Mailing Address:
Water Resources Data System
University of Wyoming, Dept 3943
1000 E University Avenue
Laramie, WY 82071

Physical Address:
Wyoming Hall, Room 249
University of Wyoming
Laramie, WY 82071

Phone: (307) 766-6651
Fax: (307) 766-3785

Funding for WRDS and the creation of this electronic document was provided by the Wyoming Water Development Commission (http://wwdc.state.wy.us)

SHERIDAN WATER SYSTEM

Level I Study Final Report

Prepared for:

Wyoming Water Development Commission

6920 Yellowtail Road

Cheyenne, Wyoming 82002

http://wwdc.state.wy.us/

Prepared by:

P.O. Box 7010

Sheridan Wyoming 82801

www.dowl.com

Principal Author: Dayton Alsaker, P.E.

Document Reviewer: Jeffrey Rosenlund, P.E., PTP

June 2019

5028.26913.01

This page intentionally blank.

CONTENTS

FIGURES

TABLES

APPENDICES

ACRONYMS

Ac-ft	acre-feet
ADD	Average Day Demand
AMI	Advanced Meter Infrastructure
AML	Abandoned Mine Lands
bgs	below ground surface
BGWTP	Big Goose Water Treatment Plant
BLM	Bureau of Land Management
BOC	Board of Control
BOR	Bureau of Reclamation
Cat Ex	Categorical Exclusion
CCR	Consumer Confidence Report
CFS	Cubic Feet per Second
CIP	Cast Iron Pipe
CIP	Capital Improvements Plan
CT	Disinfectant Residual Concentration and Contact Time
DBP	Disinfection By-Products
DEQ	Department of Environmental Quality
DIP	Ductile Iron Pipe
DR	Dimension Ratio
DWSRF	Drinking Water State Revolving Fund
EA	Environmental Assessment
EDU	Equivalent Dwelling Unit
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EPS	Extended Period Simulation
ER	Environmental Review
FNSI or FONSI	Finding of No Significant Impact
FY	Fiscal Year
GIS	Geographic Information System
gpcpd	Gallon Per Capita Per Day
GPM (or gpm)	Gallon Per Minute
GPRV	Generating Pressure Reducing Valve
HAA5	5 Haloacetic Acids
HDPE	High Density Polyethylene (pipe)

HGL	Hydraulic Grade Line
ID	Internal Diameter
KGC	Kendrick Golf Course
IUP	Intended Use Plan
JPB	Joint Powers Board
MCL	Maximum Contaminant Level
MDD	Maximum Daily Demand
MG	Million Gallons
MGD	Million Gallons per Day
mg/L	Milligrams per Liter
NEPA	National Environmental Policy Act
NTU	Nephelometric Turbidity Units
O&M	Operation & Maintenance
PHD	Peak Hour Demand
PIF	Plant Investment Fees
ppb	Parts per Billion
ppm	Parts per million
PRV	Pressure Reducing Valve
PWS	Public Water System or Public Water Supply
RWTM	Raw Water Transmission Main
SAWS	Sheridan Area Water Supply
SAWS JPB	Sheridan Area Water Supply Joint Powers Board
SCADA	Supervisory Control and Data Acquisition
SDWA	Safe Drinking Water Act
SEO	State Engineers Office
SERP	State Environmental Review Process
SLIB	State Loan and Investment Board
SRF	State Revolving Fund
SWS	Sheridan Water System
SWTP	Sheridan Water Treatment Plant
TMDL	Total Maximum Daily Limit
TOC	Total Organic Carbon
TTHM	Total Trihalomethanes
USFS	Untitled States Forest Service
VAMC	Veteran's Affairs Medical Center

VFD....................Variable Frequency Drive
WCP....................Watershed Control Plan
WTP....................Water Treatment Plant
WWDC....................Wyoming Water Development Commission
WWDO....................Wyoming Water Development Office
WYDEQ (or DEQ)....................Wyoming Department of Environmental Quality
WYDOT....................Wyoming Department of Transportation

This page intentionally left blank.

1.0 INTRODUCTION

1.1 BACKGROUND

The central water system for the City of Sheridan dates to the late 1800's. With its many improvements, revisions and expansions, it has served its users well for over 125 years. The water source was originally and continues to be the Big Goose Creek watershed which is located in the Big Horn Mountains to the west, with diversions made from the creek. By 1909, the point of diversion had been moved to the edge of the Big Horn Mountains where the creek exists the Big Goose Canyon. Since that time, this has been the location of the source of water for this system.

While there have been many expansions and improvements to this system including water storage and supply, treatment and transmission, and overall capacity, one of the largest expansions took place beginning in 1990 when the Sheridan Area Water Supply Joint Powers Board (SAWS JPB) was formed and the regional system was created. These two entities now jointly own and operate this water system.

The City of Sheridan and SAWS JPB (or SAWS) jointly sponsored this study, so the term Sponsor includes both entities. A memorandum of understanding (MOU) was prepared that unites these two entities for this study and for achieving the objectives of this Water Master Plan. Both Ownership and Operating Agreements are in place governing these important areas of the management of this water system.

The SAWS portion of this system is operated and maintained by the City of Sheridan under one Public Water System (PWS) number (WY5600052). Each entity governs its respective part of the system and they are two separate water utilities. However, the system is designed as one system, with the facilities provided and water moving throughout as is best for the overall system. Water for both entities is treated in the two water treatment plants (WTPs) by the City's staff of WTP operators. The remainder of the entire system is operated by the City's Utility Maintenance (UM) operators. Therefore, there is uniformity and efficiency of operation by having a single operations staff with the goal of operating and maintaining it as one system.

This entire system will be referred to as the Sheridan Water System (SWS). All the components of this system are discussed in more detail in this report.

Throughout the tasks in this study, the SWS as a whole was evaluated, however at times the different ownership or responsibilities was distinguished between the City and SAWS JPB portions of the system.

1.2 PURPOSE OF STUDY

The primary purpose of this study is to develop an overall Level I water master plan of the entire water system that covers both the City of Sheridan system and the SAWS JPB system. As stated, this is one water system and is designed and operated as such.

A brief summary of this water system's facilities are as follows:

- Water storage in mountain reservoirs.
- Diversion and pretreatment facilities at the Intake site on Big Goose Creek.
- Raw water transmission mains (RWTMs).
- Two water treatment plants.
- An extensive network of treated water transmission mains.
- Storage tanks for gravity supply, which are located on multiple pressure zones.
- Booster stations where needed to supply areas of higher elevation.
- Automatic control valves consisting primarily of pressure reducing valve (PRV) stations to reduce the pressure to service areas. Also included are several pressure relief valve stations, altitude valves and check valves.
- Distribution systems to serve the users.
- A supervisory control and data acquisition (SCADA) system.

This study analyzes the water system and the adequacy and condition of its components, examines the system's capability to serve into the future, and identifies recommendations for capital improvements with cost estimates and funding plans.

For this Water Master Plan, the study boundary is the water service boundary that encompasses both the City and the SAWS JPB systems.

The following is a summary of the tasks within the scope of this Master Plan:

- Task 1 – Meetings. Meetings included both public meetings to present information and obtain input, and many meetings with those involved with the management and operation of this water system.
- Task 2 – Information Review. Existing information relating to the water supply and water system was gathered and reviewed.
- Task 3 – Inventory, Evaluation and GIS. Under this task the system was inventoried and evaluated as to its condition and capability to meet current and future water demands. Also included was an evaluation of water usage, and the system's management and operation. A significant part of this task was a major upgrading of the GIS for this system and develop or revise maps as needed to illustrate this large, complex system.
- Task 4 – Hydraulic Model. Under this task the hydraulic model for this system was revised and thoroughly analyzed. The upgrading of the model was done in conjunction

with the GIS, to coordinate their data bases for this water system. Key subtasks included verifying connectivity, adding recently completed projects and upgrading the location of users and their demands using the new metering system.

- Task 5 – Water Source. The existing water supply was reviewed, as were recent studies that assessed this supply, projected future water needs, and identified and compared potential future sources of water that may be developed. Water rights and water quality were important considerations under this task.
- Task 6 – Growth and Demand Projections. Estimated growth rates for population, number of users, number of equivalent dwelling units and future water needs were developed. Estimated future needs were compared to available water supply.
- Task 7 – Recommendations and Cost Estimates. A list of recommended improvements to this system were developed, along with a discussion of the proposed improvements and associated cost estimates for Level III type projects.
- Task 8 – Water System Financing. The recently completed water system rate studies and financial plan model were utilized, with funding plans for the recommended improvements prepared. Other operating or system costs were also considered, not just costs associated with constructing the proposed improvements.
- Task 9 – Discretionary Task. This task covered additional work that was identified. Tasks became: Developing templates for data to be gathered (primarily flow and pressure data) throughout the system to be used for future assessments of the estimates included in this report; and a preliminary examination of how flows could be increased in the 30-inch RWTM to improve the generation of hydropower at the Beckton PRV station.
- Task 10 – Draft Report and Presentations. A draft report for review by the WWDO and the project sponsors was prepared. A public presentation on this report was also prepared. Input was received and incorporated.
- Task 11 – Final Report and Deliverables. The report was then finalized, along with an executive summary, the water model, the GIS and other work products as necessary. These were prepared as the final deliverables.

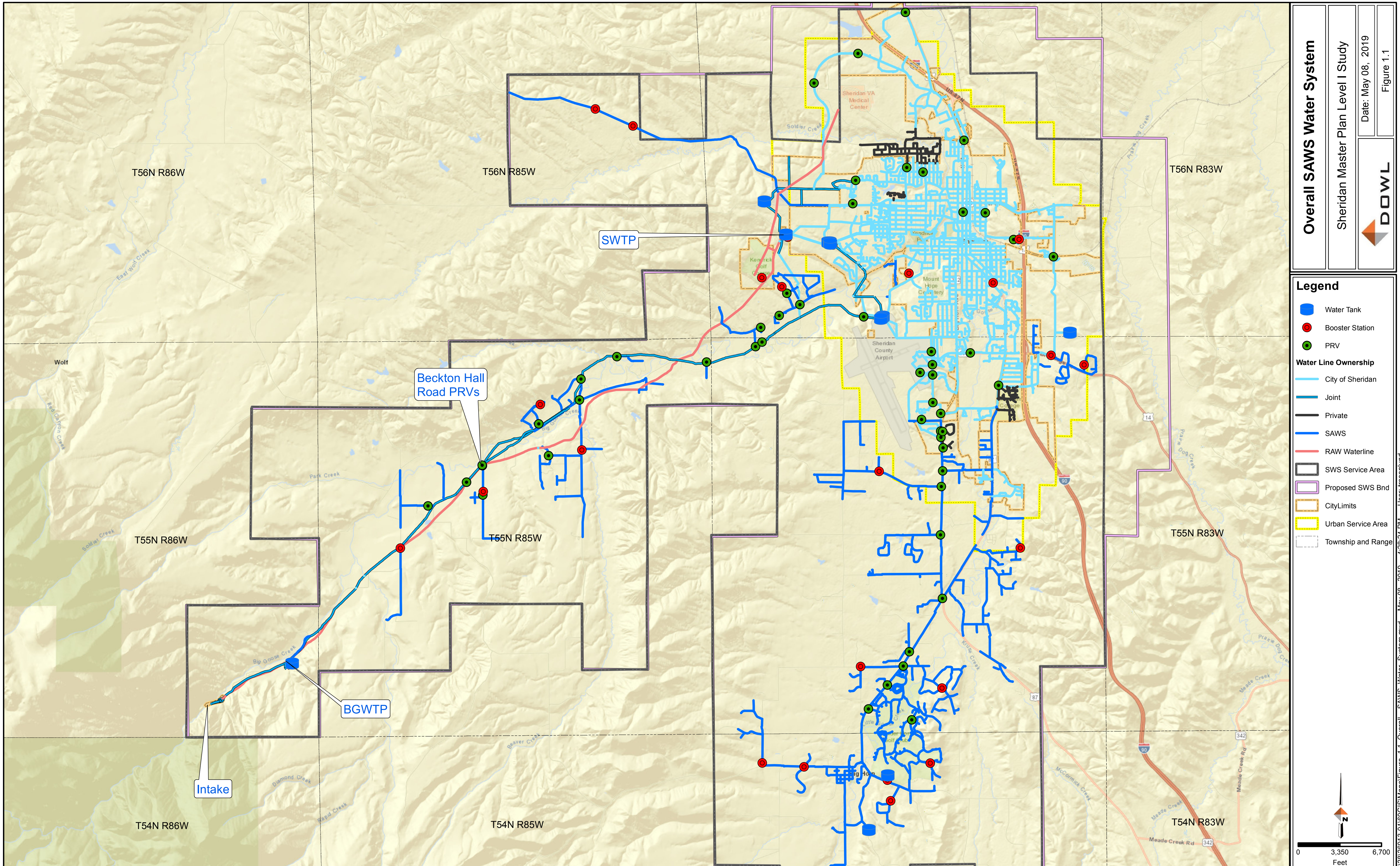
1.3 AUTHORIZATION AND CONSULTANT

The work under this project was authorized by a contract between the WWDC and DOWL (the consultant selected for this project) in a contract dated June 15, 2018 (Contract 05SC0297508).

1.4 STUDY AREA

For the purpose of this Water Master Plan, the study boundary consisted of the single service area that encompasses both the City and the SAWS JPB systems. Figure 1.1 shows the overall system and waterlines owned by each entity; this water service area is discussed further in Section 6.6.

This page intentionally left blank.


Overall SAWS Water System
Sheridan Master Plan Level I Study
Date: May 08, 2019
Figure 1.1
DOWL
Legend
Water Tank
Booster Station
PRV
Water Line Ownership
City of Sheridan
Joint
Private
SAWS
RAW Waterline
SWS Service Area
Proposed SWS Bnd
CityLimits
Urban Service Area
Township and Range
0
3,350
6,700
Feet
T56N R86W
T56N R85W
T56N R83W
T55N R86W
T55N R85W
T55N R83W
T54N R86W
T54N R85W
T54N R83W
SWTP
Beckton Hall
Road PRVs
BGWTP
Intake
Wolf
Sheridan VA Medical Center
Sheridan County Airport
Mount Hope Cemetery
Q:\28\26913-01\60GIS\Maps\Figure_1.1_Overall__SAWS_Water_System.mxd May 08, 2019 4:28:24 PM User: trosenlund

1.5 SCOPING AND PROJECT MEETINGS

A meeting was held in August 2018 to familiarize the Sponsors with the scope of the project as well as obtain input and provide information to and from affected parties. A presentation was made with maps and other visual aids to explain the project. Another public project meeting was conducted in April 2019 to review the draft report. This meeting included an overview of the work completed, as well as a summary of the findings and recommendations coming out of this study. The primary purpose of these meetings was to facilitate project activities and to inform the City council and SAWS JPB and staff, and other affected parties of the work, as well as the WWDO project manager. Information on these public meetings is included in the Appendix.

In addition to the public project meetings, several informal meetings were held with the City and SAWS staff throughout the course of the study to gather information, gather flow records and other data on the system, discuss issues with the system, and to strategize on possible improvements to be evaluated and included in the recommendations. As the work on the study progressed, bi-weekly meetings were held to provide regular updates and receive comments. These meetings included management and engineering staff, as well as the system operators.

2.0 REVIEW OF EXISTING INFORMATION

A considerable volume of information related to the water supply (and diversion from Big Goose Creek), treatment, transmission and distribution exists, as well as information on the users and their water usage. Existing information was gathered and reviewed throughout the course of this study. Included was information available through the City and SAWS JPB, the WWDO and Water Resources Data System (WRDS), the Wyoming State Engineer's Office (SEO) especially the local Board of Control (BOC) office, and a volume of maps, designs, studies and files from the DOWL office. Previous studies were reviewed for their data and analysis, and the improvements to the water system that were recommended. Local area development plans, zoning, annexation policies and other regulations were also reviewed. Summaries of pertinent data and information are included in the report.

2.1 PREVIOUS STUDIES

The following studies, reports, plans and designs are listed in this study. Many of these were referenced in the development of this Master Plan. Others are included to provide as complete a summary of existing information as possible, should a reference not used for this study be of value for another purpose. These documents are numbered so they can be referenced by their number, as may be appropriate.

A. WWDC-Funded Planning Studies
   1. Western Water Consultants, Potential for Ground Water Development, City of Sheridan Feasibility Report, December 1982.
   2. Howard Needles Tammen & Bergendoff, Sheridan Area Water Supply Investigation Level II, Volume I & II, Supplemental Groundwater Information, November 1985.
   3. Howard Needles Tammen & Bergendoff, Sheridan Area Water Supply Investigation Level II, Phase 2, Final Report, January 1987
   4. Anderson & Kelly, Sheridan Area Water Supply Investigations, Volume II, Report of Drilling and Testing, November 1985.
   5. HKM Engineering, Sheridan Area Development Analysis Level II, November 1988.
   6. HKM Engineering, Sheridan Area Water Supply Study Level II – Stage II, January 1990.
   7. Centennial Engineering & Research, Inc., Sheridan Area Raw Water Supply Pipeline Level II, Oct 1992
   8. HKM Engineering, Final Report for the Sheridan Raw Water Project (Cemetery Irrigation) Level II, October 1998.
   9. HKM Engineering, Final Report for the Sheridan Hydropower Study (Big Goose Treated Water Pipeline) Level II, October 2002.
   10. HKM Engineering, Final Report for the City of Sheridan VA Medical Center Water Project Level II Study, December 2005.

11. HKM Engineering, City of Buffalo – Sheridan Area Water System – Lake DeSmet, Level I Study, June 2008.
12. DOWL HKM, Sheridan Supplemental Supply Study Level II, Phase I, Final Report, May 2011.
13. EnTech Inc., Sheridan Supplemental Storage Level II Phase II Study, Final Report, December 2013.
14. EnTech, Inc., Goose Creek Watershed, Level I Study, November 2018.
15. Respec, Powder-Tongue/Northeast River Basin Plan Update, underway, to be completed in 2019.
16. HDR, Respec, AnchorPoint, Sheridan Municipal Watershed Wildfire Hazard Mitigation Assessment, being completed in May 2019.

B. Other Reports:

17. VELA Environmental, Upper Big Goose Creek Watershed Management Plan, 2015.
18. HKM Engineering, Design Report and O&M Manual (following construction) for the Little Goose project, 1996.
19. HKM Engineering, Design Report and O&M Manual (following construction) for the 30-inch RWTM, 1996.
20. HKM Engineering, Design Report and O&M Manual (following construction) of the 20-inch Big Goose pipeline, 2008.
21. HKM Engineering, Design Report and O&M Manual (following construction) of the Intake Facilities, 2004.
22. DOWL HKM, Sheridan Northwest Water Project, Design Report, November 15, 2008.
23. DOWL HKM, Sheridan Water Transmission Main Lining Project, Design Report, April 2009.
24. DOWL HKM, North Sheridan Water Transmission Main (NW Loop) – Preliminary Engineering Report (PER), July 2012.
25. DOWL HKM, Sheridan 4MG Tank Improvement Project – PER, August 2014.
26. DOWL, Sheridan North End Utilities PER, July 2017.
27. DOWL HKM, Sheridan Northeast Area PER, August 2014.
28. HKM Engineering, Study of Options for Water Supply Improvements to the South Hill Water Supply, 1997.
29. DOWL, SAWS Booster Station Upgrade Project:
    a. Design Report, March 1, 2013.
    b. SAWS Booster Stations (for DEQ), February 2014.
    c. Metering Upgrade, Design Report, May 22, 2018.
30. DOWL, SAWS Control Valve Upgrade Project – Design Report, January 15, 2018.
31. HKM Engineering, Sheridan Soil Corrosion Study, 1999.
32. HKM Engineering, Kendrick Golf Course PER and design of improvements, 2002.
33. HKM Engineering, The Downer Neighborhood Water Project Design Report, 1998.

C. Project Designs:

34. WWDC-funded Level IIIs:
    a. Little Goose – City Water System Improvements, 14 projects (1991 – 1997).
    b. 30-inch Raw Water Transmission Main, 1994.
    c. Intake Improvement Project, 2004.
    d. 20-inch Big Goose Pipeline, 2008.
    e. South Hill Area Water Project, 2004.
    f. Water Main Lining Project, 2011.
    g. Sheridan Northwest Loop Water Project, 2015.
    h. Sheridan North End Water Project (new pressure zone & service area), 2018.
    i. Sheridan West Works Water Project, 2017.
    j. Downer Neighborhood Water & Sewer Project, 2003.
35. Other projects of value to this Master Plan:
    a. SAWS Booster Station Upgrade Project, 2015.
    b. SAWS Control Valve Upgrade Project, 2018.
    c. SAWS Metering Upgrade Project, 2018.
    d. Kroe Lane Water Project (connection between 2 pressure zones), 2004.
    e. New water distribution systems – City SIDs (1998 – 2008), Sugarland Utilities (2011).
    f. Big Goose Supply (use BGWTP water to fill the Northwest Tank, the filter backwash tank at the Sheridan WTP, and supply part of the Sheridan WTP service area in emergencies).

