp 53N, Rge 03W, B.M. KOOTENAI County
GROUND WATER SE¼NE¼ Sec. 13, Twp 53N, Rge 04W, B.M. KOOTENAI County
GROUND WATER L3 (NW¼SW¼) Sec. 18, Twp 53N, Rge 03W, B.M. KOOTENAI County

CONDITIONS OF APPROVAL

1. Proof of application of water to beneficial use shall be submitted on or before **June 01, 2013.**
2. Subject to all prior water rights.
3. Project construction shall commence within one year from the date of permit issuance and shall proceed diligently to completion unless it can be shown to the satisfaction of the Director of the Department of Water Resources that delays were due to circumstances over which the permit holder had no control.
4. Right holder shall comply with the drilling permit requirements of Section 42-235, Idaho Code and applicable Well Construction Rules of the Department.
5. Prior to or in connection with the proof of beneficial use statement to be submitted for municipal water use under this right, the right holder shall provide the department with documentation showing that the water supply system is being regulated by the Idaho Department of Environmental Quality as a public water supply and that it has been issued a public water supply number.
6. A map depicting the place of use boundary for this water right at the time of this approval is attached to this document for illustration purposes.
7. This right does not grant any right-of-way or easement across the land of another.
8. This right authorizes the diversion of ground water within the Rathdrum Prairie Ground Water Management Area (RPGWMA). Use of water under this right shall be subject to the provisions of the management plan approved by the director for the RPGWMA.
9. When notified by the Department, the right holder shall record the quantity of water diverted and annually report diversions of water and/or other pertinent hydrologic and system information as required by Section 42-701, Idaho Code, and/or the management plan for the Rathdrum Prairie Ground Water Management Area.
10. When notified by the Department, the right holder shall install and maintain a measuring device of a type acceptable to the Department as part of the diverting works.
11. Place of use is within the service area of Remington Water District as provided for under Idaho law.

This permit is issued pursuant to the provisions of Section 42-204, Idaho Code. Witness the signature of the Director, affixed at Coeur d'Alene, this 6th day of June, 2008.

DAVID R. TUTHILL, JR., Director

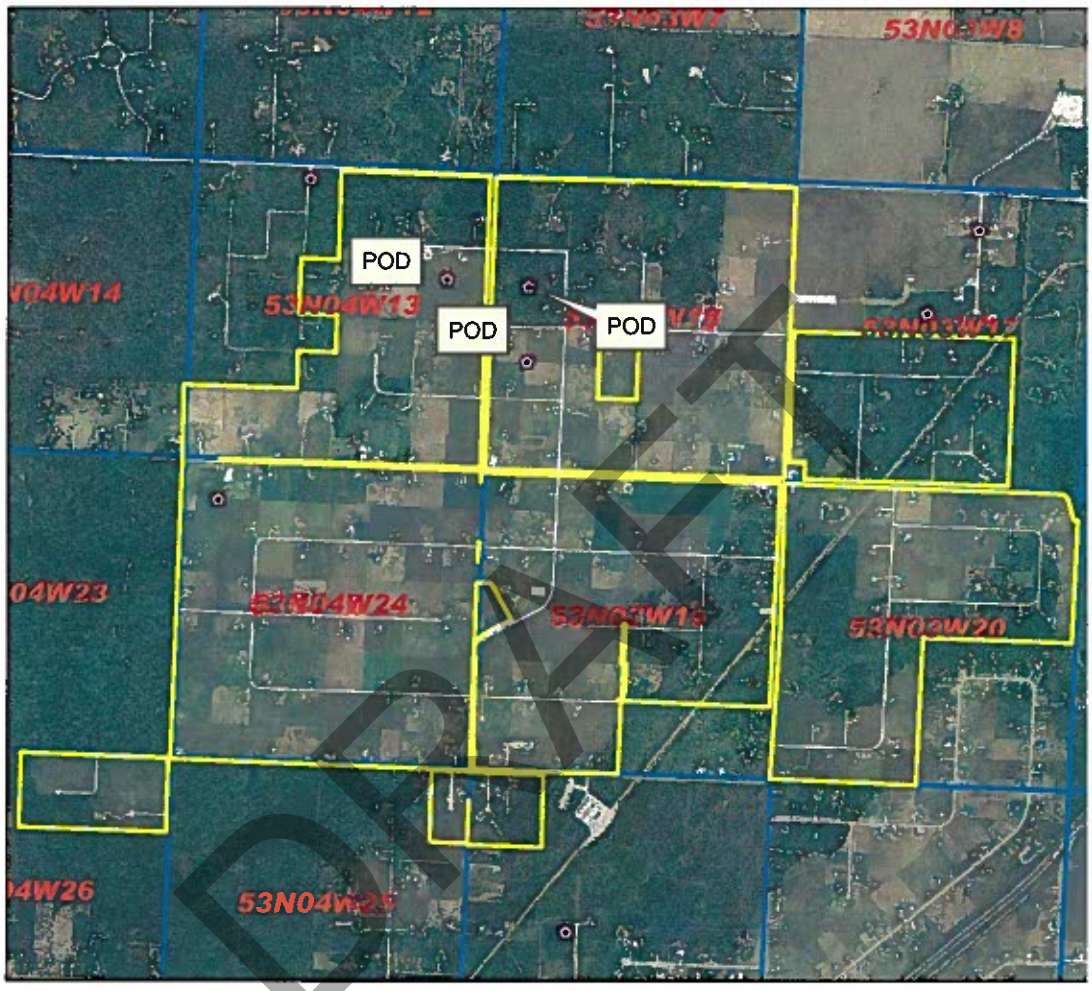
State of Idaho
Department of Water Resources

Permit to Appropriate Water

NO. 95-09427

Digital Boundary for Remington Water District

June 06, 2008



Sections
Permit POD

0 1,800 3,600 7,200 Feet

N
W E
S

State of Idaho
DEPARTMENT OF WATER RESOURCES
322 East Front Street • P.O. Box 83720 • Boise, Idaho 83720-0098
Phone: (208) 287-4800 • Fax: (208) 287-6700 • Website: www.idwr.idaho.gov

C.L. "BUTCH" OTTER
Governor

GARY SPACKMAN
Director

July 23, 2013

REMINGTON WATER DISTRICT
PO BOX 468
ATHOL ID 83801

RE: Permit No. 95-9427

Dear Permit Holder(s):

Enclosed is a copy of the approved request for extension of time submitted in connection with the above referenced permit which extends the proof due date to **June 01, 2023**.

Please note that the department granted this extension based on evidence of good cause. It is important that you work diligently toward the completion of this project during the construction period allowed because the department **will not** grant an additional extension based on good cause, according to Section 42-204(6), Idaho Code.

Section 42-248, Idaho Code, requires you or the owner of these water rights to maintain current ownership and address records on file with the department. Please contact any office of the department for the proper form to file a change of ownership of a water right and/or a change in the address of the owner. Also forms are contained on the Department website: www.idwr.idaho.gov.

Please feel free to contact the department if you have questions.

Sincerely,

Darla Block
Technical Records Specialist

Enclosure(s)

FORM 2021/15

RECEIVED
FEB 19 2015
IDWR / NORTH

80545

Ident. No. 95-17118

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

APPLICATION FOR PERMIT

To appropriate the public waters of the State of Idaho

1. Name of applicant(s) Remington Water District Phone 208 683-5054
   Name connector (check one): ☐ and ☐ or ☐ and/or
   Mailing address Box 468 City Athol
   State ID Zip 83801 Email bob@integritywater.net
2. Source of water supply Ground Water which is a tributary of _____
3. Location of point(s) of diversion:

TWP	RGE	SEC	Govt Lot	¼	¼	¼	County	Source	Local name or tag #
								See Attached	

4. Water will be used for the following purposes:
   Amount 32.0cfs (cfs or acre-feet per year) for Municpal purposes from 1-1 to 12-31 (both dates inclusive)
   Amount _____ (cfs or acre-feet per year) for _____ purposes from _____ to _____ (both dates inclusive)
   Amount _____ (cfs or acre-feet per year) for _____ purposes from _____ to _____ (both dates inclusive)
   Amount _____ (cfs or acre-feet per year) for _____ purposes from _____ to _____ (both dates inclusive)
5. Total quantity to be appropriated is (a) 32.0 cubic feet per second (cfs) and/or (b) _____ acre feet per year (af).
6. Proposed diverting works:
   a. Describe type and size of devices used to divert water from the source. Wells & Pumps of Various Sizes
   b. Height of storage dam _____ feet; active reservoir capacity _____ acre-feet; total reservoir capacity _____ acre-feet. If the reservoir will be filled more than once each year, describe the refill plan in item 11. For dams 10 feet or more in height OR reservoirs with a total storage capacity of 50 acre-feet or more, submit a separate Application for Construction or Enlargement of a New or Existing Dam. Application required? ☐ Yes ☐ No
   c. Proposed well diameter is 18-24 inches; proposed depth of well is _____ feet.
   d. Is ground water with a temperature of greater than 85°F being sought? ☐ Yes ☐ No
   e. If well is already drilled, when? _____; drilling firm _____; well was drilled for (well owner) _____; Drilling Permit No. _____.
7. Description of proposed uses (if irrigation only, go to item 8):
   a. Hydropower; show total feet of head and proposed capacity in kW. _____
   b. Stockwatering; list number and kind of livestock. _____
   c. Municipal; complete and attach the Municipal Water Right Application Checklist.
   d. Domestic; show number of households _____
   e. Other; describe fully. _____

8. Description of place of use:

   a. If water is for irrigation, indicate acreage in each subdivision in the tabulation below.

   b. If water is used for other purposes, place a symbol of the use (example: D for Domestic) in the corresponding place of use below. See instructions for standard symbols.

TWP	RGE	SEC	NE				NW				SW				SE				TOTALS
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	

Total number of acres to be irrigated: _____

9. Describe any other water rights used for the same purposes as described above. Include water delivered by a municipality, canal company, or irrigation district. If this application is for domestic purposes, do you intend to use this water, water from another source, or both, to irrigate your lawn, garden, and/or landscaping?

10. a. Who owns the property at the point of diversion? Various

    b. Who owns the land to be irrigated or place of use? Patrons of the Remington Water District

    c. If the property is owned by a person other than the applicant, describe the arrangement enabling the applicant to make this filing:

11. Describe your proposal in narrative form, and provide additional explanation for any of the items above. Attach additional pages if necessary.
    See Attached.

12. Time required for completion of works and application of water to proposed beneficial use is 5 years (minimum 1 year).

13. **MAP OF PROPOSED PROJECT REQUIRED** - Attach an 8½" x 11" map clearly identifying the proposed point of diversion, place of use, section #, township & range. A photocopy of a USGS 7.5 minute topographic quadrangle map is preferred.

The information contained in this application is true to the best of my knowledge. I understand that any willful misrepresentations made in this application may result in rejection of the application or cancellation of an approval.

Signature of Applicant

Shawn Mosqueda, Chairman
Print Name (and title, if applicable)

Signature of Applicant

Print Name (and title, if applicable)

For Department Use:

Received by _____ Date 2/19/15 Time _____ Preliminary check by _____

Fee $ 1250.00 Receipted by _____ Receipt No. N031069 Date 2/19/15

3. Location of Points of Diversion for Remington Water District RAFN Application

TWP	RGE	SEC	G. L.	1/4	1/4	1/4/	
53N	3W	18	2	SW	SW	NW	
53N	3W	18	3	SW	NW	SW	
53N	4W	13			SE	NE	
53N	4W	9			NE	SW	3 Points
52N	4W	10			SE	NW	3 Points
53N	4W	21			SE	SE	3 Points

Future

Water Right No. or App. ID_____

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

MUNICIPAL WATER RIGHT APPLICATION CHECKLIST

FOR AN APPLICATION TO APPROPRIATE WATER FOR MUNICIPAL PURPOSES

An application to appropriate water for municipal purposes must be prepared in accordance with the requirements listed below to be acceptable for processing by the Department. There are two types of permits for municipal water use. The first type of municipal permit provides water for reasonably anticipated future needs (**RAFN**) over a defined planning horizon.[1] The second type of municipal permit, called non-RAFN, provides water solely for use to meet needs that will arise in the near-term (five years).[2] A **non-RAFN** permit may have an annual volume limitation associated with it. Each type of municipal water use has a distinct set of review requirements.

Applicant Name: Remington Recreational Water & District

1. Type of Municipal Provider. Applicant must qualify as a Municipal Provider to obtain a municipal water right. See Idaho Code § 42-202B (5). Check one:

   ☐ Type 1 – Municipality
   ☑ Type 2 – Franchise or political subdivision supplying water to a municipality
   ☑ Type 3 – Corporation or association regulated as a "public water supply" system by IDEQ

   ☐ Attach documentation of qualification as a Municipal Provider. See Idaho Code § 42-202(2).

2. List existing Water Rights (permits, licenses, decrees, and beneficial use claims) available to the applicant for municipal needs. These rights may or may not have a purpose of use expressly defined as "municipal". Include a separate attachment as needed.

Right Number	Nature of Use	Diversion Rate (cfs)	Annual Vol. (acre-feet)	Service Area
95-9457	Municipal	0.33		Remington Water Dist.
95-9458	Municipal	1.92		Remington Water Dist.
95-9427	Municipal	5.9		Remington Water Dist.

3. List the total diversion rate from Item 2. Be sure to account for any combined diversion rate limits in the approval conditions of each right listed. 8.15 CFS (total from 2)

4. List the total volume from Item 2. Be sure to account for any combined volume limits in the approval conditions of each right listed _____ AF (total from 2)

[1] For a thorough discussion of RAFN water rights, see IDWR's *Recommendations for the Processing of Reasonably Anticipated Future Needs (RAFN) Municipal Water Rights at the Time of Application, Licensing, and Transfer.*
[2] For a thorough discussion of non-RAFN water rights, see IDWR's Application Processing Memorandum No. 18.

5. Planning Horizon. See Idaho Code § 42-202B (7). Check one:

   ☑ RAFN. Specify planning horizon: 30 years. Go to Item 6.
   ☐ Non-RAFN (≤5 years). Go to Item 7.

6. If application is for RAFN:

   ☑ Attach justification for planning horizon. See Idaho Code § 42-202(2) and § 42-202B(7).
   ☑ Attach description of service area. See Idaho Code § 42-202(2) and § 42-202B(9).
   ☑ Attach population projection within the service area over the planning horizon. See Idaho Code § 42-202(2) and § 42-202B(8).
   ☑ Attach evaluation for demand within the service area over the planning horizon. See Idaho Code § 42-202(2) and § 42-202B(8).

   Does demand exceed the totals listed in Items 3 and 4?

Y	N	
☑	☐	Rate?
☐	☐	Volume?

   If the answer is "No" to both rate and volume and a new point of diversion is needed, file a transfer application pursuant to Idaho Code § 42-222(1).

7. If application is for non-RAFN:

   When submitting proof of beneficial use, non-RAFN permit holders will be required to show that water was diverted for an additional increment of beneficial use over existing water rights during the authorized development period, which may be up to five years from the date of approval. Do existing demand and short term needs exceed the combined authorizations from the existing water rights listed in Items 3 and 4?

Y	N	
☐	☐	Rate?
☐	☐	Volume?

   If the answer is "No" to both rate and volume and a new point of diversion is needed, file a transfer application pursuant to Idaho Code § 42-222(1).

STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

2110 Ironwood Parkway, Coeur d'Alene, ID 83814 (208) 769-1422

C. L. "Butch" Otter, Governor
Curt A. Fransen, Director

February 6, 2015

Bob Kuchenski
Remington Recreational
Water District
PO Box 468
Athol, ID 83801
bob@integritywater.net

Subject: Remington Recreational Water District, Regulated PWS Status

Dear Mr. Kuchenski:

The purpose of this letter is to confirm the Remington Recreational Water District, Public Drinking Water System number ID1280270 is classified as a regulated community public drinking water system in accordance with the Idaho Rules for Public Drinking Water Systems.

Please contact me at 208-666-4624 with any questions or concerns.

Sincerely,

Suzanne Scheidt
Analyst
Suzanne.scheidt@deq.idaho.gov

File in TRIM: ID1280270 Remington (2015ACA443)

February 18, 2015

The Remington Recreational Water and Sewer District Board of Directors confirms its commitment to provide municipal service to the area identified as " Remington Recreational Water and Sewer District Current and Future Service Areas" on page 9 of the Rathdrum Prairie Aquifer Future Water Demand Report of the Idaho Water Resources Research Institute dated 12/15/14.

Shawn Mosqueda, Chairman

Charles Richmond, Vice Chairman

Narrative for Remington Water District RAFN Water Right Application

Service Area: The service area for the Remington Water District is defined by the area associated for the district in Figure 2, Municipal Provider Service Areas, of the "Rathdrum Prairie Aquifer Future Water Demand Study", published in December 2014 by the Idaho Water Resources Research Institute (IWRRI). This figure is attached to this application. Agreement on the service area boundaries for the various municipal providers was memorialized in Memorandum of Understanding (MOU) signed by representatives of the providers between November 24, 2014 and December 11, 2014. A copy of that MOU is attached to this application. An electronic GIS shape file on a CD for this service area is also accompanies this application.

Planning Horizon: The "Rathdrum Prairie Aquifer Future Water Demand Study" is unique in that it provides projected needs for all of the municipal providers overlying the Rathdrum Prairie Aquifer in Idaho that are interested in identifying what their respective needs would be. After consultation with IDWR, the providers decided on a 30 year planning horizon, ending on December 31, 2045.

Except as noted, information to support the numbers used in this RAFN Application come from "Rathdrum Prairie Aquifer Future Water Demand Study". Portions pertinent to this application are excerpted here.

CURRENT WATER DEMAND

Water demand on the RPA includes diversion for municipal and self-supplied domestic, commercial, industrial, and agricultural uses. Total current demand for RPA water was estimated as part of the development of the 2010 Rathdrum Prairie Comprehensive Aquifer Management Plan (RPCAMP) as Idaho does not require reporting of annual diversion rates or volumes. RPCAMP includes updating of the total demand estimate as one of the plans continuing action items. The author of the original RPCAMP estimate, SPF Water Engineering, was contracted under this study to update the total current demand estimate. The total accounting aspects of the SPF study set the context for the municipal demand assessment used in the later sections of this report.

Table 1. Total RPA Water Use

Estimated Total Rathdrum Prairie Water Use			
Sector	Non-Irrigation Use (AFA)	Irrigation Use (AFA)	Total Use (AFA)
Purveyor Areas	13,600	22,800	36,400
Self-Supplied Domestic	3,100	8,400	11,500
Self-Supplied Commercial and Industrial	8,300	Assumed Negligible	8,300
Agriculture	Assumed Negligible	28,800	28,800
Estimated Total Ground Water Diversion	25,000	60,000	85,000

SPF also analyzed the current demand for the individual municipal service providers. SPF was tasked to:

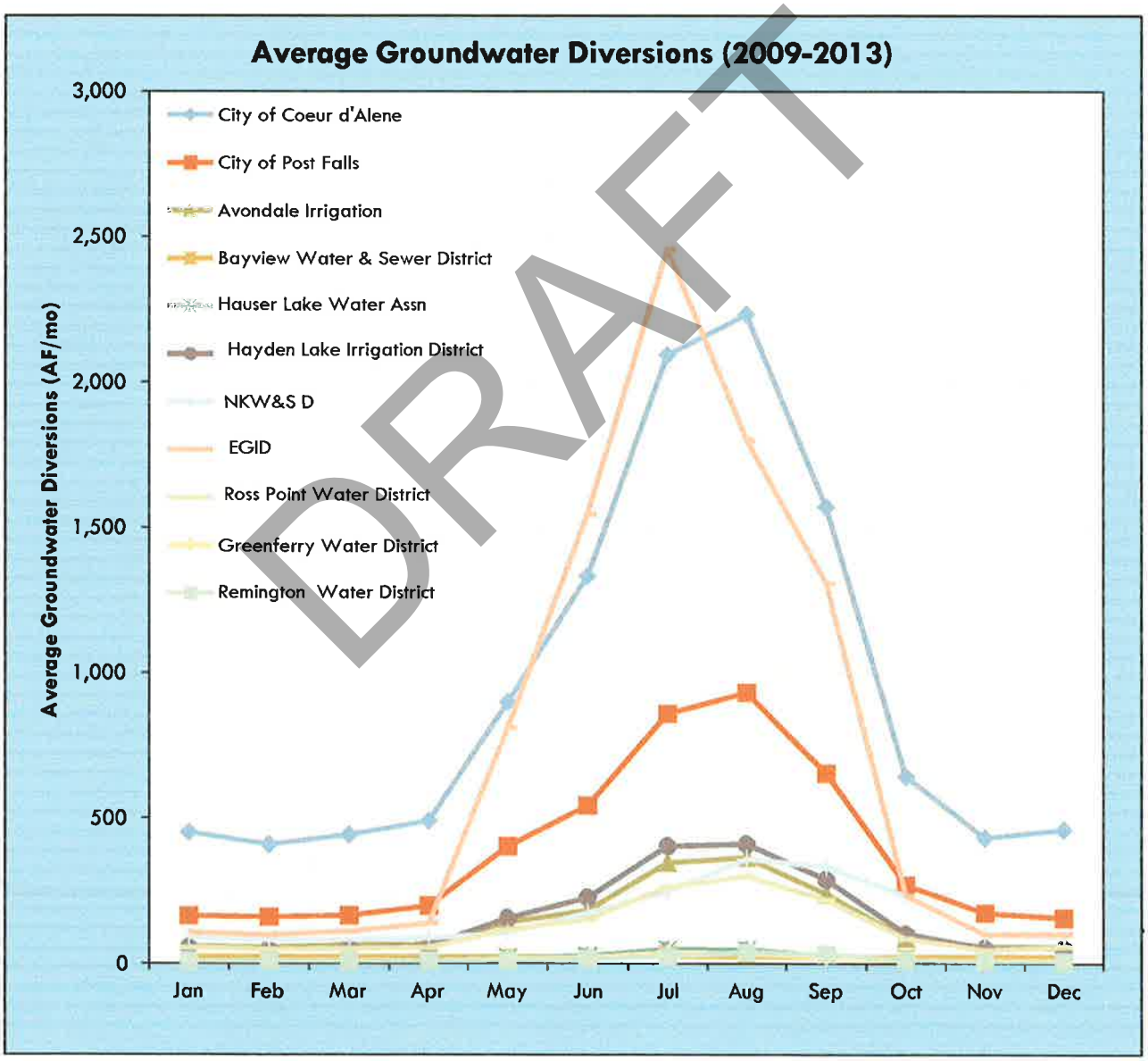
1. Request water-diversion data from Rathdrum Prairie water purveyors (list provided by IWRRI);
2. Compile water purveyor production data from 2009 to 2013;
3. Estimate current indoor (e.g., potable) and outdoor (i.e., irrigation) water use within purveyor service areas;
4. Develop estimates of total per-capita and indoor per-capita water use;
5. Estimate the amount of water use outside of purveyor boundaries for domestic, irrigation, commercial, and industrial purposes based on water- right information;
6. Estimate agricultural irrigation withdrawals outside of purveyor-supplied areas based on water-right information and/or other data;

7. Develop general estimates of "unaccounted-for" system losses based on provider information and national averages.

Eleven providers reported in sufficient detail to be included in their study, representing 89% of the RP population supplied by municipal providers. The City of Rathdrum, accounting for 6% of the RPA population, supplied data to IWRRI after SPF's study was completed. Rathdrum's data is utilized in the next section of this report. SPF's findings are summarized below. Their full study is included in this report as Appendix B. *(Note: revised population data for Greenferry and Remington water districts received after the SPF report was completed are incorporated in this report.)*

The first aspect of municipal demand needed to build a RAFN forecast is identification of the peak monthly demand (Maximum Monthly Demand). Water rights are not built on average demand, but rather, on the maximum diversion rate necessary to meet the beneficial use demand. For the Rathdrum Prairie municipal providers that equates to the hot days of summer when agricultural and landscape irrigation demand can create hourly demand spikes 5-6 times greater than normal daily demand.

Figure 3. Average Monthly Pumping



The variety in purpose, organizational structure, geographical size, location, and population across the RPA municipal providers make accurate determination of existing demand by individual water providers a critical component in building a RAFN forecast where size, location and population variables are likely to change.

Per capita demand by provider is the independent variable most useful in forecasting demand. Per capita total indoor and outdoor use by the eleven providers submitting data is listed in Table 2.

Table 2. Per Capita Water Use

Estimated Per Capita Total and Indoor Use							
Municipal Provider	Population	Average Diversion (MGA)	Average Diversion (AFA)	Average Indoor Use (based on average winter diversions) (AFA)	Estimated Average Irrigation use (AFA)	Estimated Total Use (gpd)	Estimated Indoor Use (gpd)
North Kootenai Water and Sewer District	11,179	652	2,001	1,082	919	160	86
City of Coeur d'Alene	41,240	3,738	11,472	5,250	6,224	248	114
Bayview Water and Sewer District	1,000	91	279	231	48	249	206
Hayden Lake Irrigation District	6,604	628	1,928	646	1,282	261	87
City of Post Falls	16,006	1,531	4,699	1,970	2,725	262	110
Avondale Irrigation District	5,643	567	1,739	710	1,029	275	112
Hauser Lake Water Association	677	81	248	113	135	328	150
Ross Point Water District	3,942	477	1,465	635	830	332	144
East Greenacres Irrigation District	8,632	2,877	8,830	1,231	7,599	913	127
Greenferry Water District	990	68	209	117	92	188	105
Remington Water District	909	63	194	102	91	190	100
Totals	95,912	10,773	33,063	12,087	20,973		
Population Weighted Average without East Greenacres Irrigation District						245	
Population Weighted Average with East Greenacres Irrigation District						305	111

Population and Economic Projection

Population growth and employment growth projections are necessary components for estimating future water needs. This report updates projections recorded in the 2010 Rathdrum Prairie Aquifer Water Demand Projections report and Comprehensive Aquifer Management Plan (RPCAMP 2010), utilizing a similar hybrid method, but with some important differences. This report uses projections established in the 2010 report as a base. It refines those projections based upon updated information, and applies the projections to water service areas in the following way:

Current population estimates for each current water provider service area are calculated from census data (American Community Survey 2012) at the block group level within service provider areas, and at the census tract level outside of service areas. The population distribution is further refined using GIS data for existing land use and parcel information, and aerial photo verification of housing distribution.

Current employment estimates are made at the block group and zip code level, using most current data available from American Community Survey (2012), Idaho Department of Labor (2013), US Bureau of Economic Analysis (2013), and Woods and Poole data pamphlet (2014) for the Coeur d'Alene metropolitan statistical area.

Population projections for future service areas are based on a cohort component projection model at the census block group level, using data for 2000, 2010, and 2012. Block group projections are then applied to future service areas using a weighted average for census block distribution. Future land use or zoning maps provide another level of detail to determine where future growth is likely to be more intensely concentrated than is suggested by the weighted average distribution method.

Employment projections utilize output from the Idaho Economic Forecasting Model presented in the 2010 Rathdrum Prairie Aquifer Water Demand Projections report, but update the projections using ACS 2012, Idaho Department of Labor, US Bureau of Economic Analysis, and Woods & Poole information for years 2008 – 2013. National and regional employment trends through 2040 are extrapolated to 2045.

Future land use and zoning as described in municipal and regional comprehensive and infrastructure plans is also analyzed here to determine areas of increased development intensity as it may affect population distribution or future employment growth. Estimates of current population distribution in current water provider service areas are given in Table 5.

Table 5. Current Population Estimates for Water Provider Service Area

Population Estimates by Provider Service Area			
Provider	Service Area (SqMi)	Population Density (per SqMi)	Service Area Population Estimate
Alpine Meadows Water And Sewer District	0.860	102	88
Avondale Irrigation District	6.270	900	5643
Bayview Water And Sewer District	1.225	490	600
Coeur D'Alene (ACI)	13.473	250	3368
Coeur D'Alene (City Limits)	15.993	2368	37872
Diagonal Road Water District No. 1	0.079	152	12
Dry Acres Water And Sewer District	0.318	245	78
East Greenacres Irrigation District	11.449	754	8632
Emerald Estates Water Association, Inc.	0.126	2850	358
Forest Nursery Water	0.332	12	4
Greenferry Water And Sewer District	1.771	229	990
Hackney Water And Sewer District	0.254	485	123
Harborview Water System, Inc.	0.001	133	10
Hauser Lake Water Association	2.142	316	677
Hayden Lake Irrigation District	3.983	1658	6604
Highway 54 Water Association, Inc.	0.563	149	84
Huetter (ACI And City Limits)	0.209	490	102
Idaho Irrigation, Inc.	1.131	26	29
North Kootenai Water and Sewer District	11.818	946	11179
Ohio Match Road Water	1.443	93	134
Parkview Water Association	0.019	3771	73
Pineview Estates Water	0.127	2998	382
Post Falls Water	8.167	1960	16006
Rathdrum (ACI)	12.845	222	2852
Rathdrum (City Limits)	5.170	1357	7016
Remington Recreational Water And Sewer	4.951	118	909
Rocky Beach Water And Sewer District	0.097	897	87
Ross Point Water	7.167	550	3942
Royal Highlands Water (Valley Water	0.100	2802	280
Russell Water Association, Et Al	0.129	186	24
Schaeffer Additions Water Association, Inc.	0.062	1244	77
Singer Ranch Water Association	0.376	122	46
Troy Hoffman Water Corp, Inc.	0.108	2400	259
Westwood North Water Association	0.125	232	29
TOTAL			**107,660**

Population projections for future service needs are dependent on the definition of new service area boundaries. Population growth for these regions is first calculated at the census block group level, using a cohort component method. This method takes into account natural birth and death rates, and net migration rates for 5-year age cohorts. The cohort component model uses observed values from 2000 and 2010 decadal census data, and 2012 American Community Survey data. The population is projected through 2045 using this method. As with current population estimates, service area population projections are derived from weighted averages of block group estimates, refined by analysis of future land use and infrastructure planning designations.

Table 7 summarizes population projections for the future service areas. Growth rates vary somewhat from area to area, from an average mid-term (through 2025) low of about 0.9% per year to a high of about 1.8% per year. However, most of the area reflects a moderate overall growth rate of 1.4 – 1.7% per year through 2045. Areas of faster growth are anticipated in regional transportation corridors and other priority growth areas defined in municipal comprehensive plans.

Table 7. Population Estimates for Future Water Provider Service Areas

Total Populations by Year								
Service Area	2010	2015	2020	2025	2030	2035	2040	2045
Avondale	6236	6588	6777	7037	7278	7499	7669	7838
Coeur d'Alene	45641	49162	51385	54175	56779	59246	61621	64027
East Greenacres	9535	10338	10945	11581	12215	12873	13564	14299
Greenferry	586	909	1087	1512	2158	3231	4800	4800
Hauser Lake	1961	2095	2192	2311	2415	2502	2575	2647
Hayden Lake	7132	7690	8168	8717	9295	9913	10549	11216
North Kootenai	9699	11519	13232	15554	18313	21501	25156	29435
Post Falls	18474	19530	20304	21210	22057	22867	23666	24523
Rathdrum	7528	7926	8191	8538	8871	9150	9363	9545
Remington	3479	3701	4071	4399	4757	5139	5555	5989
Ross Point	3502	4866	5540	6907	8527	10518	13018	16190
Total	**113773**	**122400**	**131892**	**141938**	**152666**	**164438**	**172735**	**190509**

Employment

Population forecasts also take into account economic trends. As with the Idaho Economic Forecasting Model used in the 2010 RPCAMP, the economic model used for employment projections is based on a simultaneous equation method that interprets regional and national economic trends. Some sectors of the economy are more dependent on national or international trade, including mining and manufacturing (basic industries). Sectors that rely on regional or local trade are considered secondary industries. The majority of current and projected future employment is attributable to these secondary industries. National and regional trend information is available through 2040. This information was extrapolated through 2045 for the purposes of this report.

CURRENT EMPLOYMENT

Table 8 summarizes current employment by zip code and municipal area through 2012 (ACS 2012). These reflect differences from base employment forecasts reported in the 2010 RPCAMP that are related to effects of the recent recession. Industry sectors that showed slower than expected growth or declines in the 2008-2012 period include:

- Agriculture, Forestry, Fishing, Mining
- Arts, Entertainment, Accommodation and Food services
- Construction
- Information
- Other services

The biggest dip in employment occurred in 2010, and most sectors showed improvement starting in 2011. Arts, entertainment, and related industries showed slower recovery, but recent reports (Idaho Dept. of Labor) indicate a steady increase in these areas as well.

Employment Forecasts

Employment forecasts provided by state and national agencies (Idaho Department of Labor, US Bureau of Economic Analysis) for the Coeur d'Alene metropolitan statistical area were used as the basis for employment forecasts for the RPA future service areas. These are compared to other forecasts (Woods & Poole 2014), as well as information from local planning agencies, to assess overall industry trends for the region. Table 9 shows employment projections by industry sector through 2045.

Although all industries show absolute growth through the forecast period, there is a decrease in federal civilian employment, with essentially flat or very low growth in agriculture/forestry/mining and information sectors.

Taking into account the relative distribution of service areas, a normalized projection of total employment for the same period by service area is given in Table 10. This normalization is based in part on current population distribution, and may over or underestimate the allocation of employment to portions of service areas that fall in or near a shared municipal boundary. Examples of this include East Greenacres and Ross Point (Post Falls municipal area) and Avondale and Hayden Lake (Hayden municipal area).

Table 8. Current Employment by Zip Code and Municipal Area for Major Industry Sectors

Current Employment by City and Zip Code											
Employment Sector	Industry Code	Athol 83801	Bayview 83803	Coeur d'Alene 83814	Dalton Gardens 83815	Hayden 83835	Hauser 83854	Hayden Lake 83835	Post Falls 83854	Rathdrum 83858	Spirit Lake 83869
All Occupations	00	264	251	21008	935	5883	389	214	13065	2921	703
Agriculture, Forestry, Fishing, Mining	11, 21	11	12	285	28	181	9	4	140	20	17
Construction	23	41	12	2260	106	632	40	5	1346	366	60
Manufacturing	31	44	24	1317	72	380	42	15	1305	377	72
Wholesale Trade	42	0	11	575	7	263	16	5	657	167	23
Retail Trade	44	44	14	2810	129	931	71	28	1755	286	141
Transportation, Warehousing, Utilities	48, 22	14	19	690	18	157	10	8	451	179	48
Information	51	0	12	380	22	45	13	6	145	39	27
Finance, Insurance, Real Estate	52 -53	0	41	1571	62	367	8	24	1284	69	16
Professional, Scientific, Management, Administrative, Waste Mgt.	54 - 56	7	24	2159	72	614	47	23	1072	115	31
Educational, Health Care and Social	61, 62	26	34	4129	280	1245	61	60	2737	720	105
Arts, Entertainment, Recreation, Accom., Food Service	71, 72	44	67	3129	70	555	56	16	1356	295	93
Other Services	81	13	46	1047	30	209	7	6	283	115	61
Public Administration	82	20	0	656	39	304	9	14	537	173	9

Table 9. Employment Forecast for the Coeur d'Alene Metropolitan Statistical Area by Industry, 2015-2045

Employment Forecasts by Industry							
Employment Sector	2015	2020	2025	2030	2035	2040	2045
All Occupations	79,648	86,388	93,674	101,555	110,089	119,332	129,188
Agriculture, Forestry, Fishing, Mining	1,695	1,769	1,844	1,921	1,998	2,074	2,1727
Construction	5,650	5,908	6,163	6,414	6,660	6,900	7,164
Manufacturing	4,925	5,069	5,204	5,327	5,439	5,539	5,655
Wholesale Trade	1,715	1,770	1,862	1,955	2,047	2,139	2,230
Retail Trade	10,468	11,061	11,655	12,248	12,838	13,423	14,070
Transportation, Warehousing, Utilities	1,417	1,48	1,541	1,601	1,660	1,718	1,787
Information	930	943	954	964	972	978	986
Finance, Insurance, Real Estate	9,000	9,893	10,846	11,858	12,929	14,059	15,326
Professional, Scientific, Management, Administrative, Waste Mgmt.	10,120	10,921	11,764	12,651	13,582	14,561	15,469
Educational, Health Care and Social	9,342	11,032	12,981	15,221	17,788	20,718	24,449
Arts, Entertainment, Recreation, etc.	8,939	9,726	10,558	11,433	12,355	13,321	14,282
Other Services	4,605	5,575	6,717	8,054	9,611	11,414	13,611
Public Administration	10,787	11,149	11,492	11,816	12,118	12,397	12,484

Table 10. Normalized Distribution of Future Employment by Future Service Area

Total Employment Projection by Future Service Area							
Service Area	2015	2020	2025	2030	2035	2040	2045
Avondale	3,891	4,100	4,303	4,505	4,702	4,870	5,018
Coeur d'Alene	29,036	31,088	33,125	35,142	37,146	39,131	40,991
East Greenacres	6,106	6,622	7,081	7,561	8,071	8,614	9,154
Greenferry	348	390	411	432	450	463	474
Hauser Lake	1,237	1,326	1,413	1,495	1,568	1,635	1,695
Hayden Lake	4,542	4,942	5,330	5,753	6,215	6,699	7,181
North Kootenai	6,803	8,005	9,510	11,334	13,481	15,975	18,845
Post Falls	11,535	12,284	12,969	13,652	14,337	15,029	15,700
Rathdrum	4,681	4,956	5,221	5,491	5,737	5,945	6,111
Remington	2,223	2,413	2,594	2,789	2,980	3,159	3,320
Ross Point	2,874	3,351	4,223	5,278	6,595	8,267	10,365
Total - all areas	**73,276**	**79,477**	**86,180**	**93,431**	**101,282**	**109,785**	**118,853**

Spatial Distribution of Growth within the RPA

Analysis of growth for municipal and unincorporated areas within the RPA area utilized comprehensive plans from municipal planning agencies and Kootenai County, as well as major infrastructure plans. Although existing and future land use or zoning maps are useful in determining areas of future growth, they do not represent ongoing new construction. To address this issue, aerial imagery and existing parcel boundaries were used to refine understanding of existing conditions. Discussions with regional planners, developers, and land managers provided insight to growth trends in various parts of the region.

ANALYSIS METHOD FOR RESIDENTIAL DENSITY, FUTURE COMMERCIAL/INDUSTRIAL LAND USE

Zoning Ordinances: County and municipal zoning ordinances associated with the most recent available comprehensive plans are used as the basis of build-out projections. The principal focus for analysis is residential use and densities allowed by each jurisdiction's zoning code.

Future Land Uses: The compiled future land use maps utilize data and imagery provided by the County and municipal planning agencies, Google Earth, and *Inside Idaho*. GIS files were created to represent undeveloped parcels zoned as residential. The potential density range for each area was calculated based on the associated zoning or use code. In keeping with approaches used in other planning documents, a projection of three (3) people per unit was used to determine population increases of each city and adjacent identified growth area. Densities of 12 persons per acre and 20 persons per acre were used in areas not covered by comprehensive plans, but identified as growth areas in the regional wastewater and transportation plans. In remaining rural areas not associated with identified growth potential, rural densities as defined in the Kootenai County Comprehensive plan were used. Identified commercial or industrial growth areas use a simplified aggregate range of land uses based on future or adjacent zoning codes.

Aerial Imagery: Aerial imagery used in this study comes from *Inside Idaho* geospatial data portal and Google Earth.