D. Other Design Plans or Site Maps:

36. Many old site maps or drawings from the early 1900's through the 1970's have been accumulated over the years on this water system. These maps include the intake facilities on Big Goose Creek, the Big Goose Valley pipelines, the older tanks and their site piping, the development of the Sheridan WTP site, and others.

E. Financial Studies:

37. *Water and Sewer Rate and Fee Study, City of Sheridan*; Raftelis Financial Consultants, Inc; July 2018.

2.2 PLANNING

2.2.1 City and County Planning

It is important that plans such as this Water System Master Plan comply with local plans by the planning commissions. Since the Sheridan area water system covers both the City and the SAWS JPB service area outside of the City, both the City of Sheridan Planning Department and the Sheridan County Planning Department were involved. Both departments have planners and administer plans. Both the City and County Planners were contacted regarding this study. The scope of this Master Plan was discussed and input from the planners was requested. There are three existing plans that are referenced for this Master Plan and were reviewed regarding considerations included in this study. These were:

- 2008 Sheridan County Compressive Plan (this plan is currently being updated)
- 2017 City of Sheridan Land Use Plan
- 2017 Sheridan Joint Planning Area Land Use Plan

Some of the highlights from these plans or other local planning considerations as they relate to this Water Master Plan include:

- Planning for the future, such as for growth, should comply with these plans.
- The existing plans should be used in the decision making of the planning commissions and governing bodies.
- Zoning and future land use maps are available and should be referenced regarding considerations for planning improvements to the water system.
- Development should not impair the water supply.
- Promotion of farming and ranching should be continued.
- The county and city will maintain a clear distinction between rural agricultural areas, and urban uses to conserve resources and provide services efficiently.
- Current city policies and land use plans support a compact development pattern within Sheridan (compatible infill). (Compact urban development).
- Ensure that scarce resources such as water and energy are available in the long-term.
- Ensure an adequate water supply for current and future generations.
- The County will work with municipalities and SAWS to extend water facilities to accommodate future urban demands only in desired growth locations.
- The County will assist with efforts of municipalities and SAWS to secure additional water rights that will meet forecasted community growth. Future growth should provide water rights necessary to support it. The County will especially consider use of existing rights available in Lake DeSmet whenever the need for additional water arises.
- The County will continue to work with the City of Sheridan in a joint planning arrangement for the unincorporated lands within the Urban Services Area.
- Regarding the JPA – promote future urban development in areas where it can efficiently be served with municipal water and sewer.
- Big Goose and Little Goose Corridors – areas already served by SAWS water. These areas have experienced growth pressure with water being available. The County Comprehensive Plan recommends that current growth patterns in these areas remain mostly rural with limited expansion of the County Low Density Residential pattern.
- Action item – Determine if the SAWS service area boundary is consistent with the designated future growth areas and County Low Density residential areas that will be

served and/or clearly distinguishes ownership and water rights. Plan for long-term water supplies, including conservation measures.

- Action item – Coordinate with the City and SAWS to plan for long-term water supplies.
- Action item – Developers will ensure that adequate public facilities are in place or planned for within a reasonable time of the start of a new development.
- Appendix C of the 2008 County Comprehensive Plan includes a discussion of the water system and issues. This is dated and other recent studies cover the topics presented here in more detail and from a more complete perspective. Refer to the updated Comprehensive Plan when it is finalized later this year.

2017 JPA:

- The JPA is the unincorporated area surrounding and in relatively close proximity to the city limits. Working together in this JPA encourages cooperative planning, efficient provisions of services and consistent and compatible decision making. It provides long-range guidance on land use issues such as where and how future development should occur.
- To the north and east, the JPA extends to the proposed new Water Service Boundary, to the Big Horn Wye to the south, and west to about 2 miles west of the City limits.
- The JPA identifies existing water facilities (and other infrastructure) that has the capacity to accommodate new growth.
- The JPA established the compact Urban Services Area.
- The JPA promotes future urban development in the area where it can efficiently be served with municipal water and sewer.
- The JPA established a Future Land Use map, which provides a framework for future development.
- The JPA steers development away from unsuitable areas – steep slopes or unstable soils, the floodplain, the groundwater protection area (without a central sewer system), and designated open spaces.
- The JPA recommends extending water and sewer to accommodate future urban demands in the desired growth locations.
- The City has had a relatively stable growth rate of approximately 1.3% since the 1990's.
- The total population served in the City/SAWS service area was about 22,500 in 2017.

Development density outside of the City (considering the SAWS service area):

- Agricultural zoned: 1 unit per 80 acres.
- Minimum lot size for rural residential if on septic within groundwater vulnerability areas (adjacent to creeks): 5 acres
- Minimum lot size for rural residential if on septic but outside of groundwater vulnerability areas: 2 acres

2.2.2 Sheridan Supplemental Storage Level II, Phase II Study

This Master Plan reviewed the previously completed Phase I and II supplemental supply studies and utilized some of their information and data. Recommendations relating to planning additional long-term water supply included:

- Park Reservoir water rights are not attached to specific lands.
- Park Reservoir is owned by the Park Reservoir Company and the Park Reservoir Irrigation District.
- One share of Park Reservoir Company equates to 1.2 ac-ft of storage space.
- There are 10,362 ac-ft of storage. Less reserves for flushing, and evaporation & seepage.
- A 2% growth rate for the City and 3% for SAWS were used.
- Using these rates, in 2063 Sheridan's annual water needs were 17,250 ac-ft.
- The total available supply was determined to be 15,410 ac-ft, but this is not all usable because instream flows can only be used when there is the demand.
- The total practical supply was determined to be 10,417 ac-ft.
- Based on the above, Sheridan's water supply is utilized in 2039. The additional supply requirement becomes 6833 ac-ft.
- Park Reservoir's firm yield was estimated to be 7680 ac-ft.
- Sheridan can purchase water in Park up to $4200/ac-ft or $5040/share (using the WWDC account funded at 67%). With the account that was set up for this purpose, up to 2000 ac-ft can be purchased.
- After January 1, 2016 this purchase price is adjusted based on the inflation rate (CPI-U) as calculated in the agreement. The funds available from the WWDC do not increase, so the increase in the purchase price could decrease the total amount purchased unless the local match was increased.

2.2.3 Sheridan Municipal Watershed Wildfire Hazard Mitigation Assessment

This study is being completed in May 2019. A summary of its purpose and key findings and recommendations relating to planning for wildfires and their potential impact on this watershed include the following:

- Wildfires often result in increased solids loadings to treatment plants in terms of ash content and runoff from soils resulting from the loss of ground cover. Post-fire water quality includes increases in turbidity and increases in the concentration and changes in the character of natural organic matter.
- The number of wildfires in the west has increased in recent decades, and the frequency of extreme weather events is also expected to increase.
- Sheridan's water supply originates in a heavily forested watershed in the Big Horn Mountains, so is particularly vulnerable to wildfire.

- The study's goal was to "create a watershed management plan that outlines site-specific forest management treatment areas that can prevent or minimize postfire hydrologic impacts in drainage areas that contribute to the municipal supply and infrastructure for Sheridan."
- The study identified fuels/treatment locations based on the hazard analyses and prioritized these locations. A matrix presents the final prioritization of these locations.
- The study built upon existing relationships between local, state and federal partners to lay the foundation for the Governor's Task Force recommendation to develop a cross-jurisdictional watershed protection plan for municipal water supply drainages that focus on proactive management to preserve water quality.
- Conclusions and recommendations included:
    - The majority of the catchments identified through the hazard analyses and identified as being critical to water supply are located primarily or entirely within designated Roadless and/or Wilderness Areas.
    - The cost, operability and permitting constraints of working in Roadless Areas make it beneficial in the short term to focus on other areas. These other areas include catchments located directly upstream from Sheridan's water supply intake and storage reservoirs.
    - Understanding the areas that pose the greatest risk to Sheridan's water supply and prioritizing those areas for mitigation was the primary goal of the project; however, it was recognized that some areas with the highest overall risk had the lowest operability and may never be treated to protect against wildfire.
    - Wildfire and postfire hydrologic impacts will remain a threat to Sheridan's water supply even if all feasible recommended treatments are implemented.
    - And probably most importantly: *"Based on the results of the residual risk index alone, evaluating alternative water supplies appears to be warranted."*

2.3 EXISTING WATER SYSTEM – OVERVIEW

This section provides an overview of the major components of the Sheridan water system.

2.3.1 Water Source

Source water for the Sheridan water system is Big Goose Creek. The diversion point is located about 13 miles southwest of Sheridan at the edge of the Big Horn Mountains. The source of water includes:

- The natural flow of Big Goose Creek.
- Water stored in mountain reservoirs that is released into Big Goose Creek and diverted at this location.

Both of these sources are very important to both the City and SAWS. Their water rights relating to direct flow diversions and stored water vary considerably, however. These rights are discussed in more detail in Section 5.1. Direct diversions from Big Goose Creek have historically satisfied this combined water system at all times other than during the irrigation season when the creek is under regulation by the BOC. During the irrigation season, not only does user demand and therefore quantity of water that must be diverted increase significantly, but irrigators are also diverting water from Big Goose Creek for their use. Stored water is released during this approximately three-month period to supplement stream flows as necessary to insure there is adequate water for this water system.

The primary mountain reservoir for this system is Twin Lakes. Twin Lakes is located on Coney Creek in the west Big Goose watershed. Its water surface elevation when full is at approximately 8588. It is owned by the City for the purpose of municipal water supply. Therefore, they manage the reservoir and the release of its stored water for their use without coordinating with other users or entities. This reservoir was reconstructed (including a major enlargement) in the late 1990's and is in good condition.

2.3.2 Intake Facilities

Intake facilities consisting of a diversion dam, pretreatment facilities, and site piping are located at the edge of the Big Horn Mountains in Section 35, T55N, R86W. In 1909, the Board of Control allowed the City to change their point of diversion for their water system to this location. At that time, the VAMC had already established a point of diversion for a pipeline to supply water to Fort McKenzie. Since 1909 water has been diverted from this location for the Sheridan water system. This location is upstream from other water users and is in approximately the same location as the diversion points for two large irrigation ditches (PK and Alliance, with the Alliance being a short distance downstream). While this location has several advantages, a major one is that pipelines connect this point to the SWS with all flow being by gravity.

Pretreatment facilities at the intake include a baffle wall (to keep out larger floating debris), a sand trap channel to remove the larger gravel and sand particles, traveling screens to remove debris, and sedimentation basins to remove finer grained materials. Two flow paths through travelling screens and sedimentation exist for redundancy and expanded capacity. A 2004 improvement project at the intake facilities increased both the hydraulic and pretreatment capabilities of the site. These facilities have a nominal design flow capacity of about 25 million gallons per day (MGD). These facilities are owned by the City of Sheridan and are used to divert all water for the SWS.

At the eastern end of the intake facility site, raw water can enter two pipelines for transport to the WTPs. Primary raw water transmission mains (RWTMs) are the 16-inch line that leads to the Big Goose WTP (BGWTP) and the 30-inch RWTM which delivers raw water to the SWTP, Kendrick Golf Course and the Veteran's Affairs Medical Center's (VAMC) WTP. There is also an older 20-inch line that is in poor condition and is not currently being used. Figure 2.1 shows the piping at the Intake facility.

2.3.3 Water Treatment

There are two water treatment plants (WTPs) which serve this water system. These are the Big Goose WTP which is located approximately 12 miles southwest of Sheridan and the Sheridan WTP which is located approximately one mile west of Sheridan. The BGWTP was constructed under the SWS regional project, going on-line in December 1993. It has a capacity of about 4.0 MGD. The SWTP was expanded under the same project at the time the BGWTP was built. This expansion increased the capacity to 14 MGD. Due to its higher elevation, the BGWTP serves the majority of the Big Goose and Little Goose Valleys, as well as the southeast Sheridan service areas, thus it is the primary water source for the SAWS service area.

The clearwells at these WTPs are very important, not only for the chlorine contact time they provide, but for the storage they hold to supply water to meet the system demands and for emergencies. These clearwells are buried concrete tanks and are in good condition. Also of importance is the elevation of their overflows, as these establish the hydraulic grade lines (HGL) for all water being supplied from these two sources. These elevations are such that they can provide supply to much of the system by gravity. There are two clearwells at the BGWTP, and they operate in series. The first one has an overflow elevation of 4398, and the larger (1.5 MG) clearwell has an overflow elevation of 4395. The elevation of the overflow at the 4 MG clearwell at the SWTP is at 4040.

The SWTP serves the majority of the City, the Downer Addition, and can supply SAWS' Soldier Creek line. Water leaves both WTPs by gravity flow. Various automatic control valves (primarily pressure reducing valves) control the flow of water throughout the system and into various parts of this system. These two WTPs, automatic valve stations and looping of pipelines within the system provide significant flexibility in the flow of water and redundancy of supply throughout this system. Therefore, while the BGWTP mostly supplies SAWS users and the SWTP mostly supplies City users, flows from these two plants cannot easily be categorized to the users of these two entities.

As stated above, the BGWTP was put on line in 1993. The SWTP was initially constructed in 1962 and was upgraded in 1993. Both plants were further upgraded in recent years to enhance their treatment processes. These recent upgrades did not increase their capacities, but significantly increased their capability to comply with drinking water regulations, primarily Long Term 2 Enhanced Surface Water Treatment Rule (LT2). This upgrade was primarily focused at reducing turbidity levels to help assure the removal of *Cryptosporidium*, if this microbe should happen to be present. The result of this upgrade and its improved chemical conditioning and monitoring has reduced treated water turbidity levels. This reduction has also helped reduce total organic carbon which in turn has helped reduce disinfection byproducts, another important rule under the Safe Drinking Water Act.

With this recent upgrade, both WTPs are in good condition and have been providing an improved level of treatment since the completion of this project. There are some improvements discussed and recommended at the BGWTP such as converting the disinfection system to on-site generation of hypochlorite and improving sludge drying capacity.

These two WTPs provide a complete treatment train of coagulation (chemical condition), flocculation, sedimentation, filtration and disinfection. So multiple barriers are provided to eliminate potential pathogens, and the resulting water supply consistently complies with stringent finished water turbidity and bacteriological requirements.

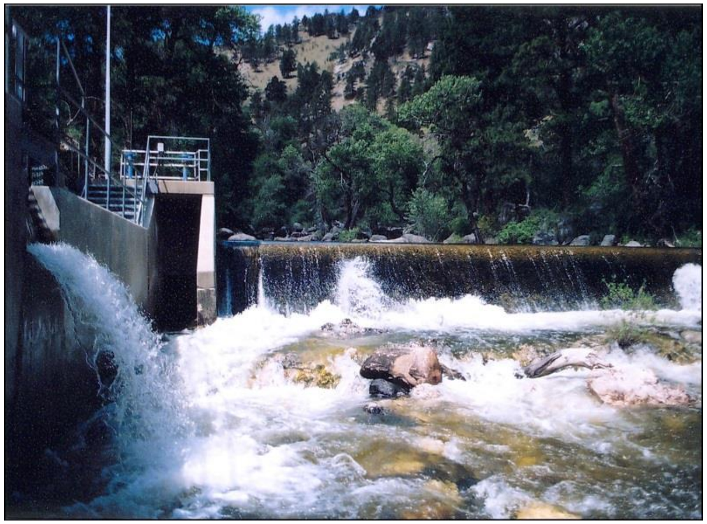
Both WTPs have had major upgrades to their clearwells in recent years. The project at the BGWTP added a 1.5 MG concrete tank next to the 475,000-gallon clearwell that was included in the original project. The 4 MG clearwell at the SWTP was recently rehabilitated with a new roof, improved columns and concrete baffles. The improvements to the 4 MG tank and the added storage at the BGWTP improved the CT (disinfectant concentration and contact time) for inactivating microorganisms, an essential step in the treatment process. Both tanks also play very important roles on this system as far as their storage capacity is concerned. These are the two most important tanks on this system for storing water and providing supply by gravity flow to meet peak demands and for emergencies. These tanks also allow the WTPs to run at consistent rates for improved and more efficient treatment, with flow from the tanks increasing and decreasing to meet the varying demand.

A 20-inch transmission main runs from the Big Goose Valley at Weeping Willow Lane up to the SWTP. There is an automatic valve at this location that can allow water from the BGWTP to enter the 4 MG tank, which can provide some operational advantages for the BGWTP if the operators wish to do this. A recent upgrade project now also allows the higher-pressure water from the BGWTP to fill both the filter backwash tank at the SWTP and the Northwest tank. These filling operations are done by gravity flow using automatic valves to control the flow. Filling the Northwest tank by gravity flow from the BGWTP allows the northwest part of the City service area to be supplied by this WTP, rather than the SWTP where pumping is required.

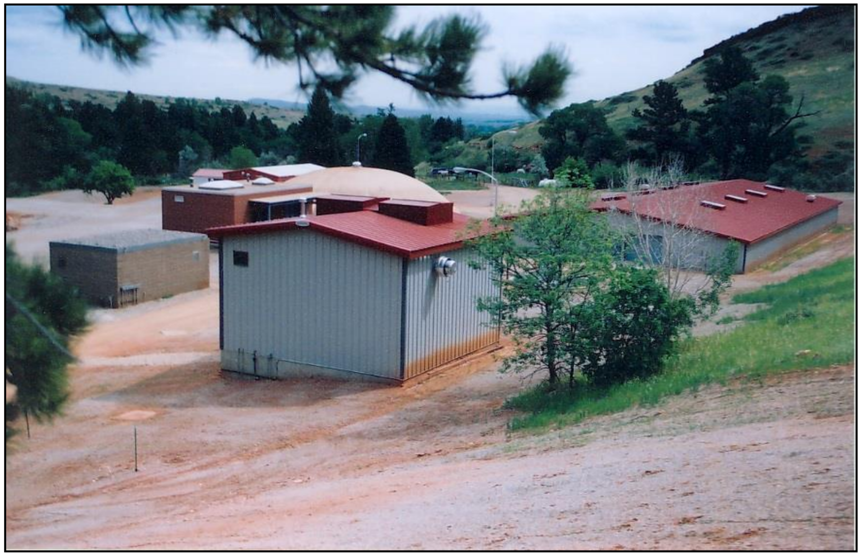
While the filling of the filter backwash tank at the SWTP and the Northwest tank is valuable and eliminates the need for pumping thus saving costs, it is another way water from the BGWTP is used in an area previously served by the SWTP. This reduces the loading on the SWTP and increases the number of City users that receive BGWTP water. This switch is fine, it just needs to be considered in any water accounting exercise.

These options also allow significant service by one WTP into the other plant's typical service area. The SWTP can serve as far west as Beckton Hall Road, for example.

Figure 2.2 and Figure 2.3 are site maps of the BGWTP and the SWTP, respectively, and the following photos illustrate some of the facilities at the BGWTP and the intake.



Diversion Dam on Big Goose Creek



Intake Pretreatment Facilities

Big Goose WTP

Sheridan WTP

2.3.4 Raw Water Transmission

The 30-inch RWTM is the primary pipeline to convey raw water to the WTPs and to Kendrick Golf Course and the VAMC. This pipeline is used for all of the water supplied to the SWTP and these two other points that only receive raw water. The 30-inch RWTM can also supply the BGWTP, but the BGWTP's primary supply comes from the 16-inch line between the intake facilities and the BGWTP. This 16-inch steel line was relined several years ago and is believed to be in good condition. It has adequate capacity for the current needs of the BGWTP.

The 30-inch RWTM was constructed in 1995–1996. It is made of coated, lined and cathodically protected steel. There have been no issues with this pipeline in the past 20 years and it is believed to be in very good condition. Being made of steel, it was designed for high pressure operation. A major pressure reducing facility is located at Beckton Hall Road. 12-inch PRVs are used to reduce pressure for the eastern portion of this pipeline. An in-line hydropower generator was recently installed on the primary flow path through this station to generate electricity from the head being cut at this location.

The pressures in and out of this vault run about 260 psi and 90 psi, respectively, so significant head is being cut. This line with this pressure reduction can carry well in excess of 20 MGD which is more than is needed for all usage points east of Beckton. If in the future additional capacity is needed, this level of pressure reduction can be reduced and thereby increase the gravity flow capacity of this line. It is believed this ultimate capacity of this transmission line can approach 30 MGD; however, depending on how far this is in the future and what the internal friction factor may be at that time, a more conservative expectation may be about 27-28 MGD.

The other RWTM in the Big Goose Valley is the 1968 vintage 20-inch ductile iron pipeline (DIP). This line is in poor condition because of external corrosion from the soil and has not been used in many years. It cannot be placed into service at this time. The possibility of pipe-bursting this line with HDPE is discussed under possible improvement projects that may be recommended. If this rehabilitation project was completed, this line would be available as a backup to provide limited raw water supply to the VAMC and the SWTP. It is believed the ultimate capacity for this pipe-bursted 20-inch DIP will be about 5.75 MGD, but this will need to be verified during design phase depending on a variety of factors.

A rehabilitated 20-inch DIP could provide important redundancy for this system, because if the 30-inch RWTM was out of service, neither the VA's WTP or the SWTP could operate until it is returned to service. Rehabilitating the 20-inch DIP over installing a new line has two important advantages. The first may be cost, especially considering this is a backup line. The second is the difficulty in obtaining easements through all the private land in the Big Goose Valley. This would be a very difficult, expensive and time-consuming proposition. It is believed most easements for the 20-inch line are 30-feet wide and still exist, but a more detailed assessment is needed should this become an actual project.

2.3.5 Hydropower Generator

As noted in the raw water transmission main discussion, a hydropower generator was recently installed (2017) in the 30-inch RWTM at the Beckton Hall Road PRV vault. The generator installed is a Soar GPRV (generating pressure reducing valve) Micro Francis Turbine Model Number IL12-22-9.0, Serial Number 1053-161004, rated for 366 ft of head and a flow of 11.1 CFS (5000 gpm or 7.2 MGD) to produce 251kW (kilowatts of power). This turbine works in parallel with the existing PRVs.

To date, the City hasn't been able to realize the income potential originally anticipated due to a few reasons. The new generator has had issues with vibration and the generator has shut down and been off line because of these vibration issues.

Also, the City has had a difficult time maintaining enough flow through the 30-inch RWTM to allow the hydropower generator to continuously produce power. The minimum flow setting is for the wicket gates to be set at 7% open, which corresponds to 1.6 MGD or 2.5 CFS. At flows lower than this, the turbine shuts down. The City requested that this study evaluate some options for maintaining the flow in the 30-inch RWTM above this minimum to generate an acceptable amount of power. These options and a brief discussion of them are as follows:

- Maintain higher production rate at the SWTP. This would require periodically overflowing the 4MG tank at the SWTP. When this happens, the overflowed water runs down Gillespie Draw and eventually back into Big Goose Creek. This option is not desirable because of the cost to treat the wasted water.

  As discussed under 2.3.3, certain areas can be served by either of the two WTPs. Since the BGWTP is at a higher elevation it can serve more areas by gravity than the SWTP. So it is possible to increase flow through the SWTP and reduce the production by the BGWTP, however this impacts other considerations such as operational efficiencies and the possible need for pumping, so the decision to increase the service area of the SWTP cannot be made based on hydropower generation alone.

- Set the GPRV to operate based on flow and allow a pressure relief valve on the 30-inch RWTM to operate and "blow off" the additional water (water goes back into the creek). We do not recommend deliberate over pressurizing of the 30-inch RWTM and counting on the pressure relief stations to automatically control the flow in the line. This would likely cause surging in the line and inconsistent flow rates.

- Install an automatic valve on a blow off near Big Goose Creek and open this valve to maintain higher flow rates. This valve would communicate with the GPRV via SCADA. This option would probably work well hydraulically but would depend on a SCADA signal to adjust flow rates.

- Install an automatic valve in the Beckton Hall Road PRV vault that would divert water from the 30-inch RWTM to the 20-inch RWTM. The RWTM would then discharge this water to Big Goose Creek. This option is the most desirable from a cost and operational standpoint. The automatic valve could be controlled directly by the GPRV controls, as they would be located in the same vault. Also, it is possible that this valve could be set to maintain a set HGL (that would correspond to a minimum flow rate in the 30-inch RWTM) and operate independently of the GPRV. The concept of discharging raw water back to Big Goose Creek was discussed with WYDEQ. They confirmed that a discharge permit would not be needed since there is no chemical addition to the water at the intake facilities. Email confirmation of this is included in the project notebook. For the water discharge, the ideal location would be approximately 2000 feet to the northeast of the Beckton Hall Road PRV Vault.

The design of this control and discharge facility needs to include a mag meter so the flow back into the creek can be measured and accounted for, and a discharge point that does not cause erosion and can accommodate spring high water levels. This point must also be easily accessible. The condition of the portion of the 20-inch RWTM used for this purpose (if it is decided to use the 20-inch as presented above as opposed to dumping water out of the 30-inch RWTM) also needs to be evaluated.

2.3.6 Treated Water Transmission

There are many key treated water transmission mains in the SWS. With the exception of the second main listed below (the 24 – 16-inch DIP line through the airport, to the Girl's School and over to the College), it is believed the ones on this list are in good condition. However, there are other older CIP/DIP transmission mains that are slowly deteriorating due to corrosion and will need to be replaced in the coming years. These lines include the transmission mains leaving the SWTP and carrying 4040 (and then 3952) water into the City's primary service area.

These key transmission lines are briefly summarized below:

- The 20-inch Big Goose pipeline. This 12-mile long line carries all the BGWTP water to the Big Goose and Little Goose Valleys and supplements flow into the City in multiple locations. A major PRV station is located on this line at Beckton Hall Road. Since this line runs at high pressure at its eastern end and should a PRV fail, the pressure will increase even further, a pressure relief valve station is located about 1200 feet west of the eastern end of this line on the airport.

- The 24-inch, 20-inch, 16-inch DIP through the Airport and over to the College. This DIP is in a deteriorated condition due to corrosion and has had several significant failures. This main was installed in 1979. It is a very important (essential) transmission main and should be replaced as discussed under recommendations. It carries primarily higher pressure BGWTP water but can carry SWTP water if the circumstances require.

- The 16-inch DIP south along Girl's School Road to Big Horn. This is a cathodically protected DIP and carries the water supply for the Little Goose Valley to Big Horn and fills the Big Horn tank. This is gravity flow from the BGWTP to this tank.

- The 12-inch main along Highway 87 south of the college. This line carries all the water supply for the area south of the college to the Woodland Park School area. This line will have to be relocated due to an upcoming WYDOT project.

- The 16-inch line through the college and up to Southeast tank and then north on East Ridge Road. This line carries BGWTP water to the Southeast Sheridan area and fills the Southeast tank. Water can then flow north along East Ridge Road.

- The 20-inch line through the City, out East 5th Street and connecting to East Ridge Road. This line carries higher pressure 4040 SWTP water across the City to the higher ground on East 5th Street and connects to the East Ridge Road line. It also supplies the downtown 3952 zone through PRV stations.

- The 20-inch PCCP line from Weeping Willow north to the SWTP. This line carries higher pressure BGWTP water to the SWTP area and can fill the Northwest tank.

- The two 24-inch lines leaving the SWTP. These two lines carry most of the SWTP water to its service area, which is the western hill (4040) zone, the South Hill area across the valley, and the downtown 3952 zone through PRV stations.

- The 12-inch line from the South Low tanks down Leopard Street. This line can both fill the South Low tanks from the downtown area or carry water from these tanks to the large downtown service area.

- The two 16-inch cross-valley lines running south from the North Low tanks. These two lines (one cast iron and one relined steel) carry SWTP water across the valley to the South Low tanks and the large South Hill pressure zone. They also serve the users in the eastern end of the Big Goose Valley.

- The 16-inch line running up to the Northwest tank and then over to Mydland. This line fills this tank and serves a large area west of Mydland Road and can supply east of Mydland through PRV stations.

- The 16-inch line running north off this line, around to the north end of Sheridan. From the above line, this 16-inch line loops around the northwest side of Sheridan and connects into the North Main area. This important line serves the Industrial Park and the area around the new north interchange. This line includes two PRV stations so serves three different pressure zones.

There are many smaller transmission mains that come off the above mains. These mains also serve many distribution systems, supply tanks, and provide water to both booster stations and PRV stations. In many cases there are backup flow paths to the primary flow path. However, in several cases, the above line is the sole supply source to its service area, so its condition needs to be monitored with repairs and upkeep made as needed.

An overview of the SWS, including these and other transmission mains is shown in Figure 1.1.

Figure 2.4 shows the transmission mains in the Big Goose Valley which carry all the water to system users and to the SWTP.

These transmission mains are key not only to the operation of the system as it currently exists, but in planning for expansion to serve growth. Since growth will continue to take place, analyzing the capacity of these transmission mains and how they can be further extended to serve additional areas within this system's service area, are an important part of this study.

Figure 2.8 shows the capacity of these transmission mains as well as the rest of the water supply system in Big Goose for the SAWS system.

2.3.7 Storage Tanks

There are several important storage tanks which are used to supply water by gravity throughout the SWS. Most of these tanks benefit both the City and SAWS users. These tanks are on multiple pressure zones and allow the system to operate as dependably as it does. All tanks are concrete that are buried up to their roof. Being made of concrete and burying them in this manner provides the following advantages:

- They are very low maintenance (do not require recoating).
- They should have a very long life (should be 100 years).
- They help protect water quality by keeping the water cooler in the summer.
- They help prevent freezing conditions in the winter.
- They are easier and safer to access for operation and maintenance.
- They can have supplemental equipment installed in them such as the mixing equipment proposed for the Big Horn tank.
- They are not as noticeable which adds to the security of the system.
- Aesthetically they have advantages over above-ground tanks.

Tanks on this water system are summarized in the following table.

Table 2.1 - Storage Tanks

TANK NAME	SIZE	OVERFLOW ELEVATION	COMMENTS
BGWTP Clearwell	0.475 + 1.5 MG	4395	Head reduced to an HGL of <4250 at Beckton Road PRV. (This setting is adjustable)
SWTP Clearwell	4 MG	4040	Serves the 3952 and 4040 pressure zones in and around Sheridan. Recently rehabilitated.
North Low	2.08 MG	3952	Three separate inter-connected tanks.
South Low	2.04 MG	3952	Three separate inter-connected tanks.
Northwest	1.0 MG	4160	Serves a large area in NW Sheridan but can supply back down to the Big Goose valley.
Southeast	1.25 MG	4040	This tank has turnover issues because of low demand. It is important for fire storage.
Big Horn	1.0 MG	4160	Serves Little Goose Valley.
Bradford Brinton	0.5 MG	4276	Serves Big Horn area.

Storage tanks are provided on the system to:

- Help meet peak demands (they fill during the lower demand time of the day and help meet the peak demands which occur at certain hours).
- Provide fire flows (which are typically the highest demands on a water system). For example, the design fire flow for commercial areas is 2500 gpm for 2 hours, which equates to 300,000 gallons that must be kept in storage.
- Provide storage for emergencies when certain supply components or electrical power may be down.
- The tanks at the WTPs provide CT for treatment.
- Allow water diversions and the WTPs to operate at steadier flow rates, for improved operation and easier use of the water rights available.

Therefore, there is over 13 MG of gravity storage on this water system. Section 13 of DEQ's Chapter 12 states that "Water systems serving in excess of 500,000 gallons on the design average daily demand shall provide clearwell and system storage capacity equal to 25% of the design maximum daily demand, plus added fire storage based on recommendations established by the State Fire Marshall or local fire agency."

Therefore, from only looking at the total storage capacity, there is more than enough storage on this system. These tanks are on multiple zones and serve different areas of the system however, which must be considered. There are issues with turnover in the Southeast tank, so possibly this tank should be operated at less than full, and/or allowed to drain down several feet before it is refilled.

The two clusters of three tanks (North Low and South Low) have operational issues due to the interconnecting piping, and old valves and other appurtenances. These tanks were assessed under the modeling task to see if it can be recommended to downsize the storage volume at these two locations to 1 MG. In any case, site upgrade projects are needed to either make the tanks work better as a set of three, or to eliminate two of the three tanks for simpler operation.

No other improvements are recommended at these tanks at this time.

2.3.8 Pump and Booster Stations

There are 18 pump or booster stations on this water system. Pump and booster stations are differentiated as follows:

- Pump stations are larger, above-ground stations that fill a tank or provide fire flows (and therefore have auxiliary power).
- Booster stations are smaller, below-ground stations that boost the pressure into a closed system that is above the hydraulic grade line of the services area. They utilize VFDs to maintain a constant pressure and are what keeps their particular service area at the proper pressure.

The pump stations on this system are as follows:

- Airport pump station. This pump station rarely operates since gravity flow meets the demand from BGWTP into Southeast Sheridan and the Little Goose Valley and is able to fill the Big Horn tank. If this cannot happen, this pump station can be used. This station monitors the level of the Big Horn tank, and it can be set so that if the level ever falls below a set-point, it will turn on to increase the flow rate in the pipeline from the Big Goose Valley, to keep this tank properly filled. As discussed in the modeling section, this pump station may be needed as demands increase in the future. This station is actually two stations in one, with the first being two high capacity, constant speed pumps that can simply fill the Big Horn tank more quickly. The second being a smaller VFD driven pump that can be used to increase the flow to a lesser and more controlled rate, providing flexibility within this station.
- Big Horn pump station. This station takes water from the Big Horn tank and delivers it to the Bradford Brinton tank, which is the next higher-pressure zone. Its design flow rate is 350 gpm.
- Northwest Pump station. This station takes water from the 4 MG tank at the SWTP and fills the Northwest tank, which in turn supplies water to much of northwest

Sheridan. Since this tank can also be filled by the BGWTP, this station is not always used. Its design flow rate is 2600 gpm.

- Southeast pump station. This is a 1000-gpm pump station which delivers water to the subdivisions in southeast Sheridan, along Highway 14 east of Skyline Drive. There is no storage tank that serves these subdivisions by gravity, therefore this pump station ramps up and down to meet the varying demand created by the users that it serves. It includes auxiliary power because of its large service area and that it provides fire flows.

The 14 booster stations on this system (in the SAWS service area) are as follows:

- Beaver Creek
- Beckton Hall
- Big Horn Ranch (Jack Drive)
- Big Horn West (Crown)
- Jeffries Draw (Paradise)
- Keystone #1
- Keystone #2
- Knode
- Parker Draw (Dow)
- Powder Horn
- Rapid Creek
- Rocky Hills
- Timm Drive
- Woodland Hills (Dee Drive)

The booster stations are on the SAWS system and serve smaller closed distribution systems on higher ground in these rural areas. They are all tri-plex pump set-ups with VFDs to maintain a constant discharge pressure despite the varying demand of their service area. These stations (along with Big Horn and Southeast) have been upgraded in recent years with new pumps, controls, VFDs, flow meters, and SCADA.

Three trailer-mounted auxiliary power generators have been obtained and strategically located throughout the system to provide power to these stations should utility power be down. The electrical supply to some of these stations was upgraded for compatibility to these generators.

With the significant upgrading of these stations and bringing them into a SCADA system, there are no further recommendations for improvements to these stations at this time.

One last booster station that is not included in the above list is Box Cross. This is an existing station that has not been needed since the 20-inch Big Goose pipeline was constructed but is available to boost the pressure into its small area if needed. It may be needed in the future as demands increase in the Little Goose Valley.

With the completion of this upgrading project and SCADA system to monitor performance data, an effort is underway to gather appropriate data to be brought into a year-end report on each station. These reports can then be used to verify design assumptions made during the improvement project and assess the capability of each station to support additional users. The hydraulic water model will also be a part of this assessment.

Figure 2.5 shows the location of these stations. Table 2.2 summarizes statistics on the stations after the upgrading project that is discussed above. If the data presented are being used to design improvements or serve additional users, the data should be verified that it is current and correct.

Table 2.2 – Hydraulic, Electrical, and Pump Data for Booster Stations

Booster Station	Suction Pressure (psi)	Discharge Pressure (psi)	Design Flow (gpm)	Design TDH (ft)	No. of Pumps	HP of Pumps	No. of Users Served	Elevation of Pumps (ft)	Low Elevation of the Distribution System (ft)	High Elevation of the Distribution System (ft)	Low Elevation of the Service Area (ft)	High Elevation of the Service Area (ft)	Low Pressure of the Service Area (psi)	High Pressure of the Service Area (psi)	Upstream HGL (ft)	Downstream HGL (ft)	Existing Service Voltage (Must verify if performing any electrical work)
Beaver Creek	57	136	100	182	3	5	61	4,077	4,065	4,260	4,064	4,260	61	141	4,225	4,390	277/480V, 3PH-4W
Beckton Hall	125	150	70	58	3	1.5	22	4,108	4,115	4,355	4,114	4,355	45	148	4,390	4,455	120/240V, 1PH-3W
Big Horn Ranch	57	107	110	126	3	3	19	4,143	4,141	4,210	4,141	4,281	47	108	4,274	4,390	120/240V, 1PH-3W
Big Horn West	50	98	220	116	3	7.5	57	4,168	4,168	4,267	4,164	4,237	66	100	4,274	4,394	277/480V, 3PH-4W
Jeffries Draw	50	120	210	230	3	10	111	3,996	3,999	4,155	3,995	4,168	40	119	4,112	4,270	277/480V, 3PH-4W
Keystone #1	40	98	55	155	3	3	8	4,048	4,048	4,150	4,048	4,150	55	98	4,150	4,274	120/240V, 1PH-3W
Keystone #2	52	125	42	165	3	2	7	4,150	4,156	4,349	4,152	4,345	39	125	4,270	4,440	120/240V, 1PH-3W
Knode	52	104	240	126	3	7.5	54	4,036	3,992	4,129	3,987	4,157	52	125	4,150	4,276	277/480V, 3PH-4W
Parker Draw	55	110	135	117	3	5	37	4,262	4,257	4,402	4,252	4,424	36	114	4,389	4,516	277/480V, 3PH-4W
Powder Horn	50	128	60+	193	4	.5, 15, 15, 10	46	4,156	4,164	4,230	4,150	4,240	95	131	4,225	4,452	277/480V, 3PH-4W
Rapid Creek	80	140	40	120	3	1	8	4,192	4,200	4,426	4,200	4,427	45	136	4,390	4,515	120/240V, 1PH-3W
Rocky Hills	54	85	70	70	3	1.5	15	4,059	3,979	4,107	3,970	4,116	54	123	4,170	4,255	120/240V, 1PH-3W
Timm Drive	70	145	40	120	3	1	7	4,036	4,032	4,052	4,052	4,210	82	138	4,225	4,370	120/240V, 1PH-3W
Woodland Hills	55	100	50	160	3	2	7	3,999	3,998	4,067	3,998	4,081	85	100	4,116	4,230	120/240V, 1PH-3W
Southeast	63	115	1000	120	4 + 2	??, 25		3,892							4,040	4,160	480V/3PH
Northwest*	8	63	1500/2600	155	3	75		4,015							4,040	4,160	480V/3PH
Big Horn*	8	60	350	120	2	20	270	4,138		4,183		4,176	43		4,160	4,276	60/230/480V/3PH
Boxcross Road	70	75	42	170	2	5	20	4,063	4,047	4,078	4,046	4,082	81	97	4,225	4,270	120/240V, 1PH-3W

Based on records of past projects. Changes can occur, and verification recommended to update to current conditions or for use in designing system expansions.
Numbers shown can be approximate. Periodic updating of table is required.
*These two stations pump to a tank (pumps are either on or off). All the other stations have VFDs to maintain a constant discharge pressure (pump into closed system).

2.3.9 Automatic Valve Stations

There are many types of automatic valves on this water system, each of which has their own important functions to carry out. Most of these valves are housed in underground vaults, pits or stations. The types of automatic valves and their purpose are:

- Pressure reducing valve (PRV). PRV stations are the most common type of automatic valve station and are essential to the operation of this water system. They reduce the pressure to a constant, adjustable downstream pressure regardless of the flow rate. These stations vary considerably in size (design flow rate), pressure reduction, configuration, and areas they serve.

- Pressure relief valve. With gravity flow, over-pressurization of a part of the system is possible in the event of something not working properly. There are several pressure relief valve stations located in this system to open and dump water should the pressure exceed the set amount on the valve. Typically, this set pressure is 15-20 psi above the normal operating pressure.

- Altitude valve. An altitude valve is needed at a tank when the transmission main supplying it normally operates at a higher HGL than the tank overflow. There is only one altitude valve on this system, at the Big Horn tank.

- Check valve. Check valves prevent flow from a normally higher-pressure area to a normally lower-pressure area but allow flow through if for some reason the higher pressure is reduced, and flow is desired from the lower pressure area.