Future Growth Areas

The 2010 RPCAMP reviewed existing planning documents, and identified changing land use and growth areas in the following locations:

1. Existing city boundaries and Areas of City Impact (ACI)
2. Exclusive Tier and Shared Tier areas in Kootenai County adjacent to Post Falls, Hayden, and Rathdrum
3. Along transportation corridors within and extending outward from city ACIs, particularly within the Exclusive Tier areas, as well as into unincorporated portions of the county
4. Rural Dispersed Villages (e.g. Bayview on Lake Pend Oreille)
5. Low density residential/rural development in areas not served by municipal water treatment facilities

Figure 6 shows a simplified distribution of future residential, rural and commercial/industrial land uses as depicted in existing planning documents. Several growth areas identified on this map are worth noting. Major commercial and mixed uses allowed under various versions of smart codes are indicated primarily along major arterial and collector roads including Highway 95 extending northward from Hayden, Highway 41 between Post Falls and Rathdrum, Huetter Road between I-90 and Hayden Avenue, and Highway 53 between Hauser (state line) and Rathdrum. At this point in time, major development is expected primarily along the US 95 and SH 41 corridors, with development along the other routes concentrated primarily at major intersections and similar high-use nodes. However, planned communities are likely to extend outside of existing ACI boundaries, particularly in the following areas:

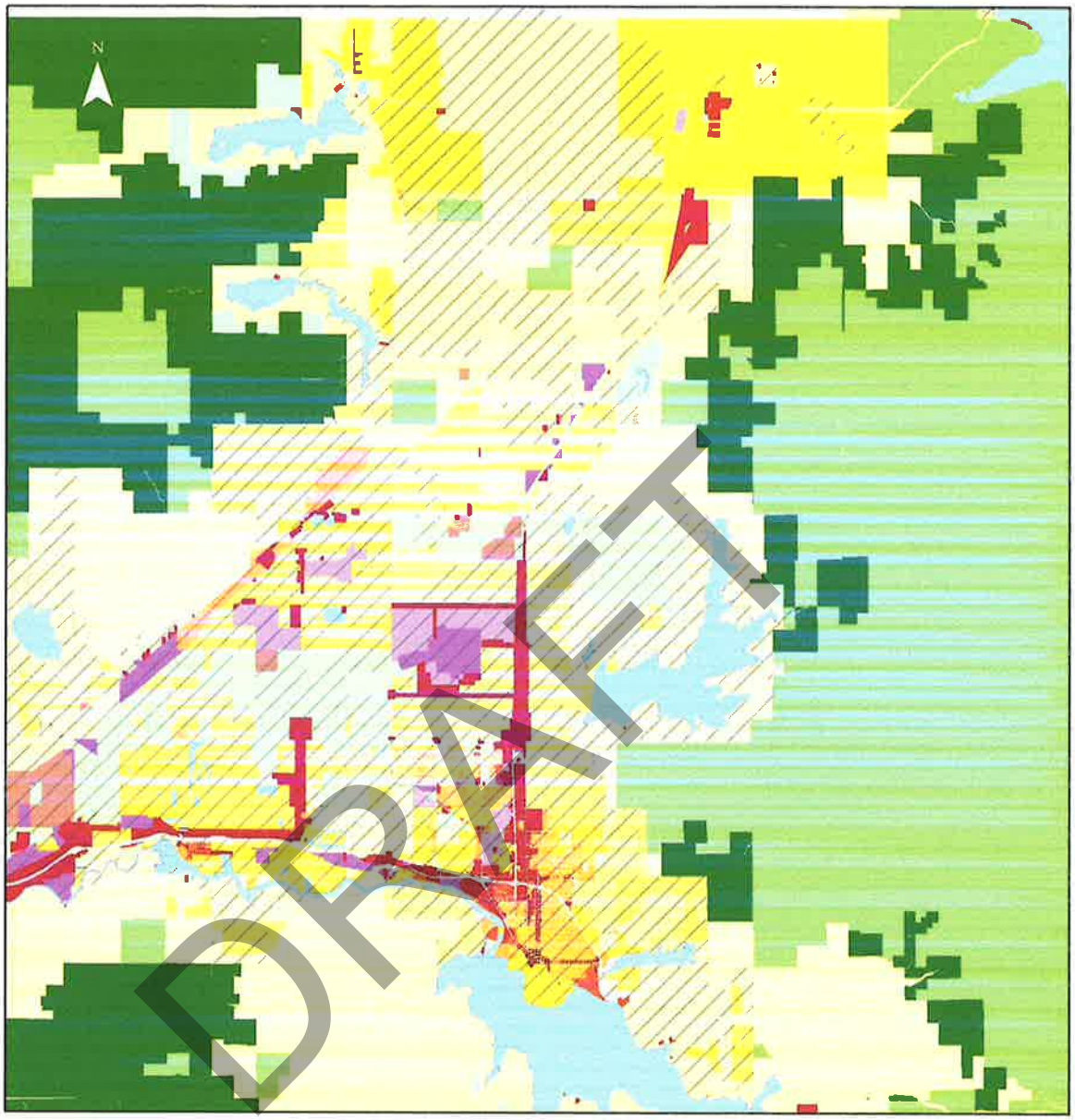
- Between Spirit Lake and Athol, as indicated by the expanded Remington and North Kootenai service areas
- North and east of Hayden/Hayden Lake
- On the margins of Post Falls and Rathdrum

Residential growth within ACIs or municipal boundaries is expected to follow patterns of development seen in the early 2000s. Some exceptions to this include areas covered by recent "smart code" or similar designations that allow for mixed residential and a variety of commercial or other uses, in some cases at slightly higher densities than typically seen in the area. One example is an area along Prairie Avenue, west of Idaho Road in Post Falls. Existing plans anticipate nodal development here with a mix of uses and housing types that may reach densities of 20 dwelling units per acre (approximately 60 persons per acre). However most of the smart code or similarly identified areas lie within the city centers of Coeur d'Alene, Post Falls and Hayden. It is unlikely that extensive higher intensity residential development will occur outside of current ACIs.

An area that may experience intensification of commercial/industrial development lies within the Shared Tier designation west of the Coeur d'Alene airport. This area is primarily covered by Avondale, Hayden Lake, and Ross Point future service areas. It is entirely possible that growth pressures over the next 30 years will increase the pressure for this currently unincorporated area to be annexed by one or more of the adjacent cities. In part because of its location with respect to current and future infrastructure, it is one of the more attractive areas for future commercial or industrial development.

In summary, relatively low to medium density (<1 – 4 units per acre) development of both ACI and rural areas is likely to constitute roughly 80-85% of new residential development over the next 30 years. However, existing cities and their ACIs, along with urban reserves, will likely see a small amount (5%-10%) higher intensity compact development both within the city centers and at nodes along existing arterial and collector corridors within ACIs and in rural portions of the county. This is a growing national trend, reflecting a changing

Figure 6. Kootenai County Future Land Use

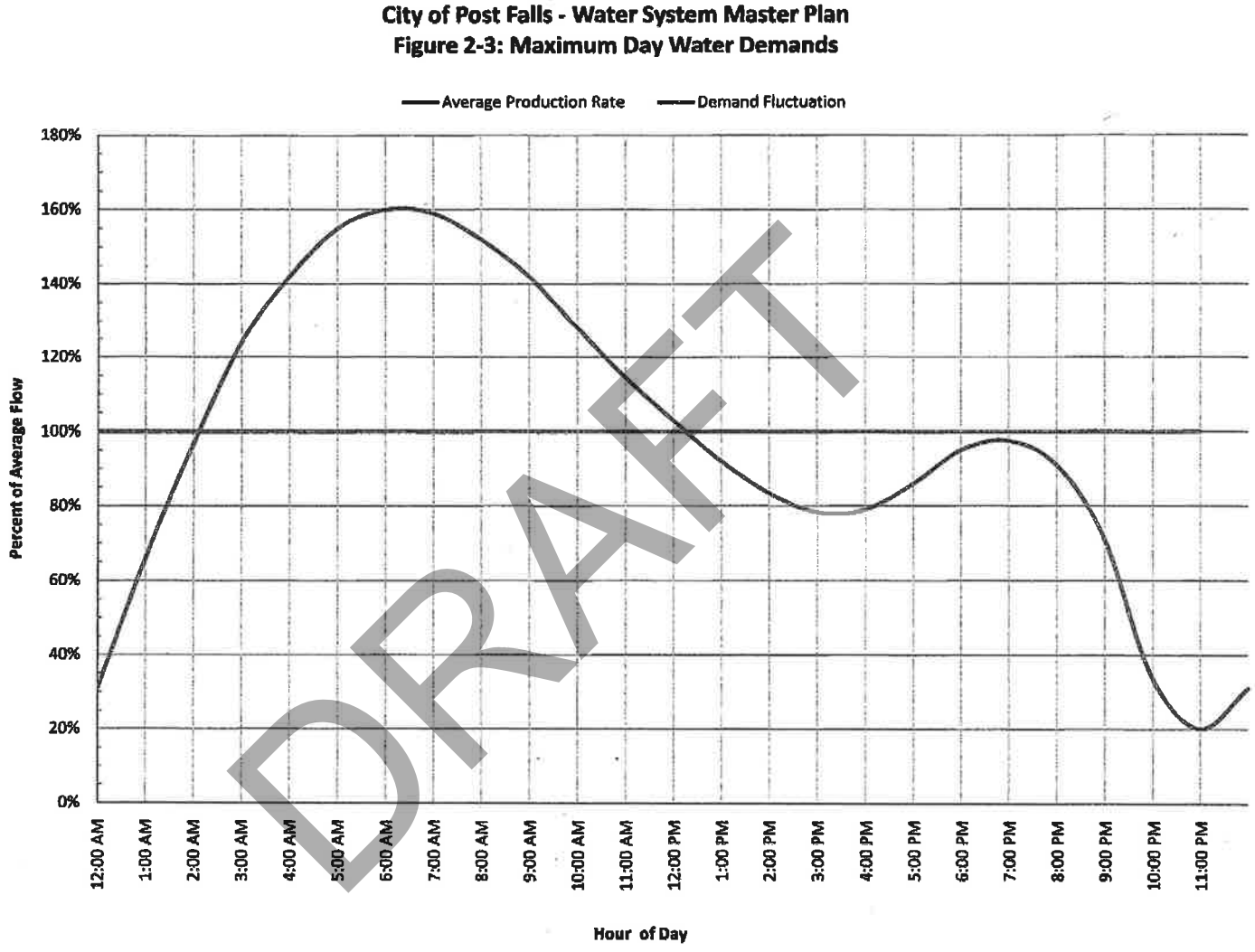


demographic distribution with a desire to be near health care and urban amenities, as well as access to a range of transportation choices. It is also likely that ongoing economic recovery will drive new development of second homes and other high-end residential development in rural areas with access to recreation and scenic resources. Some of this may be medium density (up to 3 units per acre) as individual planned communities (PUDs and similar) are approved. However, this type of development will likely constitute no more than approximately 5% of total development for the area over the next 30 years.

FUTURE WATER DEMAND

Water demand rates generally exhibit temporal variability. Agricultural irrigation demand characteristically peaks in the early morning hours of hot summer days as producers move water to crops prior to the heat of the day. Municipal providers with a large landscape irrigation component of their demand see a similar pattern. See Figure 7.

Figure 7. Peak Hourly Demand



Water Demand Forecasting Methodology

A commonly accepted method of forecasting future water demand is application of per capita usage to the projected population number. Utilization of per capita population change to underpin future municipal water demand forecasting, however, misses an important driver of municipal water demand: change in outdoor irrigation use. There is a direct relationship between increasing population density and decreasing absolute and per capita water demand (Shawley 2008; Grayman et al 2012). Irrigation makes up 63% of the RPA annual demand and is the primary factor in daily and hourly peak demand flows, yet the per capita approach to demand forecasting is unable by itself to capture change in irrigation demand created by changes in building pattern and density.

This report advances the per capita forecasting method by correlating per capita demand and population density. First, current per capita MDD was calculated from those providers who submitted actual MDD production data. Population density was obtained using government census data manipulated as shaped Geographic Information System (GIS) files overlain on current service provider areas.

Table 11. Rathdrum Prairie Aquifer Future Municipal Water Provider Population Summary

RPA Future Municipal Water Provider Population Summary						
Provider	2014 Population	2045 Population	2014 Service Area (SqMi)	2045 Service Area (SqMi)	2014 Population Density (per SqMi)	2045 Population Density (per SqMi)
Remington	909	5989	5.0	34.9	186	159
Hauser Lake	677	2647	2.1	8.7	316	304
Greenferry	990	4800	1.8	2.5	552	1920
Avondale	5643	7838	6.3	12.8	900	612
Rathdrum	7016	9545	5.2	18	1357	530
East Greenacres	8632	14299	11.5	17.2	754	831
North Kootenai	11179	29435	11.8	29.6	946	994
Ross Point	3942	16190	7.2	10.3	550	1572
Hayden Lake	6604	11216	4.0	6	1658	1869
Post Falls	16006	24523	8.2	8.4	1960	2919
Coeur d'Alene	41240	64027	16.0	17.2	2368	3722
Totals	**102838**	**190509**	**78.9**	**165.6**		

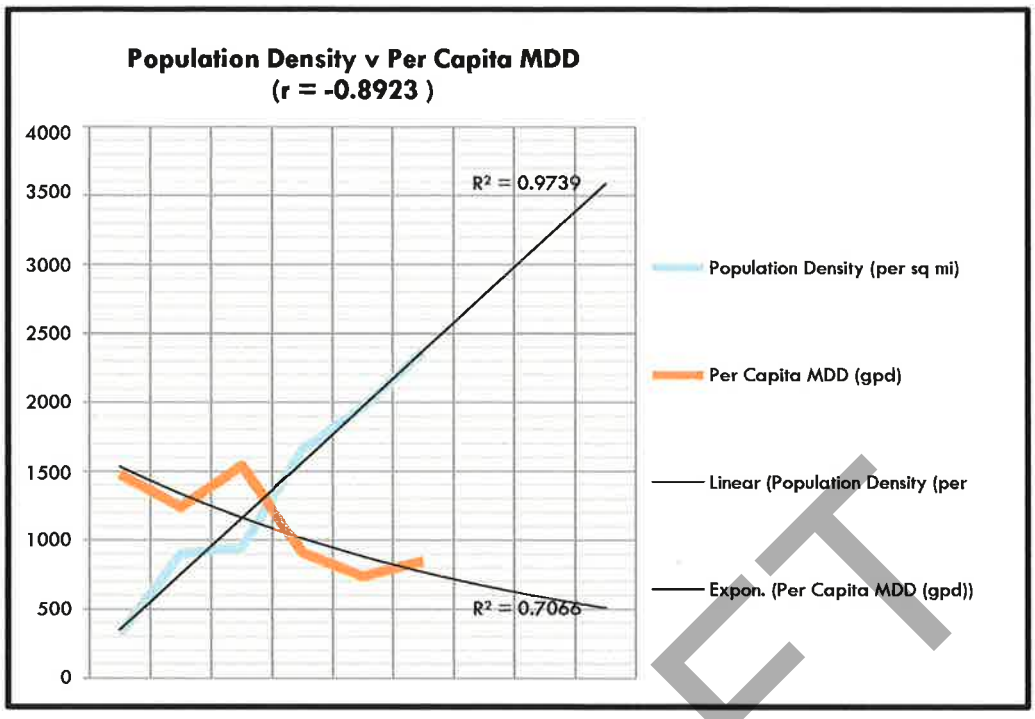
Provider specific per capita MDD and population density as shown in Table 12 were then graphed (Figure 8) and correlated (r= -0.8923).

Table 12. Maximum Daily Demand Correlation

Population Density v Per Capita MDD				
Provider	2012 Population Density (SqMi)	Per Capita MDD (gpd)	MDD Source	r value
Hauser	316	1477	Water System Master Plan 2011, Welch-Comer Engineers	-0.8923305
Avondale	900	1240	SCADA	
North Kootenai	946	1539	Welch-Comer Engineers 2014	
Hayden Lake	1658	909	SCADA	
Post Falls	1960	737	Water System Master Plan 2011, J-U-B Engineers	
Coeur d'Alene	2368	850	Comprehensive Plan, 2011	

Trend lines, also shown in Figure 8, were fitted to the curves allowing for estimation of the per capita MDD of providers that were not able to submit actual MDD production data.

Figure 8. Population Density v Per Capita MDD



Once established, the correlation was applied to the 2045 population density from the population projection report to derive the 2045 MDD.

Table 13. Maximum Daily Demand

Maximum Daily Demand (MDD)							
Provider	2045 Population	2045 Density (per SqMi)	2045 Derived Per Capita MDD (gpd)	2045 MDD (MGD)	2014 MDD (MGD)	Δ MDD (MGD)	Δ MDD (cfs)
Remington	5989	159	1560	9.34	1.60	7.74	11.98
Hauser Lake	2647	304	1510	4.00	1.0	3.00	4.64
Greenferry	4800	1920	900	4.32	1.44	2.88	4.46
Avondale	7838	612	1400	10.97	7.0	3.97	6.15
Rathdrum	9545	530	1430	13.65	7.58	6.07	9.40
East Greenacres	14299	831	1300	19.16	41.96	-22.80	-35.28
North Kootenai	29435	994	1230	37.09	17.2	19.89	30.77
Ross Point	16190	1572	1000	16.19	5.68	10.51	16.27
Hayden Lake	11216	1869	940	10.54	6.0	4.54	7.03
Post Falls	24523	2919	650	15.94	11.8	4.14	6.41
Coeur d'Alene	64027	3722	500	32.01	32.19	-0.18	-0.27
Total				**173.22**	**133.44**	**39.78**	**61.55**

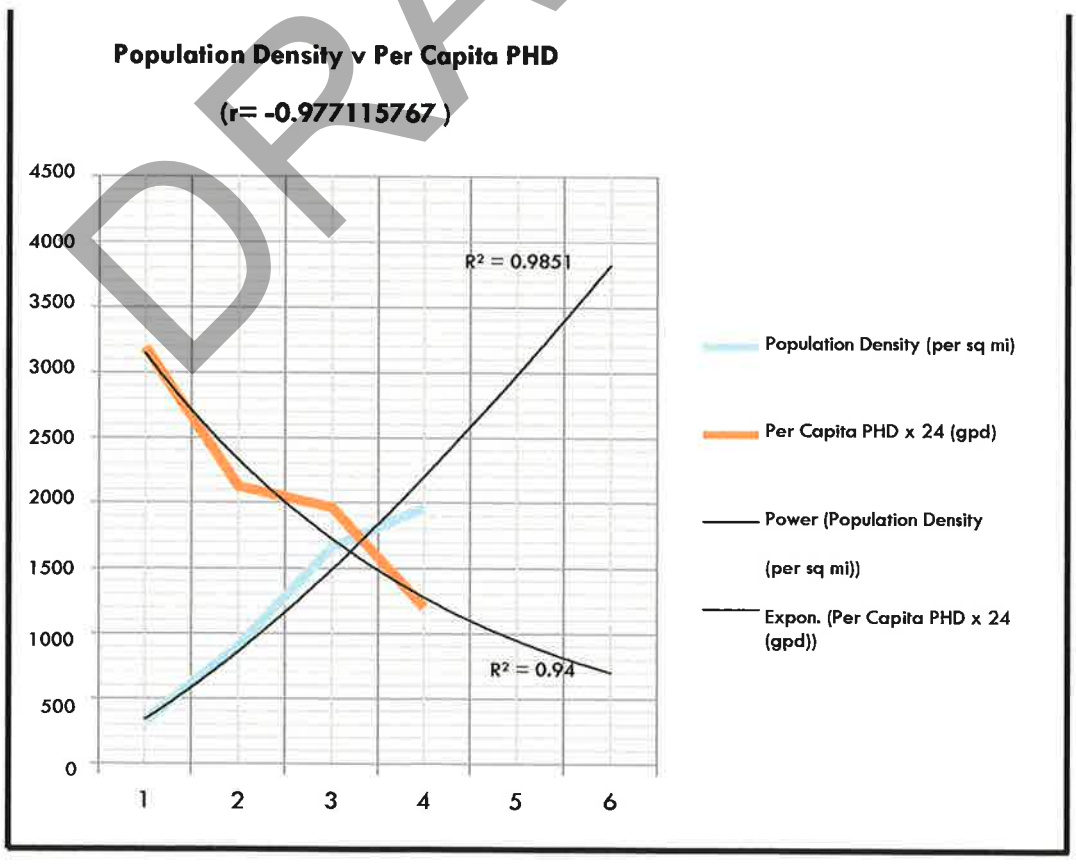
A similar process was used to establish the correlation between population density and per capita PHD. Per capita PHD was multiplied by a factor of 24 to create comparable scale between the two data sets for graphing purposes.

Table 14. Peak Hourly Demand Correlation

Population Density v Per Capita PHD				
Provider	Population Density (SqMi)	Per Capita PHD x 24 (gpd)	PHD Source	r value
Hauser	316	3191	Water System Master Plan, 2011, Welch-Comer Engineers	-0.9771158
Avondale	900	2127	SCADA, 2014	
Hayden Lake	1658	1635	SCADA, 2014	
Post Falls	1960	1200	Water System Master Plan, 2011, J-U-B Engineers	

The correlations were validated by checking derived values against engineering reports submitted by the City of Post Falls identifying a MDD to PHD ratio of 1:1.60 (Figure 8). The actual value for Post Falls per capita MDD (normalized to a one-hour period) is 30.7 gpd and the derived value for Post Falls per capita PHD is 49.7 gpd, a ratio of 1:1.62. Trend lines were fitted to the curves allowing for estimation of the per capita PHD of providers that were not able to submit actual PHD production data.

Figure 9. Population Density v Per Capita PHD



Once established, the correlation was applied to the 2045 population density from the population projection report to derive the 2045 PHD as shown in Table 15.

Table 15. Peak Hourly Demand

Peak Hourly Demand (PHD)							
Provider	2045 Population	2045 Density (per SqMi)	2045 Derived Per Capita PHD (gph)	2045 PHD (MGH)	2014 PHD (MGH)	Δ PHD (MGH)	Δ PHD (cfs)
Remington	5989	159	142	0.85	0.13	0.72	32.13
Hauser Lake	2647	304	128	0.34	0.09	0.25	11.10
Greenferry	4800	1920	74	0.36	0.13	0.23	10.04
Avondale	7838	612	112	0.88	0.5	0.38	16.85
Rathdrum	9545	530	117	1.12	0.52	0.60	26.61
East Greenacres	14299	831	102	1.46	2.39	-0.93	-41.54
North Kootenai	29435	994	97	2.86	1.07	1.78	79.55
Ross Point	16190	1572	66	1.07	0.45	0.62	27.58
Hayden Lake	11216	1869	56	0.63	0.54	0.18	3.93
Post Falls	24523	2919	44	1.08	0.80	0.13	12.47
Coeur d'Alene	64027	3722	53	1.73	1.74	-0.01	-0.50
Total				**12.21**	**8.36**	**3.85**	**171.53**

The Remington Water District has historically used the aquifer for the storage required to meet the daily system peaking requirements. To insure their ability to meet patron's needs, the district has installed backup power generators at each well site and will continue that practice as new pumping facilities come online. This RAFN application is therefore based on the Peak Hourly demand as calculated for the district in the "Rathdrum Prairie Aquifer Future Water Demand Study".

WATER RIGHT GAP ANALYSIS

The information for assembling the water rights portfolio for each provider was taken from searching the Idaho Department of Water Resources (IDWR) website for water right records in the name of the respective providers. The Remington Water District has one filing, 95-9427, that is still in permit form. The proof of beneficial use for this permit is due on June 1, 2023. The district has the well to be used for this permit in place and therefore chosen to include it in their water rights portfolio. The district has tasked its engineer to update the district's facility plan to provide information on the infrastructure necessary to provide water to the existing and future service areas.

UNACCOUNTED FOR WATER

In the time since the completion of the IWRRI study, the district has done a more detailed review of unaccounted for water. When the District was formed as a part of the Shamrock Ranch development in 1993, the initial parcels sold were 20 acre parcels. As a part of the purchase transaction, buyers were provided with a hookup to Remington Water District which included a 2 inch water meter. At that time, 2 inch water meters were designed for irrigation purposes and did not read below 2 gallons per minute accurately. 35 of these 2 inch meters were installed prior to the developer subdividing most 20 acre parcels into 10 acre parcels. Once the District determined the unaccounted for water loss issue was primarily as a result of these 2 inch water meters reading low, the installation of these 2 inch meters was suspended until the technology allowed for the newer, 2 inch meters to read accurately down to ½ gallon per minute.

For customers with these older style 2 inch meters, they could flush toilets, run drip irrigation systems, and participate in other low water flow activities that would avoid recording by these older, 2 inch water meters.

On a percentage basis, historical winter time usage yields a 23% to 30% unaccounted for water loss. Summer time usage has yielded about a 4% to 7% unaccounted for water loss. While the monthly unaccounted for water loss ranges remains fairly stable throughout the year at 500,000 to 800,000 gallons, the percentage drops in the summer months due to the tremendous irrigation demands. These older 2 inch meters are gradually being replaced with the newer, more accurate 2 inch meters.

REMINGTON WATER DISTRICT INFRASTRUCTURE

The district is continually making improvements to its system, i.e. standby generators for each of its pumping stations. Adding new service areas to the district will require considerable new infrastructure. Upon approval of this application by IDWR the district will task its engineer to update the district's facility plan to provide information on the infrastructure necessary to provide water to the existing and future service areas.

This application for permit and narrative were prepared for Remington Water District by Robert G Haynes, P.E.

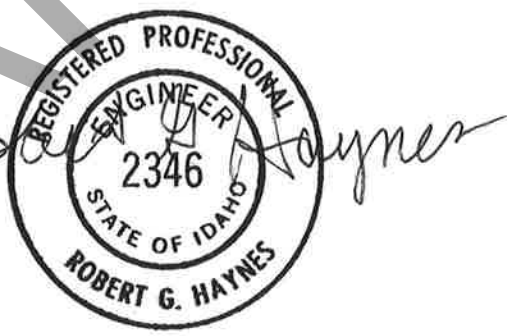
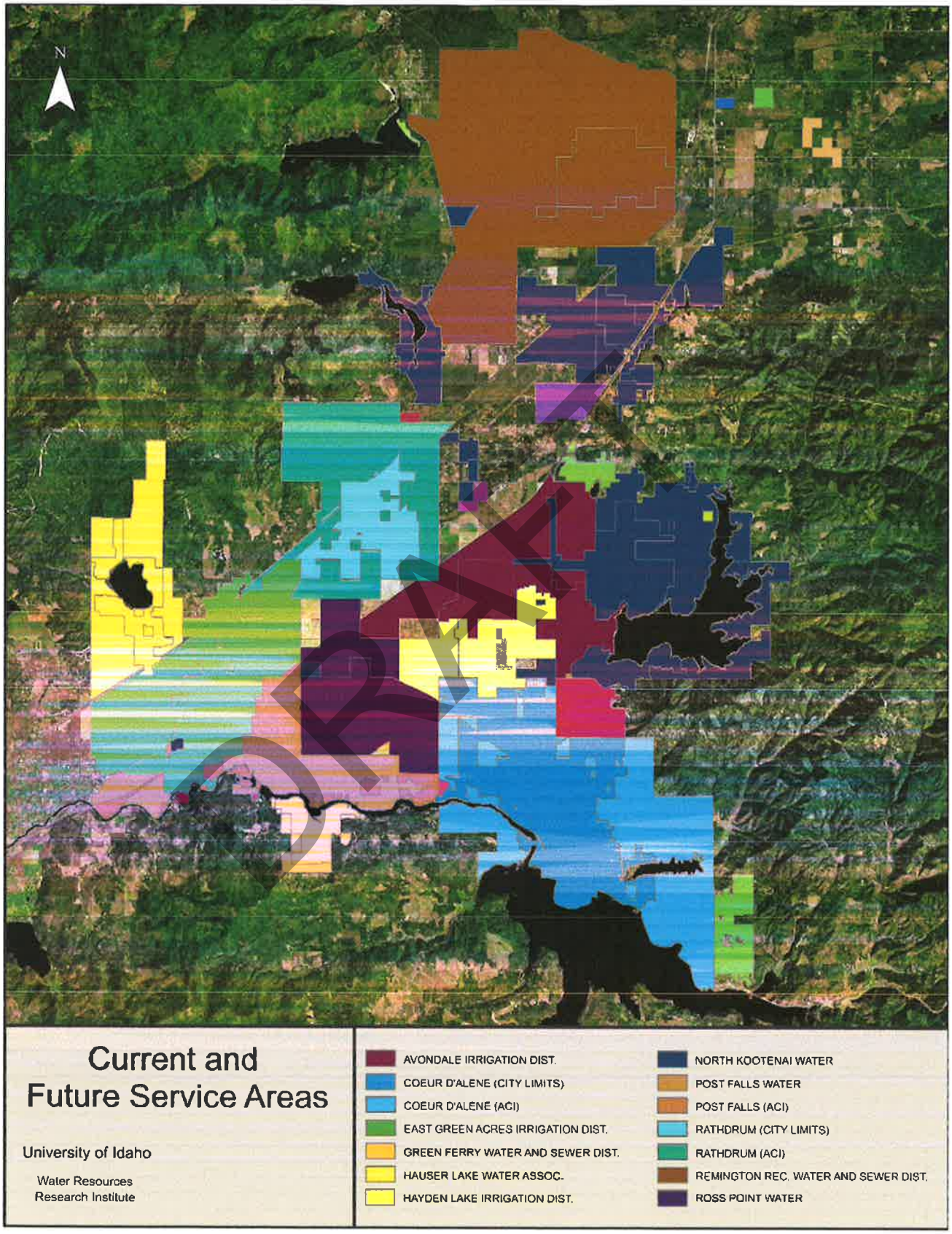


Figure 2. 2045 Municipal Provider Service Areas



Memorandum of Understanding

Between

City of Post Falls, City of Rathdrum, Avondale Irrigation District, East Greenacres Irrigation District, Greenferry Water and Sewer District, Hauser Lake Water Association, Hayden Lake Irrigation District, North Kootenai Water and Sewer District, Remington Recreational Water and Sewer District, and Ross Point Water District

This Memorandum of Understanding (MOU) sets forth the terms and understanding between the above named Rathdrum Prairie Aquifer municipal water providers to assign service areas in support of applications for Reasonably Anticipate Future Need (RAFN) water rights.

Background

42-202 Idaho Code permits municipal providers of water to apply for RAFN water rights to support future municipal development within projected service areas. Idaho Code §42-□202B (9) defines the service area for a municipality as follows:

> "Service area" means that area within which a municipal provider is or becomes entitled or obligated to provide water for municipal purposes. For a municipality, the service area shall correspond to its corporate limits, or other recognized boundaries, including changes therein, after the permit or license is issued. The service area for a municipality may also include areas outside its corporate limits, or other recognized boundaries, that are within the municipality's established planning area if the constructed delivery system for the area shares a common water distribution system with lands located within the corporate limits. For a municipal provider that is not a municipality, the service area shall correspond to the area that it is authorized or obligated to serve, including changes therein after the permit or license is issued.

At the request of Rathdrum Prairie Aquifer (RPA) municipal water providers, the Idaho Water Resources Board authorized a contract between Idaho Department of Water Resources and the Idaho Water Resources Research Institute (IWRRI) to conduct research and mediate service area boundaries necessary to support possible RAFN applications from providers withdrawing water from the RPA. Agreement on provision of service for all identified overlap areas was reached on November 11, 2014.

Purpose

The purpose of this MOU is to satisfy the requirements of Idaho Code §42-□202B (9) by creating a common future service area planning document for municipal water providers withdrawing water from the RPA. This MOU will establish municipal water provider service areas for the 30-year planning period requested by the signatory providers as basis for anticipated RAFN applications. The service areas are generally described on the maps in Appendix A. Specific areas of overlap between an incorporated city's Area of City Impact planning boundary and other municipal providers' service areas, and the agreements reached through the mediation process as to who will provide service to those areas, are more specifically described as follows:

City of Rathdrum/East Greenacres Irrigation District

East Greenacres will provide water service to the area generally described as the SW corner of Rathdrum's Area of City Impact (ACI) and the NE corner of East Greenacres service area north of Wyoming Ave, south of Lancaster Rd and east of Highway 53. RAFN Service Area Mediation Report included as Appendix B describes terms of service agreed to by both parties.

City of Post Falls/East Greenacres Irrigation District

East Greenacres will provide water service to all areas within district boundaries in the City of Post Falls, within district boundaries in the City of Post Falls ACI, and in East Greenacres future service area generally described as

west of the existing district boundary, north of West Seltice Way, south of Highway 53, and east of the Idaho state line.

City of Post Falls/Hayden Lake Irrigation District

Hayden Lake will provide water service to the triangle area within the City of Post Falls ACI generally described as south of W. Prairie Ave, west of N. Huetter Rd, east of N. Meyer Rd, and northeast of the railroad track.

City of Post Falls/Ross Point Water District

Ross Point will provide water service to all areas within its district boundaries in the City of Post Falls, within district boundaries in the City of Post Falls ACI, and in the area generally described as north of the existing district boundary and bounded by a line that runs north on Meyer Rd, west on Hayden Ave, north on Highway 41, west on Wyoming Ave, south on N. Greensferry Rd to the RR tracks, and west to the boundary of East Greenacres Irrigation District.

City of Rathdrum/Avondale Irrigation District:

No overlap. RAFN Service Area Mediation Report included as Appendix C describes terms of service agreed to by both parties.

Future service areas described in Appendix A for Greenferry, Hauser Lake, North Kootenai and Remington do not overlap with any other known RAFN applicants current or future planning boundaries or service areas. The area bounded by N. Huetter Road on the east, N. Meyer Road on the west, W. Hayden Avenue on the south, and W. Emmanuel Avenue on the north is excluded from adjoining Avondale or Hayden Lake's RAFN service areas by mutual agreement as described in Appendix D.

Duration

This MOU shall become effective upon signature by the authorized officials of the municipal providers. This MOU is at-will and may be modified by mutual consent of those signatory providers whose service areas adjoin the area to be modified. The duration of this MOU shall be the same as the provider requested 30-year planning horizon for the IWRRI RAFN research. This MOU shall end on December 31, 2044.

RAFN Service Area MOU

Municipal Water Provider Future Service Area MOU Signature Page

_____ Date: 12/3/14
City of Post Falls: signature, title

Vic Holmes Date: 12/11/14
City of Rathdrum: signature, title

District Manager Date: 12/3/2014
Avondale Irrigation District: signature, title

District Manager Date: 11-24-14
East Greenacres Irrigation District: signature, title

District Manager/Accountant Date: 12/1/2014
Greenferry Water and Sewer District: signature, title

_____ Date: 12/8/14
Hauser Lake Water Association: signature, title

_____ Date: 12/3/14
Hayden Lake Irrigation District: signature, title

District Manager Date: 11/24/14
North Kootenai Water and Sewer District: signature, title

District Manager/Accountant Date: 12/1/2014
Remington Rec. Water and Sewer District: signature, title

_____ Date: 11-24-14
Ross Point Water District: signature, title

State of Idaho
DEPARTMENT OF WATER RESOURCES
Northern Region • 7600 N. Mineral Drive, Suite 100 • Coeur d'Alene, Idaho 83815-7763
Phone: (208) 762-2800 • Fax: (208) 762-2819 • Website: www.idwr.idaho.gov

C.L. "BUTCH" OTTER
Governor

GARY SPACKMAN
Director

July 7, 2017

REMINGTON WATER DISTRICT
PO BOX 468
ATHOL, ID 83801

Re: June 30, 2017 request for extension of time to provide information for Application for Permit No. 95-17118

Dear Applicant:

The Idaho Department of Water Resources received, on your behalf, a request for an extension of time to submit the additional information requested from Bob Haynes due to complexities related to population projection associated with areas already served by an existing public water supply. Pursuant to Rule 40.01.d of the Department's Water Appropriation Rules, your request for a 6-month extension of time to provide information requested by IDWR is hereby granted. Please submit the information by December 31, 2017.

Sincerely,

Morgan Case

Morgan Case
Northern Regional Manager

cc: Robert G. Haynes, Idaho Water Engineering

Idaho Water Engineering
2571 S Reynolds RD
Coeur d'Alene ID 83814
June 28, 2017

Morgan Case, Regional Manager
Idaho Department of Water Resources
7600 Mineral Drive
Coeur d'Alene ID 83815

Re: Remington Water RAFN Application for Permit

Dear Morgan:

On behalf of the Remington Water District I would like to ask for an extension of time to submit the additional information until December 31, 2017. As we have dealing with the component of the population projection that is associated with areas already served by an existing public water supply has proven to be more difficult than I anticipated.

Thank you for your consideration

Sincerely,

Bob

Robert G Haynes, P.E.

State of Idaho
DEPARTMENT OF WATER RESOURCES
Northern Region • 7600 N. Mineral Drive, Suite 100 • Coeur d'Alene, Idaho 83815-7763
Phone: (208) 762-2800 • Fax: (208) 762-2819 • Website: www.idwr.idaho.gov

C.L. "BUTCH" OTTER
Governor

GARY SPACKMAN
Director

January 13, 2017

Remington Water District
PO Box 468
Athol, ID 83801

Re: January 11, 2017 request for extension of time to provide information for Application for Permit No. 95-17118

Dear Applicant:

The Idaho Department of Water Resources received, on your behalf, a request for an extension of time to submit the additional information requested from Bob Haynes. While the request did not provide details about why the extension was needed, I had a conversation with Bob Haynes on Monday January 9, 2017 concerning your efforts to address the issue of existing municipal providers within (completely or partially) the planned service area of the Remington Water District. Pursuant to Rule 40.01.d of the Department's Water Appropriation Rules, your request for a 6-month extension of time to provide information requested by IDWR is hereby granted. Please submit the information by June 30, 2017.

Sincerely,

Morgan Case

Morgan Case
Northern Regional Manager

cc: Robert G. Haynes, Idaho Water Engineering

Idaho Water Engineering
2571 S Reynolds RD
Coeur d'Alene ID 83814
January 9, 2017

Morgan Case, Regional Manager
Idaho Department of Water Resources
7600 Mineral Drive
Coeur d'Alene ID 83815

Re: Remington Water RAFN Application for Permit

Dear Morgan:

On behalf of the Remington Water District I would like to ask for an extension of time to submit the additional information until June 30, 2017.

Thank you for your consideration

Sincerely,

Bob

Robert G Haynes, P.E.

State of Idaho
DEPARTMENT OF WATER RESOURCES
Northern Region • 7600 N. Mineral Drive, Suite 100 • Coeur d'Alene, Idaho 83815-7763
Phone: (208) 762-2800 • Fax: (208) 762-2819 • Website: www.idwr.idaho.gov

C.L. "BUTCH" OTTER
Governor

GARY SPACKMAN
Director

October 28, 2016

COPY

Remington Water District
PO Box 468
Athol, ID 83801

Re: September 30, 2016 request for extension of time to provide information for Application for Permit No. 95-17118

Dear Applicant:

Pursuant to Rule 40.01.d of the Department's Water Appropriation Rules, your request for a 3-month extension of time to provide information requested by IDWR is hereby granted. Please submit the information by December 31, 2016.

Sincerely,

Morgan Case

Morgan Case
Northern Regional Manager

cc: Robert G. Haynes, Idaho Water Engineering

Idaho Water Engineering
2571 S Reynolds RD
Coeur d'Alene ID 83814
September 30, 2016

Morgan Case, Regional Manager
Idaho Department of Water Resources
7600 Mineral Drive
Coeur d'Alene ID 83815

Re: Remington Water RAFN Application for Permit

Dear Morgan:

On behalf of the Remington Water District I would like to ask for an extension of time to submit the additional information until December 31, 2016.

Thank you for your consideration

Sincerely,

Bob

Robert G Haynes, P.E.

State of Idaho
DEPARTMENT OF WATER RESOURCES

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Phone: (208) 762-2800 • Fax: (208) 762-2819 • Website: www.idwr.idaho.gov

C.L. "BUTCH" OTTER
Governor

GARY SPACKMAN
Director

April 27, 2016

Robert G Haynes, PE
Idaho Water Engineering
2571 S Reynolds Rd.
Coeur d'Alene, ID 83814

Re: April 27, 2016 request for extension of time to provide information for Application Nos. 95-17118

Dear Mr Haynes:

Pursuant to Rule 40.01.d of the Department's Water Appropriation Rules, your request for an extension of time to provide information requested by IDWR is hereby granted. Please submit the information by September 30, 2016.

Sincerely,

Morgan Case

Morgan Case
Regional Manager
IDWR Northern Region
morgan.case@idwr.idwr.gov
208.762.2800

Idaho Water Engineering
2571 S Reynolds RD
Coeur d'Alene ID 83814
April 27, 2016

Morgan Case, Regional Manager
Idaho Department of Water Resources
7600 Mineral Drive Suite 100
Coeur d'Alene ID 83815

Re: Remington Water District RAFN Application for Permit to Appropriate Water

Dear Morgan:

On behalf of the Remington Water District I would like to request an extension of time until September 30th to submit the additional information required by the department in support of their application.

If you have any questions, please contact me.

Sincerely

Robert G Haynes, PE

Franklin, Keith

From: Franklin, Keith
Sent: Monday, January 25, 2016 9:36 AM
To: 'Bob Haynes'
Cc: Newbry, Ashley; Keen, Shelley; Frederick, Adam
Subject: RE: RAFN

Bob,
Your request for the additional time is granted.
Keith.

From: Bob Haynes [mailto:bob@idahowaterengineering.com]
Sent: Monday, January 25, 2016 9:10 AM
To: Franklin, Keith
Subject: RAFN

Keith,

This is to confirm a request for additional time to submit the additional information the department requested for the RAFN applications. I would like to an extension to March 1 for Greenferry and to April 1 for Avondale and Remington.