- Pressure sustaining. These valves monitor upstream pressure and open when the upstream pressure exceeds a certain set point, thus controlling that upstream pressure or helping to sustain steadier flow in a certain transmission main. There is a pressure sustaining valve at the 4MG tank at the SWTP, which can allow BGWTP flow into this tank under certain conditions.

- Flow control. Flow control is done in conjunction with another function such as pressure reduction, when it is desired to not allow flow through the valve beyond a certain set amount. The new PRV in the Girl School Gate vault that opens to allow make-up water into the Southeast tank when the water level drops, also includes flow control.

- Combination air release/vacuum relief (air/vacs). Air/vacs are installed at high points on transmission mains to release air (both larger quantities when filling the line and smaller quantities that accumulate as dissolved air is released from the water) and relieve a vacuum that can occur when the line is dewatered. Air/vacs are typically housed in manholes, with an isolation valve ahead of them. Air/vacs are important to maintain the hydraulic capacity of the system and to help protect the lines against surges. There are many air/vac valves on the transmission mains throughout this water system.

Most of these valves operate simply with the water pressure available to them (hydraulically). Some of them utilize electricity for more sophisticated operation.

There are approximately 50 PRV stations on this water system. About 30 of these stations are in the SAWS system and 20 are in the City system. These are very important stations that allow the system to operate as it does, which is to utilize gravity flow to the greatest extent possible to minimize pumping. These stations reduce higher pressure from a main line to a lower, constant downstream pressure for the area each station serves. More stations are occasionally added, so it is important that they be similarly designed for uniformity and ease of O&M. Diaphragm actuated valves have been selected, and Cla-Val and Singer may be used as they are similar and proven reliable. With two valve brands, competition is also provided.

While there are some standard design practices that apply to every station, each station needs to be designed for its specific flow, pressure and role in the system. Refer to Section 6.5 for a discussion on certain design requirements.

Many of the older PRV stations were recently reconstructed to remove valves that were no longer functioning properly. Six of the more critical stations also had SCADA monitoring added. While SCADA monitoring of these stations is valuable, this effort was also a test to assess how valuable, for determining potential future expansions of the SCADA monitoring for PRV stations.

Figure 2.6 shows the locations of the PRV stations on this system. Table 2.3 summarizes the hydraulics relating to these stations after the recent upgrade project. If the data presented are being used to design improvements or serve additional users, the data needs to be verified that it is current and correct.

The single most important PRV station is the Beckton Hall Road PRV. This is located on the 20-inch treated water transmission main and reduces the hydraulic grade line (pressure) from the BGWTP (4395) to approximately 4212. The HGL for the line leading from the Beckton Hall Road PRV is adjustable (it has been set as high as 4262, for example). The pressure leaving this station was recently adjusted downward to the HGL stated above as it was found that it was not required to maintain the higher pressure that it was previously set at. Pressure leaving PRV stations should be not be set higher than is needed to provide the pressure required in their service area.

Table 2.3 – PRV Station Set Points

Label	Elevation (ft)	Diameter (Larger Valve) (in)	Pressure Setting (psi)	Hydraulic Grade (From) (ft)	Hydraulic Grade (To) (ft)	Pressure In (psi)	Pressure Out (psi)
1 - Kroe Ln. PRV	3830	6	50	4024	3941	84	48
2 - 3rd & Main PRV	3729	8	92	4025	3942	128	92
3 - 3rd & Sheridan PRV	3735	8	92	4024	3948	125	92
4 - Downer PRV	3832	12	52	4019	3952	81	52
5 - Dana PRV	3805	6	57	4020	3957	93	66
6 - Mydland/Hillpond	3918	8	53	4161	4038	105	52
7 - 5th/Mydland PRV	3927	8	49	4160	4043	101	50
8 - NW Tank to South Hill Area	3950	8	37	4167	4042	94	40
10 - BGWTP to NW Tank ACV	4022	6	58	4230	4151	90	56
11 - SE Tank PRV	3862	10	64	4030	4028	73	72
12 - College PRV	3818	8	60	4141	3957	140	60
13 - Airport South	3938	6	76	4224	4114	124	76
14 - Airport North	3924	8	62	4227	4068	131	62
15 - Upper Don Ena PRV	3930	8	69	4207	4092	120	70
16 - Lower Don Ena PRV	3842	8	66	4200	3994	155	66
17 - Lane Lane	3860	2	60	4142	4022	122	70
18 - Briggs PRV	3842	6	130	4212	4142	160	130
19 - Brayton	3866	6	55	4194	3993	142	55
20 - Sawmill Lane PRV	3877	4	93	4200	4073	140	85
21 - Pierce Road PRV	3924	4	84	4224	4109	130	80
22 - Beaver Creek PRV	3942	8	91	4242	4150	130	90
23 - Owl Creek Rd. PRV	3940	4	93	4240	4148	130	90
24 - Timm St. PRV	3990	4	75	4267	4175	120	80
27 - Beckton Hall Rd PRV	4025	12	86	4395	4224	160	86
29 - Big Horn Rd. PRV	4106	4	67	4383	4256	120	65
30 - Whitetail Meadows PRV	4126	4	70	4449	4288	140	70
31 - Wild Turkey PRV	4095	2	95	4418	4303	140	90
32 - West Brundage Lane	3928	6	50	4205	4044	120	50
33 - East Brundage Ln. PRV	3793	6	62	4031	3936	103	62
34 - Girls School North	3851	8	114	4181	4114	143	114
35 - Girl's School Rd. PRV	3876	10	62	4204	4019	142	62
35 - Girl's School Rd. Small PRV	3876	3	67	4204	4031	142	67
36 - Girls School South (Short Road)	3936	6	77	4209	4114	118	77
37 - Mtn. Shadows North PRV	3887	6	82	4222	4076	145	82
38 - Mtn. Shadows South PRV	3882	6	86	4222	4076	147	84
39 - Home Ranch Circle	3888	6	70	4220	4050	144	70
40 - Home Ranch Place	3891	6	66	4221	4044	143	66
41 - County Rd. 66 PRV	3893	6	55	4205	4036	135	62
42 - Paradise Park Rd. PRV	3902	6	90	4221	4110	138	90
43 - Swaim Rd. PRV	3914	6	96	4219	4136	132	96
44 - US Highway 87 PRV	3917	8	76	4217	4093	130	76
45 - Landon Ln. PRV	3962	4	87	4205	4161	105	86
46 - Knode Rd. PRV	3962	6	82	4216	4147	110	80
47 - Powder Horn Road/Canyon View	4054	2	55	4280	4181	98	55
48 - Powder Horn Entrance PRV	3984	6	80	4192	4169	90	80
49 - Pinehurst PRV	4028	6	80	4217	4213	82	80
50 - NW Transmission South	3942	10	40	4159	4034	94	40
51 - NW Transmission North	3834	10	44	4035	3936	87	44
Cloud Peak Ranch PRV	3949	8	62	4159	4092	91	62
Morrison Ranch PRV	3920	6	52	4200	4040	121	52
New 17 th Street PRV	3718	8	74	3952	3889	101	74
New Dove Tail Lane PRV	3711	8	78	3951	3891	104	78

Note: All data shall be verified if used for design.

2.3.10 Pressure Zones

This water system utilizes many pressure zones because of the great difference in elevation served. A good example is these differences is from elevations along Big Goose and Little Goose Creeks in the valleys to the hills paralleling the creeks, and the higher ground in the southern and western parts of the service area. Both PRV and booster stations, as well as storage tanks, are located and designed to help allow the system to operate at the proper pressure during varying flow conditions. The pressure coming off the mains in many locations is at a pressure higher than can be used by the user in order to carry this higher pressure to another location without the need to add pumping. In these cases, small PRVs in the user's service line (such as in their meter pit) are used to reduce the pressure in their service line.

The pressure zones in the SAWS system were established to provide users water pressure in the 40 to 90 psi range. The City design standards state the static pressure in the system should range between 40 and 110 psi under average day conditions. DEQ (and City standards) requires that pressures be maintained above 35 psi under all working conditions (peak hour demand), and above 20 psi at ground level in all points in the system under all conditions of flow (such as fire flows).

Since the pressure zones in the SAWS portion of the system were designed to provide between 40 and 90 psi, and at that time the City needed only two pressure zones to cover the range in elevation of its service area, these are the pressure zones presented in the table below. The allowance in the City standards to go to 110 psi is fine as new zones are created or service in existing zones is extended, with the proper design considerations. It is recommended that any time the pressure to a user under static (low demand) conditions exceeds 80 psi, that individual PRVs be installed (or be recommended to be installed) in their service lines.

The minimum pressure in a service area should not be less than 40 psi under all average day conditions. This allows for modest losses in pressure for peak hour demand and for the locations of usage being slightly higher than the main. If these conditions are such that the reduction in pressure is likely to be more than 5 psi, than a minimum pressure greater than 40 psi should be used in that circumstance.

The HGL or tank overflow elevation which sets the pressure for the particular zone is the maximum hydraulic grade established for that zone or particular service area. Not all zones have tanks, and in many cases the HGL is established by a PRV or booster station. For smaller closed distribution systems an HGL slightly different from those in this table may be used to provide the best pressure for the elevations within its particular service area.
Figure 2.7 shows the pressure zones throughout the system.

Table 2.4 provides general information on the elevations throughout the SWS service area and therefore its pressure zones. As expansions of the service area takes place, new zones or adjustments in these zones may need to be considered. The minimum and maximum elevations shown in this table are such that they are generally within the 40 to 90 psi range under low demand conditions. In some service areas these elevations can deviate from those listed as long as this is considered during the design phase.

These elevations need to be used with caution and reviewed on a case-by-case basis depending on the location within the system and the hydraulic conditions that serve the area.

Table 2.4 - Pressure Zones

ZONES	MAXIMUM ELEVATION	MINIMUM ELEVATION	HGL or TANK OVERFLOW ELEVATION
New North End Zone	3760	3700	3890
City low zone	3850	3715	3952
Zone 1 (City high zone)	3946	3830	4040
Zone 2	4066	3946	4160
Zone 3	4182	4066	4276
Zone 4	4298	4182	4390
Zone 5	4414	4298	4506
Zone 6	4530	4414	4622

Throughout this extensive system either booster stations or PRVs are needed to move from one zone to another. Looping cannot be done between distribution systems of different pressure zones without installing a booster station or PRV.

2.3.11 Distribution

Distribution systems serve the individual water users. They come off transmission mains or are served by storage tanks, booster stations or PRV stations. There are many distribution systems through the SWS. One item that separates one distribution system from another is its elevations or its pressure zone. Much of the City system is in the 3952 pressure zone and is basically one distribution system. The Downer Addition is a separate distribution system (which is owned by the Downer Neighbor Improvement & Service District). In the SAWS system elevation differences creates several separate distribution systems that have separate supply facilities.

Sometimes distributions systems are separated by closed valves, such as between the South Hill area and the rest of the City’s system. It is important to know which valves are closed and to have these depicted correctly in the GIS and hydraulic model.

Most distribution systems are operated within the standard pressure ranges as discussed under Pressure Zones. In some cases, they may operate at higher pressures and require PRVs in each service line. Operating at the pressures they do, most distribution lines in recent years are made of C900 DR18 PVC. Most of the SAWS distribution systems and the Downer distribution system are newer and utilize PVC pipe. Many of the City systems also utilize PVC pipe either because they are newer or because the older pipe has been replaced. These PVC pipe distribution systems have been performing well and should continue to perform satisfactorily for many years to come.

Many of the older parts of the City have either cast iron (CIP) or ductile iron (DIP) pipe for their distribution systems. PVC pipe was not used in the City until about 1995. Many of these systems of iron pipe have been experiencing corrosion from the soil, which creates failures that must be repaired. In many areas of more corrosive soils these lines have been replaced in the last 20 years, but other areas with iron pipe remain and should have replacement projects phased in.

While CIP can date back 100 years or more and DIP installations in Sheridan typically are 30 to 50 years old, the DIP systems are experiencing similar (or more severe) issues because of their thinner pipe wall. It is recommended that these older iron pipe distribution systems continue to be replaced as neighborhood projects can be put together as part of other infrastructure improvements. It will take a long time to replace all of the iron pipe systems, but progress should continue to be made as it has been in recent years.

Two maps of the City’s distribution system showing water line leaks due to corrosion are included in Appendix F. These figures show the leaks from the period of 1977 through 1999 and from 2000 through 2018. The replacement of older iron-pipe distribution system lines with PVC pipe started in about 1995. Since that time about 200 blocks of these lines have been replaced. These figures show the results as to where the iron lines have been replaced; however, they do not indicate a significant overall reduction in the number of corrosion leaks. Therefore, the pipe in some areas continues to deteriorate. These areas appear to coincide with the areas identified as having the more corrosive soils in the 1999 Soil Corrosion Study. It is recommended that the City continue with a program for the replacement of these distribution systems prioritizing areas based on where the most leaks have been occurring.

Concerns with the iron pipe distribution systems include:

- Continued corrosion from the soils and the need to repair leaks.
- The leak repairs, as they potentially allow unsafe water into the pipe.
- Disruption of service with leak repairs.
- The cost of the leak repairs, and how they take the operators away from other duties.
- The older CIP typically has tuberculation (internal corrosion) issues that can deteriorate the water quality and negatively impact hydraulics.
- Many of the older CIP systems are 4-inch which do not meet current standards for size.
- The iron pipe systems often have valves and hydrants that don’t work well.

- The CIP can have lead gaskets or joints with slow leaks leading to water loss.
- Fire flows are typically reduced in the areas served with CIP systems.

As new or replacement distribution systems are planned, the locating of isolation valves (gate valves), hydrants for fire protection and flushing to maintain water quality, and the looping of lines whenever practical are important design criteria. Another important task is a properly located and sized transmission main through larger distribution systems.

Especially in the SAWS system where extensions are proposed to areas of higher elevation, a thorough hydraulic analysis to assure it will receive proper pressure under all demand conditions, is essential. While booster stations will increase the pressure to distribution systems at higher elevations, they are expensive to construct and operate, and should only be added to the system when they can be adequately justified.

2.3.12 Raw Water Delivery

As discussed under Section 2.3.4, the 30-inch RWTM delivers water diverted from Big Goose Creek and pretreated at the Intake facilities, to the four delivery points of the BGWTP, SWTP, Kendrick Golf Course and VAMC. This past year, an agreement was made with Wild Rose Improvement and Service District to deliver raw water from this same pipeline to this District for irrigation use within the Don Ena Subdivision.

A summary of this agreement is presented below. It is noted that the water provided is Wild Rose's water, so does not come out of the City's water rights. If in the future any similar arrangements might be made with other entities, as long as the details of such agreements allow the City to control the delivery of raw water as was done in this case (and the entity provides their own water rights), they should be acceptable. The 30-inch RWTM is very valuable asset that can deliver raw water to many locations under pressure. The pressure is valuable as opposed to diverting raw water from an open irrigation ditch.

Using raw water for irrigation as opposed to treated water is positive for this water system, as discussed elsewhere in this study. A major factor in this and any future arrangement is that the other entity provide the water supply, such as shares out of Park Reservoir. And then at the year-end accounting of water diverted, delivered and used throughout the system, Wild Rose (and any other delivery point added later) must be added to the spreadsheet.

Wild Rose owns 60 shares (72 ac-ft) within Park Reservoir and this is the water that will be diverted by the City, carried in this RWTM and delivered to the District. With a 10% conveyance loss between the reservoir and the diversion point, this amounts to 64.8 ac-ft. If the rate of delivery to Wild Rose is 0.5 cfs, this quantity of water will be consumed in 65 days.

A summary of key points from this agreement follows:

- The agreement is for 30 years, however, if there becomes a capacity issue in the City's facilities, it can be terminated sooner.
- The 30-inch RWTM has excess capacity for many years to come, and this arrangement is conditioned on that excess capacity being available.
- A connection to the 30-inch RWTM with a meter will be provided close to Don Ena so water can be supplied to their separate irrigation system.
- The City will manage the release and delivery of the water from Park Reservoir.
- The City will charge Wild Rose $0.76/1000 gallons for the diversion, conveyance and delivery of this water to their meter.
- If Wild Rose desires water supply beyond their shares in Park, the City may provide water out of their water rights provided they have this excess quantity available at the time. The cost for this water is $30/ac-ft plus the above conveyance charge.

BIG GOOSE INTAKE SITE OVERALL UTILITY MAP

Sheridan Master Plan Level I Study

Date: April 8, 2019

Figure 2.1

DOWL

Legend

Waterline

Fence

Drain Line

Curb Stop

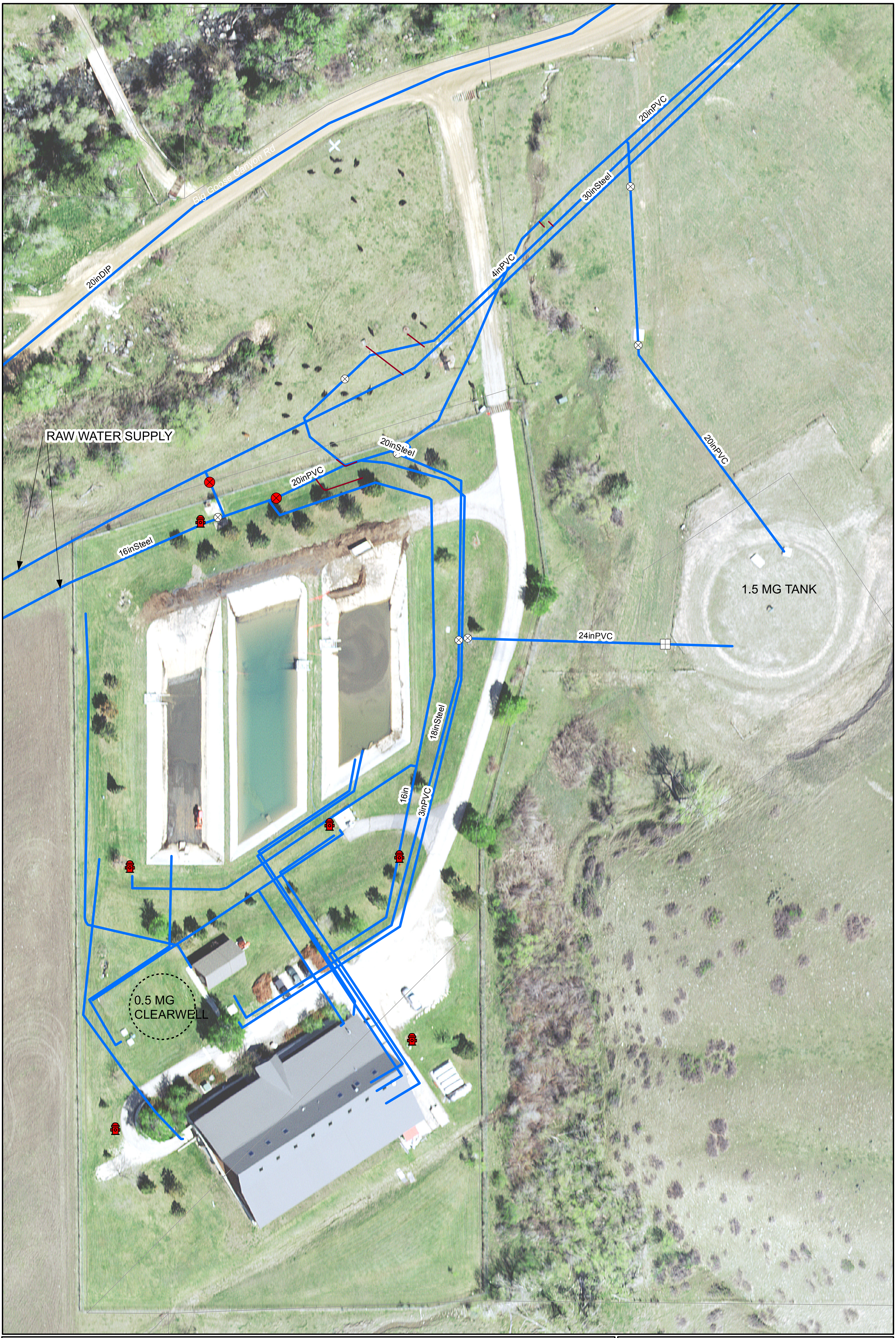
Valve

Manhole

Meter Manhole

This figure is 11"x17" but is also available in 24"x36"

\\SHR-FS\Shr-projects\28\26913-01\65CAD\SC16-CU-OV-Intake_2019_11x17.dwg PLOT DATE 2019-5-9 08:48 SAVED DATE 2019-05-09 08:24 USER: dhomola