Thanks for your consideration

Bob

State of Idaho
DEPARTMENT OF WATER RESOURCES
Northern Region • 7600 N. Mineral Drive, Suite 100 • Coeur d'Alene, Idaho 83815-7763
Phone: (208) 762-2800 • Fax: (208) 762-2819 • Website: www.idwr.idaho.gov

C.L. "BUTCH" OTTER
Governor

GARY SPACKMAN
Director

November 16, 2015

Bob Haynes, P.E.
Idaho Water Engineering
2571 S Reynolds Rd
Coeur d'Alene, ID 83814

Re: RAFN Applications for Remington Water District, Avondale Irrigation District and Greensferry Water & Sewer District.

Dear Mr. Haynes:

The North Kootenai Water & Sewer District and the Hauser Lake Water Association have requested an additional 60 days to comply with the Departments request for additional information regarding their RAFN applications. Their request for additional time was granted.

Since there was an error in the date of the letter of request that was sent to the RAFN applicants, it's only prudent that an additional 60 days, from the date of this letter, also be granted to the Remington Water District, Avondale Irrigation District and the Greensferry Water & Sewer District.

If you have any questions, don't hesitate to contact me at this office.

Sincerely,

Keith E Franklin
Program Manager Northern Region

Cc. Remington Water District
Avondale Irrigation District
Greensferry Water & Sewer District

Idaho Water Engineering
2571 S Reynolds RD
Coeur d'Alene ID 83814

Keith Franklin
Idaho Department of Water Resources
7600 Mineral Drive
Coeur d'Alene ID 83816

Re: Remington Reasonably Anticipated Future Needs Water Right Application

Dear Keith:

Thank you for sending me a copy of the letter regarding additional information for the Reasonably Anticipated Future Needs application. As you know, I'm working on three separate applications. Some of the information request, I've assembled. Some of it will require significant additional effort. I don't think we will not be able to complete work within thirty days. Also, I'm not sure when the letters were sent to the applicants, but they are dated August 28. I think this is probably an error.

Sincerely

Bob

Robert G Haynes, P.E.

Cc: Remington Water District

State of Idaho
DEPARTMENT OF WATER RESOURCES
Northern Region, 7600 Mineral Drive. Suite 100, Coeur d'Alene, Idaho 83815
Phone: (208) 762-2800 FAX: (208) 762-2819 www.idwr.idaho.gov

C.L. "BUTCH" OTTER
Governor

GARY SPACKMAN
Director

August 28, 2015

Remington Water District
Box 468
Athol, ID 83801

COPY

Re: RAFN Water Right Application

Dear Applicant:

Your recently submitted RAFN Water Right Application has been received by the Department for evaluation. The Idaho Department of Water Resources has completed an initial review of your RAFN Water Right Application and requests the following additional information, correction and/or clarification. The information that you submit in response to this letter will serve to augment your existing application, making it eligible for further processing.

NARRATIVE

The applicant must submit a narrative which details each of the key components of a RAFN application for its own system. Elements in the narrative should include:

A) Reasoning for the planning horizon selected.
B) A discussion of points of diversion, new and existing.
C) Methodology selected in determining amount of additional water needed.
D) A discussion of the existing and future water distribution system(s), including existing and future storage.
E) A discussion of anticipated completion within development period (up to five years with possible extension up to an additional ten years).
F) A discussion of all analyses described below.

FUTURE WATER DEMAND

Many northern Idaho RAFN applications have been based upon the Rathdrum Prairie Aquifer Future Demand report by the Idaho Water Resources Research Institute. In some cases the report overlooked existing water rights within an applicant's proposed service area that if acquired in the future would give the applicant an additional diversion rate over and above that of the RAFN application or may have included a water demand for areas and densities that will never be included or serviced by the applicant.

In order to tailor the Rathdrum Aquifer Future Water Demand report's gap analysis to your application, the following must be excluded from your planning area: service areas which are currently being served by community water systems, home owner associations, LLC's, etc. After land areas with competing interests have been identified and subtracted, the applicant may need to adjust the population density and corresponding water demand figures used to determine the applicants Average Daily Demand (ADD), Maximum Daily Demand (MDD) and/or Peak Hourly Demand (PHD) methods that ultimately developed a diversion rate for the planning horizon.

GAP ANALYSIS

The applicant can fulfill this requirement by subtracting their current water rights from their demand (in the future service area) at the end of the planning horizon. This analysis should be a comparison between how much water can be supplied with the applicant's existing water rights (and permits) versus how much water the municipal provider will need in the future. The difference equals the maximum amount which can be requested for this RAFN application before considering unaccounted for water.

OVERLAP ANALYSIS

The applicant must submit a thorough analysis of their RAFN future service area needs by identifying and deducting any existing water rights held by purveyors in their future service area, such as community water systems, home owner associations, and LLC's, etc. that deliver water unless documentation can show they have been accounted for in the applicants service area or GAP analysis. In addition, any water rights where the diversion rate is 0.16 cfs or greater (generally equivalent to a diversion rate for irrigation use greater than 5 acres) needs to be identified and deducted from the RAFN applications diversion rate unless documentation can show they have been accounted for in the applicants service area or GAP analysis. Finally, a general discussion of how the applicant intends to deal with water rights within the applicant's future service area having a diversion rate of 0.16 cfs or less (excluding exempt domestic type uses) must be included.

A summary of the analysis must be compiled into the report and presented to the Department listing the water rights identified and a discussion on how they are to be dealt with in the RAFN application.

UNACCOUNTED-FOR-WATER

Unaccounted-For-Water (UAW) is the difference between the volume produced at the source and the volume consumed by customers. Some examples of unauthorized UAW include water distribution system leakage, flushing lines, unauthorized use by theft, abandoned services, fire fighting, errors due to inaccurate or incorrectly read meters, etc.

Purveyors that took part in the Rathdrum Prairie Aquifer Future Water Demand study provided figures between 5% and 25% of Unaccounted-For Water. Some purveyors did not provide any percentages for their system. This type of data is required for a complete RAFN application.
IDWR's criteria for reviewing RAFN applications requires purveyors with UAW values greater than 10% to include a technical discussion and historic diversion records supporting greater percentages. Please provide a detailed analysis of your system and supporting data which justifies your percentage of UAW. Include some discussion (with numbers, and/or calculations) on why your system has these losses. Note that UAW values greater than 10% for existing systems may be acceptable with the appropriate records and justification; however, UAW values greater than 10 % for new systems (or parts thereof) are not consistent with the requirement for conservation of water resources in Idaho and will not be acceptable as part of the water demand analysis for a RAFN application.

WATER CONSERVATION PLAN

To stay in compliance with the September 15, 2005 Final Order Adopting Ground Water Management Plan for the Rathdrum Prairie Ground Water Management Area, "all new water rights or changes to existing water rights held by municipal purveyors, IDWR will require conservation plans for all systems regulated as public water systems".

Each plan may include the elements as listed in guidelines published by EPA ("Water Conservation Plan Guidelines", Environmental Protection Agency, 1998.

Additionally, applicants may utilize the Idaho Department of Water Resources "Water Conservation Measures and Guidelines for Preparing Water Conservation Plans", February 2006:

https://www.idwr.idaho.gov/Waterinformation/GroundWaterManagement/RathdrumPrairie/rpgwma.htm.

The conservation plan may also include the following components:

- Measurable conservation planning goals
- Summary of existing system characteristics and water use conditions
- Water system profile
- Description of planned facilities
- Current and future conservation opportunities
- Identification of water conservation measures
- Analysis of benefits and costs
- Select water conservation measures
- Implementation mechanisms, timetable and assessment strategies

If you haven't already done so, please submit your water conservation plan.

If an adjustment to your initial application is warranted, please provide the necessary documentation justifying the changes and provide an amendment to the RAFN applications diversion rate.

Please provide the above requested information within the next 30 days so as not to further delay processing of your application. If you have any questions, don't hesitate to contact me at this office.

Sincerely,

Keith E Franklin
Program Manager Northern Region

Cc. Ashley Newbry, Boise Office
Bob Haynes, Idaho Water Engineering

IDAHO Department of Water Resources

WATER RIGHT REPORT

10/23/2019

IDAHO DEPARTMENT OF WATER RESOURCES

Water Right Report

WATER RIGHT NO. 95-9450

Owner Type	Name and Address
Current Owner	EIGHT MILE PRAIRIE HOMEOWNERS ASSN PO BOX 546 ATHOL, ID 83801 2086830319
Original Owner	KOOTENAI INVESTMENTS CO INC PO BOX G COEUR D ALENE, ID 83814-0006

Priority Date: 08/03/1998

Basis: License

Status: Active

Source	Tributary
GROUND WATER	

Beneficial Use	From	To	Diversion Rate	Volume
MUNICIPAL	01/01	12/31	0.31 CFS	52.5 AFA
Total Diversion			0.31 CFS	52.5 AFA

Location of Point(s) of Diversion:

GROUND WATER	SWSE	Sec. 30	Township 53N	Range 03W	KOOTENAI County

Place(s) of use:

Place of Use Legal Description: MUNICIPAL KOOTENAI County

Township	Range	Section	Lot	Tract	Acres	Lot	Tract	Acres	Lot	Tract	Acres	Lot	Tract	Acres
53N	03W	30		NESE			NWSE			SWSE			SESE	

Conditions of Approval:

1.	004	The issuance of this right does not grant any right-of-way or easement across the land of another.
2.	174	This right authorizes the diversion of ground water within the Rathdrum Prairie Ground Water Management Area (RPGWMA). Use of water under this right shall be subject to the provisions of the management plan approved by the director for the RPGWMA.
3.	01M	After specific notification by the department, the right holder shall install a suitable measuring device or shall enter into an agreement with the department to determine the amount of water diverted from power records and shall annually report the information to the department.
4.		Point of diversion is located within Lot 4, Eightmile Prairie Subdivision, First Addition.
5.	128	Place of use is within the area served by the public water supply system of Eight Mile Prairie Homeowner Association. The place of use is generally located within Section 30, Township 53N, Range 3W.

Dates:

Licensed Date: 02/19/2008

Decreed Date:

Enlargement Use Priority Date:

Enlargement Statute Priority Date:

Water Supply Bank Enrollment Date Accepted:

Water Supply Bank Enrollment Date Removed:

Application Received Date:

Protest Deadline Date:

Number of Protests: 0

Other Information:

State or Federal:

Owner Name Connector:

Water District Number: NWD

Generic Max Rate per Acre:

Generic Max Volume per Acre:

Civil Case Number:

Old Case Number:

Decree Plantiff:

Decree Defendant:

Swan Falls Trust or Nontrust:

Swan Falls Dismissed:

DLE Act Number:

Cary Act Number:

Mitigation Plan: False

IDAHO Department of Water Resources

WATER RIGHT REPORT

10/23/2019

IDAHO DEPARTMENT OF WATER RESOURCES

Water Right Report

WATER RIGHT NO. 95-9012

Owner Type	Name and Address
Current Owner	ELKHORN RANCH HOMEOWNERS ASSN INC PO BOX 918 RATHDRUM, ID 83858
Original Owner	SCARCELLO RANCH PO BOX 920 RATHDRUM, ID 83858-0920 2086872525

Priority Date: 03/22/1999

Basis: License

Status: Active

Source	Tributary
GROUND WATER	

Beneficial Use	From	To	Diversion Rate	Volume
MUNICIPAL	01/01	12/31	1 CFS	148.8 AFA
Total Diversion			1 CFS	148.8 AFA

Location of Point(s) of Diversion:

GROUND WATER	SENW	Sec. 10	Township 52N	Range 04W	KOOTENAI County
GROUND WATER	SENW	Sec. 10	Township 52N	Range 04W	KOOTENAI County

Place(s) of use: Large POU Info

Conditions of Approval:

1.	180	A map depicting the place of use boundary for this water right at the time of this approval is attached to this document for illustration purposes.

2.	128	Place of use is within the area served by the public water supply system number 1280293 of Elkhorn Ranch Homeowner Association. The place of use is generally located within 3,10 Section, 52NTownship, 04WRange.
3.	01M	After specific notification by the department, the right holder shall install a suitable measuring device or shall enter into an agreement with the department to determine the amount of water diverted from power records and shall annually report the information to the department.
4.	174	This right authorizes the diversion of ground water within the Rathdrum Prairie Ground Water Management Area (RPGWMA). Use of water under this right shall be subject to the provisions of the management plan approved by the director for the RPGWMA.
5.	004	The issuance of this right does not grant any right-of-way or easement across the land of another.

Dates:

Licensed Date: 02/04/2008

Decreed Date:

Permit Proof Due Date: 7/1/2004

Permit Proof Made Date: 6/21/2004

Permit Approved Date: 6/28/1999

Permit Moratorium Expiration Date:

Enlargement Use Priority Date:

Enlargement Statute Priority Date:

Water Supply Bank Enrollment Date Accepted:

Water Supply Bank Enrollment Date Removed:

Application Received Date: 03/22/1999

Protest Deadline Date:

Number of Protests: 0

Other Information:

State or Federal:

Owner Name Connector:

Water District Number: NWD

Generic Max Rate per Acre:

Generic Max Volume per Acre:

Civil Case Number:

Old Case Number:

Decree Plantiff:

Decree Defendant:

Swan Falls Trust or Nontrust:

Swan Falls Dismissed:

DLE Act Number:

Cary Act Number:

Mitigation Plan: False

APPENDIX E:

Drinking Water Quality Testing Results Summary

WELCH-COMER
ENGINEERS | SURVEYORS

Drinking Water Branch

Sample Schedules

Return Links

Water System Detail

Water Systems

Water System Search

County Map

Glossary

Water System No. :	ID1280270	**Federal Type :**	C
Water System Name :	REMINGTON REC WATER DIST	**State Type :**	C
Principal County Served :	KOOTENAI	**Primary Source :**	GW
Status :	A	**Activity Date :**	01-11-1996

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	11-01-2012		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
ID1280270WF	WELLS 1&2 WELLFIELD	ZARS	ARSENIC (1005)	1	RT	9Y	01-01-2011		0/0	0/0
ID1280270WF	WELLS 1&2 WELLFIELD	ZFLU	IOC - FLUORIDE	1	RT	9Y	01-01-1993		0/0	0/0
ID1280270WF	WELLS 1&2 WELLFIELD	SODI	IOC - SODIUM	1	RT	3Y	01-01-2008		0/0	0/0
ID1280270WF	WELLS 1&2 WELLFIELD	ZIOC	IOCS - PHASE 2 AND 5	1	RT	9Y	01-01-2002		0/0	0/0
ID1280270WF	WELLS 1&2 WELLFIELD	ZNO3	NITRATE	1	RT	YR	01-01-2000		0/0	0/0
ID1280270WF	WELLS 1&2 WELLFIELD	ZNO2	NITRITE	1	RT	9Y	01-01-2002		0/0	0/0
ID1280270WF	WELLS 1&2 WELLFIELD	ALFA	RADS - GROSS ALPHA	1	RT	6Y	01-01-2014		0/0	0/0
ID1280270WF	WELLS 1&2 WELLFIELD	R6&8	RADS - R 226 & 228	1	RT	9Y	01-01-2014		0/0	0/0
ID1280270WF	WELLS 1&2 WELLFIELD	R226	RADS - RADIUM 226	1	RT	9Y	01-01-2014		0/0	0/0

ID1280270WF	WELLS 1&2 WELLFIELD	R228	RADS - RADIUM 228	1	RT	9Y	01-01-2014		0/0	0/0
ID1280270WF	WELLS 1&2 WELLFIELD	URAN	RADS - URANIUM	1	RT	6Y	01-01-2008		0/0	0/0
ID1280270WF	WELLS 1&2 WELLFIELD	VOCS	VOCS - GROUP	1	RT	6Y	01-01-1998		0/0	0/0
T1280270DS1	DISTRIBUTION SYSTEM	PBCU	LCR - LEAD COPPER	10	RT	3Y	01-01-2004		6/1	9/30

Total Number of Records Fetched = 13

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
T1280270DS1	DISTRIBUTION SYSTEM	2456	TOTAL HALOACETIC ACIDS (HAA5)	1	RT	YR	01-01-2015		7/1	9/30
T1280270DS1	DISTRIBUTION SYSTEM	2950	TTHM	1	RT	YR	01-01-2015		7/1	9/30

Total Number of Records Fetched = 2

Analyte Name	Method Code	Less than Indicator	Level Type	Reporting Level	Concentration level	Monitoring Period Begin Date	Monitoring Period End Date
1,1,1-TRICHLOROETHANE	null	Y	MDL	0.000500000 MG /L		1/1/2014	12/31/2019
1,1,2-TRICHLOROETHANE	null	Y	MDL	0.000500000 MG /L		1/1/2014	12/31/2019
1,1-DICHLOROETHYLENE	null	Y	MDL	0.000500000 MG /L		1/1/2014	12/31/2019
1,2,4-TRICHLOROBENZENE	null	Y	MDL	0.000500000 MG /L		1/1/2014	12/31/2019
1,2-DICHLOROETHANE	null	Y	MDL	0.000500000 MG /L		1/1/2014	12/31/2019
1,2-DICHLOROPROPANE	null	Y	MDL	0.000500000 MG /L		1/1/2014	12/31/2019
ANTIMONY, TOTAL	null	Y	MDL	0E-9		1/1/2011	12/31/2019
ARSENIC	200.8	N		0E-9	.00101 MG/L	1/1/2011	12/31/2019
ARSENIC	200.8	N		0E-9	.00121 MG/L	1/1/2011	12/31/2019
BARIUM	200.7	N		0E-9	.023 MG/L	1/1/2011	12/31/2019
BENZENE	null	Y	MDL	0.000500000 MG /L		1/1/2014	12/31/2019
BERYLLIUM, TOTAL	null	Y	MDL	0E-9		1/1/2011	12/31/2019
CADMIUM	null	Y	MDL	0E-9		1/1/2011	12/31/2019
CARBON TETRACHLORIDE	null	Y	MDL	0.000500000 MG /L		1/1/2014	12/31/2019
CHLOROBENZENE	null	Y	MDL	0.000500000 MG /L		1/1/2014	12/31/2019
CHROMIUM	null	Y	MDL	0E-9		1/1/2011	12/31/2019
CIS-1,2-DICHLOROETHYLENE	null	Y	MDL	0.000500000 MG /L		1/1/2014	12/31/2019
COMBINED URANIUM	200.8	N		0E-9	2.81 UG/L	1/1/2014	12/31/2019
DICHLOROMETHANE	null	Y	MDL	0.000500000 MG /L		1/1/2014	12/31/2019
ETHYLBENZENE	null	Y	MDL	0.000500000 MG /L		1/1/2014	12/31/2019
FLUORIDE	null	Y	MDL	0E-9		1/1/2011	12/31/2019
GROSS ALPHA, EXCL. RADON & U	null	Y		0E-9 MG/L		1/1/2014	12/31/2019
GROSS ALPHA, INCL. RADON & U	null	Y	MDL	0E-9 MG/L			
MERCURY	null	Y	MDL	0E-9		1/1/2011	12/31/2019
NICKEL	null	Y	MDL	0E-9		1/1/2011	12/31/2019
NITRATE	300	N		0E-9	.180 MG/L	1/1/2018	12/31/2018
NITRATE	300	N		0E-9	.295 MG/L	1/1/2018	12/31/2018
NITRATE	300	N		0E-9	.173 MG/L	1/1/2018	12/31/2018
NITRATE	300	N		0E-9	.273 MG/L	1/1/2019	12/31/2019
NITRATE	300	N		0E-9	.184 MG/L	1/1/2019	12/31/2019
NITRITE	null	Y	MDL	0E-9		1/1/2011	12/31/2019

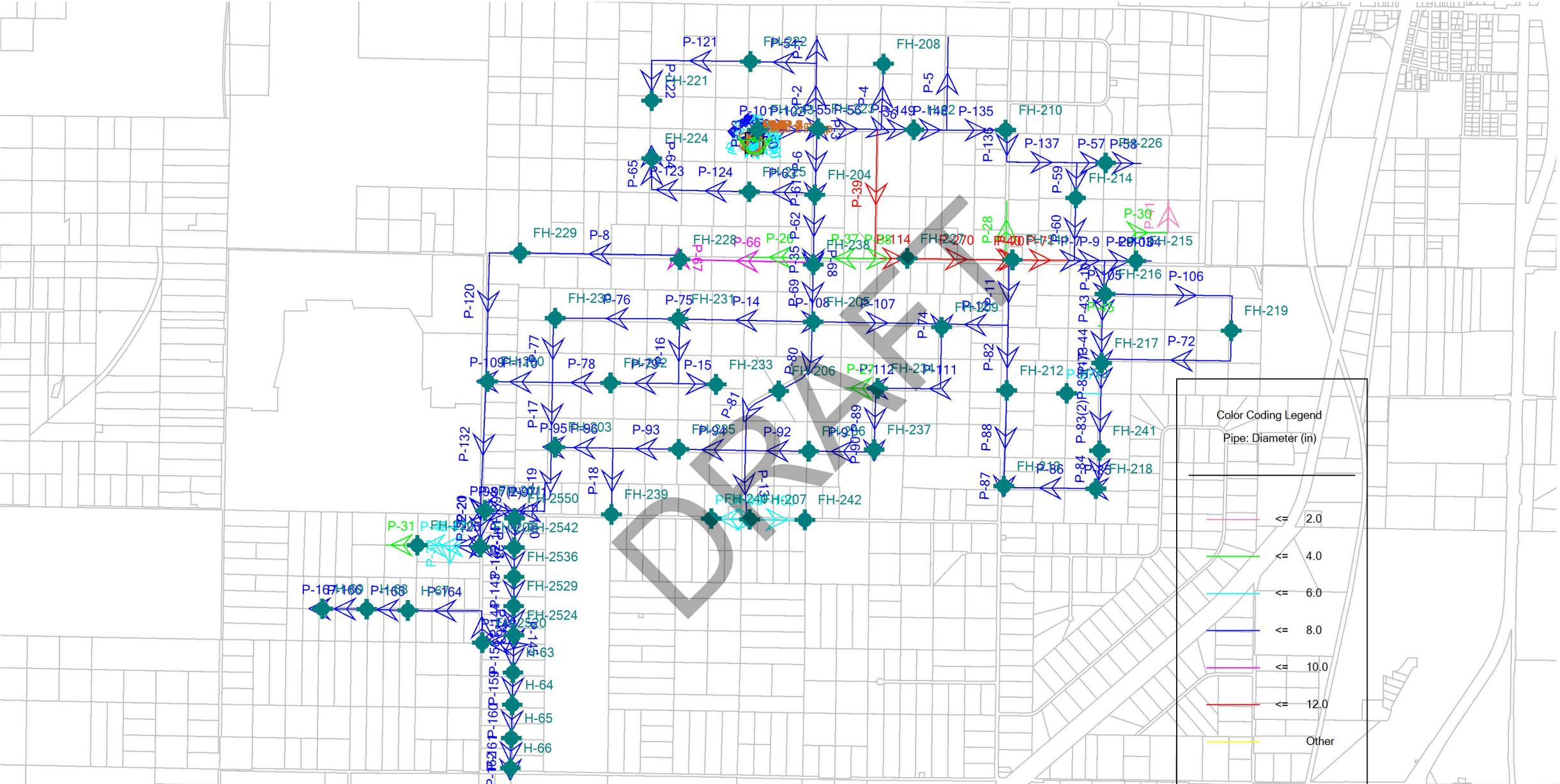
Analyte Name	Method Code	Less than Indicator	Level Type	Reporting Level	Concentration level	Monitoring Period Begin Date	Monitoring Period End Date
O-DICHLOROBENZENE	null	Y	MDL	0.000500000 MG /L		1/1/2014	12/31/2019
P-DICHLOROBENZENE	null	Y	MDL	0.000500000 MG /L		1/1/2014	12/31/2019
SELENIUM	null	Y	MDL	0E-9		1/1/2011	12/31/2019
SODIUM	200.7	N		0E-9	3.11 MG/L	1/1/2017	12/31/2019
SODIUM	200.7	N		0E-9	3.20 MG/L	1/1/2017	12/31/2019
SODIUM	null	N		0E-9	3.04 MG/L	1/1/2017	12/31/2019
SODIUM	200.7	N		0E-9	3.31 MG/L	1/1/2017	12/31/2019
SODIUM	200.7	N		0E-9	3.01 MG/L	1/1/2017	12/31/2019
STYRENE	null	Y	MDL	0.000500000 MG /L		1/1/2014	12/31/2019
TETRACHLOROETHYLENE	null	Y	MDL	0.000500000 MG /L		1/1/2014	12/31/2019
THALLIUM, TOTAL	null	Y	MDL	0E-9		1/1/2011	12/31/2019
TOLUENE	null	Y	MDL	0.000500000 MG /L		1/1/2014	12/31/2019
TOTAL HALOACETIC ACIDS (HAA5)	6251B	Y	MDL	0E-9		1/1/2018	12/31/2018
TOTAL HALOACETIC ACIDS (HAA5)	null	Y	MDL	0E-9		1/1/2019	12/31/2019
TRANS-1,2-DICHLOROETHYLENE	null	Y	MDL	0.000500000 MG /L		1/1/2014	12/31/2019
TRICHLOROETHYLENE	null	Y	MDL	0.000500000 MG /L		1/1/2014	12/31/2019
TTHM	524.2	Y	MDL	0E-9		1/1/2018	12/31/2018
TTHM	null	Y	MDL	0E-9		1/1/2019	12/31/2019
VINYL CHLORIDE	null	Y	MDL	0.000500000 MG /L		1/1/2014	12/31/2019
XYLENES, TOTAL	null	Y	MDL	0.000500000 MG /L		1/1/2014	12/31/2019

Collection Date & Time	Presence/ Absence Indicator	Analyte Name	Monitoring Period Begin Date	Monitoring Period End Date
43788	A	COLIFORM (TCR)	43770	43799
43763	A	COLIFORM (TCR)	43739	43769
43719	A	COLIFORM (TCR)	43709	43738
43693	A	COLIFORM (TCR)	43678	43708
43664	A	COLIFORM (TCR)	43647	43677
43641	A	COLIFORM (TCR)	43617	43646
43609	A	COLIFORM (TCR)	43586	43616
43559	A	COLIFORM (TCR)	43556	43585
43546	A	COLIFORM (TCR)	43525	43555
43515	A	COLIFORM (TCR)	43497	43524
43479	A	COLIFORM (TCR)	43466	43496
43451	A	COLIFORM (TCR)	43435	43465
43424	A	COLIFORM (TCR)	43405	43434
43381	A	COLIFORM (TCR)	43374	43404
43364	A	COLIFORM (TCR)	43344	43373
43334	A	COLIFORM (TCR)	43313	43343
43308	A	COLIFORM (TCR)	43282	43312
43262	A	COLIFORM (TCR)	43252	43281
43241	A	COLIFORM (TCR)	43221	43251
43193	A	COLIFORM (TCR)	43191	43220
43178	A	COLIFORM (TCR)	43160	43190
43151	A	COLIFORM (TCR)	43132	43159
43112	A	COLIFORM (TCR)	43101	43131
43096	A	COLIFORM (TCR)	43070	43100

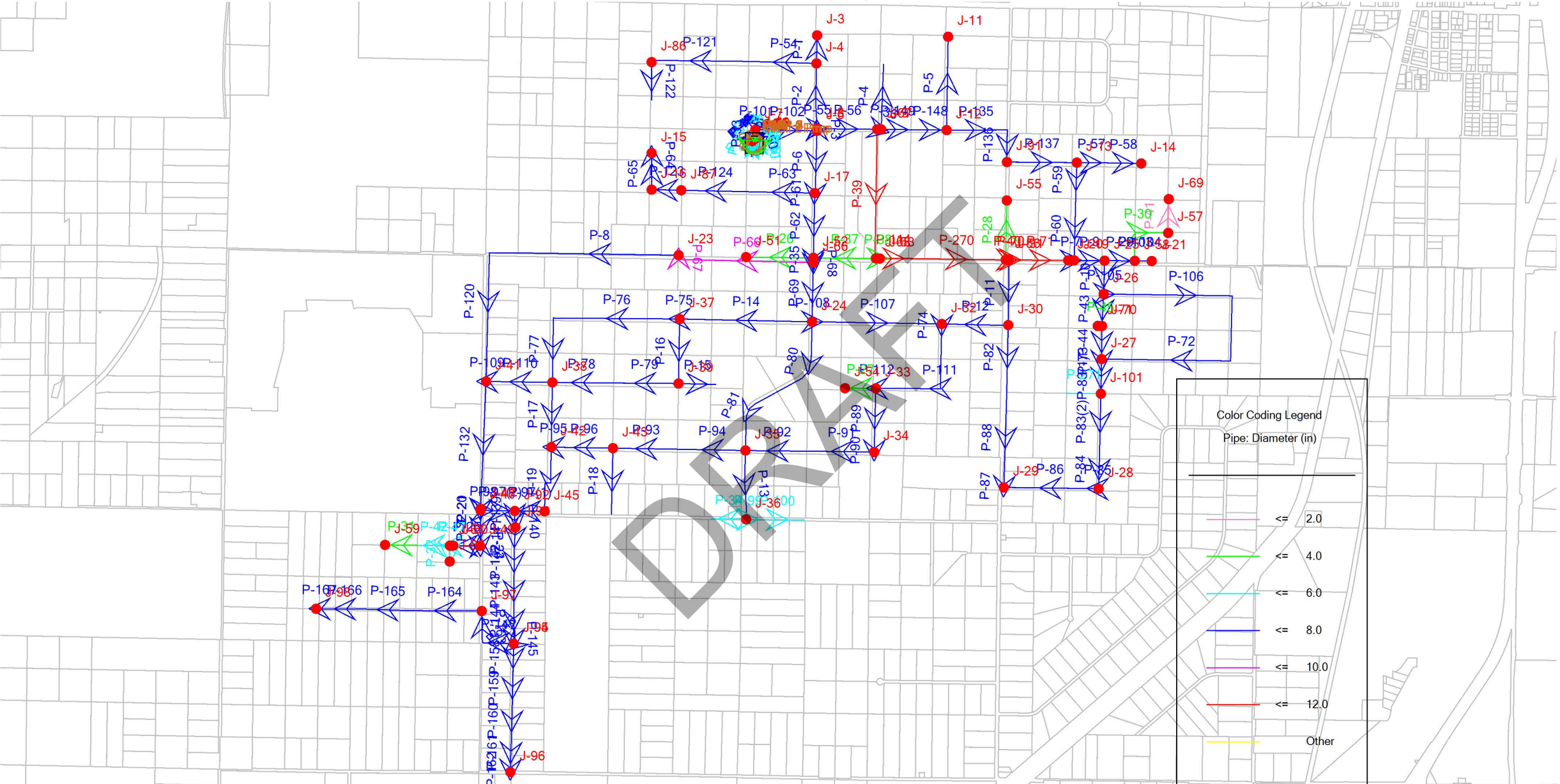
APPENDIX F:
Hydraulic Model Results

WELCH-COMER
ENGINEERS | SURVEYORS

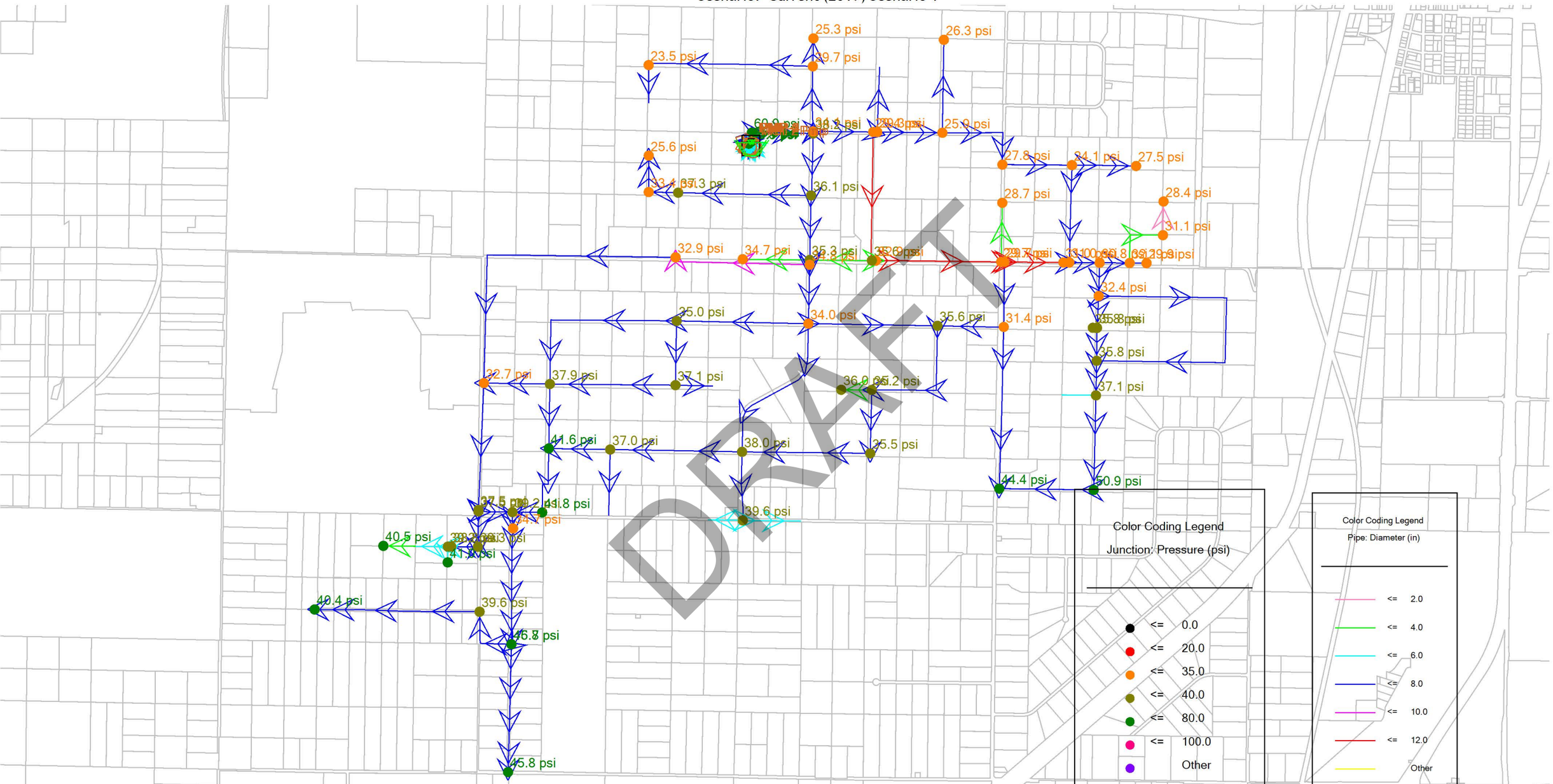
Scenario: Current (2019) Scenario 1



Scenario: Current (2019) Scenario 1



Scenario: Current (2019) Scenario 1



FlexTable: Junction Table

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Is Active?
24	J-3	2,507.0	<None>	<Collection: 1 items>	7.74	2,565.6	25.3	True
25	J-4	2,497.0	<None>	<Collection: 1 items>	11.62	2,565.6	29.7	True
29	J-6	2,487.0	<None>	<Collection: 1 items>	0.00	2,575.3	38.2	True
31	J-7	2,491.0	<None>	<Collection: 1 items>	23.23	2,631.7	60.9	True
33	J-8	2,487.0	<None>	<Collection: 1 items>	7.74	2,565.7	34.1	True
36	J-9	2,483.0	<None>	<Collection: 1 items>	15.49	2,550.8	29.3	True
40	J-11	2,488.0	<None>	<Collection: 1 items>	23.23	2,548.9	26.3	True
41	J-12	2,489.0	<None>	<Collection: 1 items>	15.49	2,548.9	25.9	True
44	J-13	2,489.0	<None>	<Collection: 1 items>	15.49	2,544.6	24.1	True
46	J-14	2,481.0	<None>	<Collection: 1 items>	19.36	2,544.6	27.5	True
48	J-15	2,501.0	<None>	<Collection: 1 items>	11.62	2,560.3	25.6	True
49	J-16	2,483.0	<None>	<Collection: 1 items>	23.23	2,560.3	33.4	True
51	J-17	2,477.0	<None>	<Collection: 1 items>	23.23	2,560.5	36.1	True
56	J-19	2,472.0	<None>	<Collection: 1 items>	23.23	2,543.6	31.0	True
58	J-20	2,472.0	<None>	<Collection: 1 items>	0.00	2,543.6	31.0	True
60	J-21	2,474.0	<None>	<Collection: 1 items>	0.00	2,543.2	29.9	True
63	J-23	2,470.0	<None>	<Collection: 1 items>	34.85	2,546.0	32.9	True
65	J-24	2,464.0	<None>	<Collection: 1 items>	30.98	2,542.6	34.0	True

FlexTable: Junction Table

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Is Active?
67	J-25	2,472.0	<None>	<Collection: 1 items>	7.74	2,543.2	30.8	True
70	J-26	2,468.0	<None>	<Collection: 1 items>	0.00	2,542.9	32.4	True
72	J-27	2,460.0	<None>	<Collection: 1 items>	30.98	2,542.8	35.8	True
75	J-28	2,425.0	<None>	<Collection: 1 items>	15.49	2,542.7	50.9	True
77	J-29	2,440.0	<None>	<Collection: 1 items>	27.11	2,542.6	44.4	True
79	J-30	2,470.0	<None>	<Collection: 1 items>	34.85	2,542.7	31.4	True
81	J-31	2,475.0	<None>	<Collection: 1 items>	0.00	2,543.6	29.7	True
84	J-32	2,460.0	<None>	<Collection: 1 items>	30.98	2,542.4	35.6	True
87	J-33	2,460.0	<None>	<Collection: 1 items>	19.36	2,541.4	35.2	True
89	J-34	2,459.0	<None>	<Collection: 1 items>	19.36	2,541.1	35.5	True
91	J-35	2,453.0	<None>	<Collection: 1 items>	15.49	2,540.8	38.0	True
94	J-36	2,449.0	<None>	<Collection: 1 items>	58.09	2,540.6	39.6	True
96	J-37	2,460.0	<None>	<Collection: 1 items>	30.98	2,540.9	35.0	True
98	J-38	2,453.0	<None>	<Collection: 1 items>	15.49	2,540.6	37.9	True
100	J-39	2,455.0	<None>	<Collection: 1 items>	15.49	2,540.8	37.1	True
105	J-41	2,465.0	<None>	<Collection: 1 items>	19.36	2,540.6	32.7	True
107	J-42	2,443.0	<None>	<Collection: 1 items>	23.23	2,539.2	41.6	True
109	J-43	2,454.0	<None>	<Collection: 1 items>	15.49	2,539.5	37.0	True

FlexTable: Junction Table

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Is Active?
114	J-45	2,442.0	<None>	<Collection: 1 items>	11.62	2,538.7	41.8	True
116	J-46	2,452.0	<None>	<Collection: 1 items>	7.74	2,538.8	37.5	True
118	J-47	2,452.0	<None>	<Collection: 1 items>	0.00	2,538.8	37.5	True
123	J-49	2,448.0	<None>	<Collection: 1 items>	0.00	2,538.7	39.3	True
127	J-50	2,449.0	<None>	<Collection: 1 items>	7.74	2,538.7	38.8	True
129	J-51	2,468.0	<None>	<Collection: 1 items>	15.49	2,548.2	34.7	True
130	J-52	2,467.0	<None>	<Collection: 1 items>	15.49	2,548.5	35.3	True
134	J-53	2,468.0	<None>	<Collection: 1 items>	38.72	2,544.0	32.9	True
136	J-54	2,458.0	<None>	<Collection: 1 items>	15.49	2,541.2	36.0	True
138	J-55	2,477.0	<None>	<Collection: 1 items>	11.62	2,543.4	28.7	True
139	J-56	2,475.0	<None>	<Collection: 1 items>	23.23	2,543.6	29.7	True
141	J-57	2,471.0	<None>	<Collection: 1 items>	11.62	2,542.9	31.1	True
142	J-58	2,469.0	<None>	<Collection: 1 items>	15.49	2,543.2	32.1	True
146	J-59	2,445.0	<None>	<Collection: 1 items>	15.49	2,538.6	40.5	True
149	J-61	2,448.0	<None>	<Collection: 1 items>	0.00	2,538.7	39.2	True
150	J-62	2,444.0	<None>	<Collection: 1 items>	15.49	2,538.7	41.0	True
152	J-63	2,489.0	<None>	<Collection: 1 items>	0.00	2,640.0	65.3	True
158	J-66	2,467.0	<None>	<Collection: 1 items>	0.00	2,547.5	34.8	True

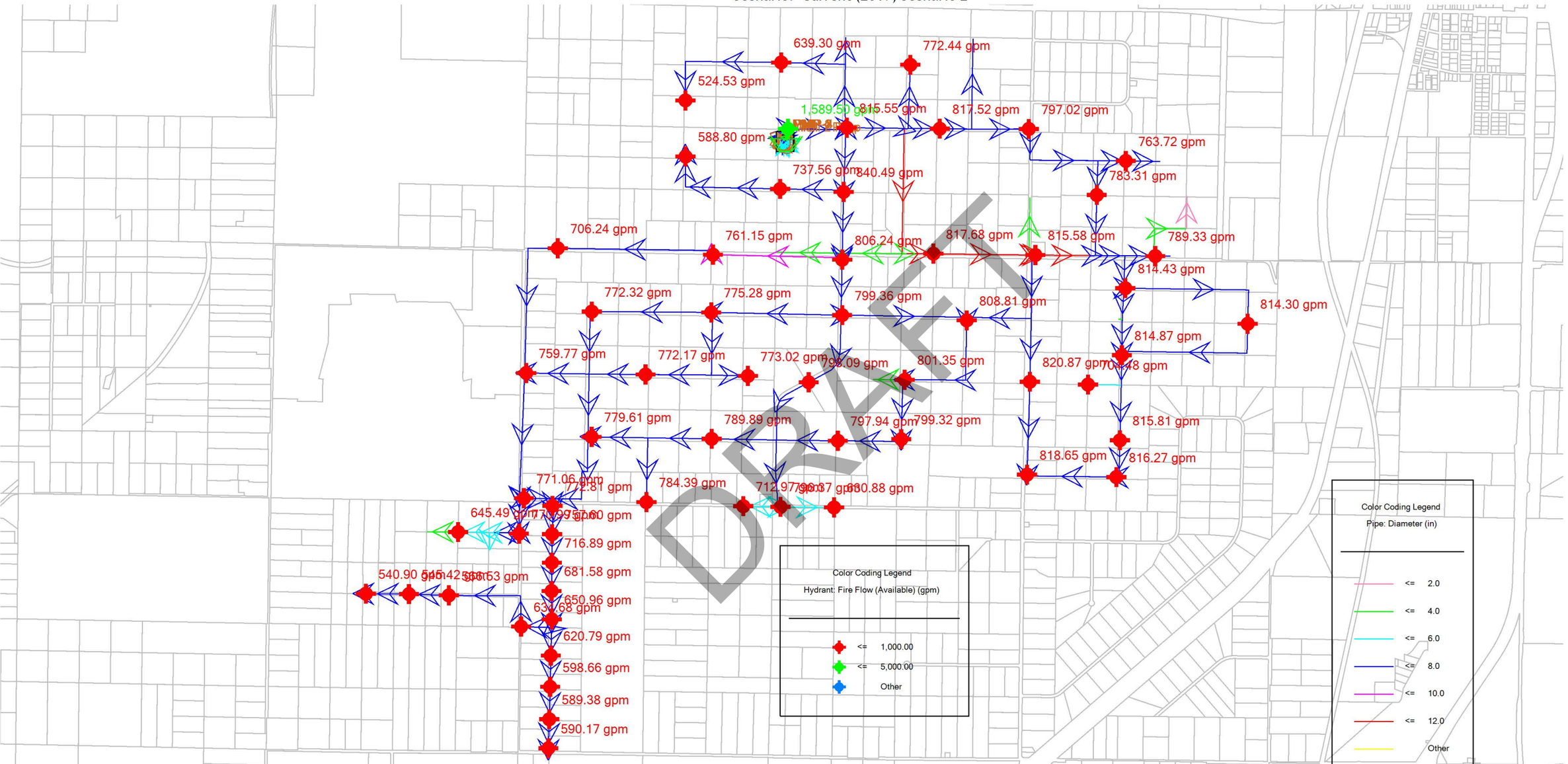
FlexTable: Junction Table

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Is Active?
162	J-67	2,483.0	<None>	<Collection: 1 items>	0.00	2,551.0	29.4	True
165	J-68	2,468.0	<None>	<Collection: 1 items>	0.00	2,550.2	35.6	True
172	J-69	2,477.0	<None>	<Collection: 1 items>	3.87	2,542.6	28.4	True
193	J-70	2,460.0	<None>	<Collection: 1 items>	15.49	2,542.8	35.8	True
196	J-71	2,460.0	<None>	<Collection: 1 items>	0.00	2,542.8	35.8	True
253	J-73	2,489.0	<None>	<Collection: 1 items>	0.00	2,641.3	65.9	True
257	J-74	2,489.0	<None>	<Collection: 1 items>	0.00	2,640.9	65.7	True
261	J-75	2,489.0	<None>	<Collection: 1 items>	0.00	2,640.6	65.6	True
495	J-86	2,511.0	<None>	<Collection: 1 items>	30.98	2,565.3	23.5	True
501	J-87	2,474.0	<None>	<Collection: 1 items>	11.62	2,560.3	37.3	True
539	J-91	2,482.0	<None>	<Collection: 1 items>	23.23	2,546.2	27.8	True
568	J-92	2,448.0	<None>	<Collection: 1 items>	3.87	2,538.5	39.2	True
570	J-93	2,458.0	<None>	<Collection: 1 items>	30.98	2,538.1	34.7	True
576	J-94	2,428.0	<None>	<Collection: 1 items>	34.85	2,535.9	46.7	True
578	J-95	2,430.0	<None>	<Collection: 1 items>	0.00	2,535.9	45.8	True
607	J-96	2,430.0	<None>	<Collection: 1 items>	7.74	2,535.8	45.8	True
621	J-97	2,444.0	<None>	<Collection: 1 items>	23.23	2,535.6	39.6	True
623	J-98	2,442.0	<None>	<Collection: 1 items>	23.23	2,535.3	40.4	True

FlexTable: Junction Table

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Is Active?
637	J-101	2,457.0	<None>	<Collection: 0 items>	0.00	2,542.7	37.1	True

Scenario: Current (2019) Scenario 2



FlexTable: Junction Table

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Is Active?
24	J-3	2,507.0	<None>	<Collection: 1 items>	3.61	2,650.9	62.3	True
25	J-4	2,497.0	<None>	<Collection: 1 items>	5.41	2,650.9	66.6	True
29	J-6	2,487.0	<None>	<Collection: 1 items>	0.00	2,653.0	71.8	True
31	J-7	2,491.0	<None>	<Collection: 1 items>	10.82	2,665.2	75.4	True
33	J-8	2,487.0	<None>	<Collection: 1 items>	3.61	2,650.9	70.9	True
36	J-9	2,483.0	<None>	<Collection: 1 items>	7.21	2,647.7	71.2	True
40	J-11	2,488.0	<None>	<Collection: 1 items>	10.82	2,647.3	68.9	True
41	J-12	2,489.0	<None>	<Collection: 1 items>	7.21	2,647.3	68.5	True
44	J-13	2,489.0	<None>	<Collection: 1 items>	7.21	2,646.3	68.1	True
46	J-14	2,481.0	<None>	<Collection: 1 items>	9.01	2,646.3	71.5	True
48	J-15	2,501.0	<None>	<Collection: 1 items>	5.41	2,649.7	64.4	True
49	J-16	2,483.0	<None>	<Collection: 1 items>	10.82	2,649.7	72.1	True
51	J-17	2,477.0	<None>	<Collection: 1 items>	10.82	2,649.8	74.8	True
56	J-19	2,472.0	<None>	<Collection: 1 items>	10.82	2,646.1	75.3	True
58	J-20	2,472.0	<None>	<Collection: 1 items>	0.00	2,646.1	75.3	True
60	J-21	2,474.0	<None>	<Collection: 1 items>	0.00	2,646.0	74.4	True
63	J-23	2,470.0	<None>	<Collection: 1 items>	16.22	2,646.6	76.4	True
65	J-24	2,464.0	<None>	<Collection: 1 items>	14.42	2,645.9	78.7	True

FlexTable: Junction Table

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Is Active?
67	J-25	2,472.0	<None>	<Collection: 1 items>	3.61	2,646.0	75.3	True
70	J-26	2,468.0	<None>	<Collection: 1 items>	0.00	2,646.0	77.0	True
72	J-27	2,460.0	<None>	<Collection: 1 items>	14.42	2,646.0	80.5	True
75	J-28	2,425.0	<None>	<Collection: 1 items>	7.21	2,645.9	95.6	True
77	J-29	2,440.0	<None>	<Collection: 1 items>	12.62	2,645.9	89.1	True
79	J-30	2,470.0	<None>	<Collection: 1 items>	16.22	2,645.9	76.1	True
81	J-31	2,475.0	<None>	<Collection: 1 items>	0.00	2,646.1	74.0	True
84	J-32	2,460.0	<None>	<Collection: 1 items>	14.42	2,645.9	80.4	True
87	J-33	2,460.0	<None>	<Collection: 1 items>	9.01	2,645.6	80.3	True
89	J-34	2,459.0	<None>	<Collection: 1 items>	9.01	2,645.6	80.7	True
91	J-35	2,453.0	<None>	<Collection: 1 items>	7.21	2,645.5	83.3	True
94	J-36	2,449.0	<None>	<Collection: 1 items>	27.04	2,645.5	85.0	True
96	J-37	2,460.0	<None>	<Collection: 1 items>	14.42	2,645.5	80.3	True
98	J-38	2,453.0	<None>	<Collection: 1 items>	7.21	2,645.5	83.3	True
100	J-39	2,455.0	<None>	<Collection: 1 items>	7.21	2,645.5	82.4	True
105	J-41	2,465.0	<None>	<Collection: 1 items>	9.01	2,645.5	78.1	True
107	J-42	2,443.0	<None>	<Collection: 1 items>	10.82	2,645.2	87.5	True
109	J-43	2,454.0	<None>	<Collection: 1 items>	7.21	2,645.2	82.7	True

FlexTable: Junction Table

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Is Active?
114	J-45	2,442.0	<None>	<Collection: 1 items>	5.41	2,645.1	87.9	True
116	J-46	2,452.0	<None>	<Collection: 1 items>	3.61	2,645.1	83.5	True
118	J-47	2,452.0	<None>	<Collection: 1 items>	0.00	2,645.1	83.5	True
123	J-49	2,448.0	<None>	<Collection: 1 items>	0.00	2,645.1	85.3	True
127	J-50	2,449.0	<None>	<Collection: 1 items>	3.61	2,645.1	84.8	True
129	J-51	2,468.0	<None>	<Collection: 1 items>	7.21	2,647.1	77.5	True
130	J-52	2,467.0	<None>	<Collection: 1 items>	7.21	2,647.2	78.0	True
134	J-53	2,468.0	<None>	<Collection: 1 items>	18.03	2,646.2	77.1	True
136	J-54	2,458.0	<None>	<Collection: 1 items>	7.21	2,645.6	81.2	True
138	J-55	2,477.0	<None>	<Collection: 1 items>	5.41	2,646.1	73.2	True
139	J-56	2,475.0	<None>	<Collection: 1 items>	10.82	2,646.1	74.0	True
141	J-57	2,471.0	<None>	<Collection: 1 items>	5.41	2,646.0	75.7	True
142	J-58	2,469.0	<None>	<Collection: 1 items>	7.21	2,646.0	76.6	True
146	J-59	2,445.0	<None>	<Collection: 1 items>	7.21	2,645.0	86.5	True
149	J-61	2,448.0	<None>	<Collection: 1 items>	0.00	2,645.1	85.3	True
150	J-62	2,444.0	<None>	<Collection: 1 items>	7.21	2,645.1	87.0	True
152	J-63	2,489.0	<None>	<Collection: 1 items>	0.00	2,667.0	77.0	True
158	J-66	2,467.0	<None>	<Collection: 1 items>	0.00	2,647.0	77.9	True

FlexTable: Junction Table

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Is Active?
162	J-67	2,483.0	<None>	<Collection: 1 items>	0.00	2,647.7	71.3	True
165	J-68	2,468.0	<None>	<Collection: 1 items>	0.00	2,647.6	77.7	True
172	J-69	2,477.0	<None>	<Collection: 1 items>	1.80	2,645.9	73.1	True
193	J-70	2,460.0	<None>	<Collection: 1 items>	7.21	2,646.0	80.5	True
196	J-71	2,460.0	<None>	<Collection: 1 items>	0.00	2,646.0	80.5	True
253	J-73	2,489.0	<None>	<Collection: 1 items>	0.00	2,667.3	77.1	True
257	J-74	2,489.0	<None>	<Collection: 1 items>	0.00	2,667.2	77.1	True
261	J-75	2,489.0	<None>	<Collection: 1 items>	0.00	2,667.2	77.1	True
495	J-86	2,511.0	<None>	<Collection: 1 items>	14.42	2,650.8	60.5	True
501	J-87	2,474.0	<None>	<Collection: 1 items>	5.41	2,649.7	76.0	True
539	J-91	2,482.0	<None>	<Collection: 1 items>	10.82	2,646.7	71.3	True
568	J-92	2,448.0	<None>	<Collection: 1 items>	1.80	2,645.0	85.2	True
570	J-93	2,458.0	<None>	<Collection: 1 items>	14.42	2,644.9	80.9	True
576	J-94	2,428.0	<None>	<Collection: 1 items>	16.22	2,644.5	93.7	True
578	J-95	2,430.0	<None>	<Collection: 1 items>	0.00	2,644.5	92.8	True
607	J-96	2,430.0	<None>	<Collection: 1 items>	3.61	2,644.4	92.8	True
621	J-97	2,444.0	<None>	<Collection: 1 items>	10.82	2,644.4	86.7	True
623	J-98	2,442.0	<None>	<Collection: 1 items>	10.82	2,644.3	87.5	True

FlexTable: Junction Table

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Is Active?
637	J-101	2,457.0	<None>	<Collection: 0 items>	0.00	2,645.9	81.7	True

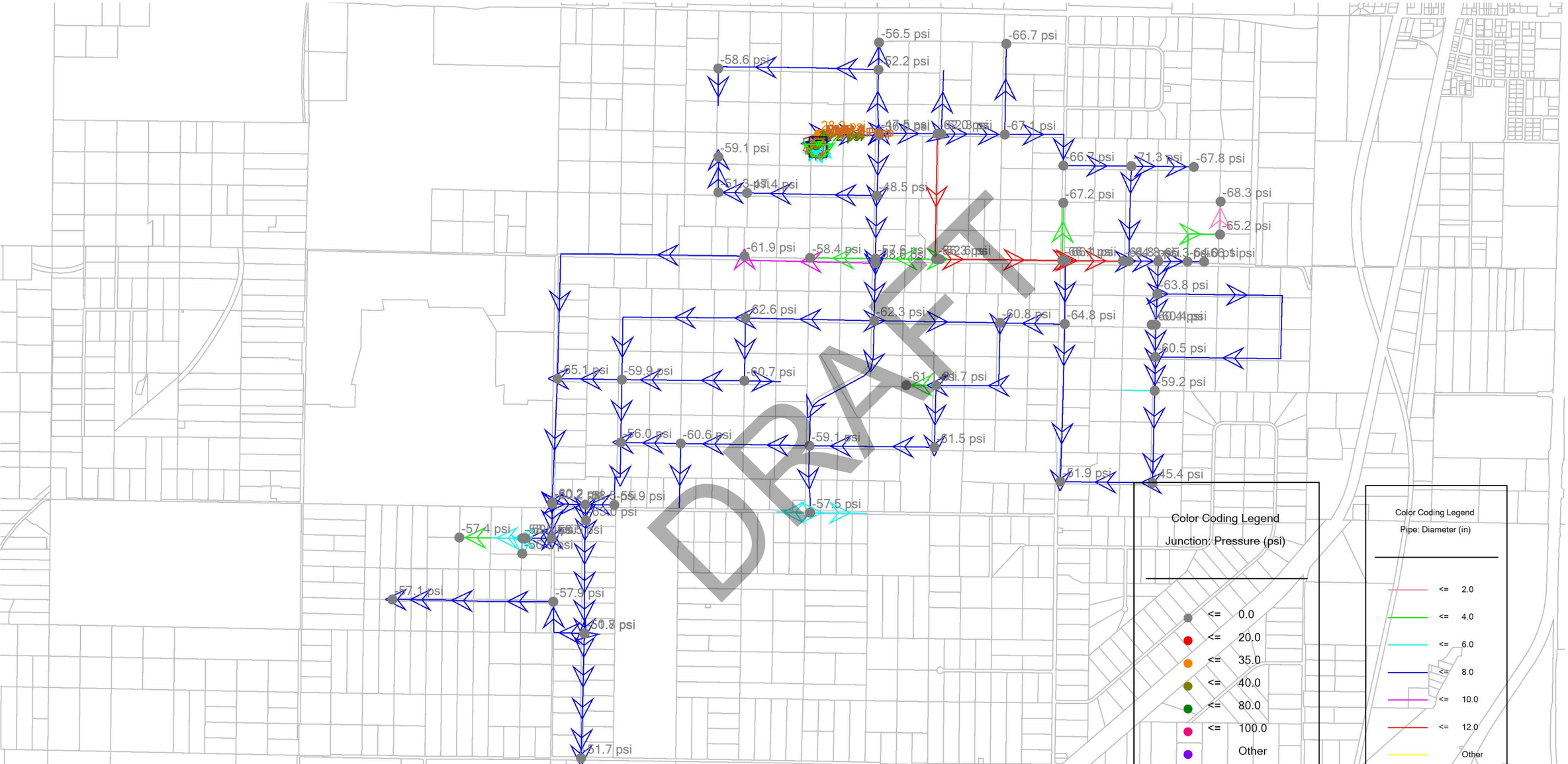
Fire Flow Node FlexTable: Fire Flow Report

Label	Zone	Fire Flow Iterations	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Flow (Total Needed) (gpm)	Flow (Total Available) (gpm)	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)	Pressure (Zone Lower Limit) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (System Lower Limit) (psi)	Pressure (Calculated System Lower Limit) (psi)	Junction w/ Minimum Pressure (System)
FH-222	<None>	12	False	1,000.00	639.30	1,007.21	646.51	20.0	20.4	20.0	20.0	495: J-86	(N/A)	20.0	495: J-86
FH-208	<None>	8	False	1,000.00	772.44	1,007.21	779.65	20.0	20.1	20.0	24.8	495: J-86	(N/A)	24.8	495: J-86
FH-221	<None>	10	False	1,000.00	524.53	1,007.21	531.74	20.0	20.0	20.0	21.5	495: J-86	(N/A)	21.5	495: J-86
FH-223	<None>	7	False	1,000.00	815.55	1,000.00	815.55	20.0	30.2	20.0	20.0	495: J-86	(N/A)	20.0	495: J-86
FH-226	<None>	9	False	1,000.00	763.72	1,000.00	763.72	20.0	20.0	20.0	20.5	44: J-13	(N/A)	20.5	44: J-13
FH-214	<None>	10	False	1,000.00	783.31	1,000.00	783.31	20.0	25.0	20.0	20.0	44: J-13	(N/A)	20.0	44: J-13
FH-204	<None>	6	False	1,000.00	840.49	1,000.00	840.49	20.0	30.1	20.0	20.0	48: J-15	(N/A)	20.0	48: J-15
FH-225	<None>	7	False	1,000.00	737.56	1,009.01	746.58	20.0	30.0	20.0	20.0	48: J-15	(N/A)	20.0	48: J-15
FH-224	<None>	10	False	1,000.00	588.80	1,000.00	588.80	20.0	20.0	20.0	20.0	48: J-15	(N/A)	20.0	48: J-15
FH-229	<None>	9	False	1,000.00	706.24	1,012.62	718.85	20.0	20.1	20.0	29.6	495: J-86	(N/A)	29.6	495: J-86
FH-228	<None>	7	False	1,000.00	761.15	1,000.00	761.15	20.0	29.2	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-238	<None>	10	False	1,000.00	806.24	1,000.00	806.24	20.0	31.3	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-211	<None>	6	False	1,000.00	815.58	1,000.00	815.58	20.0	24.8	20.0	20.0	44: J-13	(N/A)	20.0	44: J-13
FH-219	<None>	5	False	1,000.00	814.30	1,018.03	832.32	20.0	29.4	20.0	20.0	44: J-13	(N/A)	20.0	44: J-13
FH-217	<None>	6	False	1,000.00	814.87	1,000.00	814.87	20.0	25.6	20.0	20.0	44: J-13	(N/A)	20.0	44: J-13
FH-209	<None>	10	False	1,000.00	808.81	1,000.00	808.81	20.0	30.7	20.0	20.1	349: FH-229	(N/A)	20.1	349: FH-229
FH-231	<None>	7	False	1,000.00	775.28	1,000.00	775.28	20.0	29.5	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-230	<None>	10	False	1,000.00	772.32	1,014.42	786.74	20.0	23.0	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-232	<None>	6	False	1,000.00	772.17	1,007.21	779.38	20.0	32.2	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-233	<None>	6	False	1,000.00	773.02	1,005.41	778.43	20.0	25.4	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-206	<None>	7	False	1,000.00	798.09	1,007.21	805.30	20.0	29.4	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-212	<None>	6	False	1,000.00	820.87	1,019.83	840.69	20.0	24.6	20.0	20.0	44: J-13	(N/A)	20.0	44: J-13
FH-241	<None>	10	False	1,000.00	815.81	1,003.61	819.41	20.0	36.0	20.0	20.0	44: J-13	(N/A)	20.0	44: J-13
FH-218	<None>	10	False	1,000.00	816.27	1,000.00	816.27	20.0	38.7	20.0	20.1	44: J-13	(N/A)	20.1	44: J-13
FH-213	<None>	6	False	1,000.00	818.65	1,000.00	818.65	20.0	32.6	20.0	20.0	44: J-13	(N/A)	20.0	44: J-13
FH-237	<None>	6	False	1,000.00	799.32	1,000.00	799.32	20.0	27.0	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-236	<None>	6	False	1,000.00	797.94	1,007.21	805.15	20.0	29.6	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-235	<None>	6	False	1,000.00	789.89	1,007.21	797.10	20.0	29.9	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-203	<None>	6	False	1,000.00	779.61	1,000.00	779.61	20.0	32.1	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-220	<None>	9	False	1,000.00	645.49	1,000.00	645.49	20.0	20.1	20.0	21.8	146: J-59	(N/A)	21.8	146: J-59
FH-202	<None>	10	False	1,000.00	770.99	1,000.00	770.99	20.0	22.9	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-201	<None>	10	False	1,000.00	771.06	1,000.00	771.06	20.0	26.8	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-239	<None>	10	False	1,000.00	784.39	1,009.01	793.40	20.0	20.3	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-240	<None>	8	False	1,000.00	712.97	1,003.61	716.58	20.0	20.1	20.0	26.2	349: FH-229	(N/A)	26.2	349: FH-229
FH-207	<None>	6	False	1,000.00	796.37	1,000.00	796.37	20.0	22.9	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-242	<None>	9	False	1,000.00	630.88	1,005.41	636.29	20.0	20.1	20.0	31.7	349: FH-229	(N/A)	31.7	349: FH-229
FH-243	<None>	6	True	1,000.00	1,589.50	1,000.00	1,589.50	20.0	34.7	20.0	20.0	495: J-86	(N/A)	20.0	495: J-86
FH-215	<None>	7	False	1,000.00	789.33	1,000.00	789.33	20.0	23.4	20.0	20.0	172: J-69	(N/A)	20.0	172: J-69
FH-216	<None>	10	False	1,000.00	814.43	1,000.00	814.43	20.0	23.4	20.0	20.0	44: J-13	(N/A)	20.0	44: J-13
FH-205	<None>	6	False	1,000.00	799.36	1,000.00	799.36	20.0	30.7	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-200	<None>	10	False	1,000.00	759.77	1,000.00	759.77	20.0	28.1	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-234	<None>	6	False	1,000.00	801.35	1,000.00	801.35	20.0	26.9	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-227	<None>	5	False	1,000.00	817.68	1,007.21	824.89	20.0	26.7	20.0	20.0	44: J-13	(N/A)	20.0	44: J-13
FH-210	<None>	8	False	1,000.00	797.02	1,003.61	800.62	20.0	20.1	20.0	20.5	44: J-13	(N/A)	20.5	44: J-13
FH-2520	<None>	11	False	1,000.00	634.68	1,000.00	634.68	20.0	29.6	20.0	20.0	628: H-68	(N/A)	20.0	628: H-68
FH-2524	<None>	11	False	1,000.00	650.96	1,000.00	650.96	20.0	29.1	20.0	20.0	612: H-64	(N/A)	20.0	612: H-64
FH-2529	<None>	10	False	1,000.00	681.58	1,000.00	681.58	20.0	31.4	20.0	20.0	612: H-64	(N/A)	20.0	612: H-64
FH-2536	<None>	10	False	1,000.00	716.89	1,000.00	716.89	20.0	27.9	20.0	20.0	612: H-64	(N/A)	20.0	612: H-64

Fire Flow Node FlexTable: Fire Flow Report

Label	Zone	Fire Flow Iterations	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Flow (Total Needed) (gpm)	Flow (Total Available) (gpm)	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)	Pressure (Zone Lower Limit) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (System Lower Limit) (psi)	Pressure (Calculated System Lower Limit) (psi)	Junction w/ Minimum Pressure (System)
FH-2542	<None>	25	False	1,000.00	757.60	1,000.00	757.60	20.0	20.2	20.0	20.1	612: H-64	(N/A)	20.1	612: H-64
FH-2550	<None>	10	False	1,000.00	772.81	1,000.00	772.81	20.0	26.6	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
H-62	<None>	7	False	1,000.00	817.52	1,000.00	817.52	20.0	21.6	20.0	20.0	41: J-12	(N/A)	20.0	41: J-12
H-63	<None>	11	False	1,000.00	620.79	1,007.21	628.00	20.0	21.3	20.0	20.0	612: H-64	(N/A)	20.0	612: H-64
H-64	<None>	10	False	1,000.00	598.66	1,007.21	605.87	20.0	20.1	20.0	21.8	615: H-65	(N/A)	21.8	615: H-65
H-65	<None>	9	False	1,000.00	589.38	1,005.41	594.79	20.0	20.1	20.0	21.5	612: H-64	(N/A)	21.5	612: H-64
H-66	<None>	11	False	1,000.00	590.17	1,000.00	590.17	20.0	26.0	20.0	20.0	615: H-65	(N/A)	20.0	615: H-65
H-67	<None>	11	False	1,000.00	566.53	1,010.82	577.35	20.0	25.2	20.0	20.0	628: H-68	(N/A)	20.0	628: H-68
H-68	<None>	9	False	1,000.00	545.42	1,010.82	556.23	20.0	20.1	20.0	22.7	623: J-98	(N/A)	22.7	623: J-98
H-69	<None>	10	False	1,000.00	540.90	1,000.00	540.90	20.0	20.1	20.0	20.1	623: J-98	(N/A)	20.1	623: J-98
H-70	<None>	9	False	1,000.00	704.48	1,000.00	704.48	20.0	20.1	20.0	28.4	44: J-13	(N/A)	28.4	44: J-13
J-3	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-4	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-6	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-7	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-8	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-9	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-11	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-12	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-13	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-14	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-15	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-16	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-17	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-19	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-20	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-21	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-23	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-24	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-25	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-26	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-27	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-28	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-29	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-30	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-31	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-32	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-33	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-34	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-35	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-36	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-37	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-38	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-39	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-41	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-42	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-43	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-45	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)

Scenario: Growth A Scenario 1



FlexTable: Junction Table

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Is Active?
24	J-3	2,507.0	<None>	<Collection: 1 items>	28.22	2,376.4	-56.5	True
25	J-4	2,497.0	<None>	<Collection: 1 items>	21.17	2,376.4	-52.2	True
29	J-6	2,487.0	<None>	<Collection: 1 items>	0.00	2,403.9	-36.0	True
31	J-7	2,491.0	<None>	<Collection: 1 items>	38.80	2,556.1	28.2	True
33	J-8	2,487.0	<None>	<Collection: 1 items>	14.11	2,377.3	-47.5	True
36	J-9	2,483.0	<None>	<Collection: 1 items>	35.28	2,339.0	-62.3	True
40	J-11	2,488.0	<None>	<Collection: 1 items>	63.50	2,333.7	-66.7	True
41	J-12	2,489.0	<None>	<Collection: 1 items>	35.28	2,333.9	-67.1	True
44	J-13	2,489.0	<None>	<Collection: 1 items>	28.22	2,324.3	-71.3	True
46	J-14	2,481.0	<None>	<Collection: 1 items>	35.28	2,324.2	-67.8	True
48	J-15	2,501.0	<None>	<Collection: 1 items>	21.17	2,364.4	-59.1	True
49	J-16	2,483.0	<None>	<Collection: 1 items>	35.28	2,364.4	-51.3	True
51	J-17	2,477.0	<None>	<Collection: 1 items>	38.80	2,365.0	-48.5	True
56	J-19	2,472.0	<None>	<Collection: 1 items>	42.33	2,322.2	-64.8	True
58	J-20	2,472.0	<None>	<Collection: 1 items>	0.00	2,322.2	-64.8	True
60	J-21	2,474.0	<None>	<Collection: 1 items>	0.00	2,321.1	-66.1	True
63	J-23	2,470.0	<None>	<Collection: 1 items>	49.39	2,327.0	-61.9	True
65	J-24	2,464.0	<None>	<Collection: 1 items>	56.44	2,320.0	-62.3	True

FlexTable: Junction Table

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Is Active?
67	J-25	2,472.0	<None>	<Collection: 1 items>	14.11	2,321.2	-65.3	True
70	J-26	2,468.0	<None>	<Collection: 1 items>	0.00	2,320.6	-63.8	True
72	J-27	2,460.0	<None>	<Collection: 1 items>	56.44	2,320.2	-60.5	True
75	J-28	2,425.0	<None>	<Collection: 1 items>	28.22	2,320.1	-45.4	True
77	J-29	2,440.0	<None>	<Collection: 1 items>	31.75	2,320.1	-51.9	True
79	J-30	2,470.0	<None>	<Collection: 1 items>	31.75	2,320.2	-64.8	True
81	J-31	2,475.0	<None>	<Collection: 1 items>	0.00	2,322.2	-66.1	True
84	J-32	2,460.0	<None>	<Collection: 1 items>	49.39	2,319.5	-60.8	True
87	J-33	2,460.0	<None>	<Collection: 1 items>	35.28	2,317.3	-61.7	True
89	J-34	2,459.0	<None>	<Collection: 1 items>	42.33	2,316.8	-61.5	True
91	J-35	2,453.0	<None>	<Collection: 1 items>	28.22	2,316.4	-59.1	True
94	J-36	2,449.0	<None>	<Collection: 1 items>	56.44	2,316.2	-57.5	True
96	J-37	2,460.0	<None>	<Collection: 1 items>	56.44	2,315.2	-62.6	True
98	J-38	2,453.0	<None>	<Collection: 1 items>	28.22	2,314.5	-59.9	True
100	J-39	2,455.0	<None>	<Collection: 1 items>	28.22	2,314.8	-60.7	True
105	J-41	2,465.0	<None>	<Collection: 1 items>	126.99	2,314.5	-65.1	True
107	J-42	2,443.0	<None>	<Collection: 1 items>	35.28	2,313.5	-56.0	True
109	J-43	2,454.0	<None>	<Collection: 1 items>	28.22	2,314.0	-60.6	True

FlexTable: Junction Table

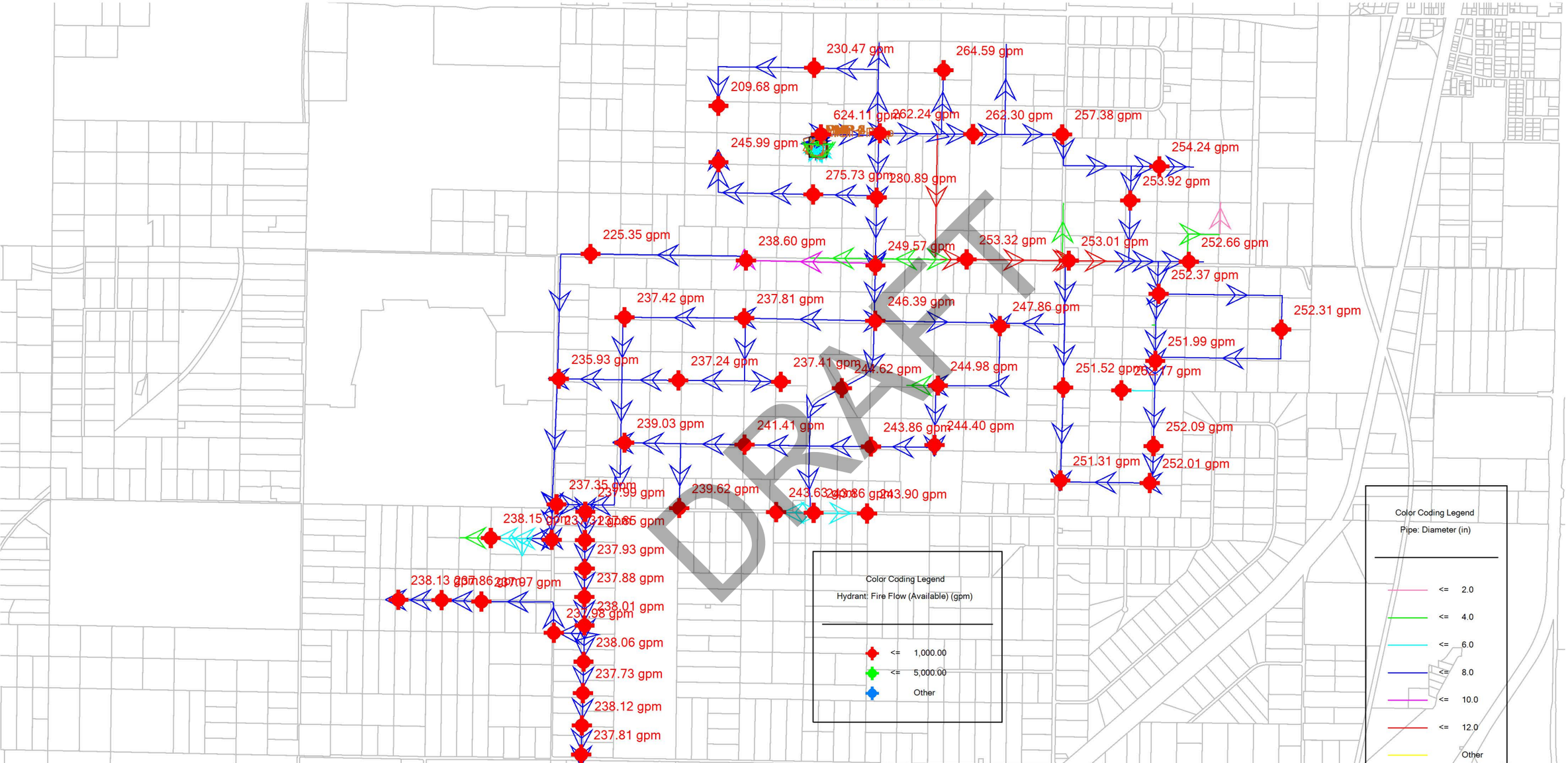
ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Is Active?
114	J-45	2,442.0	<None>	<Collection: 1 items>	10.58	2,312.9	-55.9	True
116	J-46	2,452.0	<None>	<Collection: 1 items>	7.06	2,312.8	-60.2	True
118	J-47	2,452.0	<None>	<Collection: 1 items>	0.00	2,312.8	-60.2	True
123	J-49	2,448.0	<None>	<Collection: 1 items>	0.00	2,312.8	-58.5	True
127	J-50	2,449.0	<None>	<Collection: 1 items>	14.11	2,312.7	-59.0	True
129	J-51	2,468.0	<None>	<Collection: 1 items>	28.22	2,333.1	-58.4	True
130	J-52	2,467.0	<None>	<Collection: 1 items>	28.22	2,334.0	-57.6	True
134	J-53	2,468.0	<None>	<Collection: 1 items>	45.86	2,323.2	-62.6	True
136	J-54	2,458.0	<None>	<Collection: 1 items>	28.22	2,316.9	-61.1	True
138	J-55	2,477.0	<None>	<Collection: 1 items>	24.69	2,321.6	-67.2	True
139	J-56	2,475.0	<None>	<Collection: 1 items>	21.17	2,322.2	-66.1	True
141	J-57	2,471.0	<None>	<Collection: 1 items>	21.17	2,320.3	-65.2	True
142	J-58	2,469.0	<None>	<Collection: 1 items>	28.22	2,321.1	-64.0	True
146	J-59	2,445.0	<None>	<Collection: 1 items>	28.22	2,312.2	-57.4	True
149	J-61	2,448.0	<None>	<Collection: 1 items>	0.00	2,312.7	-58.5	True
150	J-62	2,444.0	<None>	<Collection: 1 items>	14.11	2,312.7	-56.8	True
152	J-63	2,489.0	<None>	<Collection: 1 items>	0.00	2,578.2	38.6	True
158	J-66	2,467.0	<None>	<Collection: 1 items>	0.00	2,331.6	-58.6	True

FlexTable: Junction Table

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Is Active?
162	J-67	2,483.0	<None>	<Collection: 1 items>	0.00	2,339.6	-62.0	True
165	J-68	2,468.0	<None>	<Collection: 1 items>	0.00	2,337.9	-56.3	True
172	J-69	2,477.0	<None>	<Collection: 1 items>	7.06	2,319.2	-68.3	True
193	J-70	2,460.0	<None>	<Collection: 1 items>	28.22	2,320.4	-60.4	True
196	J-71	2,460.0	<None>	<Collection: 1 items>	0.00	2,320.4	-60.4	True
253	J-73	2,489.0	<None>	<Collection: 1 items>	0.00	2,581.8	40.2	True
257	J-74	2,489.0	<None>	<Collection: 1 items>	0.00	2,580.9	39.8	True
261	J-75	2,489.0	<None>	<Collection: 1 items>	0.00	2,580.0	39.4	True
495	J-86	2,511.0	<None>	<Collection: 1 items>	56.44	2,375.5	-58.6	True
501	J-87	2,474.0	<None>	<Collection: 1 items>	21.17	2,364.4	-47.4	True
539	J-91	2,482.0	<None>	<Collection: 1 items>	35.28	2,327.8	-66.7	True
568	J-92	2,448.0	<None>	<Collection: 1 items>	3.53	2,312.7	-58.5	True
570	J-93	2,458.0	<None>	<Collection: 1 items>	28.22	2,312.3	-63.0	True
576	J-94	2,428.0	<None>	<Collection: 1 items>	31.75	2,310.5	-50.8	True
578	J-95	2,430.0	<None>	<Collection: 1 items>	0.00	2,310.5	-51.7	True
607	J-96	2,430.0	<None>	<Collection: 1 items>	7.06	2,310.5	-51.7	True
621	J-97	2,444.0	<None>	<Collection: 1 items>	21.17	2,310.3	-57.9	True
623	J-98	2,442.0	<None>	<Collection: 1 items>	21.17	2,310.0	-57.1	True

FlexTable: Junction Table

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Is Active?
637	J-101	2,457.0	<None>	<Collection: 0 items>	0.00	2,320.2	-59.2	True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264.59 gpm
209.68 gpm
624.11 gpm
262.24 gpm
262.30 gpm
257.38 gpm
245.99 gpm
254.24 gpm
253.92 gpm
275.73 gpm
280.89 gpm
225.35 gpm
238.60 gpm
249.57 gpm
253.32 gpm
253.01 gpm
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252.37 gpm
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237.88 gpm
238.13 gpm
238.01 gpm
237.98 gpm
238.06 gpm
237.73 gpm
238.12 gpm
237.81 gpm
Color Coding Legend
Hydrant: Fire Flow (Available) (gpm)
<= 1,000.00
<= 5,000.00
Other
Color Coding Legend
Pipe: Diameter (in)
<= 2.0
<= 4.0
<= 6.0
<= 8.0
<= 10.0
<= 12.0
Other

FlexTable: Junction Table

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Is Active?
24	J-3	2,507.0	<None>	<Collection: 1 items>	14.61	2,593.2	37.3	True
25	J-4	2,497.0	<None>	<Collection: 1 items>	10.96	2,593.2	41.6	True
29	J-6	2,487.0	<None>	<Collection: 1 items>	0.00	2,600.4	49.1	True
31	J-7	2,491.0	<None>	<Collection: 1 items>	20.08	2,641.2	65.0	True
33	J-8	2,487.0	<None>	<Collection: 1 items>	7.30	2,593.4	46.0	True
36	J-9	2,483.0	<None>	<Collection: 1 items>	18.26	2,583.5	43.5	True
40	J-11	2,488.0	<None>	<Collection: 1 items>	32.87	2,582.6	40.9	True
41	J-12	2,489.0	<None>	<Collection: 1 items>	18.26	2,582.7	40.5	True
44	J-13	2,489.0	<None>	<Collection: 1 items>	14.61	2,577.3	38.2	True
46	J-14	2,481.0	<None>	<Collection: 1 items>	18.26	2,577.3	41.7	True
48	J-15	2,501.0	<None>	<Collection: 1 items>	10.96	2,589.7	38.4	True
49	J-16	2,483.0	<None>	<Collection: 1 items>	18.26	2,589.7	46.1	True
51	J-17	2,477.0	<None>	<Collection: 1 items>	20.08	2,589.8	48.8	True
56	J-19	2,472.0	<None>	<Collection: 1 items>	21.91	2,577.1	45.5	True
58	J-20	2,472.0	<None>	<Collection: 1 items>	0.00	2,577.1	45.5	True
60	J-21	2,474.0	<None>	<Collection: 1 items>	0.00	2,576.9	44.5	True
63	J-23	2,470.0	<None>	<Collection: 1 items>	25.56	2,579.8	47.5	True
65	J-24	2,464.0	<None>	<Collection: 1 items>	29.21	2,576.8	48.8	True