PRV
Normally Open Valve
Normally Closed Valve
Hydrant
AirVac
Pressure_ReliefValves
Blowoffs
WaterServiceLine
WaterPipeline
CountyRoads
Parcels

0 40 80
Feet

Big Goose WTP Site

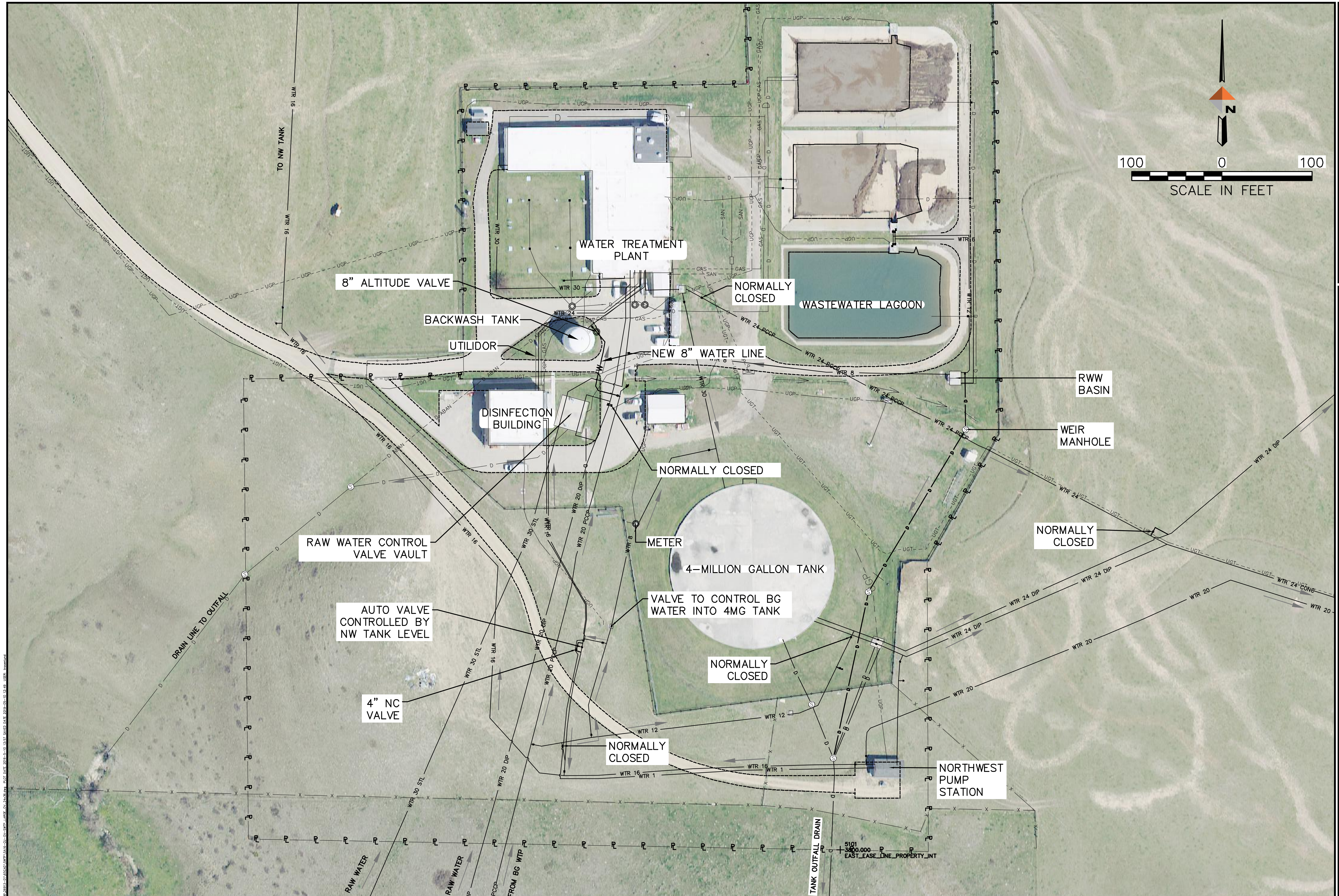
Sheridan Master Plan Level I Study

DOWL

Date: May 09, 2019

Figure 2.2

Q:\28\26913-01\60GIS\Maps\Figure_2.2_BGWTP.mxd May 09, 2019 9:13:36 AM User: trosenlund



Sheridan Water Treatment Plant
Overall Utility Map

Sheridan Master Plan Level I Study

Date: April 8, 2019

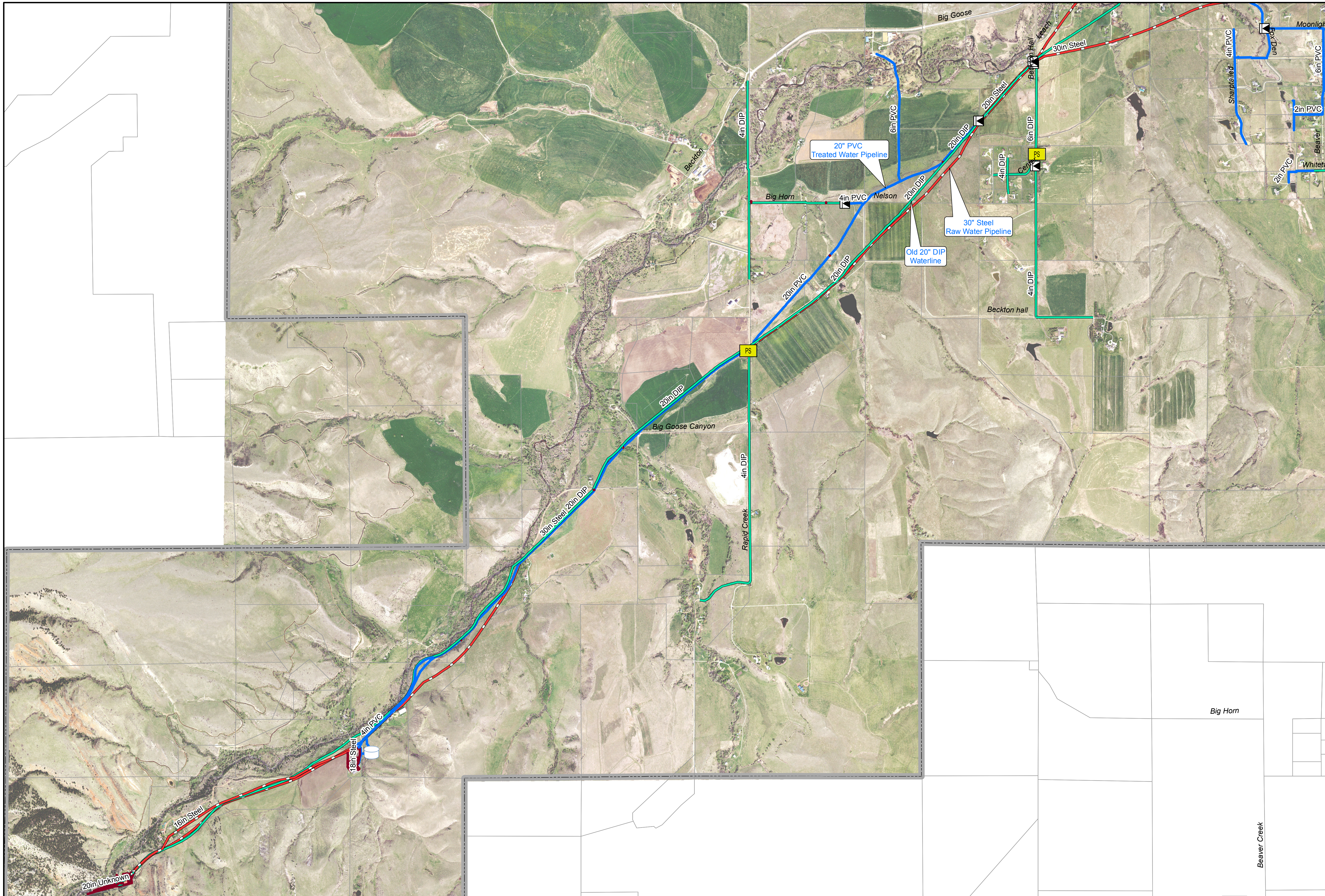
Figure 2.3

DOWL

Legend

- Waterline
- Property Line
- Drain Line
- Abandon Drain Line
- Sanitary Sewer Line
- Fence
- Gas Line
- Underground Tele.
- Underground Power
- Abandon Electrical
- Valve
- Manhole

This figure is 11"x17" but is also available in 24"x36"



Big Goose Valley Waterlines

Sheridan Master Plan Level I Study

Date: May 09, 2019

Figure 2.4 - Page 1 of 2

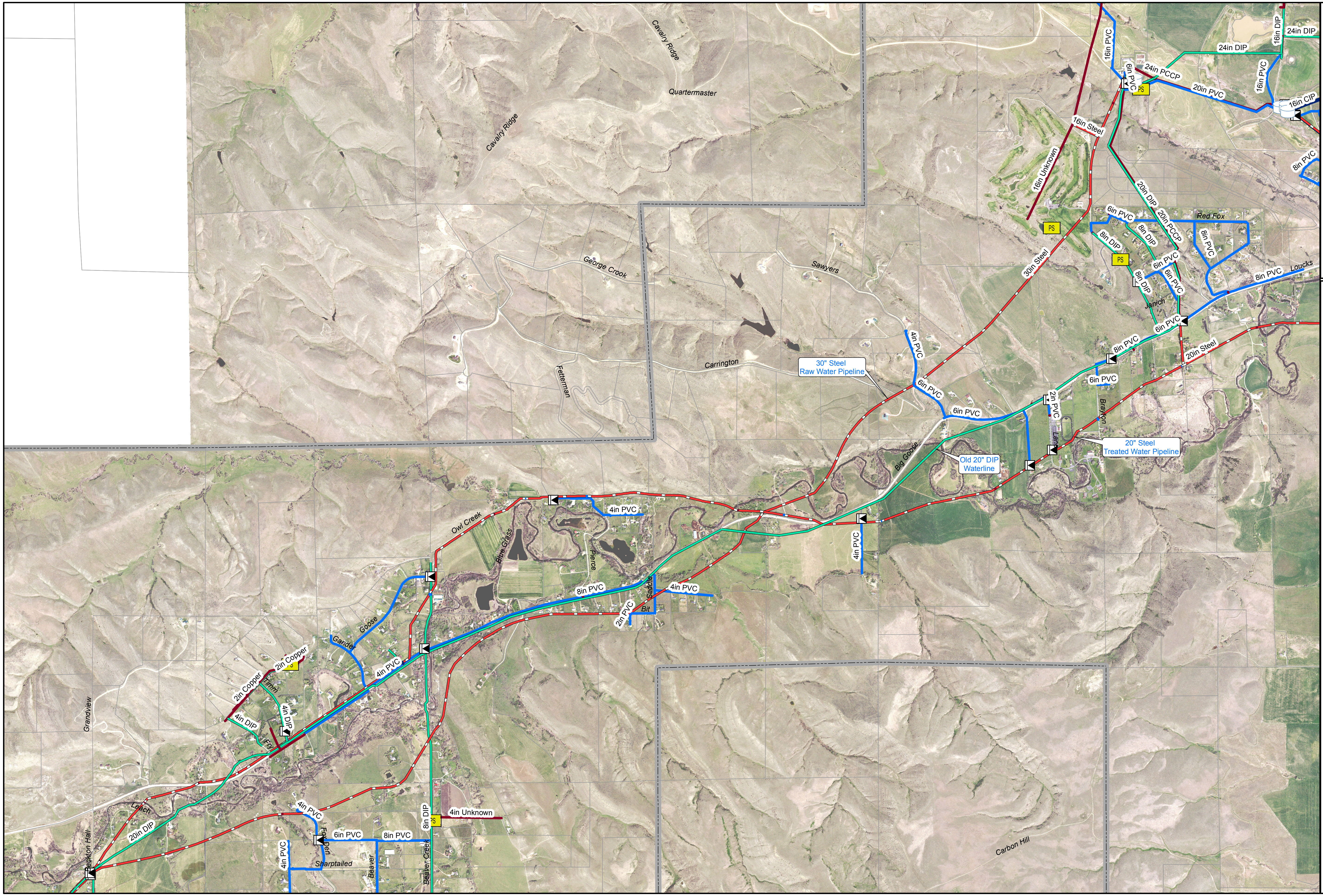
DOWL

Legend

- Water Tank
- Pump Station
- PRV
- Material Unknown
- CIP
- CMP
- DIP
- HDPE
- PVC
- RCP
- Steel
- Abandon Water
- Parcels
- SAWS Service Area

0 1,000 2,000
Feet

Q:\28\26913-01\60GIS\Maps\Figure_2.4_Big_Goose_Valley_Waterlines_1.mxd May 09, 2019 10:02:05 AM User: trosenlund



Big Goose Valley Waterlines

Sheridan Master Plan Level I Study

Date: May 09, 2019

Figure 2.4 - Page 2 of 2

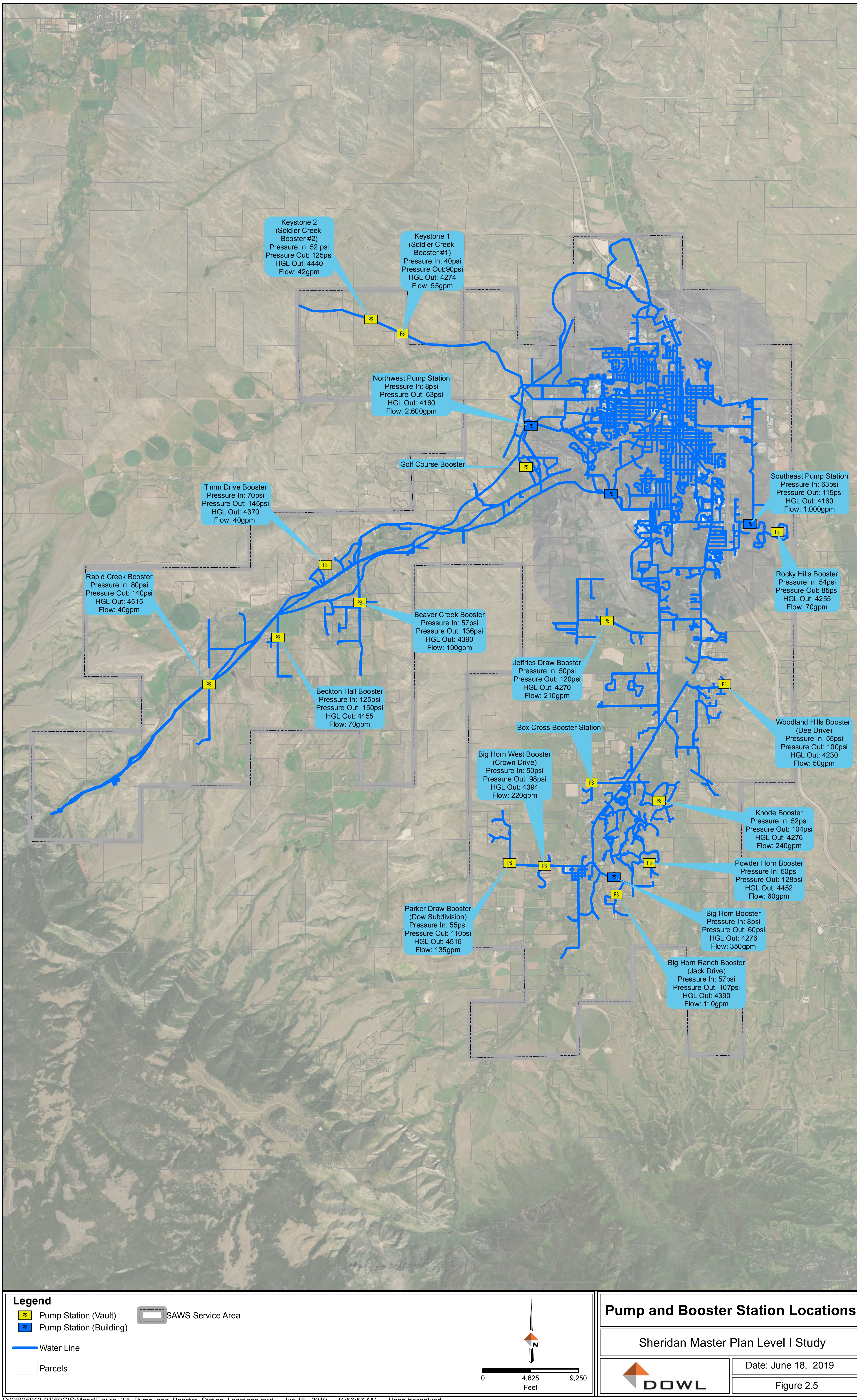
DOWL

Legend

- Water Tank
- Pump Station
- PRV
- Material Unknown
- CIP
- CMP
- DIP
- HDPE
- PVC
- Concrete
- Steel
- Abandon Water
- Parcels
- SAWS Service Area

0 1,000 2,000
Feet

Q:\2826913-01\60GIS\Maps\Figure_2.4_Big_Goose_Valley_Waterlines_2.mxd May 09, 2019 10:15:50 AM User: trosenlund



Pump and Booster Station Locations

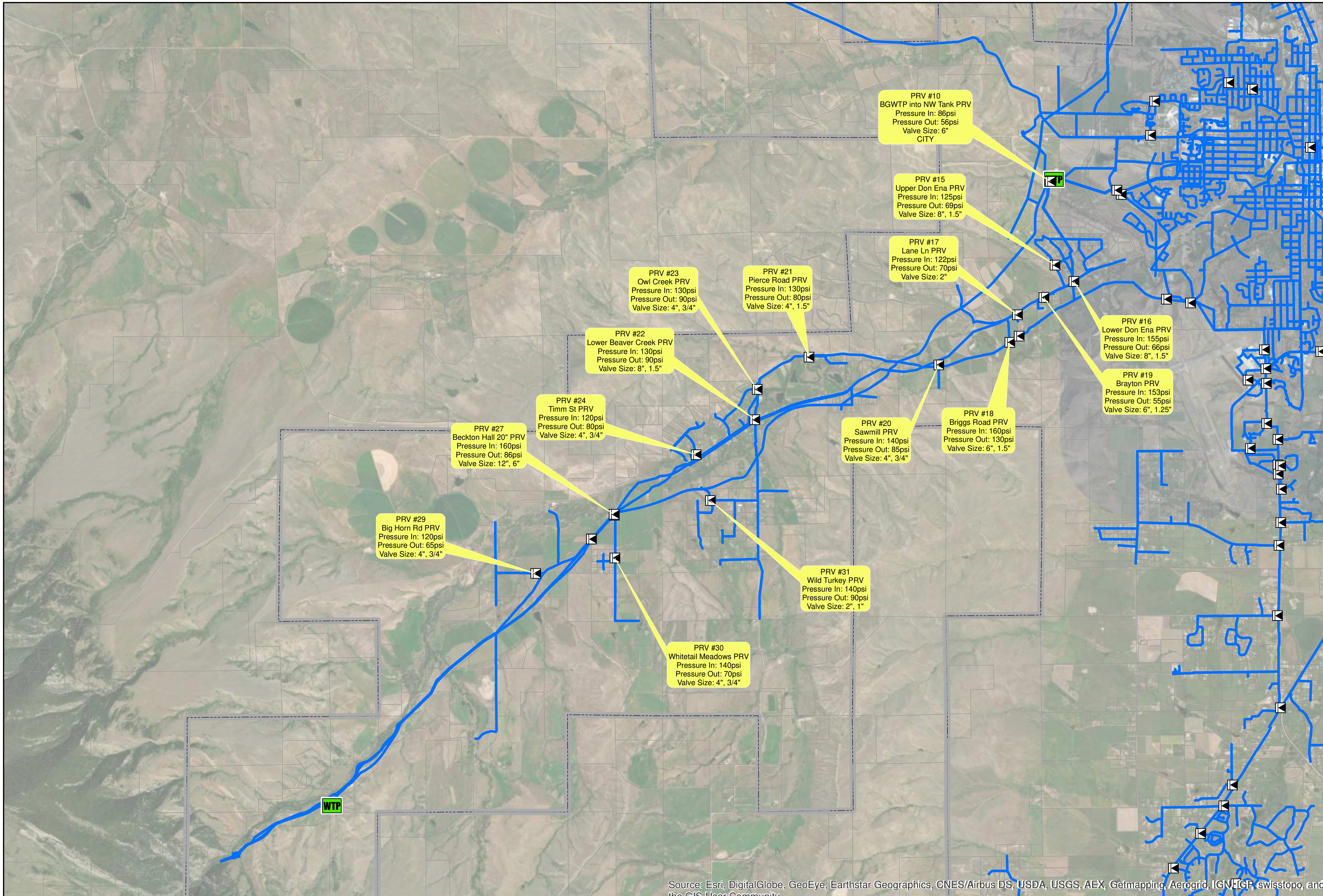
Sheridan Master Plan Level I Study

DOWL

Date: June 18, 2019

Figure 2.5

Q:\28\26913-01\60GIS\Maps\Figure_2.5_Pump_and_Booster_Station_Locations.mxd Jun 18, 2019 11:56:57 AM User: trosenlund