FlexTable: Junction Table

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Is Active?
67	J-25	2,472.0	<None>	<Collection: 1 items>	7.30	2,576.9	45.4	True
70	J-26	2,468.0	<None>	<Collection: 1 items>	0.00	2,576.7	47.0	True
72	J-27	2,460.0	<None>	<Collection: 1 items>	29.21	2,576.6	50.5	True
75	J-28	2,425.0	<None>	<Collection: 1 items>	14.61	2,576.6	65.6	True
77	J-29	2,440.0	<None>	<Collection: 1 items>	16.43	2,576.6	59.1	True
79	J-30	2,470.0	<None>	<Collection: 1 items>	16.43	2,576.7	46.2	True
81	J-31	2,475.0	<None>	<Collection: 1 items>	0.00	2,577.2	44.2	True
84	J-32	2,460.0	<None>	<Collection: 1 items>	25.56	2,576.6	50.4	True
87	J-33	2,460.0	<None>	<Collection: 1 items>	18.26	2,575.9	50.1	True
89	J-34	2,459.0	<None>	<Collection: 1 items>	21.91	2,575.7	50.5	True
91	J-35	2,453.0	<None>	<Collection: 1 items>	14.61	2,575.6	53.0	True
94	J-36	2,449.0	<None>	<Collection: 1 items>	29.21	2,575.6	54.8	True
96	J-37	2,460.0	<None>	<Collection: 1 items>	29.21	2,575.3	49.9	True
98	J-38	2,453.0	<None>	<Collection: 1 items>	14.61	2,575.0	52.8	True
100	J-39	2,455.0	<None>	<Collection: 1 items>	14.61	2,575.1	52.0	True
105	J-41	2,465.0	<None>	<Collection: 1 items>	65.73	2,575.0	47.6	True
107	J-42	2,443.0	<None>	<Collection: 1 items>	18.26	2,574.5	56.9	True
109	J-43	2,454.0	<None>	<Collection: 1 items>	14.61	2,574.7	52.2	True

FlexTable: Junction Table

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Is Active?
114	J-45	2,442.0	<None>	<Collection: 1 items>	5.48	2,574.2	57.2	True
116	J-46	2,452.0	<None>	<Collection: 1 items>	3.65	2,574.1	52.8	True
118	J-47	2,452.0	<None>	<Collection: 1 items>	0.00	2,574.1	52.8	True
123	J-49	2,448.0	<None>	<Collection: 1 items>	0.00	2,574.1	54.5	True
127	J-50	2,449.0	<None>	<Collection: 1 items>	7.30	2,574.1	54.1	True
129	J-51	2,468.0	<None>	<Collection: 1 items>	14.61	2,581.1	48.9	True
130	J-52	2,467.0	<None>	<Collection: 1 items>	14.61	2,581.3	49.5	True
134	J-53	2,468.0	<None>	<Collection: 1 items>	23.74	2,577.6	47.4	True
136	J-54	2,458.0	<None>	<Collection: 1 items>	14.61	2,575.8	51.0	True
138	J-55	2,477.0	<None>	<Collection: 1 items>	12.78	2,577.0	43.3	True
139	J-56	2,475.0	<None>	<Collection: 1 items>	10.96	2,577.2	44.2	True
141	J-57	2,471.0	<None>	<Collection: 1 items>	10.96	2,576.7	45.7	True
142	J-58	2,469.0	<None>	<Collection: 1 items>	14.61	2,576.9	46.7	True
146	J-59	2,445.0	<None>	<Collection: 1 items>	14.61	2,573.9	55.8	True
149	J-61	2,448.0	<None>	<Collection: 1 items>	0.00	2,574.1	54.5	True
150	J-62	2,444.0	<None>	<Collection: 1 items>	7.30	2,574.1	56.3	True
152	J-63	2,489.0	<None>	<Collection: 1 items>	0.00	2,647.1	68.4	True
158	J-66	2,467.0	<None>	<Collection: 1 items>	0.00	2,580.7	49.2	True

FlexTable: Junction Table

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Is Active?
162	J-67	2,483.0	<None>	<Collection: 1 items>	0.00	2,583.6	43.5	True
165	J-68	2,468.0	<None>	<Collection: 1 items>	0.00	2,582.9	49.7	True
172	J-69	2,477.0	<None>	<Collection: 1 items>	3.65	2,576.4	43.0	True
193	J-70	2,460.0	<None>	<Collection: 1 items>	14.61	2,576.7	50.5	True
196	J-71	2,460.0	<None>	<Collection: 1 items>	0.00	2,576.7	50.5	True
253	J-73	2,489.0	<None>	<Collection: 1 items>	0.00	2,648.1	68.8	True
257	J-74	2,489.0	<None>	<Collection: 1 items>	0.00	2,647.9	68.7	True
261	J-75	2,489.0	<None>	<Collection: 1 items>	0.00	2,647.6	68.6	True
495	J-86	2,511.0	<None>	<Collection: 1 items>	29.21	2,592.9	35.5	True
501	J-87	2,474.0	<None>	<Collection: 1 items>	10.96	2,589.7	50.0	True
539	J-91	2,482.0	<None>	<Collection: 1 items>	18.26	2,579.1	42.0	True
568	J-92	2,448.0	<None>	<Collection: 1 items>	1.83	2,574.1	54.6	True
570	J-93	2,458.0	<None>	<Collection: 1 items>	14.61	2,573.6	50.0	True
576	J-94	2,428.0	<None>	<Collection: 1 items>	16.43	2,571.4	62.0	True
578	J-95	2,430.0	<None>	<Collection: 1 items>	0.00	2,571.4	61.2	True
607	J-96	2,430.0	<None>	<Collection: 1 items>	3.65	2,571.4	61.2	True
621	J-97	2,444.0	<None>	<Collection: 1 items>	10.96	2,571.2	55.0	True
623	J-98	2,442.0	<None>	<Collection: 1 items>	10.96	2,571.1	55.9	True

FlexTable: Junction Table

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Is Active?
637	J-101	2,457.0	<None>	<Collection: 0 items>	0.00	2,576.6	51.8	True

Fire Flow Node FlexTable: Fire Flow Report

Label	Zone	Fire Flow Iterations	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Flow (Total Needed) (gpm)	Flow (Total Available) (gpm)	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)	Pressure (Zone Lower Limit) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (System Lower Limit) (psi)	Pressure (Calculated System Lower Limit) (psi)	Junction w/ Minimum Pressure (System)
FH-222	<None>	8	False	1,000.00	230.47	1,021.91	252.38	20.0	20.5	20.0	20.0	495: J-86	(N/A)	20.0	495: J-86
FH-208	<None>	13	False	1,000.00	264.59	1,012.78	277.37	20.0	23.9	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-221	<None>	8	False	1,000.00	209.68	1,016.43	226.11	20.0	20.8	20.0	20.0	495: J-86	(N/A)	20.0	495: J-86
FH-223	<None>	16	False	1,000.00	262.24	1,000.00	262.24	20.0	30.5	20.0	20.0	495: J-86	(N/A)	20.0	495: J-86
FH-226	<None>	13	False	1,000.00	254.24	1,000.00	254.24	20.0	23.2	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-214	<None>	15	False	1,000.00	253.92	1,000.00	253.92	20.0	26.6	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-204	<None>	24	False	1,000.00	280.89	1,000.00	280.89	20.0	31.2	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-225	<None>	22	False	1,000.00	275.73	1,018.26	293.99	20.0	30.0	20.0	20.0	48: J-15	(N/A)	20.0	48: J-15
FH-224	<None>	6	False	1,000.00	245.99	1,000.00	245.99	20.0	20.0	20.0	20.0	48: J-15	(N/A)	20.0	48: J-15
FH-229	<None>	6	False	1,000.00	225.35	1,062.08	287.42	20.0	20.0	20.0	23.5	495: J-86	(N/A)	23.5	495: J-86
FH-228	<None>	16	False	1,000.00	238.60	1,000.00	238.60	20.0	30.4	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-238	<None>	16	False	1,000.00	249.57	1,000.00	249.57	20.0	32.5	20.0	20.1	349: FH-229	(N/A)	20.1	349: FH-229
FH-211	<None>	15	False	1,000.00	253.01	1,000.00	253.01	20.0	27.2	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-219	<None>	24	False	1,000.00	252.31	1,036.52	288.83	20.0	39.6	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-217	<None>	24	False	1,000.00	251.99	1,000.00	251.99	20.0	32.7	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-209	<None>	16	False	1,000.00	247.86	1,000.00	247.86	20.0	33.5	20.0	20.1	349: FH-229	(N/A)	20.1	349: FH-229
FH-231	<None>	16	False	1,000.00	237.81	1,000.00	237.81	20.0	33.0	20.0	20.1	349: FH-229	(N/A)	20.1	349: FH-229
FH-230	<None>	15	False	1,000.00	237.42	1,025.56	262.99	20.0	28.0	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-232	<None>	24	False	1,000.00	237.24	1,014.61	251.85	20.0	37.1	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-233	<None>	23	False	1,000.00	237.41	1,007.30	244.71	20.0	34.1	20.0	20.1	349: FH-229	(N/A)	20.1	349: FH-229
FH-206	<None>	24	False	1,000.00	244.62	1,014.61	259.22	20.0	33.5	20.0	20.1	349: FH-229	(N/A)	20.1	349: FH-229
FH-212	<None>	24	False	1,000.00	251.52	1,029.21	280.73	20.0	31.2	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-241	<None>	25	False	1,000.00	252.09	1,007.30	259.39	20.0	44.6	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-218	<None>	24	False	1,000.00	252.01	1,000.00	252.01	20.0	47.7	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-213	<None>	24	False	1,000.00	251.31	1,000.00	251.31	20.0	41.3	20.0	20.1	349: FH-229	(N/A)	20.1	349: FH-229
FH-237	<None>	16	False	1,000.00	244.40	1,000.00	244.40	20.0	33.2	20.0	20.1	349: FH-229	(N/A)	20.1	349: FH-229
FH-236	<None>	23	False	1,000.00	243.86	1,014.61	258.46	20.0	35.3	20.0	20.1	349: FH-229	(N/A)	20.1	349: FH-229
FH-235	<None>	24	False	1,000.00	241.41	1,014.61	256.01	20.0	36.7	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-203	<None>	24	False	1,000.00	239.03	1,000.00	239.03	20.0	39.4	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-220	<None>	17	False	1,000.00	238.15	1,000.00	238.15	20.0	33.3	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-202	<None>	23	False	1,000.00	237.31	1,000.00	237.31	20.0	36.3	20.0	20.1	349: FH-229	(N/A)	20.1	349: FH-229
FH-201	<None>	24	False	1,000.00	237.35	1,000.00	237.35	20.0	35.2	20.0	20.1	349: FH-229	(N/A)	20.1	349: FH-229
FH-239	<None>	23	False	1,000.00	239.62	1,009.13	248.74	20.0	37.6	20.0	20.1	349: FH-229	(N/A)	20.1	349: FH-229
FH-240	<None>	23	False	1,000.00	243.63	1,003.65	247.28	20.0	36.2	20.0	20.1	349: FH-229	(N/A)	20.1	349: FH-229
FH-207	<None>	24	False	1,000.00	243.86	1,000.00	243.86	20.0	36.4	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-242	<None>	22	False	1,000.00	243.90	1,005.48	249.38	20.0	31.8	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-243	<None>	16	False	1,000.00	624.11	1,000.00	624.11	20.0	49.0	20.0	20.0	495: J-86	(N/A)	20.0	495: J-86
FH-215	<None>	15	False	1,000.00	252.66	1,000.00	252.66	20.0	28.8	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-216	<None>	15	False	1,000.00	252.37	1,000.00	252.37	20.0	29.4	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-205	<None>	16	False	1,000.00	246.39	1,000.00	246.39	20.0	32.2	20.0	20.1	349: FH-229	(N/A)	20.1	349: FH-229
FH-200	<None>	11	False	1,000.00	235.93	1,000.00	235.93	20.0	30.7	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-234	<None>	16	False	1,000.00	244.98	1,000.00	244.98	20.0	32.9	20.0	20.1	349: FH-229	(N/A)	20.1	349: FH-229
FH-227	<None>	15	False	1,000.00	253.32	1,007.30	260.62	20.0	29.4	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-210	<None>	13	False	1,000.00	257.38	1,005.48	262.86	20.0	23.4	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-2520	<None>	24	False	1,000.00	237.98	1,000.00	237.98	20.0	42.1	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-2524	<None>	24	False	1,000.00	238.01	1,000.00	238.01	20.0	40.0	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-2529	<None>	24	False	1,000.00	237.88	1,000.00	237.88	20.0	42.9	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-2536	<None>	24	False	1,000.00	237.93	1,000.00	237.93	20.0	40.2	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229

Fire Flow Node FlexTable: Fire Flow Report

Label	Zone	Fire Flow Iterations	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Flow (Total Needed) (gpm)	Flow (Total Available) (gpm)	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)	Pressure (Zone Lower Limit) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (System Lower Limit) (psi)	Pressure (Calculated System Lower Limit) (psi)	Junction w/ Minimum Pressure (System)
FH-2542	<None>	24	False	1,000.00	237.85	1,000.00	237.85	20.0	33.2	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
FH-2550	<None>	24	False	1,000.00	237.99	1,000.00	237.99	20.0	36.6	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
H-62	<None>	13	False	1,000.00	262.30	1,000.00	262.30	20.0	24.0	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
H-63	<None>	22	False	1,000.00	238.06	1,007.30	245.36	20.0	31.4	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
H-64	<None>	21	False	1,000.00	237.73	1,007.30	245.03	20.0	29.6	20.0	20.1	349: FH-229	(N/A)	20.1	349: FH-229
H-65	<None>	22	False	1,000.00	238.12	1,005.48	243.59	20.0	30.8	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
H-66	<None>	23	False	1,000.00	237.81	1,000.00	237.81	20.0	39.0	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
H-67	<None>	22	False	1,000.00	237.97	1,010.95	248.93	20.0	35.8	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
H-68	<None>	21	False	1,000.00	237.86	1,010.95	248.82	20.0	29.9	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
H-69	<None>	22	False	1,000.00	238.13	1,000.00	238.13	20.0	31.7	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
H-70	<None>	22	False	1,000.00	252.17	1,000.00	252.17	20.0	29.9	20.0	20.0	349: FH-229	(N/A)	20.0	349: FH-229
J-3	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-4	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-6	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-7	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-8	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-9	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-11	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-12	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-13	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-14	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-15	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-16	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-17	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-19	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-20	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-21	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-23	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-24	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-25	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-26	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-27	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-28	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-29	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-30	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-31	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-32	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-33	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-34	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-35	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-36	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-37	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-38	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-39	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-41	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-42	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-43	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)
J-45	<None>	(N/A)	False	1,000.00	(N/A)	(N/A)	(N/A)	20.0	(N/A)	20.0	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)

APPENDIX G:

Engineers Opinion of Probable Costs

WELCH-COMER
ENGINEERS | SURVEYORS

REMINGTON WATER DISTRICT
OPTION 1: McCORMICK WELL AND EXISTING WELL UPGRADE
ENGINEER's OPINION OF PRELIMINARY PROJECT COSTS

Prepared By:	Derek Huff, EIT	Date:	November 18, 2019		
Project Manager:	Ashley Williams, PE	Date:			

Item No.	Description	Unit	Quantity	Unit Price	Total
	Mobilization	LS	1	$ 77,000.00	$ 77,000.00
MCCORMICK					
	New Well Pump (1600 gpm, 350 HP)	EA	1	$ 190,000.00	$ 190,000.00
	Water Quality Testing	LS	1	$ 3,000.00	$ 3,000.00
	Well Alignment and Test Pumping	LS	1	$ 37,000.00	$ 37,000.00
	Mechanical and Site Piping	LS	1	$ 120,000.00	$ 120,000.00
	Electrical	LS	1	$ 300,000.00	$ 300,000.00
	3-Phase Power Extension (McCormick)	LS	1	$ 100,000.00	$ 100,000.00
	12-inch Transmission Line from McCormick	LF	550	$ 80.00	$44,000.00
	Well House	LS	1	$ 150,000.00	$ 150,000.00
WELL 1 UPGRADE					
	Remove Existing Pump	LS	1	$ 10,000.00	$ 10,000.00
	Well Alignment and Test Pumping	LS	1	$ 35,000.00	$ 35,000.00
	New Well Pump (1600 gpm, 350 HP)	EA	1	$ 190,000.00	$ 190,000.00
	Mechanical and Site Piping	LS	1	$ 120,000.00	$ 120,000.00
	Electrical	LS	1	$ 200,000.00	$ 200,000.00
	Well Cover	LS	1	$ 25,000.00	$ 25,000.00
TRANSMISSION	12-inch Transmission Line from Existing Site to White Cloud/Teton Loop	LF	2000	$ 80.00	$ 160,000.00
	8-inch Transmission Pipe Completing White Cloud/Teton Loop	LF	1250	$ 65.00	$ 81,250.00
				Subtotal =	$ 1,842,250.00
				15% Contingency =	$276,000.00
				Total Estimated Construction =	**$ 2,118,300.00**
ENGINEERING					
	Design Phase Services				$212,000.00
	Bidding Phase Services				$8,000.00
	Construction Phase Services				$191,000.00
	Post Construction Phase				$3,000.00
	Start-Up/O&M Manual				$3,000.00
ESTIMATED TOTAL PROJECT COST					**$ 2,535,000.00**
COST BREAKDOWN					
	McCormick Well				$ 1,370,000.00
	Well 1 Upsize				$ 833,000.00
	Transmission				$ 332,000.00
	Assumptions:				
	Test pumping of existing wells to check drawdown				
	Existing Well 1 is capable of supporting line shaft pump				
	2 bid phases assumed				
	O&M Manual is project-specific				
	Assumes a portion of design for McCormick has been completed				

REMINGTON WATER DISTRICT
OPTION 1A: WELL 4 AND EXISTING WELL UPGRADE
ENGINEER's OPINION OF PRELIMINARY PROJECT COSTS

Prepared By:	Derek Huff, EIT	Date:	November 18, 2019		
Project Manager:	Ashley Williams, PE	Date:			

Item No.	Description	Unit	Quantity	Unit Price	Total
	Mobilization	LS	1	$ 85,000.00	$ 85,000.00
NEW WELL					
	Drill New 18-inch Well	VF	550	$ 700.00	$ 385,000.00
	Water Quality Testing	LS	1	$ 3,000.00	$ 3,000.00
	New Well Pump (1600 gpm, 350 HP)	EA	1	$ 190,000.00	$ 190,000.00
	Mechanical and Site Piping	LS	1	$ 150,000.00	$ 150,000.00
	Electrical	LS	1	$ 250,000.00	$ 250,000.00
	Upgrade Existing Transformer	LS	1	$ 35,000.00	$ 35,000.00
	Well House	LS	1	$ 100,000.00	$100,000.00
WELL 1 UPGRADE					
	Remove Existing Pump	LS	1	$ 10,000.00	$ 10,000.00
	Well Alignment and Test Pumping	LS	1	$ 40,000.00	$ 40,000.00
	New Well Pump (1600 gpm, 350 HP)	EA	1	$ 190,000.00	$ 190,000.00
	Mechanical and Site Piping	LS	1	$ 120,000.00	$ 120,000.00
	Electrical	LS	1	$ 200,000.00	$ 200,000.00
	Well Cover	LS	1	$ 25,000.00	$ 25,000.00
TRANSMISSION	12-inch Transmission Line from Existing Site to White Cloud/Teton Loop	LF	2000	$ 80.00	$ 160,000.00
	Cloud/Teton Loop	LF	1250	$ 65.00	$ 81,250.00
				Subtotal =	$ 2,024,250.00
				15% Contingency =	$304,000.00
				Total Estimated Construction =	**$ 2,328,300.00**
ENGINEERING					
	Design Phase Services				$256,000.00
	Bidding Phase Services				$12,000.00
	Construction Phase Services				$233,000.00
	Post Construction Phase				$3,000.00
	Start-Up/O&M Manual				$3,000.00
ESTIMATED TOTAL PROJECT COST					**$ 2,835,000.00**
COST BREAKDOWN					
	McCormick Well				$ 1,670,000.00
	Well 1 Upsize				$ 833,000.00
	Transmission				$ 332,000.00
	Assumptions:				
	Test pumping of existing wells to check drawdown				
	Existing Well 1 is capable of supporting line shaft pump				
	Existing well site has adequate space for new well and control area				
	3 bid phases assumed				
	O&M Manual is project-specific				

REMINGTON WATER DISTRICT
OPTION 1B:TWO NEW WELLS AT EXISTING SITE
ENGINEER's OPINION OF PRELIMINARY PROJECT COSTS

Prepared By:	Derek Huff, EIT	Date:	November 18, 2019		
Project Manager:	Ashley Williams, PE	Date:			

Item No.	Description	Unit	Quantity	Unit Price	Total
	Mobilization	LS	1	$ 105,000.00	$ 105,000.00
	Upgrade Existing Transformer	LS	1	$ 50,000.00	$ 50,000.00
	Test Pumping at Existing Wells	LS	1	$ 20,000.00	$ 20,000.00
NEW WELL #1					
	Drill New 18-inch Well	VF	550	$ 700.00	$ 385,000.00
	New Well Pump (1600 gpm, 350 HP)	EA	1	$ 190,000.00	$ 190,000.00
	Mechanical and Site Piping	LS	1	$ 150,000.00	$ 150,000.00
	Electrical	LS	1	$ 250,000.00	$ 250,000.00
	Well House	LS	1	$ 100,000.00	$100,000.00
NEW WELL # 2					
	Drill New 18-inch Well	VF	550	$ 700.00	$ 385,000.00
	New Well Pump (1600 gpm, 350 HP)	EA	1	$ 190,000.00	$ 190,000.00
	Mechanical and Site Piping	LS	1	$ 150,000.00	$ 150,000.00
	Electrical	LS	1	$ 250,000.00	$ 250,000.00
	Well Cover	LS	1	$ 25,000.00	$ 25,000.00
TRANSMISSION	12-inch Transmission Line from Existing Site to White Cloud/Teton Loop	LF	2000	$ 80.00	$ 160,000.00
	8-inch Transmission Pipe Completing White Cloud/Teton Loop	LF	1250	$ 65.00	$ 81,250.00
				Subtotal =	$ 2,491,250.00
				15% Contingency =	$374,000.00
				Total Estimated Construction =	**$ 2,865,300.00**
ENGINEERING					
	Design Phase Services				$289,000.00
	Bidding Phase Services				$12,000.00
	Construction Phase Services				$262,000.00
	Post Construction Phase				$3,000.00
	Start-Up/O&M Manual				$3,000.00
ESTIMATED TOTAL PROJECT COST					**$ 3,434,000.00**
COST BREAKDOWN					
	New Well 1				$ 1,580,000.00
	New Well 2				$ 1,522,000.00
	Transmission				$ 332,000.00

Assumptions:

One well will be housed in well house and other in well field with well cover
Test pumping of existing wells to check drawdown
Existing well site has adequate space for two new wells and control area
3 bid phases assumed
O&M Manual is project-specific

REMINGTON WATER DISTRICT
OPTION 2: STANDPIPE RESERVOIR
ENGINEER's OPINION OF PRELIMINARY PROJECT COSTS

Prepared By:	Derek Huff, EIT	Date:	December 2, 2019		
Project Manager	Ashley Williams, PE	Date:			

Item No.	Description	Unit	Quantity	Unit Price	Total
	Mobilization	LS	1	$57,000.00	$57,000.00
	Construction of Standpipe Reservoir	GAL	525,000	$2.00	$1,050,000.00
	Land Acquisition	LS	1	$40,000.00	$40,000.00
	Foundation	LS	1	$50,000.00	$50,000.00
				Subtotal =	$ 1,197,000.00
				15% Contingency =	$180,000.00
				Total Estimated Construction =	**$ 1,377,000.00**
ENGINEERING					
	Design Phase Services				$138,000.00
	Bidding Phase Services				$5,000.00
	Construction Phase Services				$138,000.00
	Post Construction Phase				$3,000.00
ESTIMATED TOTAL PROJECT COST					**$1,661,000.00**
	Assumptions:				

REMINGTON WATER DISTRICT
OPTION 3: UNDERGROUND STORAGE RESERVOIR
ENGINEER's OPINION OF PRELIMINARY PROJECT COSTS

Prepared By:	Derek Huff, EIT	Date:	October 8, 2019		
Project Manager	Ashley Williams, PE	Date:			

Item No.	Description	Unit	Quantity	Unit Price	Total
	Mobilization	LS	1	$21,900.00	$21,900.00
	Construction of Underground Storage Reservoir	GAL	250,000	$1.75	$437,500.00
					$0.00
					$0.00
				Subtotal =	$ 459,400.00
				15% Contingency =	$69,000.00
				Total Estimated Construction =	**$ 528,400.00**
ENGINEERING					
	Design Phase Services				$53,000.00
	Bidding Phase Services				$5,000.00
	Construction Phase Services				$53,000.00
	Post Construction Phase				$3,000.00
ESTIMATED TOTAL PROJECT COST					**$642,400.00**
	Assumptions:				
	There is room for reservoir at existing well site				

REMINGTON WATER DISTRICT
OPTION 3: BOOSTER PUMP UPGRADE- CURRENT CONFIGURATION
ENGINEER's OPINION OF PRELIMINARY PROJECT COSTS

Prepared By:	Derek Huff, EIT	Date:	December 2, 2019		
Project Manager	Ashley Williams, PE	Date:			
Item No.	Description	Unit	Quantity	Unit Price	Total
	Mobilization	LS	1	$ 8,000.00	$8,000.00
	500 gpm Booster Pump	EA	2	$ 11,000.00	$22,000.00
	Electrical	LS	1	$ 35,000.00	$35,000.00
	Mechanical Piping	LS	1	$ 25,000.00	$ 25,000.00
	Building Expansion	LS	1	$ 75,000.00	$ 75,000.00
				Subtotal =	$ 165,000.00
				15% Contingency =	$25,000.00
				Total Estimated Construction =	**$ 190,000.00**
ENGINEERING					
	Design Phase Services				$19,000.00
	Bidding Phase Services				$6,000.00
	Construction Phase Services				$19,000.00
	Post Construction Phase				$3,000.00
ESTIMATED TOTAL PROJECT COST					**$237,000.00**
	Assumptions:				
	1 Bid Package (building/piping/pump)				
	Power is available from current transformer				

REMINGTON WATER DISTRICT
MINIMUM IMPROVEMENT OPTION: McCORMICK WELL AND WELL 1 UPSIZE
ENGINEER's OPINION OF PRELIMINARY PROJECT COSTS

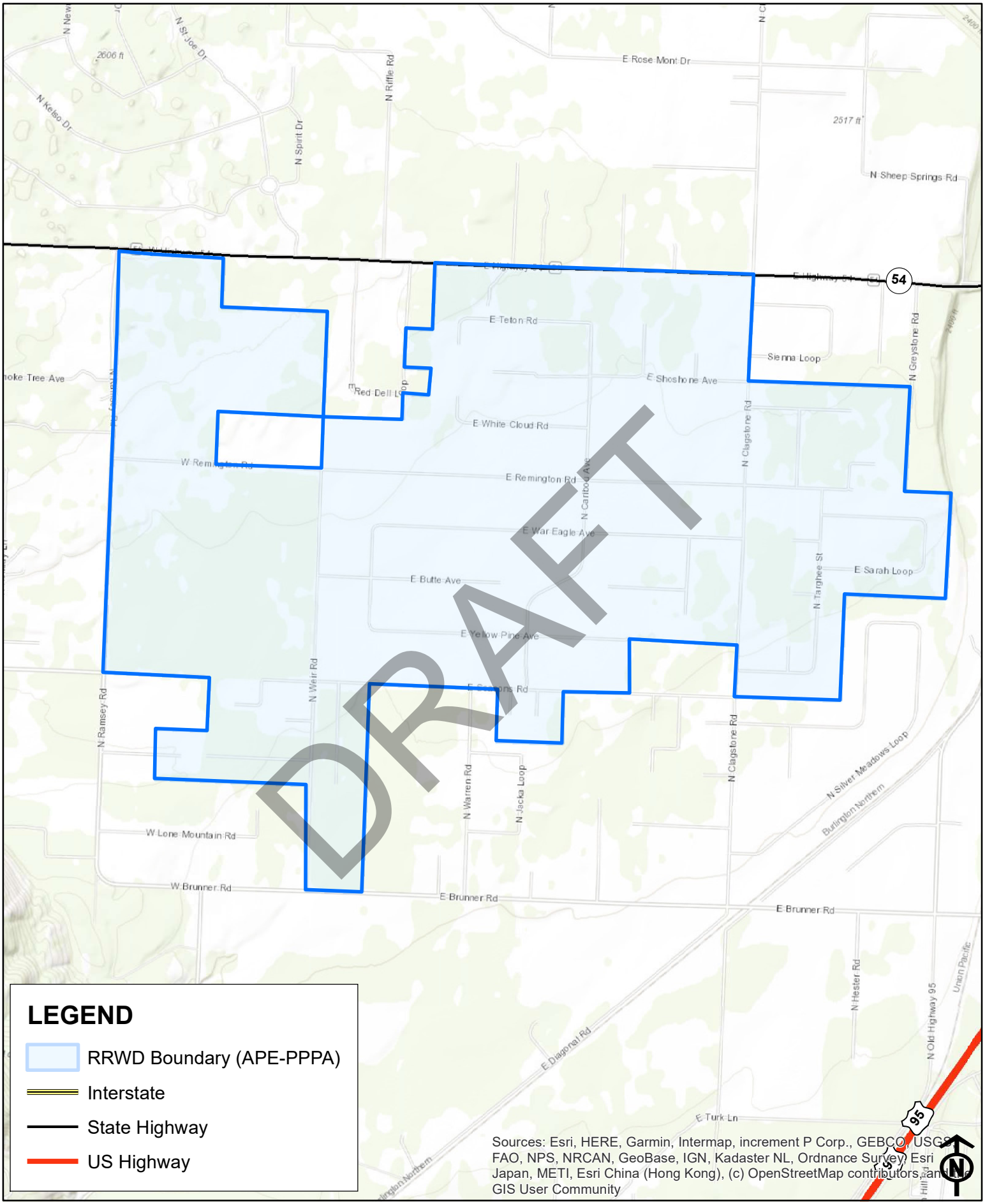
Prepared By:	Derek Huff, EIT	Date:	November 18, 2019		
Project Manage	Ashley Williams, PE	Date:			
Item No.	Description	Unit	Quantity	Unit Price	Total
	Mobilization	LS	1	$ 48,000.00	$ 48,000.00
WELL 1 UPSIZE					
	Pull Pump and Complete Alignment	LS	1	$ 20,000.00	$ 20,000.00
	Pump Testing	LS	1	$ 25,000.00	$ 25,000.00
	New Well Pump (800 gpm, 200 HP)	EA	1	$ 135,000.00	$ 135,000.00
	Mechanical and Site Piping	LS	1	$ 50,000.00	$ 50,000.00
	Electrical	LS	1	$ 50,000.00	$ 50,000.00
	Upgrade Existing Transformer	LS	1	$ -	$ -
	Pump House Expansion	LS	1	$ -	$ -
MCCORMICK					
	New Well Pump (800 gpm, 200 HP)	EA	1	$ 135,000.00	$ 135,000.00
	Water Quality Testing	LS	1	$ 3,000.00	$ 3,000.00
	Mechanical and Site Piping	LS	1	$ 85,000.00	$ 85,000.00
	Electrical	LS	1	$ 150,000.00	$ 150,000.00
	3-Phase Power Extension (McCormick)	LS	1	$ 100,000.00	$ 100,000.00
	PRV Vault for White Cloud	LS	1	$ 30,000.00	$ 30,000.00
	12-inch Transmission Line from McCormick	LF	750	$ 80.00	$60,000.00
	Pump House	LS	1	$ 100,000.00	$ 100,000.00
				Subtotal =	$ 991,000.00
				15% Contingency =	$149,000.00
				Total Estimated Construction =	**$ 1,140,000.00**
ENGINEERING					
	Design Phase Services				$114,000.00
	Bidding Phase Services				$4,000.00
	Construction Phase Services				$103,000.00
	Post Construction Phase				$3,000.00
	Start-Up/O&M Manual				$3,000.00
ESTIMATED TOTAL PROJECT COST					**$ 1,367,000.00**
	Assumptions:				
	McCormick Well has been test pumped				
	O&M Manual is project-specific				
	Assumes a portion of design for McCormick has been completed				

APPENDIX H:

Environmental Review Documentation

WELCH-COMER
ENGINEERS | SURVEYORS

1. APE/PPPA Map



LEGEND

- RRWD Boundary (APE-PPPA)
- Interstate
- State Highway
- US Highway

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

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www.welchcomer.com 208-664-9382

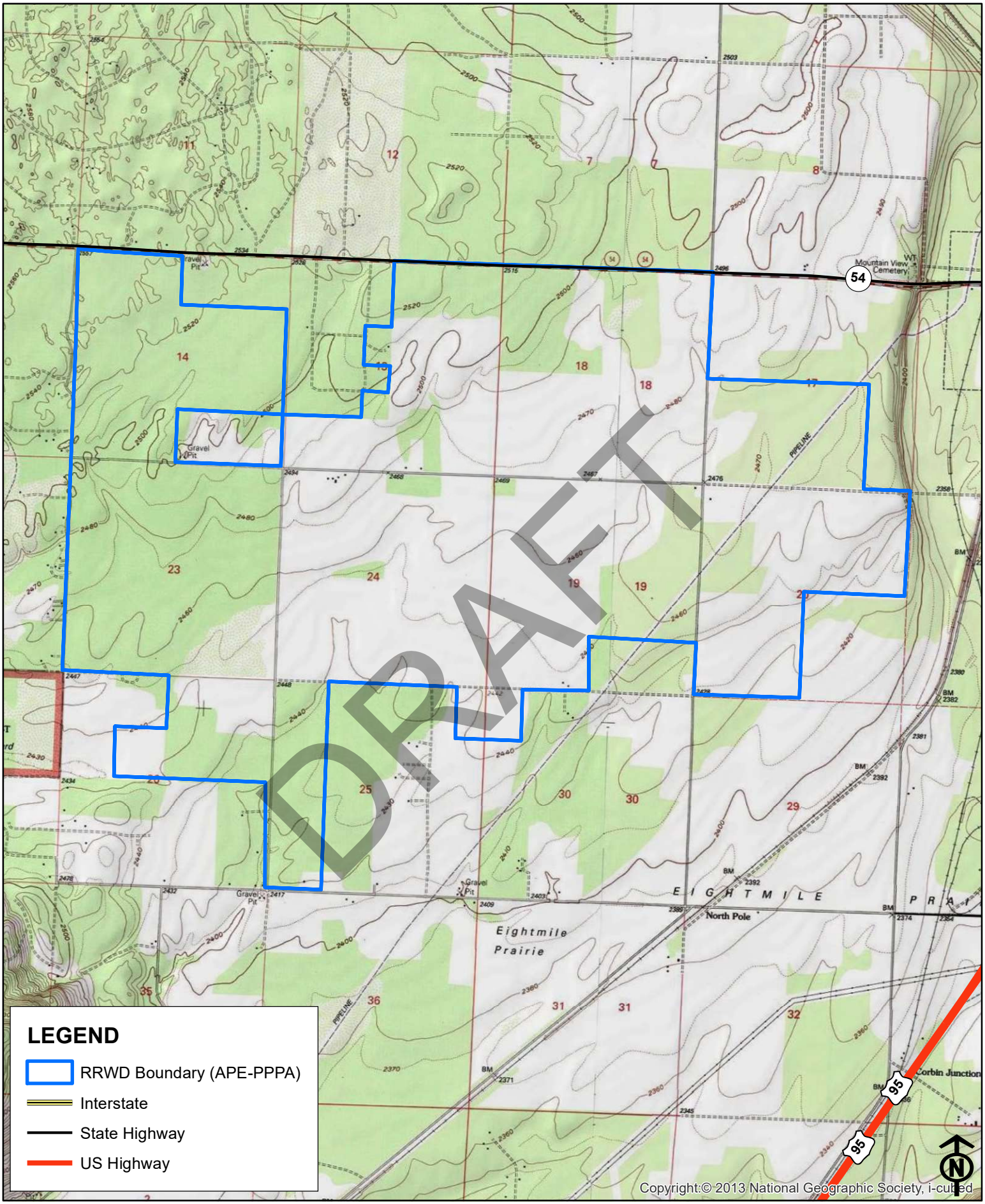
RRWD Water System Plan

APE-PPPA Map

Sources:
Idaho Transportation Dept.
Kootenai County GIS
Basemap (see above)

PROJECT NO.....41276.01
DRAWN BY.....DH
FILENAME.....APE_PPPA
DATE.....11/21/19

2. Topography



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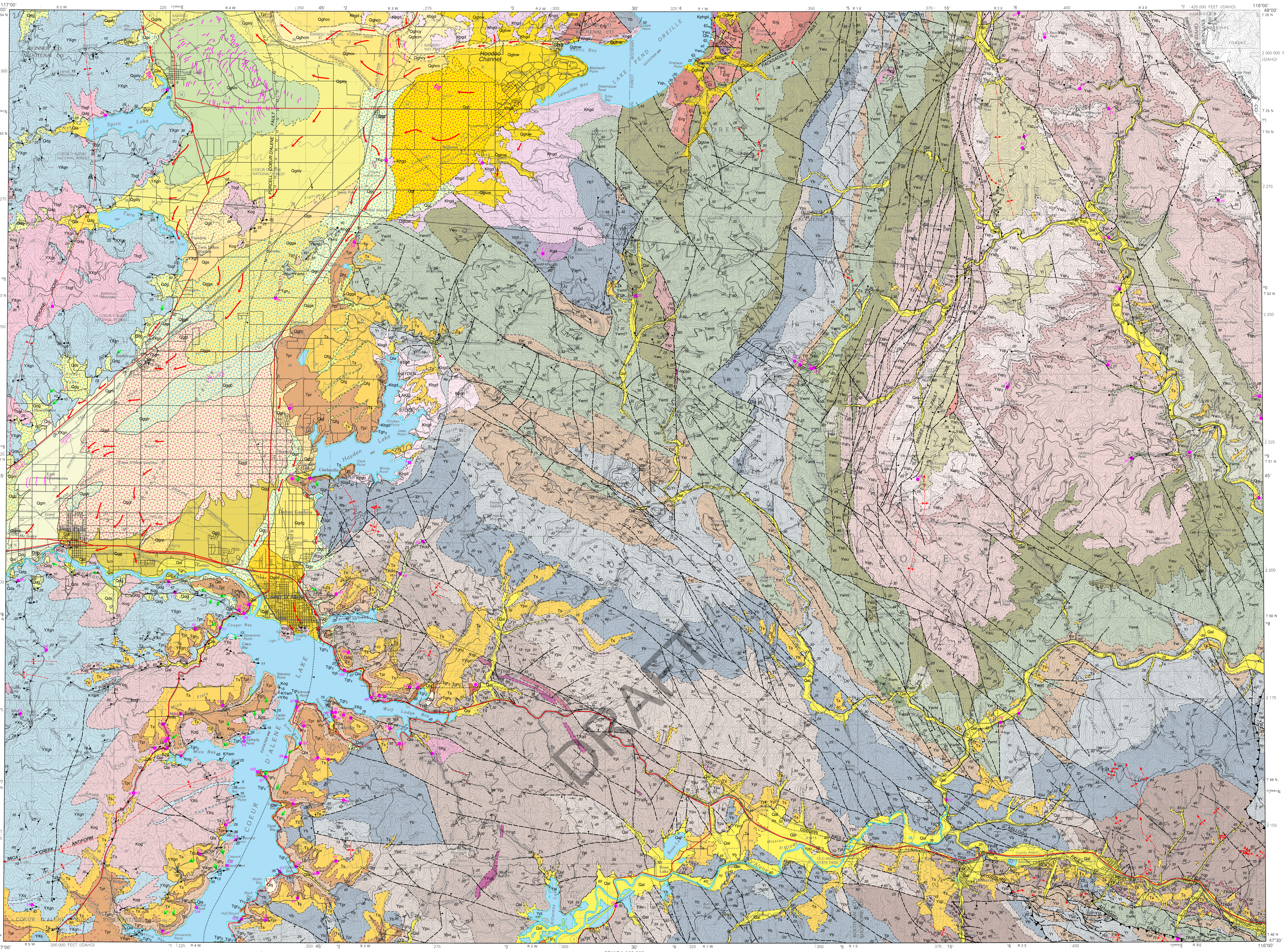
RRWD Water System Plan

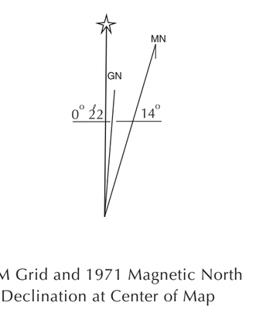
Topographic Map

Sources:
Idaho Transportation Dept.
Kootenai County GIS
Basemap (see above)

PROJECT NO.....41276.01
DRAWN BY.....DH
FILENAME.....Topo
DATE.....11/21/19



Base map from digitally scanned USGS 1:100,000 composite film base, 1987.
Roads from USGS, 1:100,000 Digital Line Graph data.
Projection and 10,000-meter grid, zone 12, Universal Transverse Mercator.
25,000 foot grid ticks based on Idaho coordinate system, west zone.
1927 North American Datum.



UTM Grid and 1971 Magnetic North Declination at Center of Map

SCALE 1:100,000

KILOMETERS

MILES

Contour Interval 50 Meters

QUADRANGLE LOCATION

Prepared in cooperation with the U.S. Geological Survey.

This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program.

Digital cartography and GIS data capture by Jane S. Freed, Loudon R. Stanford, Vance T. MacKubbin, and Alan K. Schlerf.

Map edited by Roger C. Stewart.

Note on printing: The map is reproduced at a high resolution of 600 dots per inch. The inks are resistant to run but not to the fading caused by long-term exposure to light.

Map version 8-23-2006.

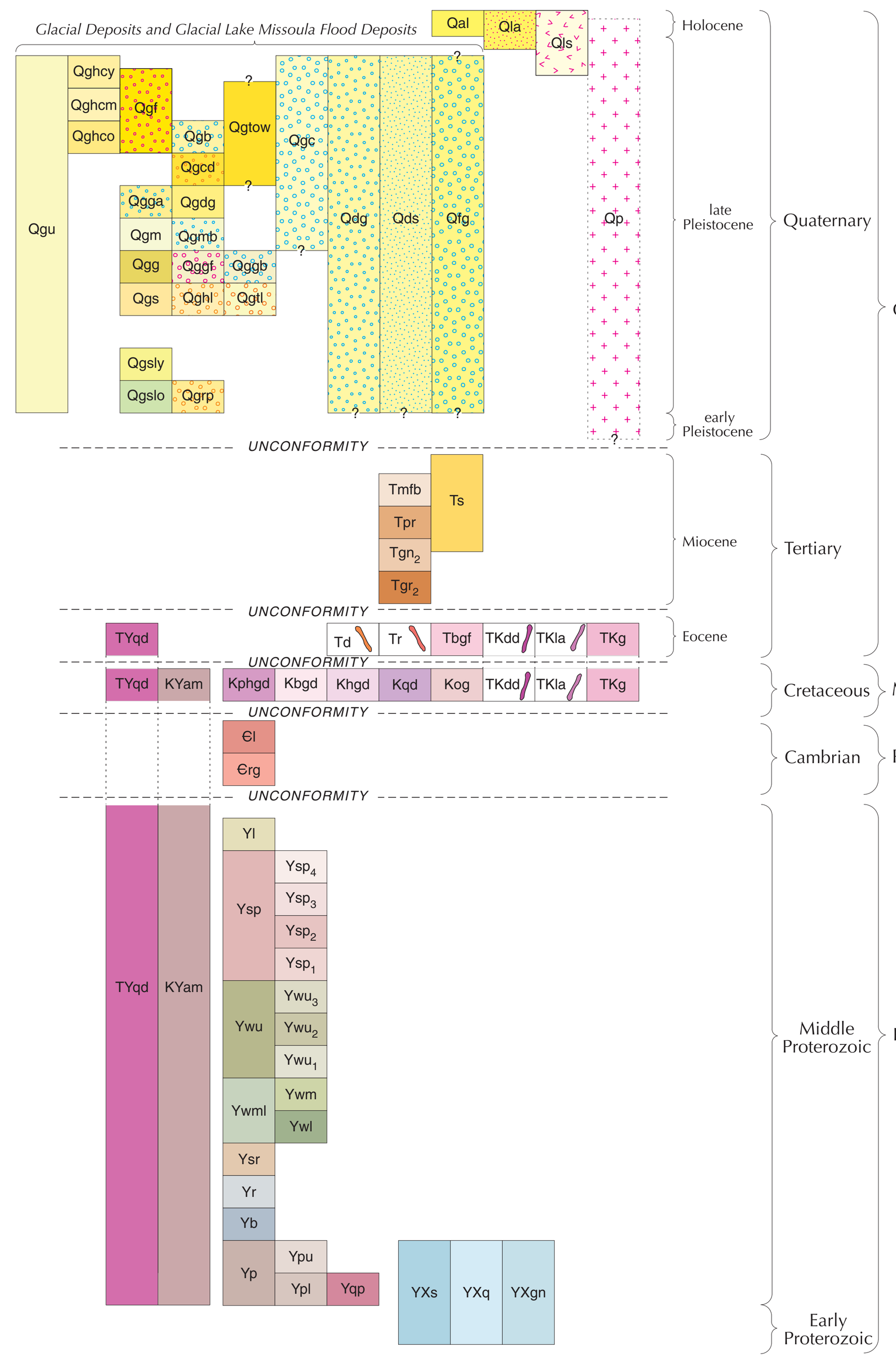
Geologic Map of the Coeur d'Alene 30 x 60 Minute Quadrangle, Idaho

Compiled and mapped by

Reed S. Lewis, Russell F. Burmester, Roy M. Breckenridge, Mark D. McFadden, and John D. Kauffman

2002

CORRELATION OF MAP UNITS



MAP UNITS

Unit descriptions in accompanying booklet

HOLOCENE DEPOSITS

- Qal — Alluvial deposits (Holocene)
- Qla — Lacustrine sediments and alluvium (Holocene)
- Qls — Landslide deposits (Holocene)
- Qfg — Fluvial gravel (Pleistocene and Holocene)
- Qp — Palouse Formation (Pleistocene and Holocene) *(pattern only)*

DEPOSITS OF GLACIAL ORIGIN

- Qghcy — Gravel of Hoodoo channel, younger (late Pleistocene)
- Qghcm — Gravel of Hoodoo channel, middle (late Pleistocene)
- Qghco — Gravel of Hoodoo channel, older (late Pleistocene)
- Qgtow — Bouldery till and outwash deposits (late Pleistocene)

CATASTROPHIC FLOOD DEPOSITS AND REWORKED OUTWASH

- Qgu — Gravel, undivided (Pleistocene) *(cross section only)*
- Qgf — Gravel of Farragut State Park (Pleistocene)
- Qgc — Channel gravel, undivided (Pleistocene)
- Qdg — Distal gravel deposits (Pleistocene)
- Qds — Distal sand and silt deposits (Pleistocene)
- Qgb — Gravel of Beck Road (Pleistocene)
- Qgcd — Gravel of Coeur d' Alene (Pleistocene)
- Qgdg — Gravel of Dalton Gardens fan (Pleistocene)
- Qgga — Gravel of Garwood (Pleistocene)
- Qgm — Gravel of McGuire (Pleistocene)
- Qgmb — Gravel of McGuire, bar facies (Pleistocene)
- Qgg — Gravel of Green Ferry (Pleistocene)
- Qggf — Gravel of Green Ferry, fan facies (Pleistocene)
- Qggb — Gravel of Green Ferry, bar facies (Pleistocene)
- Qgs — Gravel of Scarcello Road (Pleistocene)
- Qghl — Gravel of Hayden Lake (Pleistocene)
- Qgtl — Gravel of Twin Lake (Pleistocene)
- Qgsly — Gravel of Spirit Lake, younger (Pleistocene)
- Qgslo — Gravel of Spirit Lake, older (Pleistocene)
- Qgrp — Gravel of Ross Point (Pleistocene)

OLDER SEDIMENTS

- Ts — Sediment (Miocene)

COLUMBIA RIVER BASALT GROUP

Saddle Mountains Formation(?)

- Tmfb — Basalt of Mica Flats (Miocene)

Wanapum Formation

- Tpr — Priest Rapids Member (Miocene)

Grande Ronde Formation

- Tgn_2 — Grande Ronde N_2 magnetostratigraphic unit (Miocene)
- Tgr_2 — Grande Ronde R_2 magnetostratigraphic unit (Miocene)

INTRUSIVE ROCKS

- Tr — Rhyolite dikes (Eocene)
- Td — Dacite dikes (Eocene)
- Tbgf — Fine-grained biotite granite (Eocene)
- TKdd — Diabase and diorite dikes (Tertiary or Cretaceous)
- TKla — Lamprophyre dikes (Tertiary or Cretaceous)
- TKg — Granitic rocks, undivided (Tertiary or Cretaceous)
- TYqd — Quartz diorite dikes and sills (Tertiary, Cretaceous, or Proterozoic)
- Kphgd — Porphyritic hornblende-biotite granodiorite (Cretaceous)
- Kbgd — Biotite granodiorite (Cretaceous)
- Khgd — Hornblende-biotite granodiorite (Cretaceous)
- Kqd — Biotite-hornblende quartz diorite (Cretaceous)
- Kog — Orthogneiss (Cretaceous)
- KYam — Amphibolite (Cretaceous or Proterozoic)

PALEOZOIC ROCKS

- Єl — Lakeview Limestone (Cambrian)
- Єrg — Rennie Shale and Gold Creek Quartzite (Cambrian)

BELT SUPERGROUP

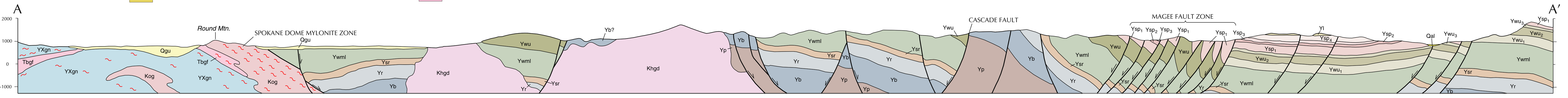
- Yl — Libby Formation (Middle Proterozoic)
- Ysp — Striped Peak Formation, undivided (Middle Proterozoic)
- Ysp_4 — Striped Peak Formation, member four (Middle Proterozoic)
- Ysp_3 — Striped Peak Formation, member three (Middle Proterozoic)
- Ysp_2 — Striped Peak Formation, member two (Middle Proterozoic)
- Ysp_1 — Striped Peak Formation, member one (Middle Proterozoic)
- Ywu — Wallace Formation, upper member, undivided (Middle Proterozoic)
- Ywu_3 — Wallace Formation, upper member three (Middle Proterozoic)
- Ywu_2 — Wallace Formation, upper member two (Middle Proterozoic)
- Ywu_1 — Wallace Formation, upper member one (Middle Proterozoic)
- Ywml — Wallace Formation, middle and lower members, undivided (Middle Proterozoic)
- Ywm — Wallace Formation, middle member (Middle Proterozoic)
- Ywl — Wallace Formation, lower member (Middle Proterozoic)
- Ysr — St. Regis Formation (Middle Proterozoic)
- Yr — Revett Formation (Middle Proterozoic)
- Yb — Burke Formation (Middle Proterozoic)
- Yp — Prichard Formation, undivided (Middle Proterozoic)
- Ypu — Prichard Formation, upper part (Middle Proterozoic)
- Ypl — Prichard Formation, lower part (Middle Proterozoic)
- Yqp — Quartzite of the Prichard Formation (Middle Proterozoic)

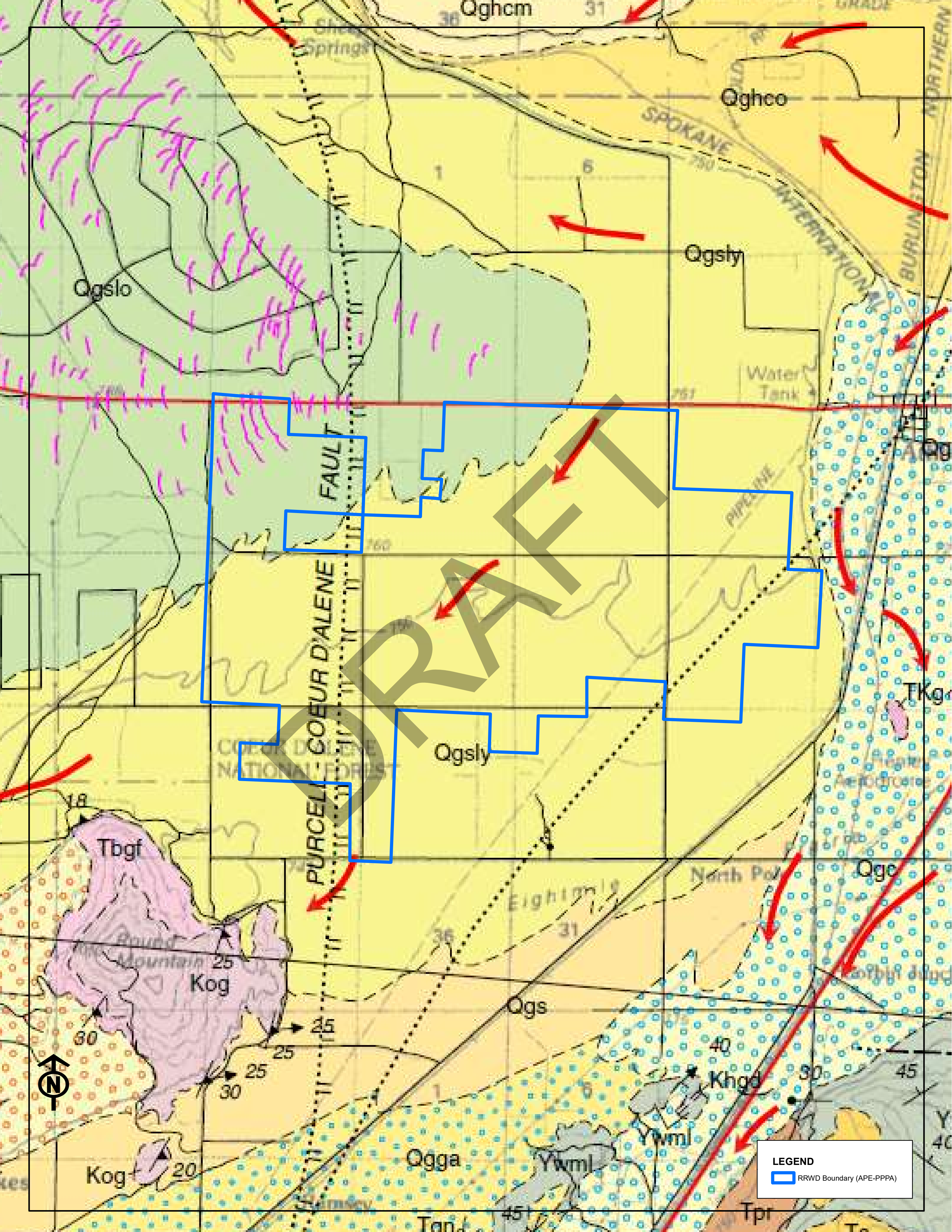
BELT SUPERGROUP OR PRE-BELT METAMORPHIC ROCKS

- YXs — Schist of the Priest River metamorphic complex (Proterozoic)
- YXq — Quartzite of the Priest River metamorphic complex (Proterozoic)
- YXgn — Gneiss of the Priest River metamorphic complex (Proterozoic)

MAP SYMBOLS

- Contact: dashed where approximately located
- High-angle fault: dashed where approximately located; dotted where concealed
- Normal fault: dashed where approximately located; dotted where concealed; ball and bar on downthrown side
- Detachment fault: dashed where approximately located; dotted where concealed; hachures on downthrown side
- Strike-slip fault: dashed where approximately located; dotted where concealed
- Thrust fault: approximately located; dotted where concealed; teeth on upper plate; includes steep (reverse) faults
- Fold axis: dotted where concealed; arrow indicates plunge direction
- Syncline
- Anticline
- Overturned syncline
- Overturned anticline
- 21 Strike and dip of compositional layering interpreted as bedding
- Strike of vertical bedding
- Horizontal bedding
- 71 Strike and dip of bedding; ball indicates bedding known to be upright
- 20 Overturned bedding
- 17 Strike and dip of foliation
- Strike of vertical foliation
- 40 Bearing and plunge of lineation, type unknown
- 5 Bearing and plunge of mineral lineation
- 10 Bearing and plunge of crenulation lineation
- 25 Bearing and plunge of small fold axis
- 15 Bearing and plunge of asymmetrical small fold showing counterclockwise rotation viewed down plunge
- 9 Bearing and plunge of asymmetrical small fold showing clockwise rotation viewed down plunge
- 20 Strike and dip of fracture cleavage
- Strike of vertical fracture cleavage
- Vein
- 6 Sample location
- Giant current ripple field
- Abandoned channels of Glacial Lake Missoula floods drainageways
- Channels scoured in bedrock by Glacial Lake Missoula floods
- Mylonite (cross section only)




Qghcm
Qghco
Qgsly
Qgslo
FAULT
PURCELL - COEUR D'ALENE
COEUR D'ALENE NATIONAL FOREST
Qgsly
Water Tank
SPOKANE
INTERNATIONAL
BURLINGTON NORTHERN
PIPELINE
TKg
Qgc
North Pole
Tbgf
Round Mountain
Kog
Qgs
Qgga
Ywml
Khgd
Tpr
DRAFT
LEGEND
RRWD Boundary (APE-PPPA)

United States Department of Agriculture

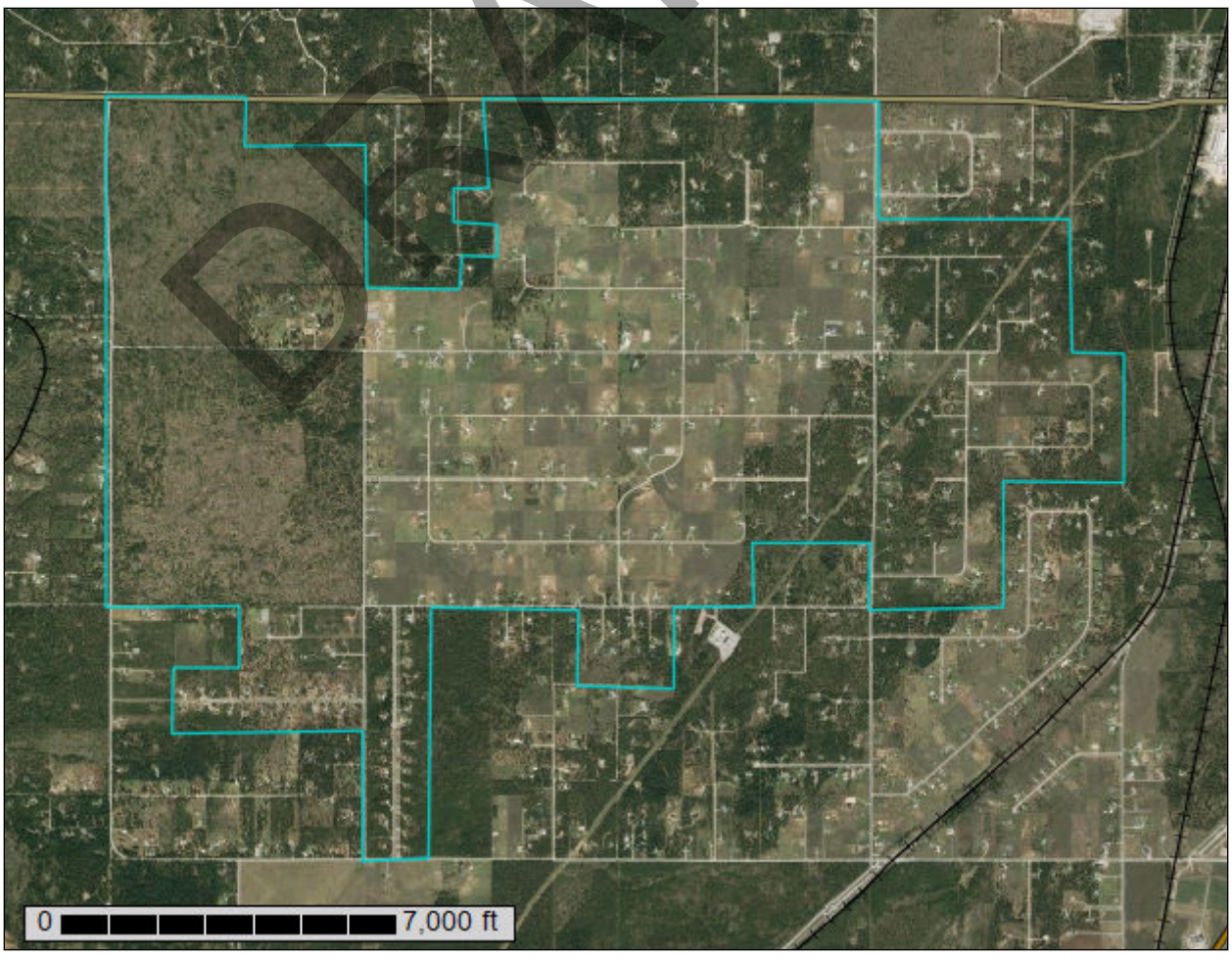
NRCS

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 Kootenai County Area, Idaho

Remington Water District WSP



October 1, 2019

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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Contents

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.

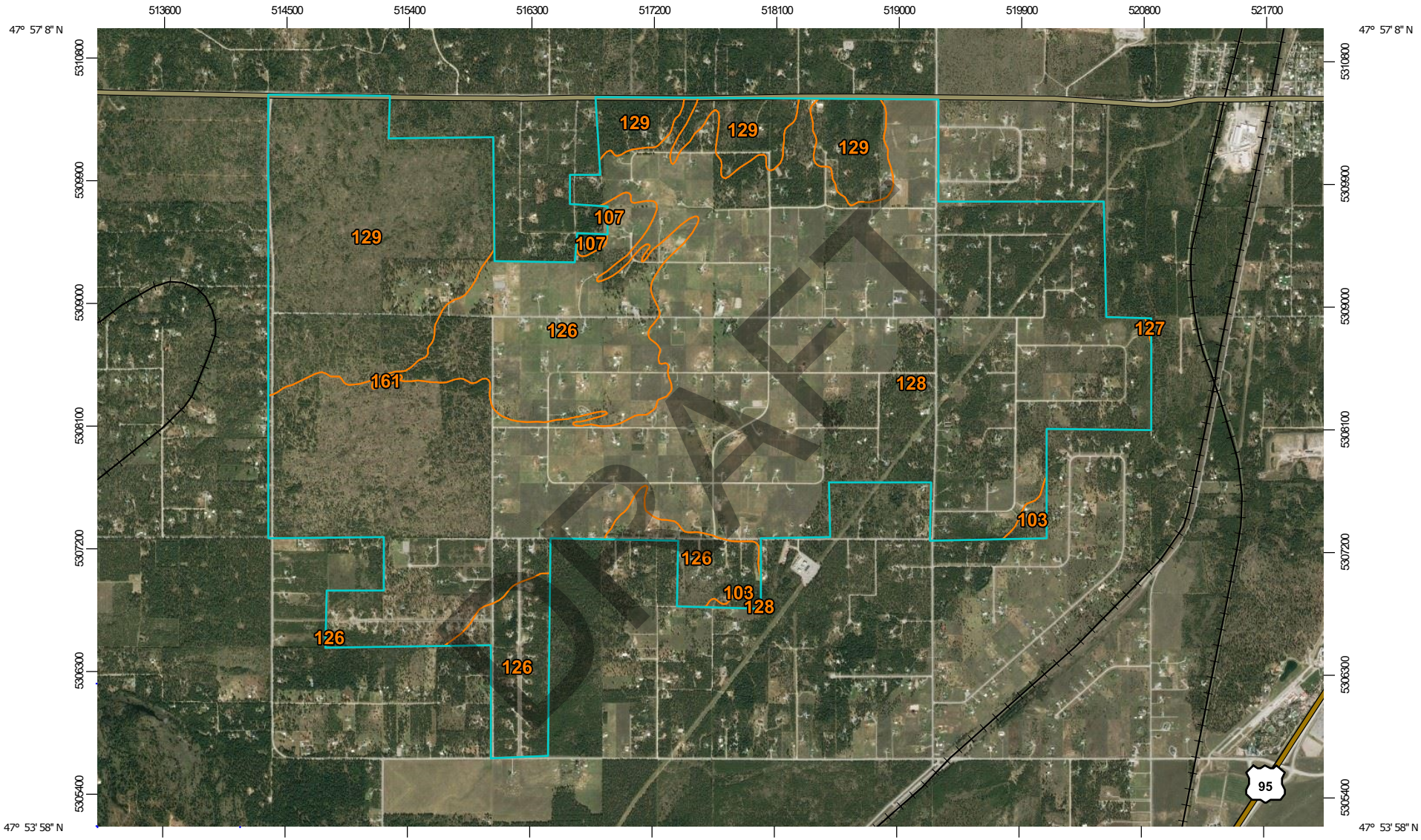
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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 Scale: 1:41,200 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 500 1000 2000 3000

Feet
0 2000 4000 8000 12000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Survey Areas
- Soil Map Unit Polygons

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

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.

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: Kootenai County Area, Idaho
Survey Area Data: Version 17, Sep 17, 2019

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

Date(s) aerial images were photographed: Apr 24, 2019—Jun 26, 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
103	Avonville fine gravelly silt loam, 0 to 7 percent slopes	22.1	0.5%
107	Bonner silt loam, 0 to 8 percent slopes	7.5	0.2%
126	Kootenai gravelly silt loam, 0 to 7 percent slopes	723.7	15.1%
127	Kootenai gravelly silt loam, 20 to 45 percent slopes	1.1	0.0%
128	Kootenai cobbly silt loam, 0 to 7 percent slopes	3,092.8	64.5%
129	Kootenai-Bonner complex, 0 to 20 percent slopes	942.7	19.7%
161	Rathdrum silt loam, 0 to 7 percent slopes	3.1	0.1%
Totals for Area of Interest		**4,793.0**	**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.

Kootenai County Area, Idaho

103—Avonville fine gravelly silt loam, 0 to 7 percent slopes

Map Unit Setting

National map unit symbol: 2nm2
Elevation: 2,200 to 2,400 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 140 to 150 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Avonville and similar soils: 70 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Avonville

Setting

Landform: Outwash terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Volcanic ash and loess over outwash

Typical profile

A - 0 to 16 inches: fine gravelly ashy silt loam
Bw - 16 to 25 inches: very gravelly silt loam
BC - 25 to 37 inches: extremely gravelly sandy loam
2C - 37 to 60 inches: extremely gravelly sand

Properties and qualities

Slope: 0 to 7 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 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Hydric soil rating: No

107—Bonner silt loam, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2nm6

Elevation: 2,000 to 3,000 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 90 to 120 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Bonner and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bonner

Setting

Landform: Outwash terraces
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Volcanic ash and loess over outwash derived from granite and/or schist and/or gneiss

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
Oe - 1 to 2 inches: moderately decomposed plant material
A - 2 to 10 inches: ashy silt loam
Bw - 10 to 20 inches: gravelly silt loam
2BC - 20 to 28 inches: gravelly sandy loam
3C - 28 to 62 inches: very gravelly loamy sand

Properties and qualities

Slope: 0 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 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 6.2 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Other vegetative classification: grand fir/ninebark (CN506)
Hydric soil rating: No

126—Kootenai gravelly silt loam, 0 to 7 percent slopes

Map Unit Setting

National map unit symbol: 2nmt
Elevation: 2,100 to 2,700 feet
Mean annual precipitation: 25 to 30 inches
Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 90 to 120 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition
Kootenai and similar soils: 75 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kootenai

Setting
Landform: Outwash terraces, moraines
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Volcanic ash and loess over outwash derived from granite and/or gneiss and/or schist

Typical profile
Oi - 0 to 1 inches: slightly decomposed plant material
Oe - 1 to 2 inches: moderately decomposed plant material
A - 2 to 8 inches: gravelly silt loam
Bw1 - 8 to 24 inches: gravelly silt loam
Bw2 - 24 to 28 inches: very gravelly loam
2C - 28 to 62 inches: extremely gravelly coarse sand

Properties and qualities
Slope: 0 to 7 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 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.5 inches)

Interpretive groups
Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: B
Ecological site: Warm-Frigid, Xeric, Loamy Slopes, mixed ash surface (Douglas Fir/Warm Dry Shrub) Pseudotsuga menziesii / Physocarpus malvaceus - Symphoricarpos albus (F043AY518WA)
Other vegetative classification: Douglas-fir/common snowberry (CN310)
Hydric soil rating: No

127—Kootenai gravelly silt loam, 20 to 45 percent slopes

Map Unit Setting
National map unit symbol: 2nmv
Elevation: 2,100 to 2,700 feet
Mean annual precipitation: 25 to 30 inches
Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 90 to 120 days
Farmland classification: Not prime farmland

Map Unit Composition
Kootenai and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kootenai

Setting
Landform: Outwash terraces, escarpments
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Volcanic ash and loess over outwash derived from granite and/or gneiss and/or schist

Typical profile
Oi - 0 to 1 inches: slightly decomposed plant material
Oe - 1 to 2 inches: moderately decomposed plant material
A - 2 to 8 inches: gravelly silt loam
Bw1 - 8 to 24 inches: gravelly silt loam
Bw2 - 24 to 28 inches: very gravelly loam
2C - 28 to 62 inches: extremely gravelly coarse sand

Properties and qualities
Slope: 20 to 45 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 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.5 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: Warm-Frigid, Xeric, Loamy Slopes, mixed ash surface (Douglas Fir/Warm Dry Shrub) Pseudotsuga menziesii / Physocarpus malvaceus - Symphoricarpos albus (F043AY518WA)
Other vegetative classification: Douglas-fir/common snowberry (CN310)
Hydric soil rating: No

128—Kootenai cobbly silt loam, 0 to 7 percent slopes

Map Unit Setting
National map unit symbol: 2nmw
Elevation: 2,100 to 2,700 feet
Mean annual precipitation: 25 to 30 inches
Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 90 to 120 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Kootenai and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kootenai

Setting
Landform: Outwash terraces, moraines
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Volcanic ash and loess over outwash derived from granite and/or gneiss and/or schist

Typical profile
Oi - 0 to 1 inches: slightly decomposed plant material
Oe - 1 to 2 inches: moderately decomposed plant material
A - 2 to 8 inches: cobbly silt loam
Bw1 - 8 to 24 inches: gravelly silt loam
Bw2 - 24 to 28 inches: very gravelly loam
2C - 28 to 62 inches: extremely gravelly coarse sand

Properties and qualities
Slope: 0 to 7 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 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.5 inches)

Interpretive groups
Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: B
Ecological site: Warm-Frigid, Xeric, Loamy Slopes, mixed ash surface (Douglas Fir/Warm Dry Shrub) Pseudotsuga menziesii / Physocarpus malvaceus - Symphoricarpos albus (F043AY518WA)
Other vegetative classification: Douglas-fir/common snowberry (CN310)
Hydric soil rating: No

129—Kootenai-Bonner complex, 0 to 20 percent slopes

Map Unit Setting
National map unit symbol: 2nmx
Elevation: 2,000 to 3,000 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 90 to 120 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Kootenai and similar soils: 60 percent
Bonner and similar soils: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kootenai

Setting

Landform: Outwash terraces, moraines
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Volcanic ash and loess over outwash derived from granite and/or gneiss and/or schist

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
Oe - 1 to 2 inches: moderately decomposed plant material
A - 2 to 8 inches: gravelly silt loam
Bw1 - 8 to 24 inches: gravelly silt loam
Bw2 - 24 to 28 inches: very gravelly loam
2C - 28 to 62 inches: extremely gravelly coarse sand

Properties and qualities

Slope: 0 to 20 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 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: Warm-Frigid, Xeric, Loamy Slopes, mixed ash surface (Douglas Fir/Warm Dry Shrub) Pseudotsuga menziesii / Physocarpus malvaceus - Symphoricarpos albus (F043AY518WA)
Other vegetative classification: Douglas-fir/common snowberry (CN310)
Hydric soil rating: No

Description of Bonner

Setting

Landform: Outwash terraces, moraines
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Volcanic ash and loess over outwash derived from granite and/or schist and/or gneiss

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material

Oe - 1 to 2 inches: moderately decomposed plant material
A - 2 to 10 inches: gravelly ashy silt loam
Bw - 10 to 20 inches: gravelly silt loam
2BC - 20 to 28 inches: gravelly sandy loam
3C - 28 to 62 inches: very gravelly loamy sand

Properties and qualities

Slope: 0 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 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Other vegetative classification: grand fir/ninebark (CN506)
Hydric soil rating: No

161—Rathdrum silt loam, 0 to 7 percent slopes

Map Unit Setting

National map unit symbol: 2nny
Elevation: 2,000 to 2,600 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 90 to 110 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Rathdrum and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rathdrum

Setting

Landform: Outwash terraces, depressions
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Volcanic ash and/or loess over alluvium and/or outwash

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
Oe - 1 to 2 inches: moderately decomposed plant material
Bw - 2 to 24 inches: ashy silt loam
BC - 24 to 46 inches: silt loam

C1 - 46 to 56 inches: very fine sandy loam
C2 - 56 to 62 inches: silt loam

Properties and qualities

Slope: 0 to 7 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 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Other vegetative classification: western redcedar/ladyfern (CN540)
Hydric soil rating: No

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

AOI Inventory

This folder contains a collection of tabular reports that present a variety of soil information. Included are various map unit description reports, special soil interpretation reports, and data summary reports.

Legend

This report presents general information about the map units in the selected area. It shows map unit symbols and names for each map unit.

Report—Legend

Legend–Kootenai County Area, Idaho	
Map unit symbol and name	**Map unit acres**
103—Avonville fine gravelly silt loam, 0 to 7 percent slopes	19,912
107—Bonner silt loam, 0 to 8 percent slopes	9,415
126—Kootenai gravelly silt loam, 0 to 7 percent slopes	20,235
127—Kootenai gravelly silt loam, 20 to 45 percent slopes	2,040
128—Kootenai cobbly silt loam, 0 to 7 percent slopes	6,149
129—Kootenai-Bonner complex, 0 to 20 percent slopes	11,964
161—Rathdrum silt loam, 0 to 7 percent slopes	1,708

References

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American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

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Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

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United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

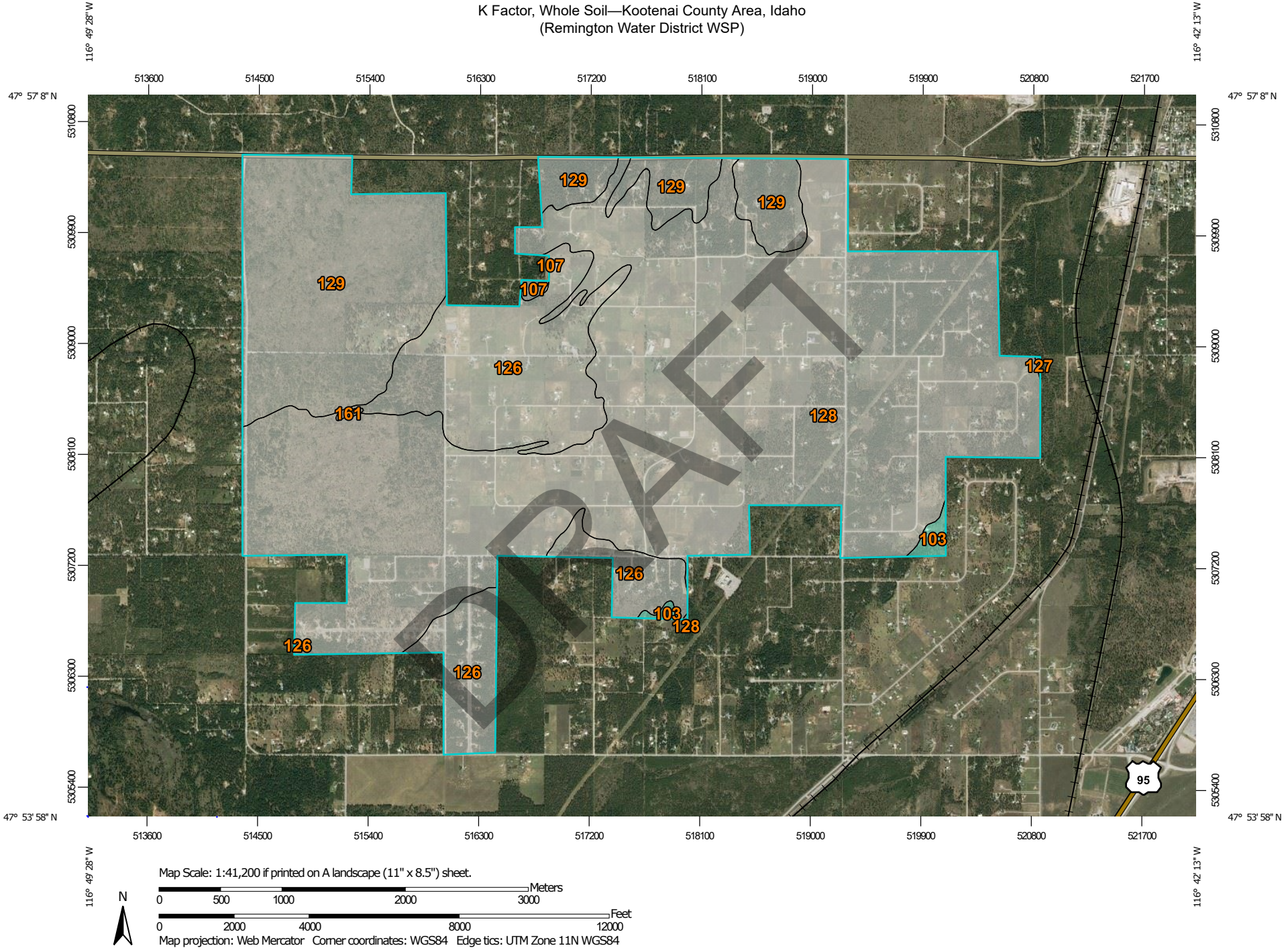
United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

K Factor, Whole Soil—Kootenai County Area, Idaho
(Remington Water District WSP)



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Soil Rating Lines

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Soil Rating Points

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

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.

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: Kootenai County Area, Idaho
Survey Area Data: Version 17, Sep 17, 2019

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

Date(s) aerial images were photographed: Apr 24, 2019—Jun 26, 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.