PRV Stations - Big Goose

Sheridan Master Plan Level I Study

Date: March 25, 2019

Figure 2.6 - Page 1 of 2

DOWL

Legend

PRV

WTP Water Treatment Plant

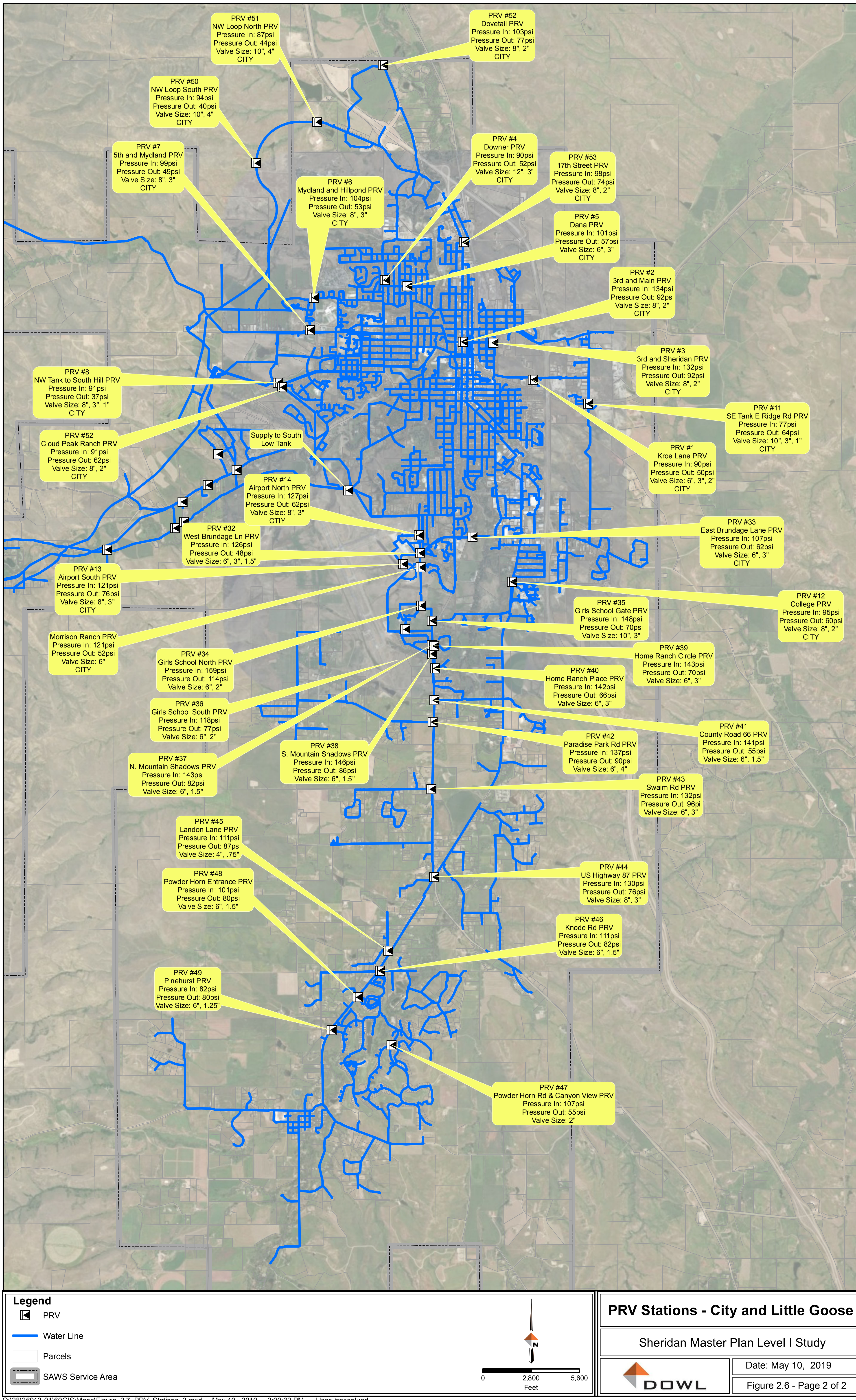
Water Line

Parcels

SAWS Service Area

0 2,400 4,800
Feet

\\SHR-FS\Shr-projects28\26913-01\60GIS\Maps\Figure_2.7_PRV_Stations_1.mxd Mar 25, 2019 11:07:59 AM User: dhomola



PRV Stations - City and Little Goose

Sheridan Master Plan Level I Study

DOWL

Date: May 10, 2019

Figure 2.6 - Page 2 of 2

Q:\28\26913-01\60GIS\Maps\Figure_2.7_PRV_Stations_2.mxd May 10, 2019 2:00:32 PM User: trosenlund

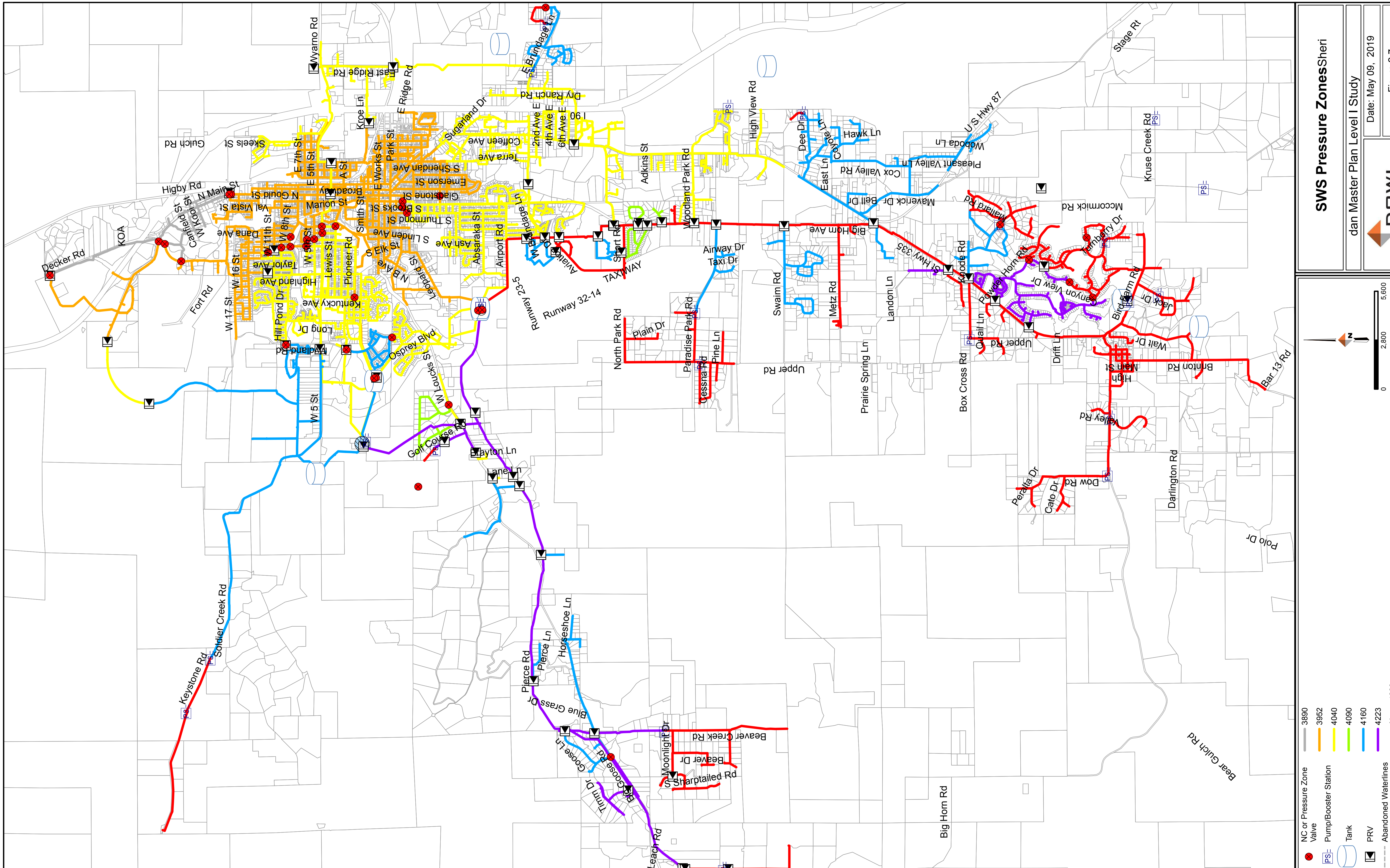
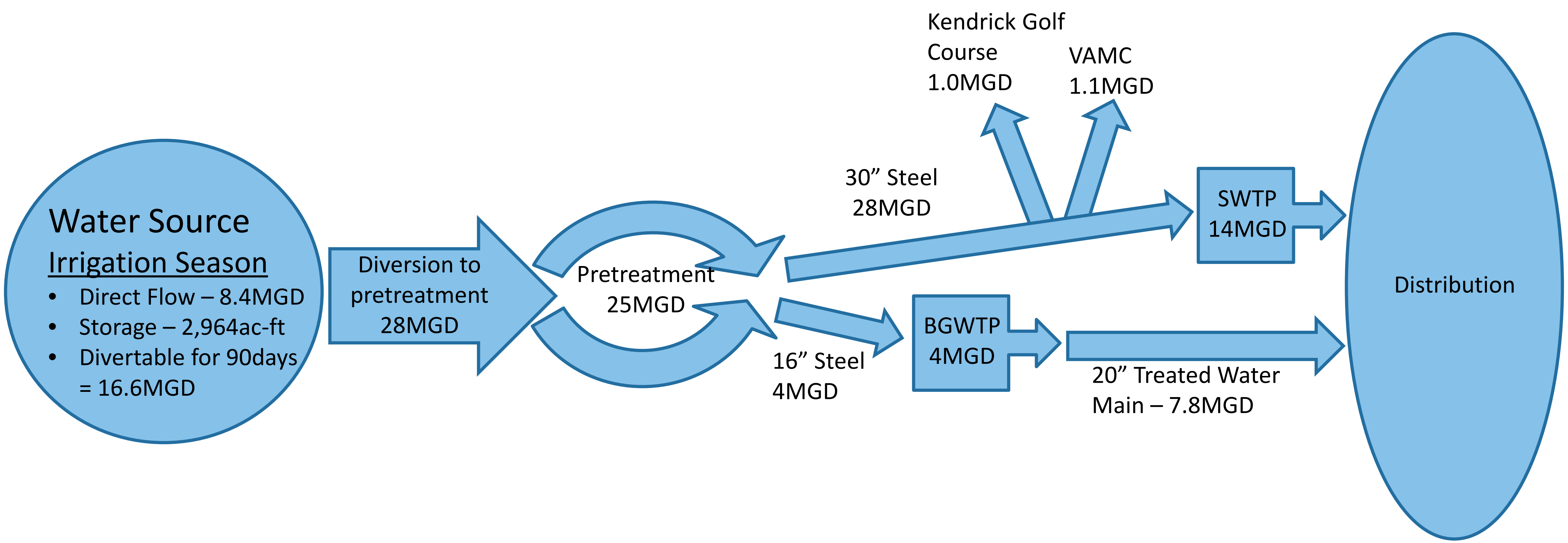

SWS Pressure Zones
Sheridan Master Plan Level I Study
Date: May 09, 2019
Figure 2.7
DOWL
0
2,800
5,600
Feet
NC or Pressure Zone Valve
Pump/Booster Station
Tank
PRV
Abandoned Waterlines
3890
3952
4040
4090
4160
4223
Above 4223
Q:\2826913-01\60GIS\Maps\Figure_2.8_Waterline_HGLs.mxd May 09, 2019 10:56:02 AM User: trosenlund
Decker Rd
KOA
Higby Rd
N Main St
Gulch Rd
Skeels St
Wyarno Rd
East Ridge Rd
E Ridge Rd
Kroe Ln
Sugarland Dr
Dry Ranch Rd
E Brundage Ln
Coffeen Ave
Terra Ave
S Sheridan Ave
Emerson St
Gladstone St
S Thurmond St
S Linden Ave
Ash Ave
Absaraka St
Airport Rd
Runway 23-5
Runway 32-14
TAXIWAY
Fort Rd
W 17 St
W 16 St
Highland Ave
Taylor Ave
Dana Ave
Val Vista St
N Gould St
Broadway
Marion St
Smith St
Lewis St
Pioneer Rd
Kentucky Ave
Long Dr
Hill Pond Dr
Osprey Blvd
W Loucks St
Golf Course Rd
Clayton Ln
Lane Ln
W 5 St
Soldier Creek Rd
Keystone Rd
Pierce Rd
Pierce Ln
Horseshoe Ln
Blue Grass Dr
Goose Ln
Big Goose Rd
Timm Dr
Leach Rd
Moonlight Dr
Beaver Creek Rd
Beaver Dr
Sharptailed Rd
Adkins St
Woodland Park Rd
High View Rd
Airway Dr
Taxi Dr
North Park Rd
Plain Dr
Paradise Park Rd
Cessna Rd
Pine Ln
Upper Rd
Swaim Rd
Metz Rd
Prairie Spring Ln
Landon Ln
Big Horn Ave
St Hwy 335
Box Cross Rd
Rhode Rd
Quail Ln
Drift Ln
Dee Dr
East Ln
Hawk Ln
Cox Valley Rd
Bell Dr
Maverick Dr
Pleasant Valley Ln
Woboda Ln
U S Hwy 87
Stage Rt
Kruse Creek Rd
Mccormick Rd
Mallard Rd
Turnberry Dr
Big Horn Rd
Canyon View Dr
Bird Farm Rd
Jack Dr
Wait Dr
Brinton Rd
Bar 13 Rd
Main St
High
Valley Rd
Dow Rd
Peralta Dr
Cato Dr
Darlington Rd
Polo Dr
Bear Gulch Rd
Big Horn Rd

Figure 2.8 Big Goose Supply Capacity



3.0 INVENTORY, EVALUATION, AND GIS

3.1 EXISTING INFRASTRUCTURE EVALUATION

Existing infrastructure for the Sheridan water system was reviewed and assessed under this task. This included discussions with City staff, including the intake and WTP operators, Utility Maintenance, and Engineering. Various site visits were conducted as well. The hydraulic model was used to evaluate the ability of the existing system to provide the current and future demands. Section 4.0 discusses the hydraulic modeling work.

3.2 GEOGRAPHIC INFORMATION SYSTEM

A GIS (Geographic Information System) is an information system for storing, manipulating, analyzing, managing, and presenting spatial or geographic data. DOWL used ArcGIS by ESRI to manage the GIS of this system. Much of the data were already assembled into a GIS. DOWL used this existing information and work done during this study to improve and refine the GIS.

3.3 GIS

A significant task under this study was updating the Geographic Information System, or GIS. A data plan for the GIS was created based on the existing GIS and can be found in Appendix C. The City of Sheridan has a very robust and current GIS. They currently maintain the GIS on an ongoing basis and require that all new City and development projects provide updated GIS information from the record drawings. As a summary, the following items are part of the Sheridan GIS water geodatabase:

- Water Pipelines
- Abandoned Waterlines
- Pump Stations
- Hydrants
- Water Tank
- PRVs or Pressure Control Stations
- Meters
- Water Taps (includes active and inactive taps)
- Air/Vacuum Valves
- Water Valves
- Water Service Line
- Water Service Point (Curbstop, Corpstop, etc.)
- Water Line Leaks
- SAWS Service Area Boundary

- Record Drawings – this layer consists of PDF drawings that are hyperlinked to a GIS layer.
- Junctions – This layer was added from the hydraulic water model to address areas where pipe connectivity is unknown.

The layers noted above are layers that were already existing or created during this study. Not all layers are completely populated or were edited under this project. All layers should continue to be updated as outlined in Section 3.5. The attribute data in each layer follows a pre-identified schema which was followed and built upon in this study. This schema is shown in Appendix C.

The GIS geodatabase was updated with the following steps during this study:

1. A meeting was held with the City and Wood, PLC to coordinate updates to the City's geodatabase during this project and acquire the latest data to build upon. Note: At this meeting it was determined that Wood would keep track of any updates made to the water layer by Wood during the course of the study so these updates could be added to the GIS product after this study is completed.

2. Connectivity information was input into the GIS from the hydraulic model. This was done by exporting the nodes from the hydraulic model. In many areas, the nodes needed to be moved to the same location as the existing pipe network.

3. Data from the existing hydraulic model were compared to the existing GIS. Attribute information from the model such as material and size were used to update the GIS.

4. Record drawings were also used to add initial locations of various GIS data not initially contained in the GIS such as valves, hydrants, service lines, etc.

5. Surface features were located and surveyed with survey grade GPS units. Around 3,000 points were recorded. The survey was done in Wyoming State Plane East Central Zone, NAD 83, US Survey foot, on grid, with no scale factor. DOWL used the Sheridan CORS station and other previously established control around the City of Sheridan to survey water system features.

6. Surveyed points were imported into the GIS. Point feature layers (valves, hydrants, air/vacuum valves, meters, etc.) were updated from this survey data.

7. From the survey shots and consideration of what data were available, DOWL assigned each valve and hydrant point a level of accuracy as follows:

    a. Sub Centimeter – Features surveyed with survey grade GPS by DOWL
    b. Sub Foot – Features surveyed with survey grade GPS by others or by DOWL in the distant past.

   c. Sub Meter – Features gathered from record drawings and surveys which matched closely to DOWL survey check shots.
   d. Sub 3 Meter – Features gathered from record drawings which matched well to DOWL checks.
   e. Sub 10 Meter – Features gathered from record drawings
   f. Digitized – Data in which the origin was uncertain, or it didn't match well with survey check shots.

8. DOWL created a map of features with levels of accuracy color coded and met with the City to determine areas to focus on as shown in Figure 3.1.

9. It was decided to focus this study's efforts on the main transmission lines, but additional surveying was also completed throughout the system.

10. The GIS was then updated based on the survey information. Record drawings were consulted to verify location of lines relative to valves.

11. The meter locations were obtained from the Mueller Mi.net system. The existing GIS locations prior to this study were established during the recent City meter replacement project and were of low quality. During the course of this study, these data were corrected, refined, and updated on the Mueller Mi.net system to provide much higher quality meter location data. This process is described later in this section.

12. Several follow up surveys were done to collect additional survey data on features that were missed during the initial survey.

13. The GIS was published to ArcGIS Online to be viewed with Collector for ArcGIS by City UM staff who began reviewing the GIS and collecting data in areas missed. These data were collected with a tablet of relatively low spatial accuracy. DOWL then reviewed this data and adjusted it. See recommendations section on collecting data moving forward.