K Factor, Whole Soil

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
103	Avonville fine gravelly silt loam, 0 to 7 percent slopes	.32	22.1	0.5%
107	Bonner silt loam, 0 to 8 percent slopes		7.5	0.2%
126	Kootenai gravelly silt loam, 0 to 7 percent slopes		723.7	15.1%
127	Kootenai gravelly silt loam, 20 to 45 percent slopes		1.1	0.0%
128	Kootenai cobbly silt loam, 0 to 7 percent slopes		3,092.8	64.5%
129	Kootenai-Bonner complex, 0 to 20 percent slopes		942.7	19.7%
161	Rathdrum silt loam, 0 to 7 percent slopes		3.1	0.1%
Totals for Area of Interest			**4,793.0**	**100.0%**

Description

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kw (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable)

3. Surface Water and Ground Water

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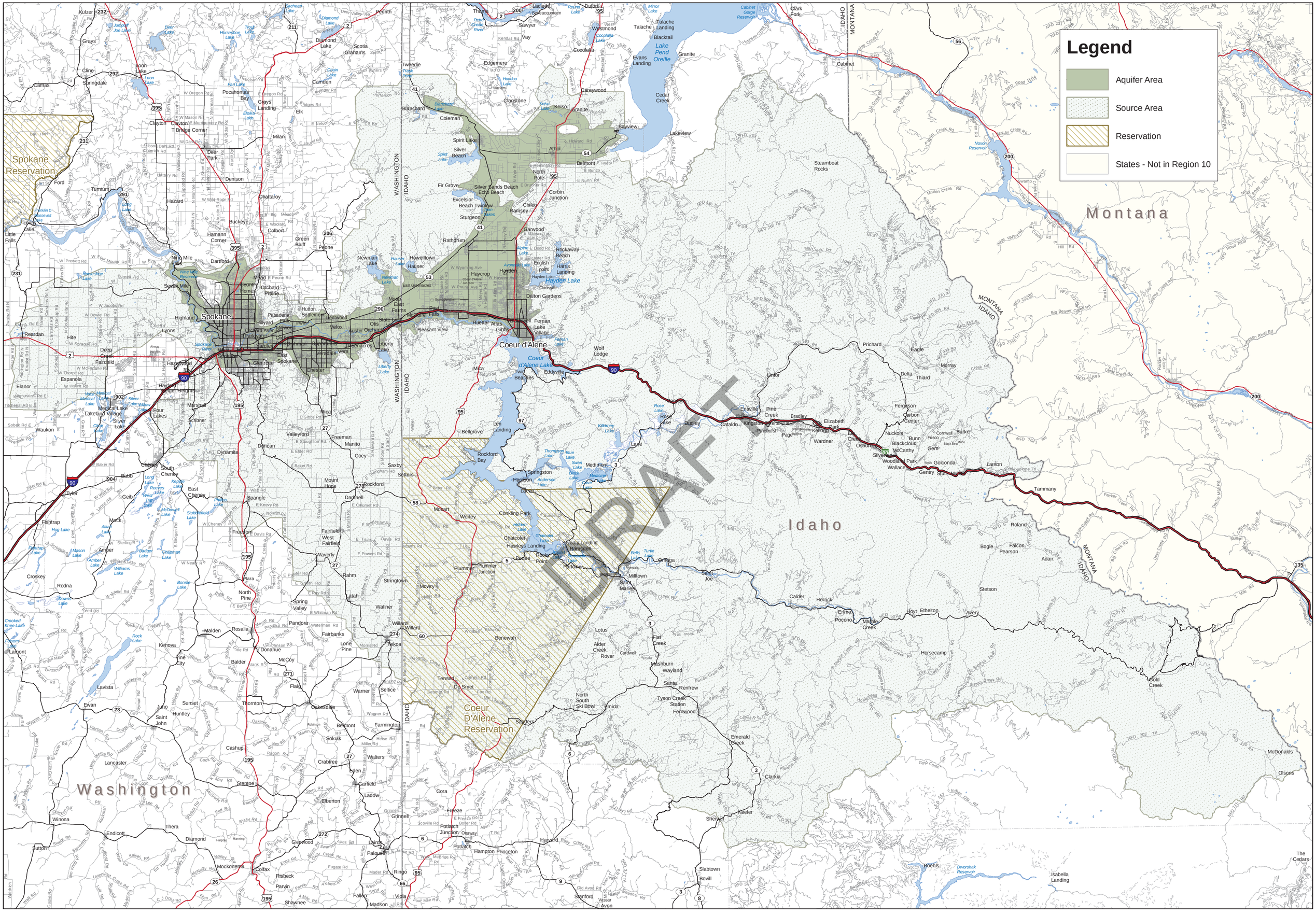
RRWD Water System Plan

Stream Overview

Sources:
Idaho Transportation Dept.
Idaho Dept. of Environmental Quality
Basemap (see above)

PROJECT NO.....41276.01
DRAWN BY.....DH
FILENAME.....Stream
DATE.....11/21/2019



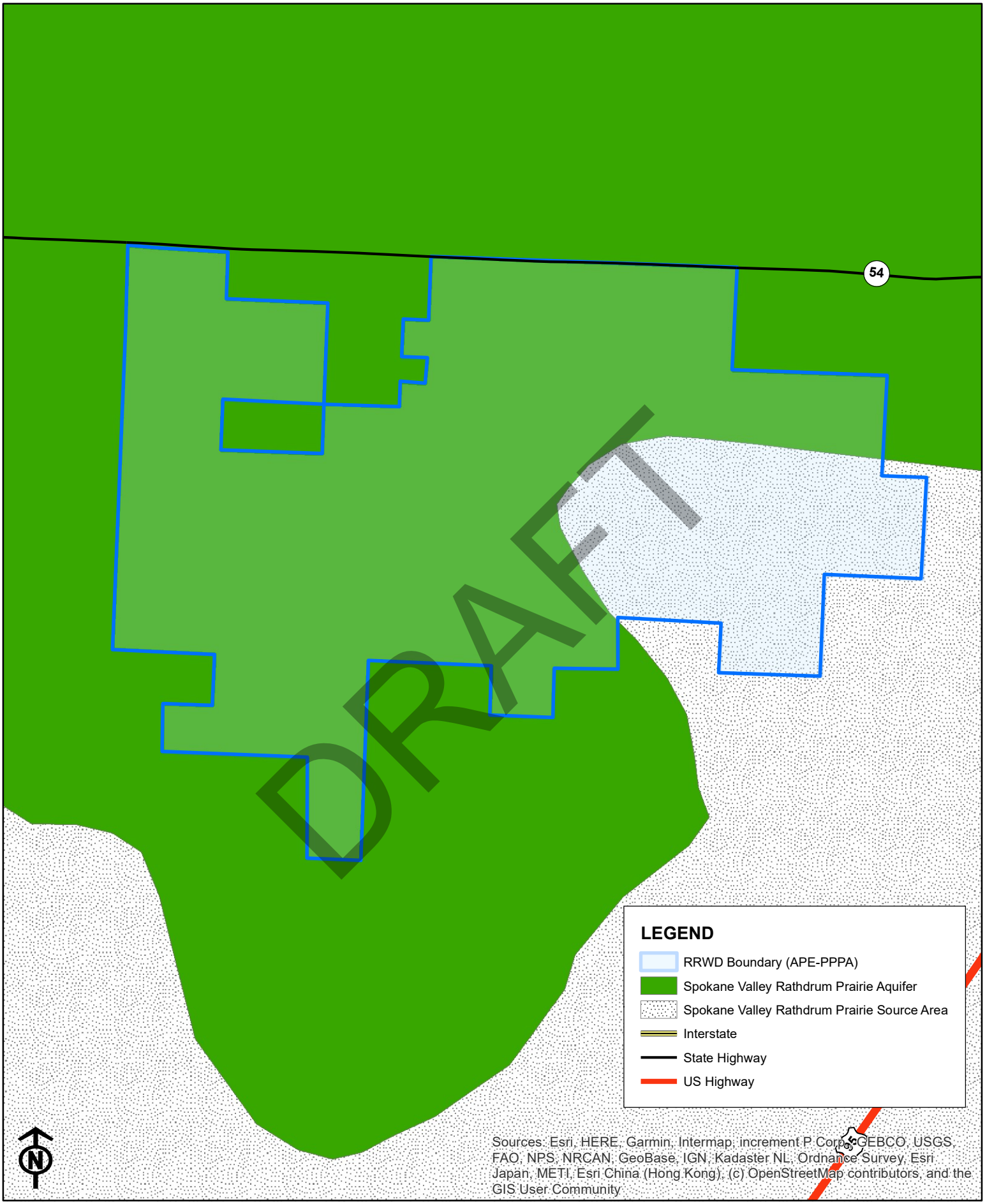
Spokane-Rathdrum Sole Source Aquifer

0 5 10 20 30 40 50 Kilometers

N W E S

The U.S. Environmental Protection Agency (EPA) has compiled this computer representation from data or information sources that may not have been verified by the EPA. This data is offered here as a general representation only, and is not to be re-used without verification by an independent professional qualified to verify such data or information. The EPA does not guarantee the accuracy, completeness, or timeliness of the information shown, and shall not be liable for any loss or injury resulting from reliance upon the information shown.

Map Created 11/04/2008 EPA Region 10



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RRWD Water System Plan

Sole Source Aquifer Overview

Sources:
Idaho Transportation Dept.
EPA Sole Source Aq
Basemap (see above)

PROJECT NO.....41276.01
DRAWN BY.....AW
FILENAME.....SoleSourceAq
DATE.....5/21/19

4. Endangered Species and Critical Habitat

U.S. Fish & Wildlife Service

ECOS

ECOS / Species Reports / Species By County Report

Species By County Report

The following report contains Species that are known to or are believed to occur in this county. Species with range unrefined past the state level are now excluded from this report. If you are looking for the Section 7 range (for Section 7 Consultations), please visit the IPaC application.

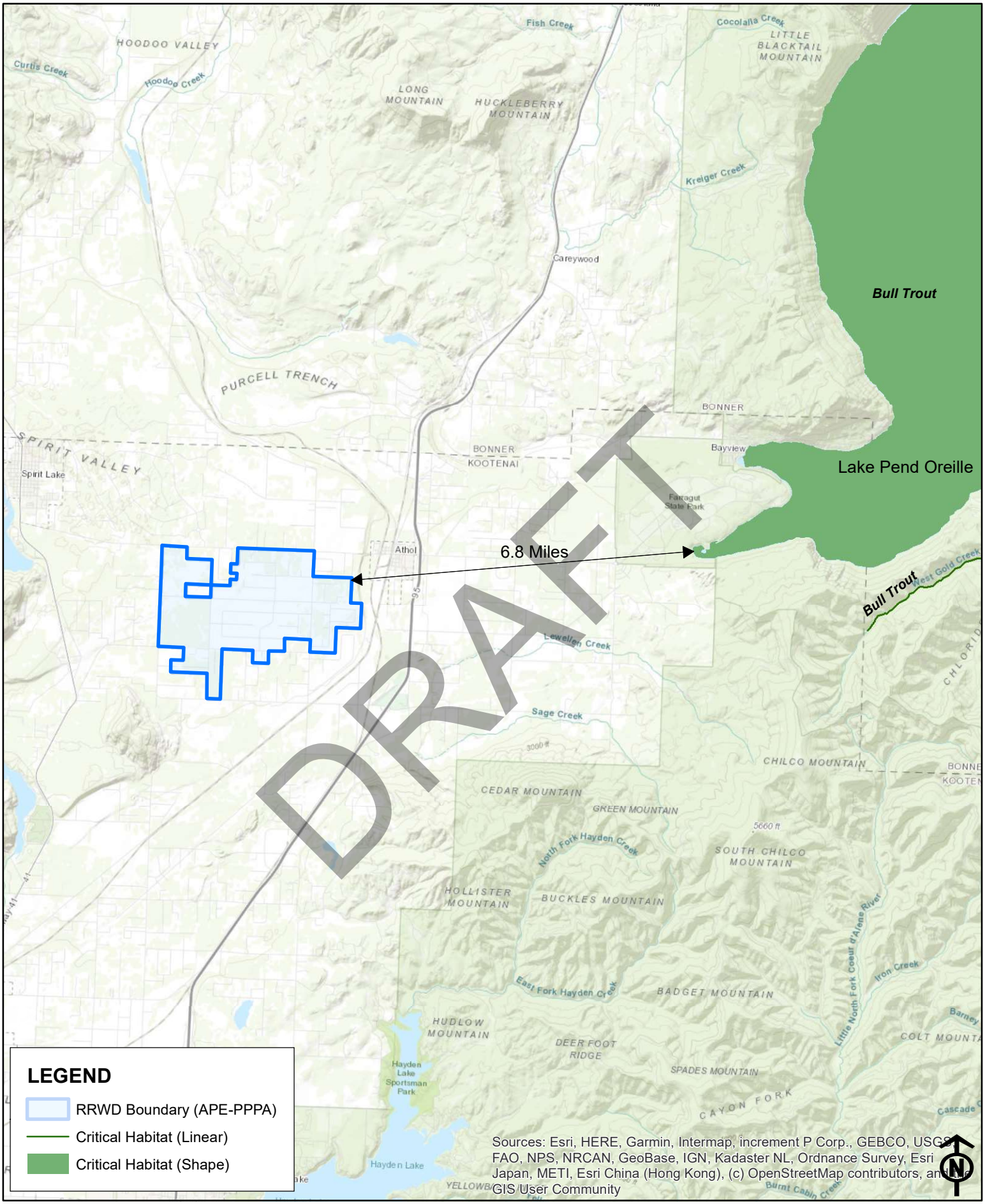
County: Kootenai, Idaho

CSV

Need to contact a FWS field office about a species? Follow this link to find your local FWS Office.

Group	Name	Population	Status	Lead Office	Recovery Plan	Recovery Plan Action Status	Recovery Plan Stage
Birds	Yellow-billed Cuckoo (*Coccyzus americanus*)	Western U.S. DPS	Threatened	Arizona Ecological Services Field Office			
Fishes	Bull Trout (*Salvelinus confluentus*)	U.S.A., conterminous, lower 48 states	Threatened	Idaho Fish and Wildlife Office	Recovery Plan for the Coterminous United States Population of Bull Trout (Salvelinus confluentus)	Implementation Progress	Final
Flowering Plants	Spalding's Catchfly (*Silene spaldingii*)	Wherever found	Threatened	Idaho Fish and Wildlife Office	Spalding's Catchfly Final Recovery Plan	Implementation Progress	Final
Flowering Plants	Water howellia (*Howellia aquatilis*)		Threatened	Montana Ecological Services Field Office	Water Howellia (Howellia aquatilis) Recovery Plan, Public and Agency Review Draft	Implementation Progress	Draft
Mammals	Gray wolf (*Canis lupus*)	Northern Rocky Mountain DPS	Recovery	Office of the Regional Director			

Group	Name	Population	Status	Lead Office	Recovery Plan	Recovery Plan Action Status	Recovery Plan Stage
Mammals	Canada Lynx (*Lynx canadensis*)	Wherever Found in Contiguous U.S.	Threatened	Montana Ecological Services Field Office	4(f)(I) Determination Regarding Recovery Planning for the Canada Lynx (Lynx canadensis)	Recovery efforts in progress, but no implementation information yet to display.	Exempt
Mammals	North American wolverine (*Gulo gulo luscus*)	Wherever found	Proposed Threatened	Montana Ecological Services Field Office			



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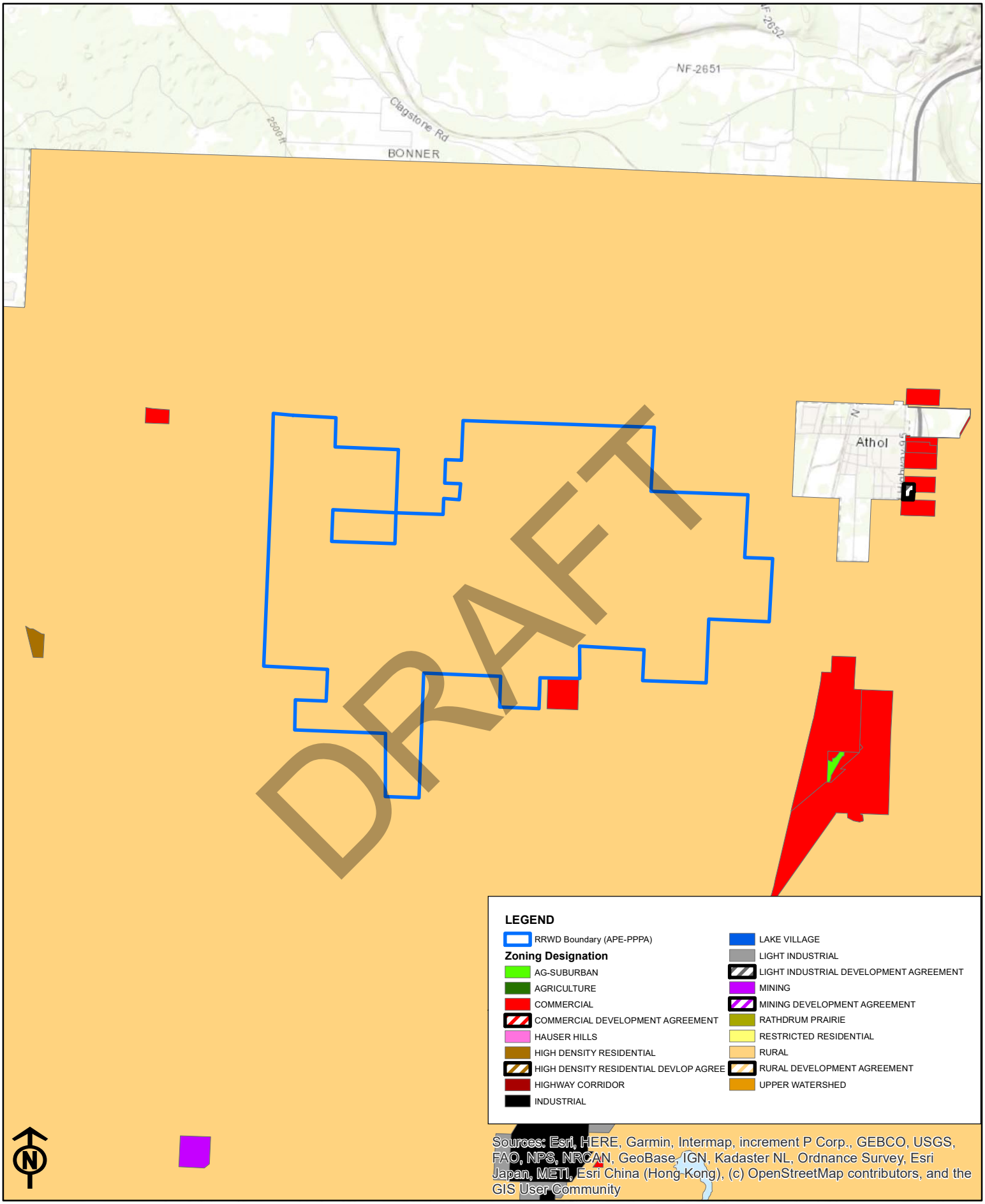
Critical Habitat Overview

Sources:
Idaho Transportation Dept.
USFWS Critical Habitat
Basemap (see above)

PROJECT NO.....41276.01
DRAWN BY.....DH
FILENAME.....CriticalHabitat
DATE.....11/21/19

5. Zoning and Land Use



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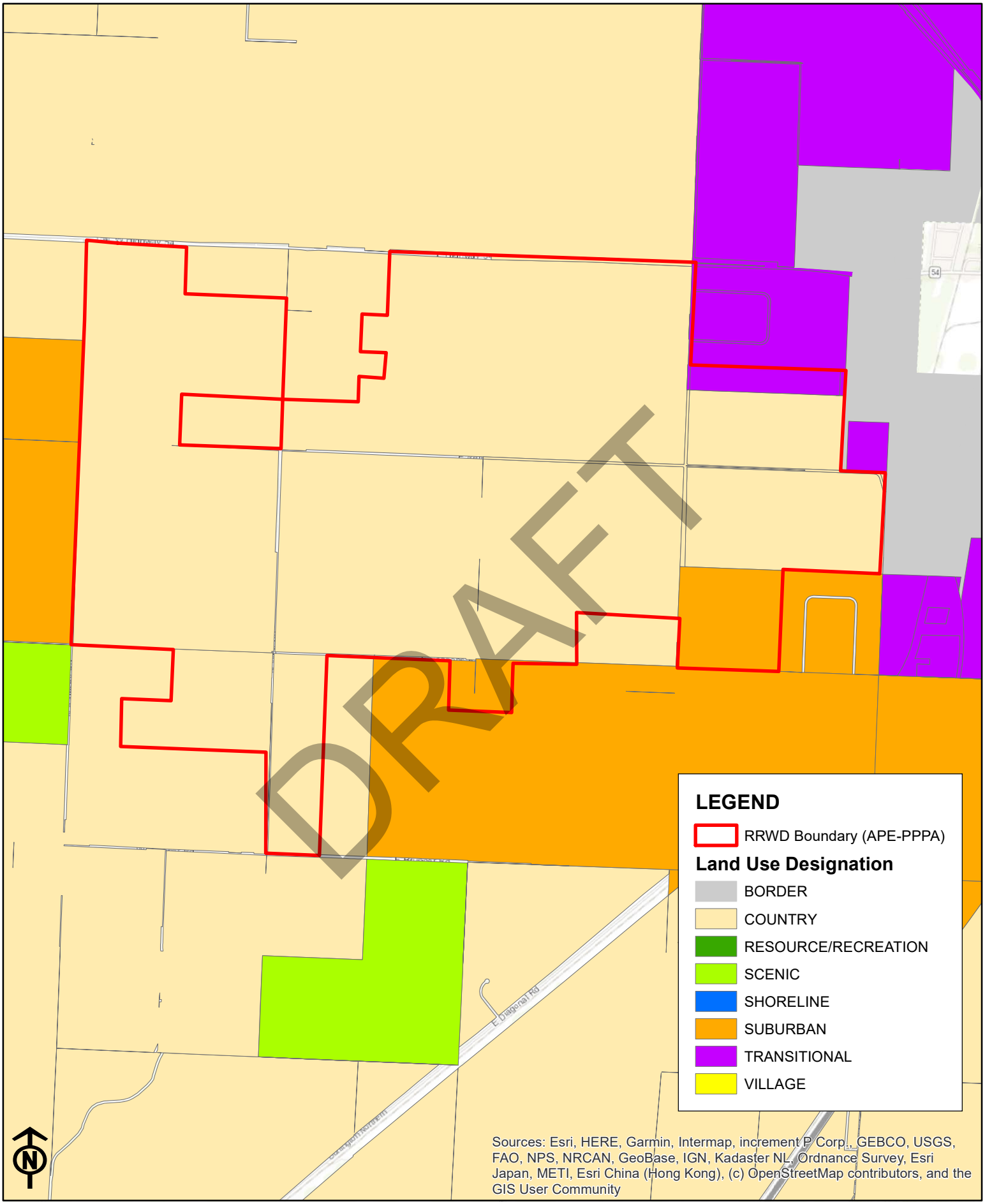
RRWD Water System Plan

Zoning Overview

Sources:
Idaho Transportation Dept.
Kootenai County Zoning
Basemap (see above)

PROJECT NO.....41276.01
DRAWN BY.....DH
FILENAME.....Zoning
DATE.....11/21/19



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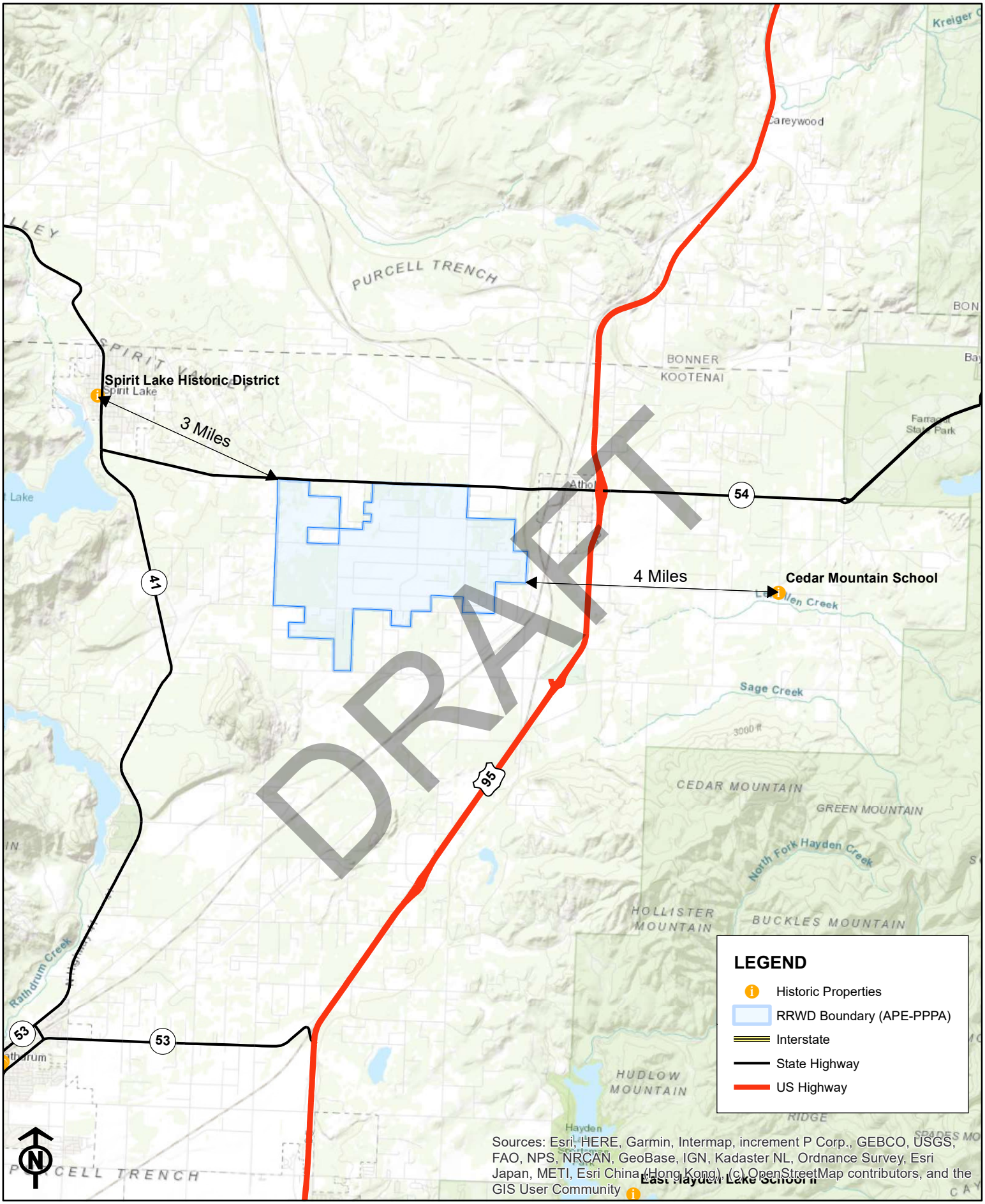
RRWD Water System Plan

Land Use Overview

Sources:
Idaho Transportation Dept.
Kootenai County Comp Plan
Basemap (see above)

PROJECT NO.....41276.01
DRAWN BY.....DH
FILENAME.....LandUse
DATE.....11/21/19

6. Cultural Resources



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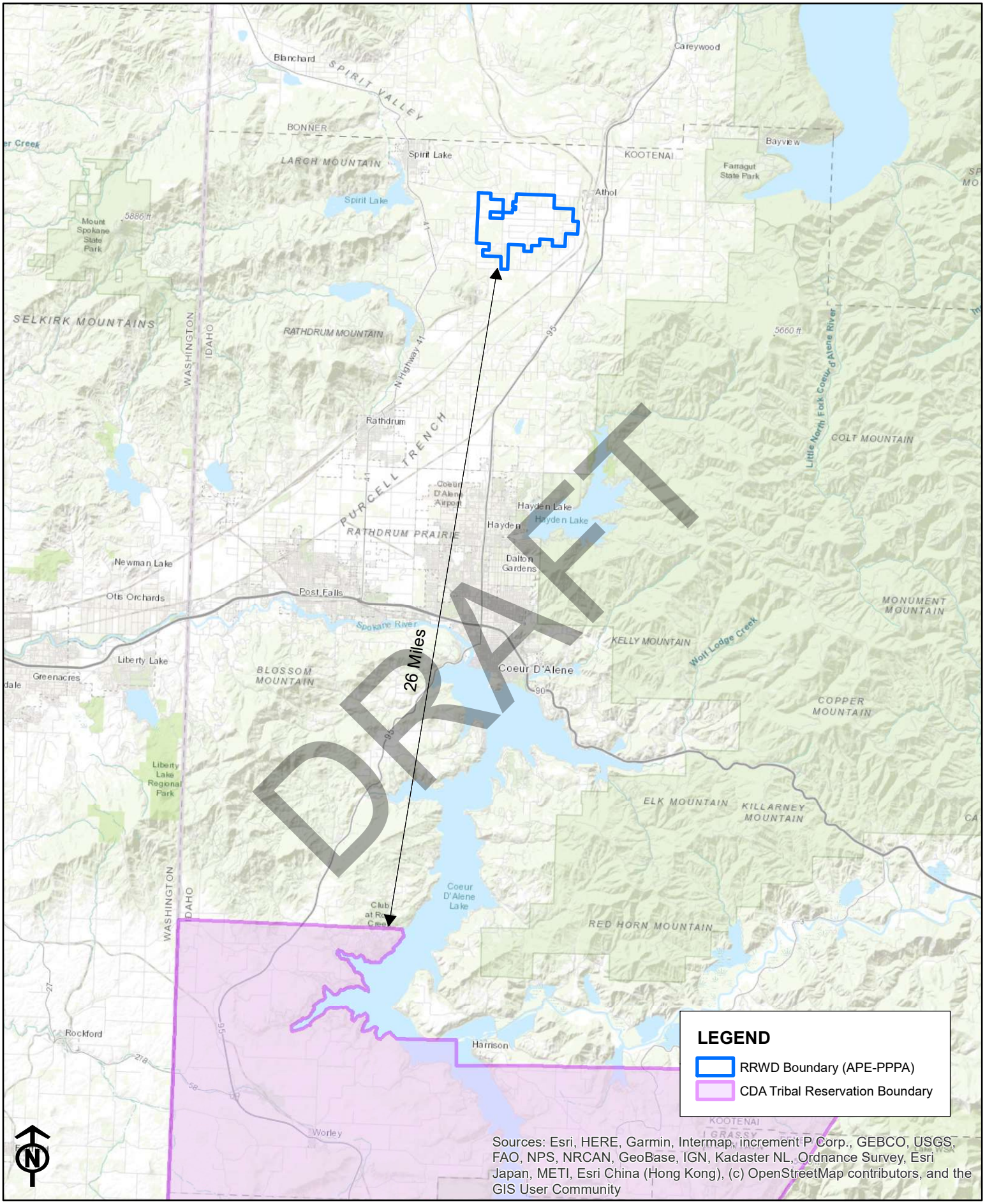
RRWD Water System Plan

Historic Property Overview

Sources:
Idaho Transportation Dept.
National Register of Historic Places
Basemap (see above)

PROJECT NO.....41276.01
DRAWN BY.....DH
FILENAME.....HistoricProp
DATE.....11/21/19

Ref#	Property Name	State	County	City	Street & Number	Listed Date
	85002093 Cedar Mountain School	IDAHO	Kootenai	Athol	Parks and Lewellyn Creek Rd.	9/12/1985
	85002090 Bayview School II	IDAHO	Kootenai	Bayview	Careywood Rd.	9/12/1985
	85002095 East Hayden Lake School II	IDAHO	Kootenai	Camp Mivoden	Hayden Lake Rd.	9/12/1985
	66000312 Cataldo Mission	IDAHO	Kootenai	Cataldo	Off U.S. 10	10/15/1966
	78001070 Clark House	IDAHO	Kootenai	Clarksville	On Hayden Lake	12/12/1978
	79000792 Coeur d'Alene City Hall	IDAHO	Kootenai	Coeur d'Alene	5th and Sherman Sts.	8/3/1979
	77000461 Coeur d'Alene Federal Building	IDAHO	Kootenai	Coeur d'Alene	4th and Lakeside	12/16/1977
	78001071 Coeur d'Alene Masonic Temple	IDAHO	Kootenai	Coeur d'Alene	525 Sherman Ave.	5/22/1978
	85001126 Davey, Harvey M., House	IDAHO	Kootenai	Coeur d'Alene	315 Wallace Ave.	5/23/1985
	79000793 First United Methodist Church	IDAHO	Kootenai	Coeur d'Alene	618 Wallace Ave.	6/18/1979
	79000794 Fort Sherman Buildings	IDAHO	Kootenai	Coeur d'Alene	North Idaho Junior College campus	10/25/1979
	88000272 Gray, John P. and Stella, House	IDAHO	Kootenai	Coeur d'Alene	521 S. Thirteenth St.	3/31/1988
	75000633 Inland Empire Electric Railway Substation	IDAHO	Kootenai	Coeur d'Alene	Mullan Rd. and Northwest Blvd.	6/27/1975
	77000462 Kootenai County Courthouse	IDAHO	Kootenai	Coeur d'Alene	501 Government Way	12/23/1977
	09001163 Mooney-Dahlberg Farmstead	IDAHO	Kootenai	Coeur d'Alene	5803 Riverview Dr.	12/30/2009
	90000548 Mullan Road	IDAHO	Kootenai	Coeur d'Alene	3 segments:1)between Aldar Creek and Cedar Creek;2)Fourth of July Pass between I-80 and Old US 10;3)Heyburn State Park	4/5/1990
	85002100 Prairie School II	IDAHO	Kootenai	Coeur d'Alene	Prairie Ave.	9/12/1985
	76000676 Roosevelt School	IDAHO	Kootenai	Coeur d'Alene	1st and Wallace Sts.	7/30/1976
	92000418 Sherman Park Addition	IDAHO	Kootenai	Coeur d'Alene	Bounded by Garden Ave., Hubbard St., Lakeshore Dr. and Park Dr.	4/27/1992
	77000463 St. Thomas Catholic Church	IDAHO	Kootenai	Coeur d'Alene	919 Indiana Ave.	10/5/1977
	99001476 Crane, Silas W., and Elizabeth, House	IDAHO	Kootenai	Harrison	201 S. Coeur d'Alene Ave.	12/9/1999
	96001505 Harrison Commercial Historic District	IDAHO	Kootenai	Harrison	Roughly bounded by N. Lake Ave., W. Harrison St., N. Coeur d'Alene., and Pine St.	12/20/1996
	87001562 Finch, John A., Caretaker's House	IDAHO	Kootenai	Hayden Lake	2160 Finch Rd.	9/14/1987
	85002156 Thunborg, Jacob and Cristina, House	IDAHO	Kootenai	Hayden Lake	Chicken Point	9/12/1985
	85002097 Lane School II	IDAHO	Kootenai	Lane	Lanz Rd.	9/12/1985
	85002098 McGuires School	IDAHO	Kootenai	McGuire	Corbin Rd. and Old Hwy. 10	9/12/1985
	85002092 Cave Lake School	IDAHO	Kootenai	Medimont	ID 3	9/12/1985
	85002096 Indian Springs School II	IDAHO	Kootenai	Medimont	ID 3	9/12/1985
	85002099 Pleasant View School II	IDAHO	Kootenai	Pleasant View	Pleasant View Rd.	9/12/1985
	85002094 Cougar Gulch School III	IDAHO	Kootenai	Post Falls	Cougar Gulch Rd.	9/12/1985
	84003851 Post Falls Community United Presbyterian Church	IDAHO	Kootenai	Post Falls	4th and William Sts.	9/7/1984
	03000124 Spokane Valley Land and Water Company Canal	IDAHO	Kootenai	Post Falls	Diverts in Falls Park, Fourth St.	3/20/2003
	92000420 Treaty Rock	IDAHO	Kootenai	Post Falls	N of I-90, NE of Spokane R. falls	4/30/1992
	96001507 Washington Water Power Bridges	IDAHO	Kootenai	Post Falls	.5 mi. W of jct. of Spokane and 4th Sts.	12/20/1996
	97000765 Young, Samuel and Ann, House	IDAHO	Kootenai	Post Falls	120 4th Ave.	7/9/1997
	01000834 Kootenai County Jail	IDAHO	Kootenai	Rathdrum	802 Second St.	8/10/2001
	74000742 Rathdrum State Bank	IDAHO	Kootenai	Rathdrum	1st and Mills Sts.	11/8/1974
	77000464 St. Stanislaus Kostka Mission	IDAHO	Kootenai	Rathdrum	McCartney and 3rd Sts.	11/17/1977
	85002091 Bellgrove School II	IDAHO	Kootenai	Rockford Bay	Hamaker Rd.	9/12/1985
	85002101 Rose Lake School II	IDAHO	Kootenai	Rose Lake	Queen St. and ID 3	9/12/1985
	85002102 Upper Twin Lakes School	IDAHO	Kootenai	Silver Sands Beach	Twin Lakes Rd.	9/12/1985
	79000795 Spirit Lake Historic District	IDAHO	Kootenai	Spirit Lake	Maine St.	2/8/1979



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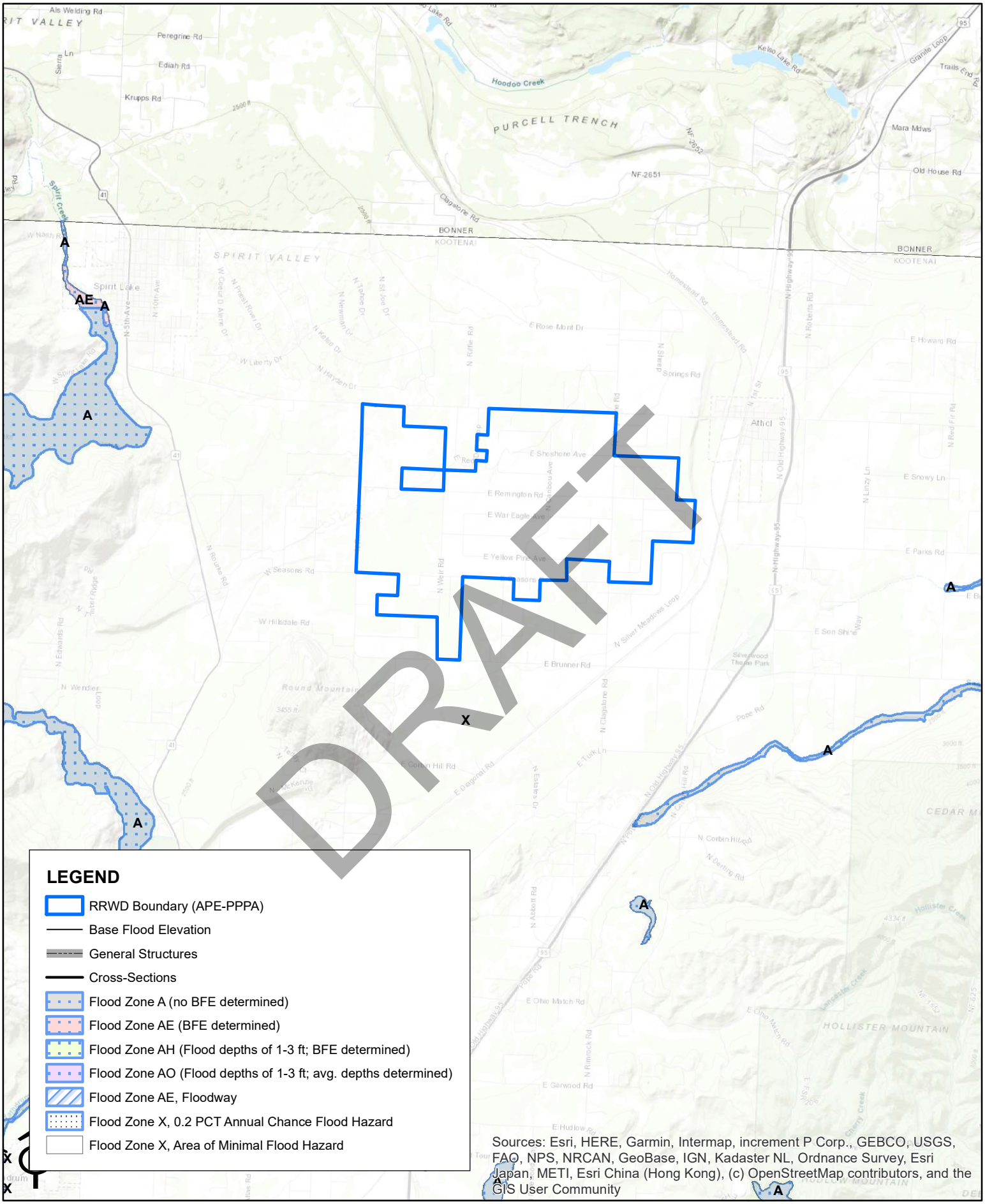
RRWD Water System Plan

Tribal Reservation Overview

Sources:
Idaho Transportation Dept.
CDA Tribe
Basemap (see above)

PROJECT NO.....41276.01
DRAWN BY.....DH
FILENAME.....TribalBoundary
DATE.....11/21/19

7. Floodplains and Wetlands



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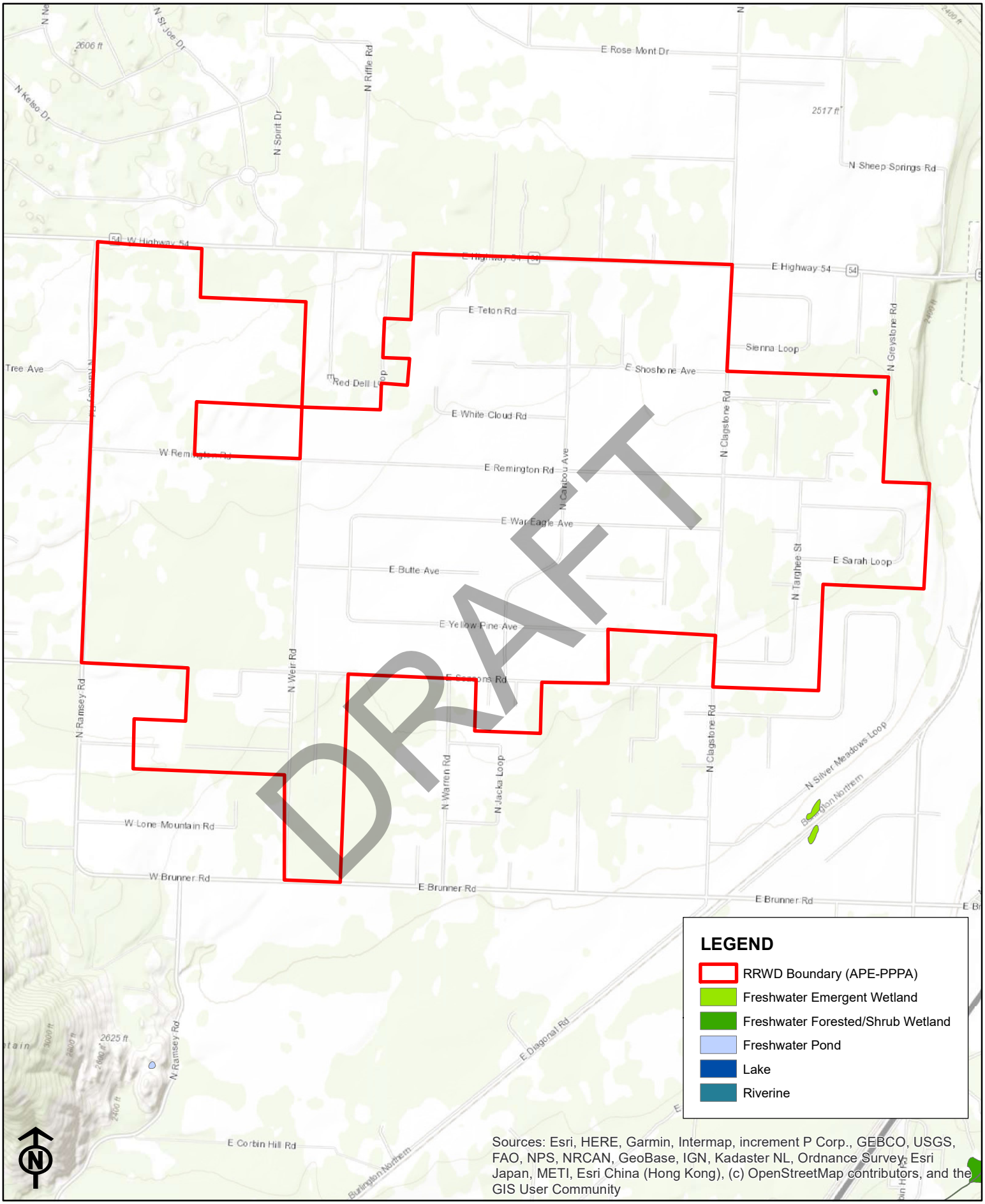
RRWD Water System Plan

Floodplain Overview

Sources:
Idaho Transportation Dept.
FEMA, Kootenai County
Basemap (see above)

PROJECT NO.....41276.01
DRAWN BY.....DH
FILENAME.....Floodplain
DATE.....11/21/2019



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RRWD Water System Plan

Wetland Overview

Sources:
Idaho Transportation Dept.
USFWS Wetlands
Basemap (see above)

PROJECT NO.....41276.01
DRAWN BY.....DH
FILENAME.....Wetland
DATE.....11/21/19

8. Wild and Scenic Rivers

THE NATIONAL WILD AND SCENIC RIVERS SYSTEM
www.rivers.gov

The National Wild and Scenic Rivers System was created by Congress in 1968 (Public Law 90-542; 16 U.S.C. 1271 et seq.) to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations. The Act is notable for safeguarding the special character of these rivers, while also recognizing the potential for their appropriate use and development. It encourages river management that crosses political boundaries and promotes public participation in developing goals for river protection.

Rivers may be designated by Congress or, if certain requirements are met, the Secretary of the Interior. Each river is administered by either a federal or state agency. Designated segments need not include the entire river and may include tributaries. For federally administered rivers, the designated boundaries generally average one-quarter mile on either bank in the lower 48 states and one-half mile on rivers outside national parks in Alaska in order to protect river-related values.

Rivers are classified as wild, scenic, or recreational.

(1) Wild river areas — Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.

(2) Scenic river areas — Those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

(3) Recreational river areas — Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

Regardless of classification, each river in the National System is administered with the goal of protecting and enhancing the values that caused it to be designated. Designation neither prohibits development nor gives the federal government control over private property. Recreation, agricultural practices, residential development, and other uses may continue. Protection of the river is provided through voluntary stewardship by landowners and river users and through regulation and programs of federal, state, local, or tribal governments. In most cases not all land within boundaries is, or will be, publicly owned, and the Act limits how much land the federal government is allowed to acquire from willing sellers. Visitors to these rivers are cautioned to be aware of and respect private property rights.

The Act purposefully strives to balance dam and other construction at appropriate sections of rivers with permanent protection for some of the country's most outstanding free-flowing rivers. To accomplish this, it prohibits federal support for actions, such as the construction of dams or other instream activities, that would harm the river's free-flowing condition, water quality, or outstanding resource values. However, designation does not affect existing water rights or the existing jurisdiction of states and the federal government over waters as determined by established principles of law.

With the passage of the Omnibus Public Land Management Act of 2009, the National System protects more than 12,500 miles of 203 rivers in 39 states and the Commonwealth of Puerto Rico; this is a little more than one-third of one percent of the nation's rivers. By comparison, more than 75,000 large dams across the country have modified at least 600,000 miles, or about 17%, of American rivers.

For general questions concerning the wild and scenic rivers program, refer to the Interagency Wild and Scenic Rivers Coordinating Council website at **www.rivers.gov** or contact one of the following:

USDA Forest Service
U.S. Department of Agriculture
Wilderness and Wild and Scenic Rivers
201 - 14th Street, SW
Washington, DC 20250

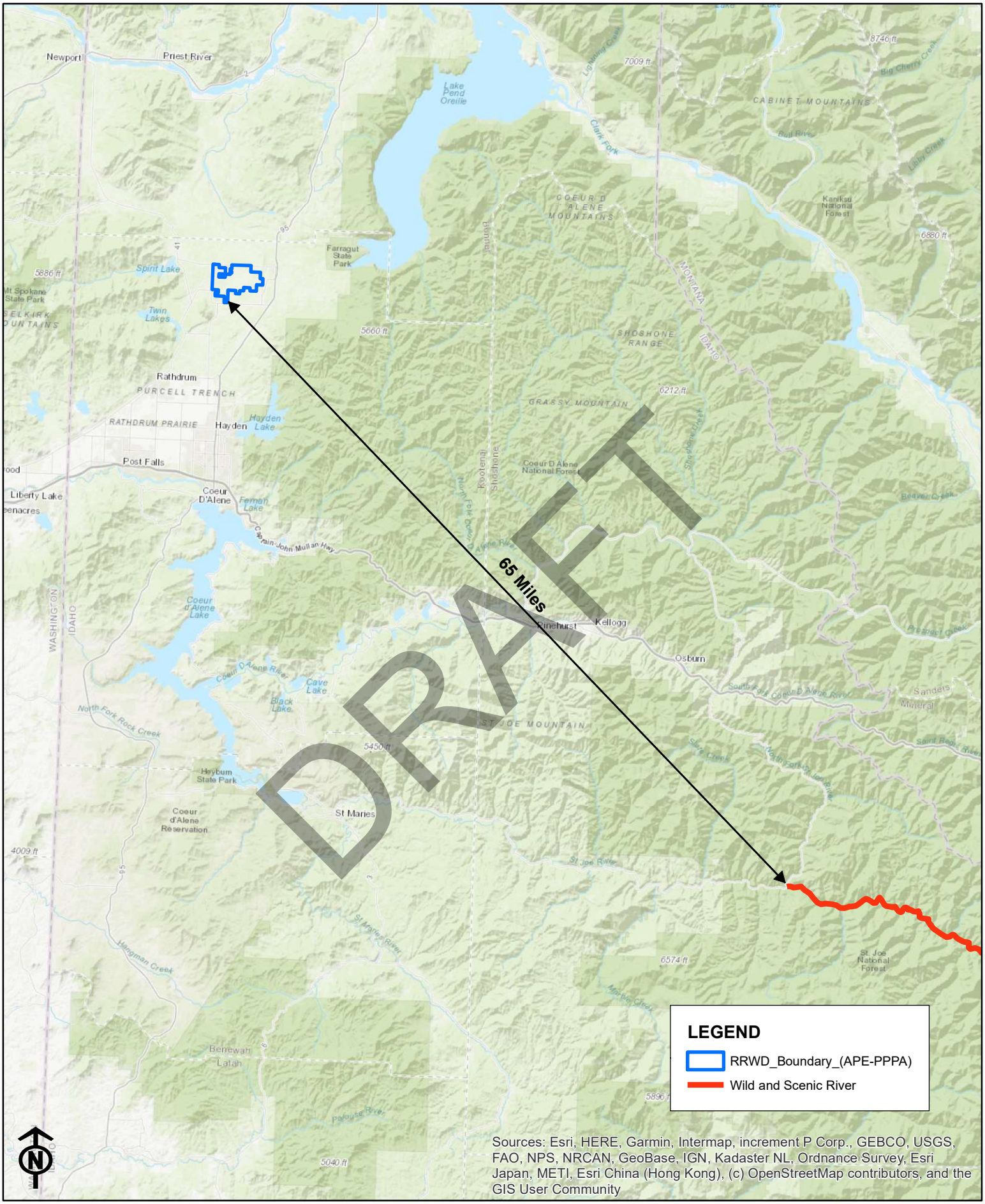
Bureau of Land Management
U.S. Department of the Interior
National Landscape Conservation Service
1620 L Street, NW
Washington, DC 20036

U.S. Fish and Wildlife Service
U.S. Department of the Interior
National Wildlife Refuge System
Division of Natural Resources
4401 North Fairfax Drive (ARL-670)
Arlington, VA 22303

National Park Service
U.S. Department of the Interior
Conservation and Outdoor Recreation
1849 C Street, NW
Org Code - 2240
Washington, DC 20240

Produced by the USDA Forest Service; USDI Bureau of Land Management, Fish and Wildlife Service, and National Park Service in cooperation with the National Atlas of the United States®.

Alaska Wild and Scenic Rivers System map is available through www.rivers.gov. There are no Wild and Scenic Rivers in Hawaii.



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www.welchcomer.com 208-664-9382

RRWD Water System Plan

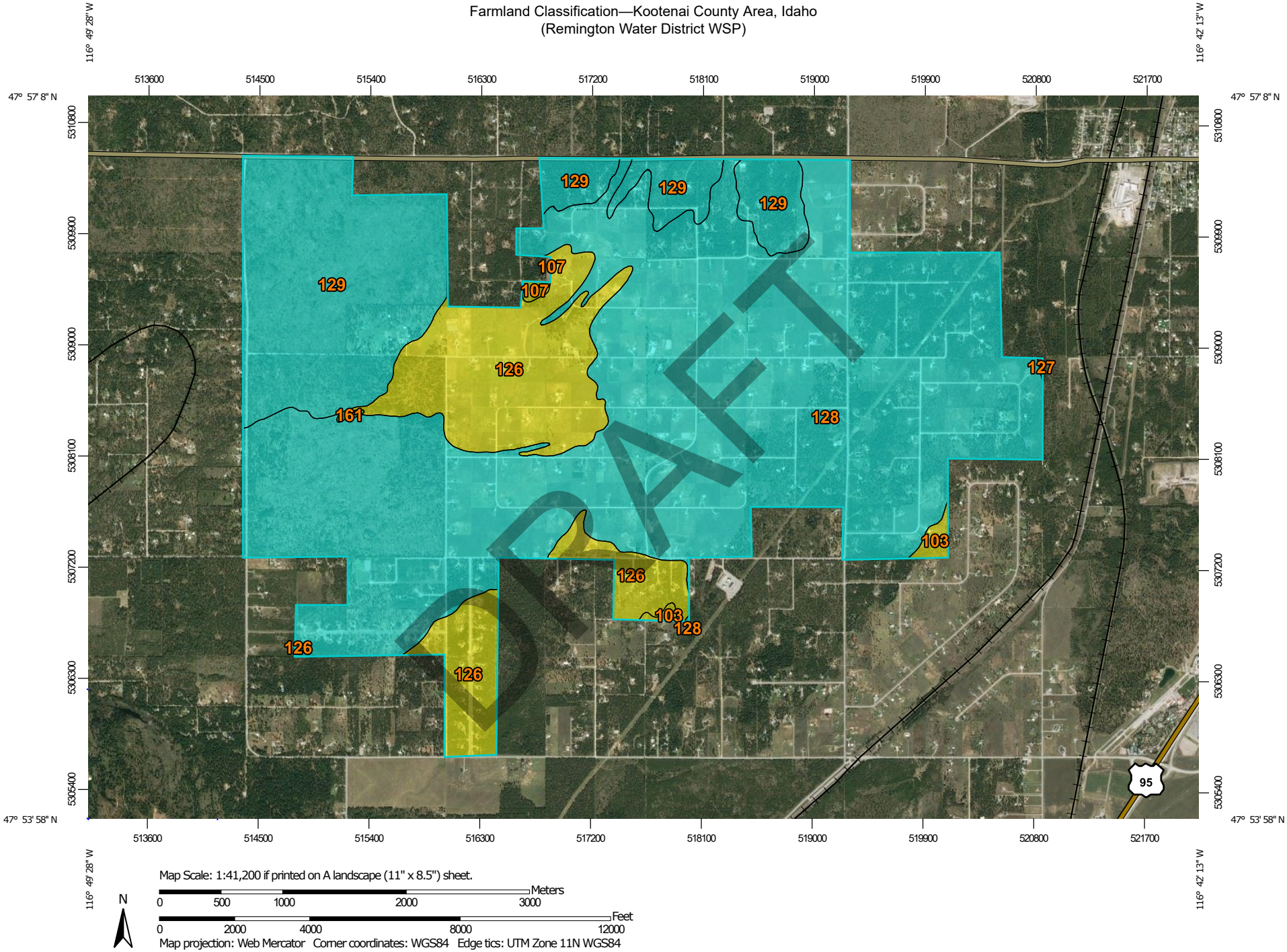
Wild and Scenic River Overview

Sources:
Idaho Transportation Dept.
USDA Forest Service, Wild and Scenic
Basemap (see above)

PROJECT NO.....41276.01
DRAWN BY.....DH
FILENAME.....WildnScenic
DATE.....11/21/19

9. Prime Agricultural Farmlands

Farmland Classification—Kootenai County Area, Idaho
(Remington Water District WSP)



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

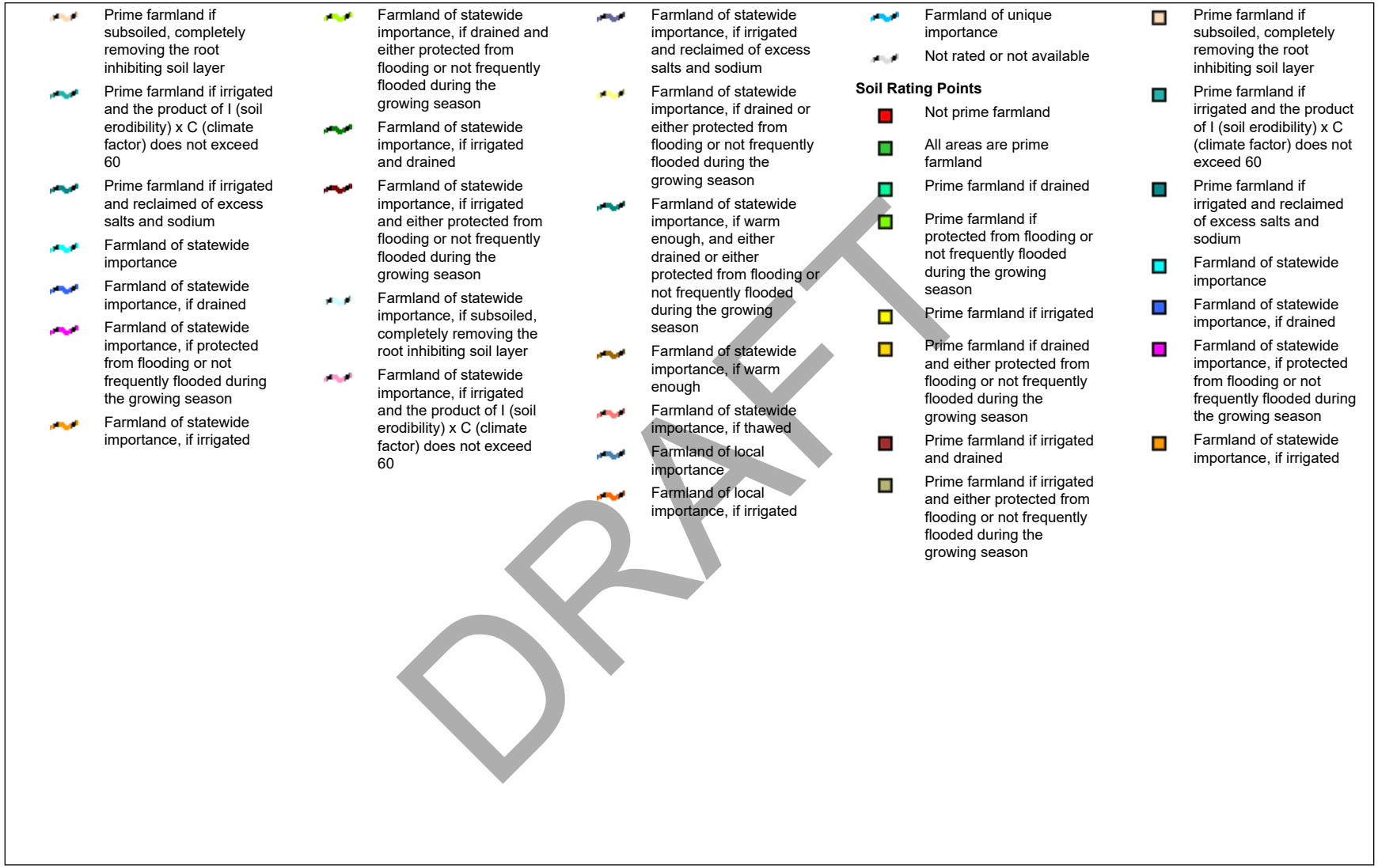
Soils

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

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.

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: Kootenai County Area, Idaho
Survey Area Data: Version 17, Sep 17, 2019

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

Date(s) aerial images were photographed: Apr 24, 2019—Jun 26, 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.

Farmland Classification

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
103	Avonville fine gravelly silt loam, 0 to 7 percent slopes	Prime farmland if irrigated	22.1	0.5%
107	Bonner silt loam, 0 to 8 percent slopes	Prime farmland if irrigated	7.5	0.2%
126	Kootenai gravelly silt loam, 0 to 7 percent slopes	Prime farmland if irrigated	723.7	15.1%
127	Kootenai gravelly silt loam, 20 to 45 percent slopes	Not prime farmland	1.1	0.0%
128	Kootenai cobbly silt loam, 0 to 7 percent slopes	Farmland of statewide importance	3,092.8	64.5%
129	Kootenai-Bonner complex, 0 to 20 percent slopes	Farmland of statewide importance	942.7	19.7%
161	Rathdrum silt loam, 0 to 7 percent slopes	All areas are prime farmland	3.1	0.1%
Totals for Area of Interest			**4,793.0**	**100.0%**

Description

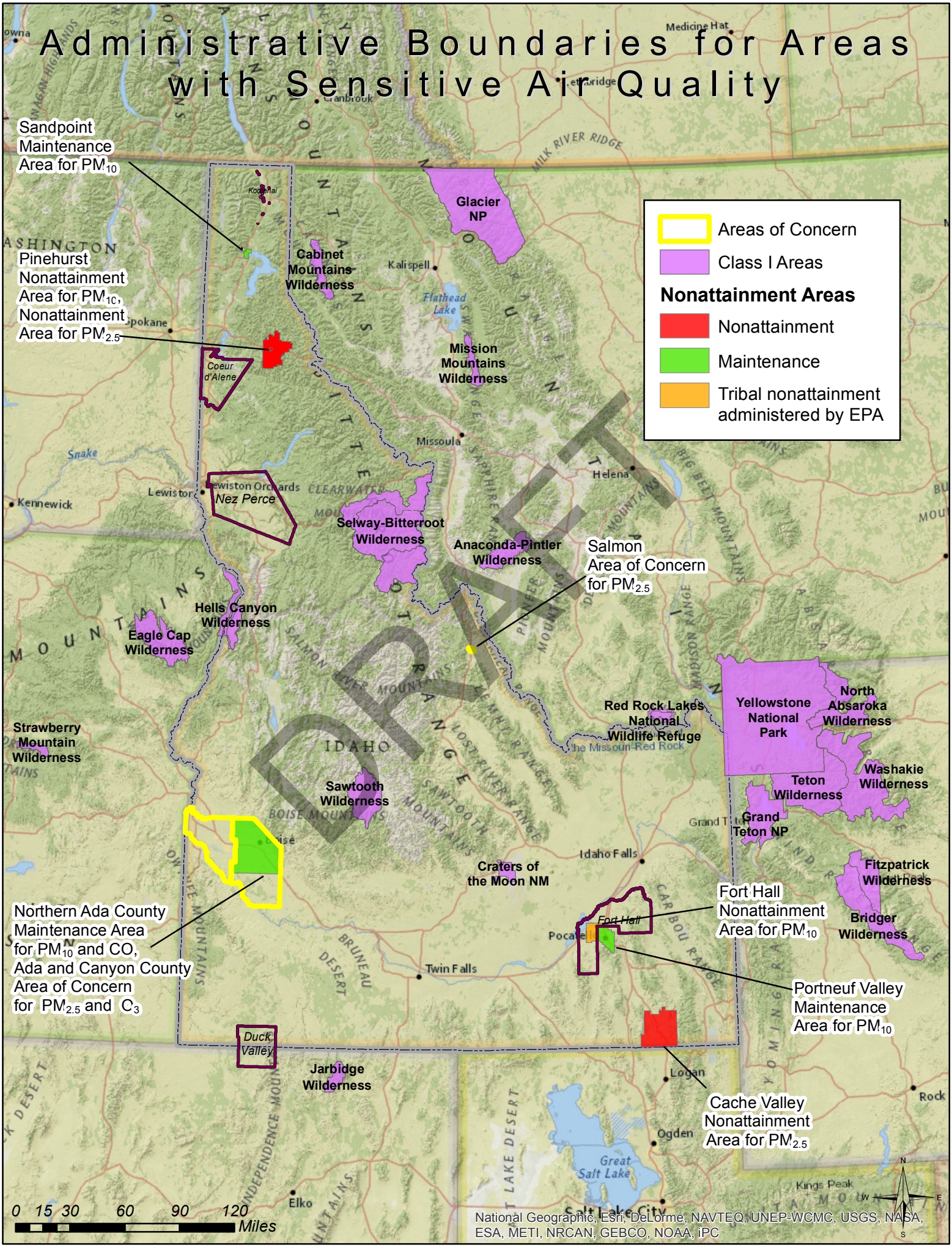
Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime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

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

10. Air Quality


Administrative Boundaries for Areas with Sensitive Air Quality
Sandpoint Maintenance Area for PM10
Pinehurst Nonattainment Area for PM10, Nonattainment Area for PM2.5
Northern Ada County Maintenance Area for PM10 and CO, Ada and Canyon County Area of Concern for PM2.5 and C3
Salmon Area of Concern for PM2.5
Fort Hall Nonattainment Area for PM10
Portneuf Valley Maintenance Area for PM10
Cache Valley Nonattainment Area for PM2.5
Areas of Concern
Class I Areas
Nonattainment Areas
Nonattainment
Maintenance
Tribal nonattainment administered by EPA
Glacier NP
Cabinet Mountains Wilderness
Mission Mountains Wilderness
Selway-Bitterroot Wilderness
Anaconda-Pintler Wilderness
Hells Canyon Wilderness
Eagle Cap Wilderness
Strawberry Mountain Wilderness
Sawtooth Wilderness
Craters of the Moon NM
Red Rock Lakes National Wildlife Refuge
Yellowstone National Park
North Absaroka Wilderness
Washakie Wilderness
Teton Wilderness
Grand Teton NP
Fitzpatrick Wilderness
Bridger Wilderness
Jarbidge Wilderness
Duck Valley
Nez Perce
Coeur d'Alene
Fort Hall
DRAFT
0 15 30 60 90 120 Miles
National Geographic, Esri, DeLorme, NAVTEQ, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, iPC

11. Comparison Table

SOURCE OPTIONS

Environmental Criteria	No Action	Develop McCormick Well	Upsize Pump for Well 1	Drill New Well
Climate and Physical Aspects (Topography, Geology, and Soils)	No Impact	Excavation for Well House (Minor Long-Term Impact, Short-Term Impact)	No Impact	Excavation for New Well and Well House (Minor Long-Term Impact, Short-Term Impact)
Population, Economic, and Social Profile	No Potential for Growth or Expansion	Increased User Rates, Allow for Growth, Improved Service	Increased User Rates, Allow for Growth, Improved Service	Increased User Rates, Allow for Growth, Improved Service
Land Use	No Impact	No Impact	No Impact	No Impact
Floodplain Development	No Impact	No Impact	No Impact	No Impact
Wetlands and Water Quality	No Impact	Site Disturbance (Short-Term Impact to Water Quality)	Site Disturbance (Short-Term Impact to Water Quality)	Site Disturbance (Short-Term Impact to Water Quality)
Wild and Scenic Rivers	No Impact	No Impact	No Impact	No Impact
Cultural Resources	No Impact	Potential Impact (Excavation in New Area)	Potential Impact (Excavation in New Area)	Potential Impact (Excavation in New Area)
Flora and Fauna	No Impact	Site Disturbance (Short-Term Impact)	Site Disturbance (Short-Term Impact)	Site Disturbance (Short-Term Impact)
Recreation and Open Space	No Impact	No Impact	No Impact	No Impact
Agricultural Lands	No Impact	No Impact	No Impact	No Impact
Air Quality	No Impact	Construction Emissions (Short-Term Impact)	Construction Emissions (Short-Term Impact)	Construction Emissions (Short-Term Impact)
Energy	No Impact	Improved Overall System Efficiency	Improved Overall System Efficiency	Improved Overall System Efficiency
Public Health	Continue Deficiencies in Service and Reliability	Improved Service and Reliability	Improved Service and Reliability	Improved Service and Reliability
Option Cost	$0	$1,370,000	$833,000	$1,670,000

STORAGE

Environmental Criteria	No Action	New Standpipe Reservoir	New Underground Reservoir
Climate and Physical Aspects (Topography, Geology, and Soils)	No Impact	Excavation for Storage Tank and Waterline (Minor Long-Term Impact, Short-Term Impact)	Excavation for Waterline (Minor Long-Term Impact, Short-Term Impact)
Population, Economic, and Social Profile	Potential of No Growth or Expansion	Increased User Rates, Improved Service	Increased User Rates, Improved Service
Land Use	No Impact	No Impact	No Impact
Floodplain Development	No Impact	No Impact	No Impact
Wetlands and Water Quality	No Impact	Site Disturbance (Short-Term Impact to Water Quality and small Wetland)	Site Disturbance (Short-Term Impact to Water Quality and small Wetland)
Wild and Scenic Rivers	No Impact	No Impact	No Impact
Cultural Resources	No Impact	Potential Impact (Excavation in New Area)	Potential Impact (Excavation in New Area)
Flora and Fauna	No Impact	Site Disturbance (Short-Term Impact)	Site Disturbance (Short-Term Impact)
Recreation and Open Space	No Impact	No Impact	No Impact
Agricultural Lands	No Impact	No Impact	No Impact
Air Quality	No Impact	Construction Emissions (Short-Term Impact)	Construction Emissions (Short-Term Impact)
Energy	No Impact	Improved Overall System Efficiency	Improved Overall System Efficiency
Public Health	Continue Deficiencies in Service and Reliability	Improved Service and Reliability	Improved Service and Reliability
Option Cost	$0	$1,661,000	$642,000

BOOSTER

Environmental Criteria	No Action	Replace and Upsize
Climate and Physical Aspects (Topography, Geology, and Soils)	No Impact	Excavation for Expanded Pumphouse (Minor Long-Term Impact, Short-Term Impact)
Population, Economic, and Social Profile	Potential of No Growth or Expansion	Increased User Rates, Improved Service
Land Use	No Impact	No Impact
Floodplain Development	No Impact	No Impact
Wetlands and Water Quality	No Impact	Site Disturbance (Short-Term Impact to Water Quality and small Wetland)
Wild and Scenic Rivers	No Impact	No Impact
Cultural Resources	No Impact	Potential Impact (Excavation in New Area)
Flora and Fauna	No Impact	Site Disturbance (Short-Term Impact)
Recreation and Open Space	No Impact	No Impact
Agricultural Lands	No Impact	No Impact
Air Quality	No Impact	Construction Emissions (Short-Term Impact)
Energy	No Impact	Improved Overall System Efficiency
Public Health	Continue Deficiencies in Service and Reliability	Improved Service and Reliability
Option Cost	$0	$237,000

DISTRIBUTION OPTIONS

Environmental Criteria	No Action	New Transmission Main for Increased Source Production	Upsize Undersized Transmission Pipe	Transmission to Serve Annexation Properties
Climate and Physical Aspects (Topography, Geology, and Soils)	No Impact	Excavation for Waterline (Minor Long-Term Impact, Short-Term Impact)	Excavation for Waterline (Minor Long-Term Impact, Short-Term Impact)	Excavation for Waterline (Minor Long-Term Impact, Short-Term Impact)
Population, Economic, and Social Profile	No Potential for Growth or Expansion	Increased User Rates, Allow for Improved Service	Increased User Rates, Allow for Improved Service	Increased User Rates, Allow for Improved Service
Land Use	No Impact	No Impact	No Impact	No Impact
Floodplain Development	No Impact	No Impact	Site Disturbance (Short-Term Impact)	Site Disturbance (Short-Term Impact)
Wetlands and Water Quality	No Impact	Site Disturbance (Short-Term Impact to Water Quality)	Site Disturbance (Short-Term Impact to Water Quality and/or Wetlands)	Site Disturbance (Short-Term Impact to Water Quality and/or Wetlands)
Wild and Scenic Rivers	No Impact	No Impact	No Impact	No Impact
Cultural Resources	No Impact	No Impact	No Impact	No Impact
Flora and Fauna	No Impact	Site Disturbance (Short-Term Impact)	Site Disturbance (Short-Term Impact)	Site Disturbance (Short-Term Impact)
Recreation and Open Space	No Impact	No Impact	No Impact	No Impact
Agricultural Lands	No Impact	No Impact	No Impact	No Impact
Air Quality	No Impact	Construction Emissions (Short-Term Impact)	Construction Emissions (Short-Term Impact)	Construction Emissions (Short-Term Impact)
Energy	No Impact	Improved Overall System Efficiency	Improved Overall System Efficiency	Improved Overall System Efficiency
Public Health	Continue Deficiencies in Service and Reliability, Potentially Leading to Contamination	Improved Service and Reliability	Improved Service, Reliability, and Availably of Fire Protection	Improved Service and Reliability
Option Cost	$0	$332,000	$1,155,000	Unknown

APPENDIX I:

DEQ Communications

Derek Huff

From: Derek Huff
Sent: Wednesday, December 4, 2019 9:22 AM
To: Derek Huff
Subject: Remington Meeting

From: Katy Baker-Casile
Sent: Monday, July 29, 2019 10:56 AM
To: rtate@tate-eng.com; john@pacni.org; bobkuch@rwdonline.org; Necia Maiani; Chad Oakland; Steve Cordes; Anna Moody; 'shawn@ognmail.com'
Subject: Remington Meeting

Good Day,
Thank you for taking the time to meet with DEQ last week. The following topics were discussed during our meeting on July 25, 2019 regarding the Remington Water District and the Cayuga Ranch project.

The 2007 master plan is in the DEQ system, however no record of a formal approval exists. The maps and pictures are of very poor quality in the copy we have. If a clear electronic copy is available please provide it to DEQ.

It is unclear from our meeting: What improvements, if any, have been constructed from those outlined in the MP?

Connections:
2007 MP – 285
2015 – 311 (9.1% increase from 2007)
2019 – 387 (375 current + 8 Cayuga + 4 split lots) (35.8% increase from 2007)

A "Substantial Modification" is by definition a 25% increase, so the system growth triggers the necessity to meet the current requirements of the DW rules, including source redundancy.

Water right:
2007 MP reports a combined right=1,149 gpm (2.56 cfs) and 2 water rights attached to well #3 for 4.9 cfs for irrigation, with a recommendation they be converted to a municipal right of 1,700 gpm (3.78 cfs)

Booster station:
- PER Must discuss current and anticipated water usage and pump sizing to meet PHD with largest pump offline
- DEQ can review and approve based on demonstrated need of existing users, with the understanding that the planned growth may trigger the need for additional booster station work.

Well #3:
- A well site evaluation report and then a well site visit are still needed. DEQ was not able to locate a well site evaluation in our files.
- A PER must be submitted for review and approval including pump sizing calculations, pump curves, expected demand, well house changes, control system changes, and all other current rule requirements relating to wells and well houses
- Has the well been videoed? If not, this needs to be done.
- Has the plumbness of the borehole been determined?
- Plans and specifications with details sufficient to construct the proposed improvements must be submitted for review and approval once the PER has been reviewed and approved.

Sanitary Survey deficiencies

- Sample taps must be installed for each well prior to treatment.
- Well #1 must be capable of pumping to waste without affecting other system components.

Cayuga water main extension

- DEQ must be in receipt of stamped plans and an unconditional will serve letter. The will serve letter that was forwarded this morning discussed using 2" main lines to be bored across the road. Per the rules, the minimum size for water mains is 3". Please address this discrepancy with a revised will serve letter and plans that reflect this change.
- The Cayuga Ranch development will only serve 8 single family homes with no further connections possible at that location.

Pleased let me know if I missed any additional topics.

Thank you,

Katy

Katy R. Baker-Casile, P.E. | Senior Drinking Water Engineer
Idaho Department of Environmental Quality
2110 Ironwood Parkway
Coeur d'Alene, ID 83814
(208) 666-4640
http://www.deq.idaho.gov/

Our mission is to protect human health and the quality of Idaho's air, land, and water.

State of Idaho
Department of
Environmental Quality

2110 Ironwood Parkway ▪ Coeur d'Alene, ID 83814 ▪ (208) 769-1422

Brad Little, Governor
John H. Tippets, Director

July 19, 2019

Chad Oakland
North River Investments LLC
850 W Ironwood Dr #300
Coeur d'Alene, ID 83814
chad@northidahochad.com

Subject: Cayuga Ranch Water Services (P&S 14110) Plans and Specifications

Dear Mr. Oakland:

On July 12, 2019, the Idaho Department of Environmental Quality (DEQ) received a submittal regarding the project titled "*Cayuga Ranch Water Services*". The project was submitted to DEQ as reviewed and approved by the qualified licensed professional engineer (QLPE) Robert M. Tate, P.E. of Tate Engineering on July 12, 2019. However, it is DEQ's understanding that the water purveyor (Remington Water District) does not have the capacity to serve the proposed project while having the ability to serve existing connections without diminishing quality of service. The QLPE approved set of plans and specifications from Robert M. Tate, P.E. of Tate Engineering dated July 12, 2019 for the above mentioned project are hereby **administratively rejected** and the project is **not approved** for construction purposes.

According to IDAPA 58.01.08.504.02., "If the proposed project is to be connected to an existing public water system, a letter from the purveyor must be submitted to the Department stating that the purveyor will be able to provide services to the proposed project. The Department may require documentation supporting the ability of the purveyor to provide service to the new system without diminishing quality of service to existing customers. This letter must be submitted prior to or concurrent with the submittal of plans and specifications as required in Subsection 504.03."

At this time, DEQ has not approved a facility plan indicating that Remington Water District is anticipating system capacity increases or upgrades to the system which would adequately provide service to existing and future connections. At this time DEQ is in receipt of documentation stating that the District does not have adequate capacity to provide peak hour demand for their existing connections.

As a prerequisite for approval for the construction of water mains for the above mentioned project, Remington Water District must provide technical documentation demonstrating that the system has the physical infrastructure to consistently meet drinking water quality standards and treatment requirements and is able to meet the requirements of routine and emergency operations; quantity and pressure requirements of IDAPA 58.01.08 Subsection 552.01 throughout the system must be demonstrated. Approvals for water mains supplied from Remington Water District will not be given until water quality and quantity are proven to be acceptable.

Should you have any questions or require additional information, please do not hesitate to contact me at (208) 666-4634 or via e-mail at taylor.enos@deq.idaho.gov

Sincerely,

Taylor Enos
Water Quality Engineer

c: Drew Dittman, P.E., Lake City Engineering, dittman@lakecityengineering.com
Rob Tate, P.E., Tate Engineering, rtate@tate-eng.com
Bob Kuchenski, Remington Water District, bob@integritywater.net
Tina West, Panhandle Health District, twest@phd1.idaho.gov
John Nielsen, Idaho Division of Building Safety, john.nielsen@dbs.idaho.gov
Matthew Plaisted, P.E., DEQ Engineering Manager, matthew.plaisted@deq.idaho.gov
Katy Baker-Casile, P.E., DEQ CdA Senior DW Engineer, katy.baker-casile@deq.idaho.gov
Anna Moody, DEQ CdA DW Manager, anna.moody@deq.idaho.gov
EDMS: 2019AFM407 : 2019AGD4475

State of Idaho
Department of
Environmental Quality

2110 Ironwood Parkway ▪ Coeur d'Alene, ID 83814 ▪ (208) 769-1422

Brad Little, Governor
John H. Tippets, Director

July 30, 2019

Chad Oakland
North River Investments LLC
850 W Ironwood Dr. #300
Coeur d'Alene, ID 83814
chad@northidahochad.com

Subject: Cayuga Ranch Water Services (P&S 40855) Plans and Specifications

Dear Mr. Oakland:

On July 19, 2019, the Idaho Department of Environmental Quality (DEQ) issued a letter administratively rejecting the qualified licensed professional engineer (QLPE) approval by Robert M. Tate, P.E. of Tate Engineering for the project "*Cayuga Ranch Water Services"*. The July 19, 2019 letter also disapproved the above mentioned project for construction purposes based on DEQ's understanding that the water purveyor (Remington Water District) did not have the capacity to serve the proposed project while having the ability to serve existing connections without diminishing quality of service.

After a meeting on July 25, 2019, DEQ and Remington Water District determined that the Cayuga Ranch (formerly Cayuga Estates) project was originally approved and platted as lots with individual wells; sanitary restrictions were lifted by Panhandle Health District. Capacity issues were also discussed during the July 25, 2019 meeting, and requirements for bringing a previously constructed source well (McCormick Well #3) online were outlined by DEQ Senior Drinking Water Engineer Katy Baker-Casile, P.E. in an email dated July 29, 2019.

The purpose of this letter is to rescind the previous administratively rejected letter from July 19, 2019 for the "*Cayuga Ranch Water Services"* project and acknowledge the plan and specification construction approval by Robert M. Tate, P.E. of Tate Engineering for the above referenced project in accordance with Idaho Code, Section 39-118.

Rob Tate, as the QLPE representing Remington Water District, has determined that the above mentioned project complies with established engineering standards of care and with state adopted facility and design standards. If major modifications to this accepted design are necessary during construction, the design engineer must secure approval of the changes from the QLPE.

Within thirty (30) days of completion of construction, Section 39-118(3) of Idaho Code requires that record plans and specifications based on information provided by the construction contractor and field observations made by the engineer or the engineer's designee be submitted to the Department of Environmental Quality. The record drawings must depict the actual construction of facilities.

The record drawing submittal must be made to DEQ by the engineer representing the public agency or regulated public utility, if the resultant facilities will be owned and operated by a public agency or regulated public utility; or by the design engineer or owner designated substitute engineer, if the constructed facilities will not be owned and operated by a public agency or regulated public utility. Such submittal by the professional engineer must confirm material compliance with the approved plans or disclose any material deviations therefrom.

Alternatively, if construction does not materially deviate from the original plans and specifications approved by the QLPE and previously provided to DEQ, the owner may have a statement prepared by a licensed Professional Engineer and filed with DEQ indicating the construction did not materially deviate from the approved plans and specifications.

Should you have any questions or require additional information, please do not hesitate to contact me at (208) 666-4634 or via e-mail at taylor.enos@deq.idaho.gov

Sincerely,

Taylor Enos
Water Quality Engineer

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