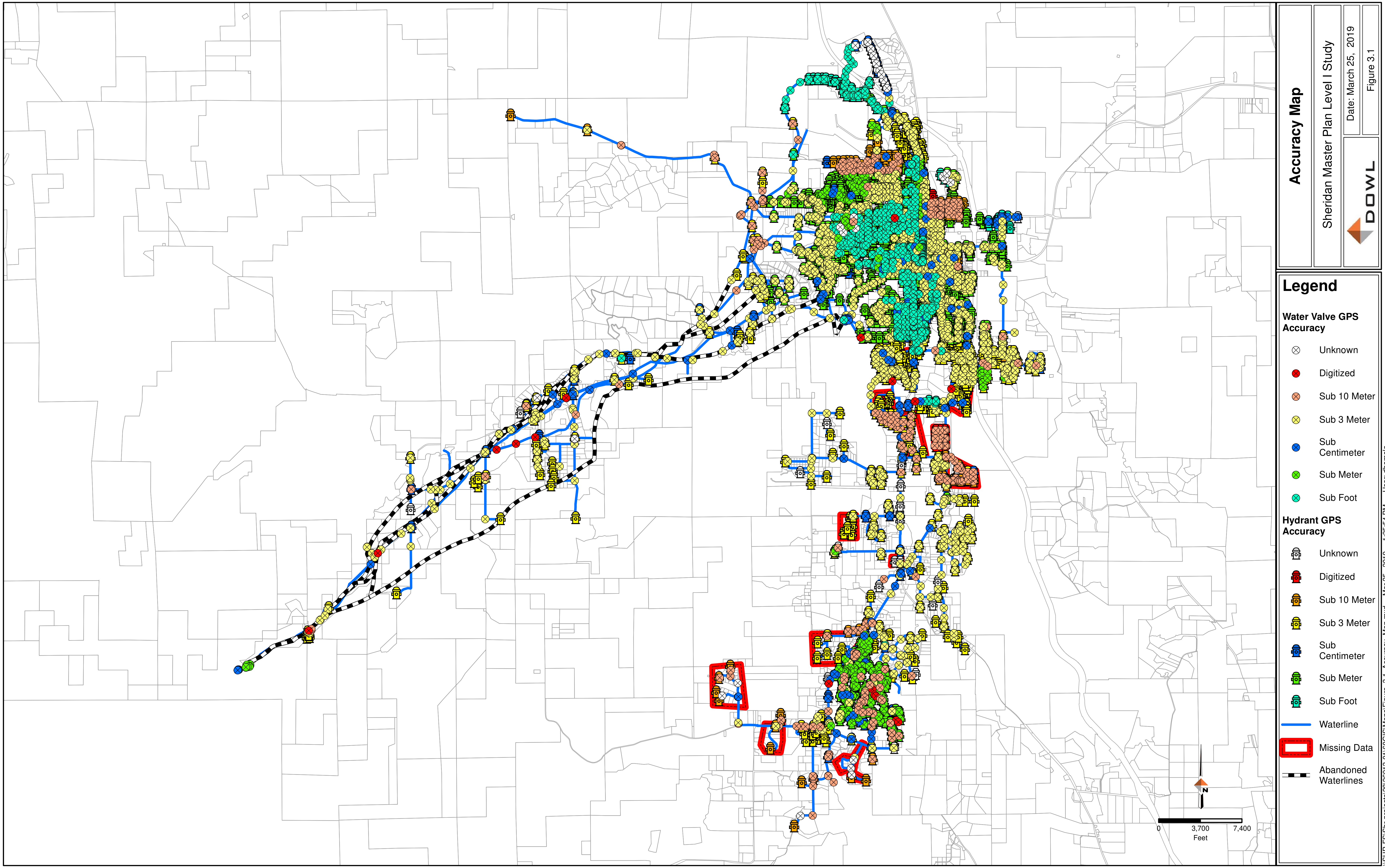
14. DOWL imported data collected by City UM and made final adjustments to the GIS and model. This process will need to be on going as development happens and improvement projects are completed.

One downfall of the water geodatabase was that it lacked connectivity information, or at least lacked a way to display the water system connectivity. This is an issue in areas of the system where a high-pressure transmission main may cross through a lower pressure zone, or in a higher-pressure zone where piping from a lower zone runs to tanks. A layer was added to the geodatabase to show where pipes are connected or not. As noted above, this layer is a point shapefile called "Junctions" and places points where pipes are connected. This layer also has pressure information from the hydraulic model.

Also, the original water system GIS was built from the hydraulic model some 20-30 years ago. At that time, only the basic information such as pipelines and tanks were included in the GIS. Since then, the list of layers described earlier has been added and physical locations of the pipelines, valves, and other items have been adjusted and updated, mainly in areas of the City that have been rebuilt or surveyed. Prior to this study, it was unclear of the source and accuracy of the data. As noted in step 8 above, the accuracy fields were populated and used to show areas of the system that needed more work than others, which allowed this study's surveying efforts to be prioritized.

As noted above, the existing meter layer created during the meter replacement project had many problems. When the meter replacement contractor installed a meter, they took a gps shot with their tablet. There were many discrepancies, meter locations in the ROW, several meters on one lot and none on the others in the vicinity, and meters that did not match up with the lots they were on. To fix this, we did the following:

- A highly accurate meter layer for the SAWS meter pits was created during the meter replacement project design and was created with a survey shot on each meter pit. Since these are highly accurate shots, we used these points and linked them up with the socket IDs.
- The county address points layer was also used to assign a location to meter data based on addresses that matched the county address points. For meters that didn't match the address layer points, the meter locations were geocoded based on their address to assign a location for them.
- Updated meter shapefile was provided to Mueller and Mueller updated the meter location information on their system.


Accuracy Map
Sheridan Master Plan Level I Study
Date: March 25, 2019
Figure 3.1
DOWL
Legend
Water Valve GPS Accuracy
Unknown
Digitized
Sub 10 Meter
Sub 3 Meter
Sub Centimeter
Sub Meter
Sub Foot
Hydrant GPS Accuracy
Unknown
Digitized
Sub 10 Meter
Sub 3 Meter
Sub Centimeter
Sub Meter
Sub Foot
Waterline
Missing Data
Abandoned Waterlines
N
0
3,700
7,400
Feet
\\SHR-FS\Shr-projects28\26913-01\60GIS\Maps\Figure_3.1_Accuracy_Map.mxd Mar 25, 2019 1:35:54 PM User: dhomola

3.4 COLLECTOR FOR ARCGIS

The water system operators were provided with Collector for ArcGIS during this project but still rely on paper copies of the record drawings. With Collector for ArcGIS and the other deliverables from this master plan, they can access the same (or better) data through GIS. Over time, the paper copies could be replaced or scanned and linked to an accurate GIS map that can be updated as the SWS changes. PDFs of the as-built drawings can then be accessed in the field on mobile devices through Collector.

DOWL created a GIS map of the system using ArcGIS for Desktop and then published and packaged the maps to ArcGIS Online. Wood, PLC has been doing a similar process with ArcGIS Enterprise. The GIS can be shared with SAWS and City UM through these online portals. To access this data on a mobile device the following requirements must be met:

- ArcGIS Online license with a license for Collector for ArcGIS, or
- ArcGIS Enterprise – level 2 member, or
- Portal for ArcGIS 10.3.1 or higher
- Android, iOS, or Windows device
- Free Collector for ArcGIS app

The City currently has the ArcGIS Enterprise license, which contains 5 named Level 2 users. If more than 5 Level 2 users are desired, the City will need to purchase more licenses.

These options are discussed in more detail in Appendix C.

3.5 GIS RECOMMENDATIONS

Moving forward, the GIS should be updated as features are added or changed. This could be done every couple months or as larger projects are completed. See discussion below for the recommended process for incorporating these changes.

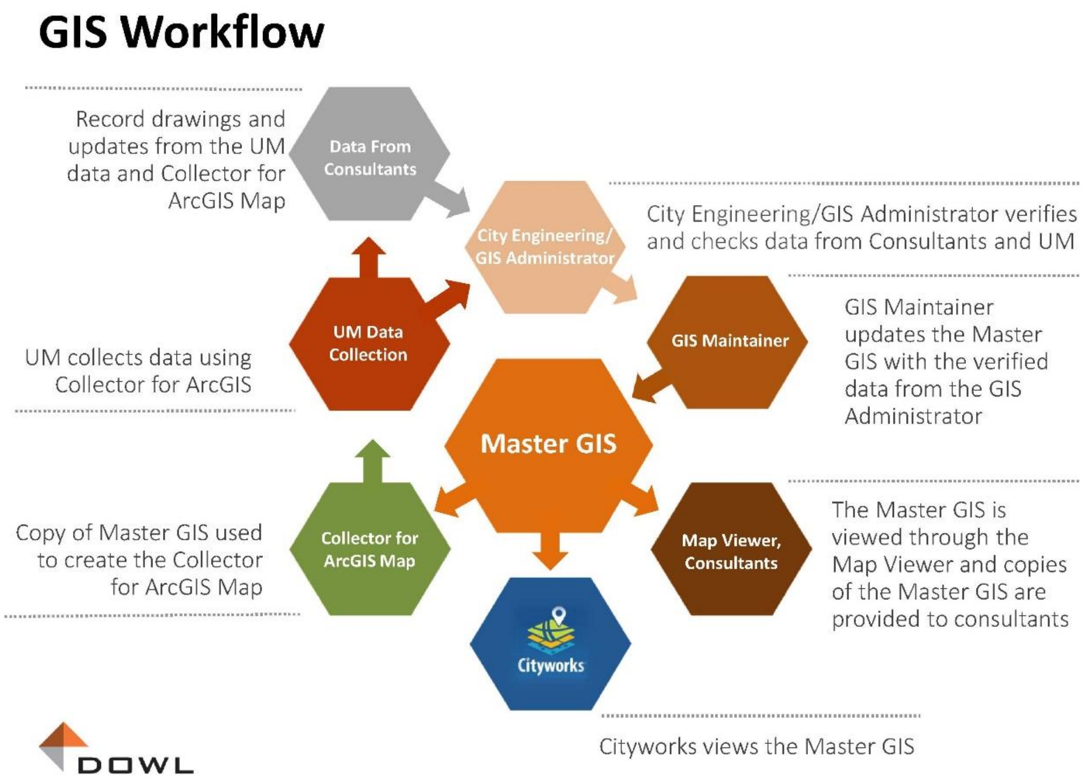
In addition to periodic updates, to get the most value out of the GIS, the following is recommended to SAWS and the City:

- Continue to incorporate via an attachment link old record drawings, details, and site details that cannot be shown in the GIS mapping. These attachments can be opened and viewed in Collector for ArcGIS.
- Obtain field tablets for viewing and editing the GIS data. Several options exist for tablets. Operator experience and preference will need to be considered when selecting tablets. iOS or Apple iPads are recommended as the Collector for ArcGIS app is more developed and more widely used on these devices.
- Use *Collector for ArcGIS* coupled with ArcGIS Online, to locate, update, maintain, and create new features. The *Collector for ArcGIS* can also be used on smartphones for accessing and editing the GIS data.

- Set up protocol for adding data and modifying existing data in the GIS. We recommend that the GIS be updated at least once annually. This would likely be done by a consultant. The water model should be updated at the same time as the GIS update.
- Perform additional line locating and surveying to further refine the location data of pipelines and surface features.
- Add layers to the GIS for tracer wire access points and easements.

3.5.1 Data Collection and GIS Update Workflow

Below is a schematic of the proposed flow of data through the GIS database and its various working parts.



Typically, the "City Engineering/GIS Administrator" bubble would be the City GIS department. However, the City currently doesn't have a GIS department. Someone with the understanding of what data is accurate and what needs more work would instruct the GIS Maintainer on updating the Master GIS. This currently falls on the City Engineering Department, who gets help from consultants as needed. While this works, sometimes data are lost, or a lack of communication causes some data to not be updated correctly. Therefore, the GIS Administrator should have a more integral part in reviewing and verifying these data to make sure they are accurate before telling the maintainer what to change.

After discussing with City staff, DOWL recommends the continued access of the GIS through the Collector for ArcGIS mobile application for City UM staff and SAWS. Changing existing data or adding missing or new data to the GIS should follow the following process:

As-built drawings should continue to be submitted to the City as new utilities are installed. Ideally these drawings would be submitted as shapefiles in the correct schema but if this can't be done the CAD drawings should be submitted. The City will need to pass these data on to the GIS Maintainer for inclusion into the GIS, as they are now doing with Wood, PLC. These as-built data should be checked for accuracy and if necessary, additional data collection be done on these areas during the annual update as outlined in Step 3 below.

1. When an area needing updated is found in the field by City UM staff, it should be marked in Collector for ArcGIS by one of the two options:
    a. Create a new feature on the feature layer needing updating with the correct accuracy field filled out and notes indicating what needs updating. This option might be necessary if a feature is needed to finish a work order in CityWorks. However, it should be avoided if possible though so duplicate or inaccurate features aren't collected. The new data will need to be carefully reviewed by the GIS Administrator and adjusted as needed.
    b. Create a new "Maintenance" feature of the point or area needing updated with notes on what exactly needs updating.

2. When a significant number of areas need updating, City Engineering would likely hire a Consultant to survey in these areas and input all attribute data. The Consultant's method of data collection should provide survey grade locations. The Consultant should provide all the updated information to the GIS Maintainer and review the existing GIS with them so the GIS is updated properly and old data are removed.

Any time a new feature is collected, whether by City UM staff, consultants, or others, it is imperative that the accuracy field be filled out so that the administrator of the data knows the level of accuracy of the data and can review and adjust as needed.

3.5.2 Fire Department Collaboration

The City of Sheridan Fire Department uses Collector for ArcGIS to locate hydrants and record flow tests. Wood, PLC currently administers these data, approves edits, and assists the fire department with their use of Collector. Wood has also aided the City of Sheridan with their GIS and incorporated some of the updates that the fire department has made into the City's GIS. It is recommended that this collaboration continue since both entities will benefit. As explained above, actual flow test data taken by the fire department and the City as well as modeled available fire flow data are attached to the hydrant feature class. These attribute data can be used to give the Fire Department and others an idea of what flows they can expect from a hydrant. These data should be shared with the fire department.

Currently, when a flow test is recorded, it is not documented whether a flushing hose is used or how long it is. This makes it hard to tell the actual full capacity of the hydrant. The hydrant flow data were used to check the calibration of the model but not having this data limited the usefulness of the flow numbers. See Section 4.0 for additional details. DOWL has added fields to the hydrant layer to show whether a hose was used during a flow test and its characteristics. These fields should be filled out in the future during flow testing. These fields should also be added to the fire department's data to be populated, DOWL has already requested this be done.

3.5.3 Asset Management and GIS – Cityworks

DOWL recommends a more streamlined process for issuing, completing, and recording service requests and work orders using Cityworks, the asset management system the City currently uses.

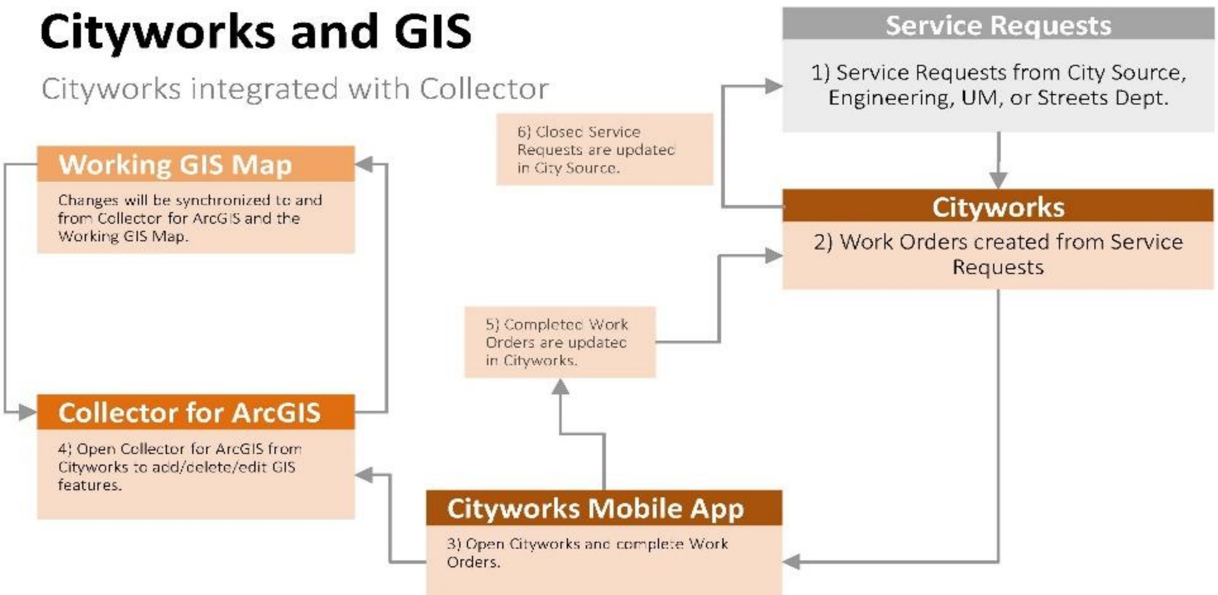
Currently the City uses Cityworks to create work orders and send hard copies of the work orders with field staff. The information from these hard copies must be entered back into Cityworks to retain the information and close the work order.

DOWL recommends that the City uses Cityworks Respond for completion of the work orders. Cityworks Respond is an HTML 5 customizable app accessed via a web page. Using Cityworks Respond, the work orders would be completed electronically from the field while online. This would ensure that more of the information about the specific work order is retained. This would also reduce the amount of work transferring the data from hard copies back into Cityworks.

The Cityworks Mobile app does not allow customization like Cityworks Respond but it does allow work orders to be completed offline. This would allow field staff to download work orders, complete them offline, and synchronize the completed work orders to Cityworks once online. Through conversations with the City Engineering Department, UM, and IT, the Mobile app does not include all the functionality and customization that they would like. This may change as Cityworks updates the app and further develops their software. DOWL recommends that the City stay in contact with Cityworks, and periodically check to see if the Mobile App has been upgraded or if a new app from Cityworks becomes available. DOWL recommends that the City move towards the Cityworks Mobile app if the functionalities they desire are incorporated so they can go offline with Cityworks and complete field orders in areas without internet connectivity.

The Cityworks Mobile app can also be integrated with Collector for ArcGIS for maintenance and updating the GIS. Figure 3.2 shows a recommended work flow schematic of CityWorks with the Collector App.

Figure 3.2 – Recommended Cityworks/Collector Workflow



4.0 HYDRAULIC MODEL

The program used for the modeling of the water systems evaluated under this study was Bentley® WaterGEMS® V8i (SELECTseries 3). Most of the modeling runs performed in this study were steady-state modeling runs, to evaluate operation of the system during maximum day, peak hour and fire flow scenarios. Extended Period Simulation (EPS) runs were performed mainly for water age and other operational issues, such as pump and tank operation.

4.1 MODEL CREATION

The DOWL WaterGEMS hydraulic model of the SWS was used as a starting point for this study. Changes to this existing model included:

- Demands were adjusted as discussed in Section 6.4 for all areas.
- The GIS was reviewed with system operators and adjustments made to the GIS as discussed in Section 3.0. This information was verified in the model and a large effort was made in updating the model and GIS with correct pipe sizes, pipe locations, material, elevations, and pressures. Functionality exists to use the same geodatabase in the model and synchronize it with the geodatabase used for the GIS. This functionality is not automatic and will be performed as needed and on a more manual basis. Reasons for this include the following:
    - The schema in the GIS layers would need to be greatly increased to include all the model components and fields.
    - Including all the GIS fields and information in the model should be possible, but has resulted in model instability in the past.
    - Current workflow of GIS updates is not certain. There is some hesitation to make updates to the hydraulic model from GIS updates that have not been validated hydraulically. However, hopefully with the recommendations on GIS upkeep and new junctions layer in the GIS, this will be remedied in the future.
- Meters and corresponding demands were added from the AMI data at their correct location
- Hydrants were added with an adjusted emitter coefficient, as discussed in Appendix D.

Some of the data input and/or updated in the model include the following:

- Pump data – pump operating curves, horsepower, rotational inertia, etc.
- Tank data – size and configuration of tanks, high and low levels.
- Operational controls – when pumps or control valves turn on and off based on tank level. This was necessary for the EPS runs.
- Demands – The demands discussed in Section 6.4 were assigned to the model.

Flow testing and calibration of the model was performed as discussed in Appendix D.

4.2 MODEL SCENARIOS

In addition to evaluating the existing system, the hydraulic model was used as a tool in this study to analyze impacts of proposed improvements and calculate future transmission main capacities and line sizes. The following model scenarios were evaluated:

1. Demand Scenarios
    a. Average Day Demand (ADD)
    b. Maximum Day Demand (MDD)
    c. Peak Hour Demand (PHD)
    d. Minimum Day Demand
2. Fire Flow Analysis
3. Flushing Analysis
4. Extended Period Simulation (EPS) and water age analysis

Peak day and Peak hour runs were done for the following growth scenarios:

1. Future (2050) demand
2. Future (2070) demand

Also, proposed new water system improvements were evaluated with the hydraulic model. These improvement scenarios included:

1. Addition of new Upper Road waterline
2. Increased airport transmission line size
3. Increased east-west 4160 zone transmission options
4. Options to improve pressures in Little Goose

The following subsections present the results of the hydraulic modeling.

4.3 HYDRAULIC ANALYSIS RESULTS

4.3.1 System Pressures

Steady-state analyses were run to evaluate how well the existing system can accommodate the existing and future demands. Peak day scenarios were evaluated with storage tanks turned off, to identify any transmission main needs. The transmission mains should be able to supply the peak day demand without relying on tanks.

A peak hour analysis was done to evaluate the ability of the system to provide peak hour demands and not drop below the required 35 psi. For these scenarios, the tanks were turned on.

Figure 4.1 through Figure 4.6 show the system pressures during peak day and peak hour demand for existing, 2050, and 2070 growth scenarios.

The following should be noted about the future growth scenarios:

1. Initially, water can be supplied to Little Goose by gravity as is done now.
2. Eventually, the airport pump station may need to come on line to get enough water to the Big Horn tank.
3. The Big Horn tank needs to be able to operate to supply water from the tank back to the North during the peak hour and fire flow demand times.
4. Future growth scenarios require the Beckton Hall Road PRV to be adjusted back up to it's original design HGL of 4262.

Table 4.1 shows the resulting flow in key locations during the various demand scenarios. This helps give an idea of where water is needed.

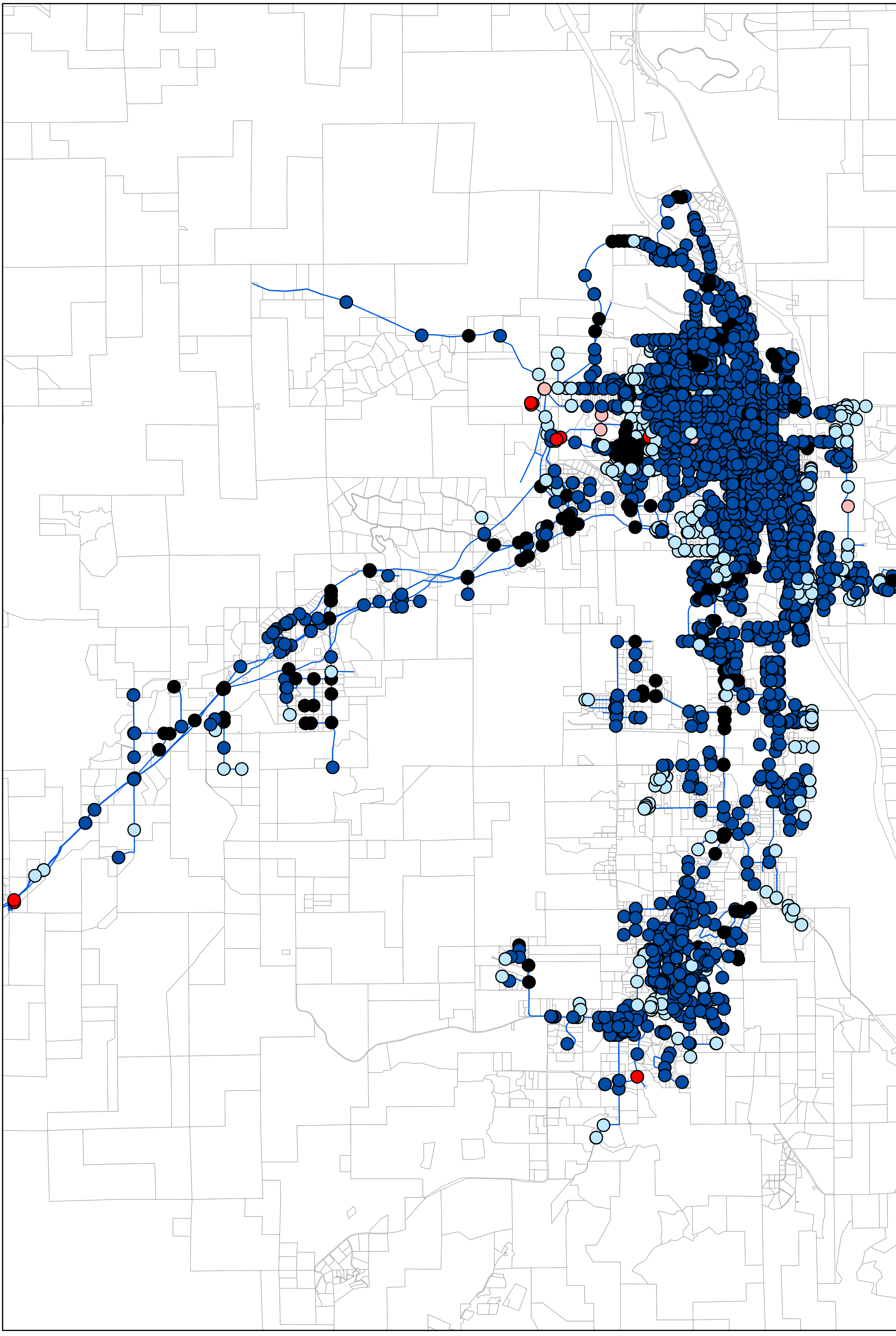
Table 4.1 – Flow at Key Locations During Demand Scenarios

	Flow for various scenarios (gpm)					
Location	Existing Peak Day	Existing Peak Hour	2050 Peak Day	2050 Peak Hour	2070 Peak Day	2070 Peak Hour
From Airport Pump Station (1)	2,885	2,908	5,763	3,880	7,766	5,770
From Bighorn Tank to North	(N/A)	0	(N/A)	1,600	(N/A)	2,677
Leaving BGWTP	3,039	3,144	4,619	4,192	5,464	4,825
Leaving Bradford Tank	116	127	492	765	517	805
Leaving North Low Tank	704	895	873	1,141	894	1,176
Leaving S. Low Tank	439	534	562	722	572	738
Leaving SE Tank	(N/A)	2,000	(N/A)	4,324	(N/A)	4,934
Leaving SWTP_1	1,109	1,792	1,549	1,998	1,791	2,282
Leaving SWTP_2	1,908	3,016	2,538	3,361	2,994	3,936
Leaving Sheridan NW Tank to North	127	99	548	1,378	3,195	5,615
Leaving Sheridan NW Tank to South	1,184	112	1,706	556	3,069	2,193
SE PRV	0	932	947	2,764	1,051	3,052
Through County Rd 66 PRV	0	0	412	374	563	553
Through Girls School Rd PRV	1,670	1,147	3,588	2,288	4,111	2,661
Towards SWTP from PCCP	0	0	-1,527	-279	-2,655	-1,550

As shown in the figures, the existing system provides adequate pressure during the existing peak day and peak hour demands, but the system will require some improvements to supply 2050 and 2070 demands. With the exception of two areas, the existing system is able to supply adequate flow and pressure during the future growth scenarios. The two main areas that experience lower pressures during the peak demand times are:

1. The area near East Ridge Road and 5th Street. This area is on the upper end of the elevation range served by the 4040 zone. On all the future peak hour demand scenarios the area on the east end of 5th Street, near the intersection of East Ridge Road has low pressures. This is an area at the top of the divide east of Sheridan. Under current peak hour conditions, the pressures are low but still acceptable, in the 35 – 50 psi range. This area can normally be served with adequate pressure by the 4040 zone. When demands increase in the future, the 4040 lines leaving the Sheridan plant and the 20-inch cross valley line have significant flow and higher head loss, which results in lower pressures on the east side of Sheridan. This also results in higher flow rates coming from the Southeast tank, through the Southeast PRV. In the past, the water in the Southeast tank has been preserved for the area south and east of Sheridan as it is supplied by the BGWTP via the Girls School Gate PRV. Recommended improvements to solve these low-pressure problems include a new east-west cross valley line from the 4160 zone and a PRV from this new line to the 4040 zone near East Ridge Road.

2. Little Goose Valley. The Little Goose Valley primarily gets its water from the 20-inch Big Goose Valley Pipeline, which supplies treated water to Big Goose and Little Goose Valleys from the BGWTP. The 20-inch Big Goose Valley Pipeline was designed to supply 5,400 gpm to the Big and Little Goose Valleys. This design requires operation of the Airport pump station. Approximately 4500 gpm is able to be supplied through this pipeline before pumping is required. The 2070 peak day demand requires approximately 5600 gpm through the 20-inch Big Goose Valley Pipeline. Therefore, it is not surprising that some areas in Little Goose may have low pressures during the future peak hour demand scenarios. However, in reviewing the water demand in the system under future scenarios, much of the demand on the BGWTP comes from demand in the southeast area of Sheridan. Some adjustments can be made in the system through PRV settings to reduce this demand on the BGWTP, as discussed under system improvements.



Legend

Pressure (PSI)

- <20
- 20-35
- 35-60
- 60-100
- >100
- WaterPipeline
- Parcels

0 3,700 7,400
Feet

Existing System Peak Day Pressure Results

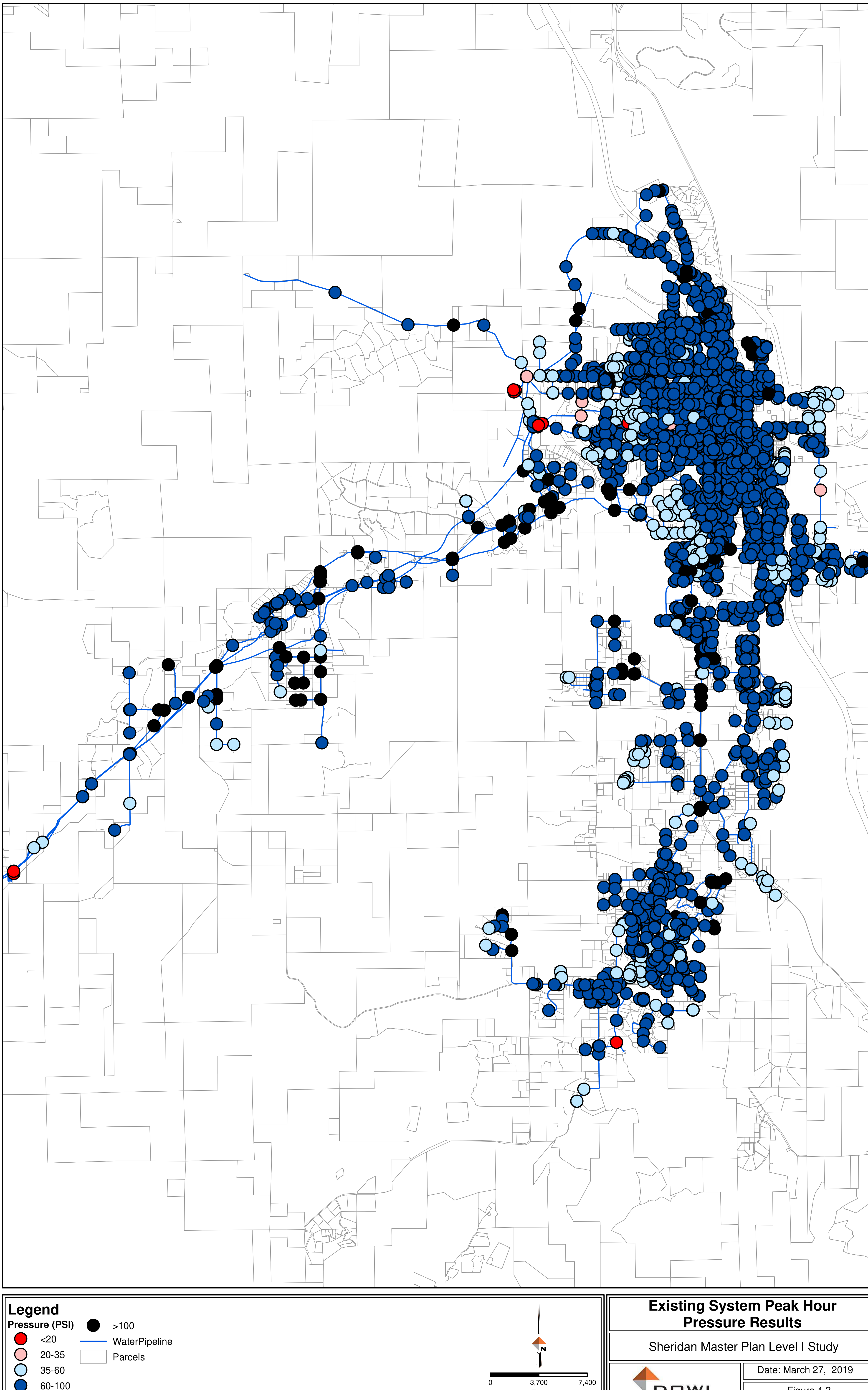
Sheridan Master Plan Level I Study

DOWL

Date: March 27, 2019

Figure 4.1

\\SHR-FS\Shr-projects\28\26913-01\60GIS\Maps\Figure_4.1_Existing_Peak_Day_Model_Results.mxd Mar 27, 2019 11:36:11 AM User: dhomola



Existing System Peak Hour Pressure Results

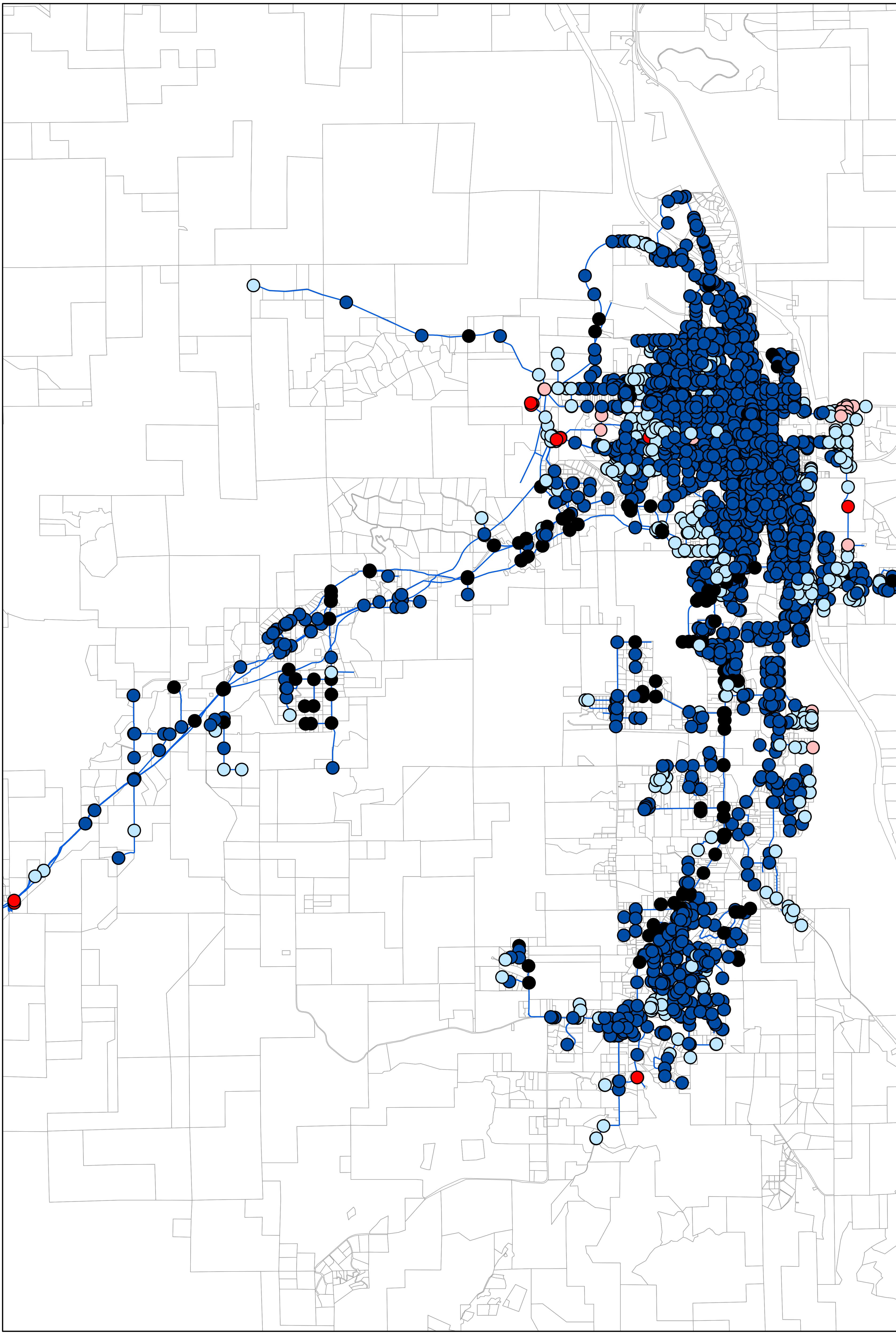
Sheridan Master Plan Level I Study

DOWL

Date: March 27, 2019

Figure 4.2

\\SHR-FS\Shr-projects\28\26913-01\60GIS\Maps\Figure_4.2_Existing_Peak_Hour_Model_Results.mxd Mar 27, 2019 11:37:32 AM User: dhomola



Legend

Pressure (PSI)

- <20
- 20-35
- 35-60
- 60-100
- >100
- WaterPipeline
- Parcels

0 3,700 7,400
Feet

N

2050 System Peak Day Pressure Results

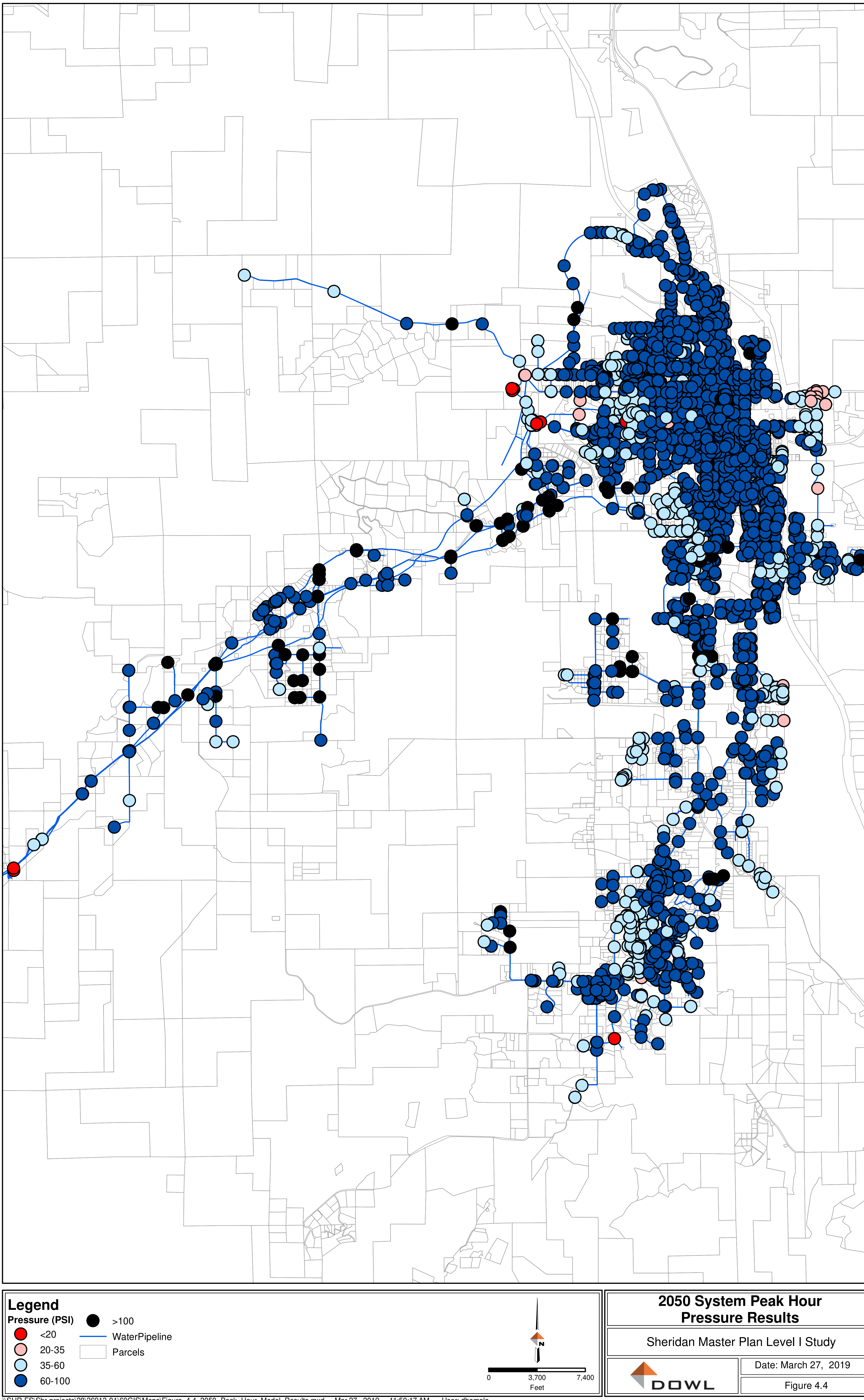
Sheridan Master Plan Level I Study

DOWL

Date: March 27, 2019

Figure 4.3

\\SHR-FS\Shr-projects\28\26913-01\60GIS\Maps\Figure_4.3_2050_Peak_Day_Model_Results.mxd Mar 27, 2019 11:48:52 AM User: dhomola



Legend

Pressure (PSI)

- <20
- 20-35
- 35-60
- 60-100
- >100
- WaterPipeline
- Parcels

0 3,700 7,400
Feet

2050 System Peak Hour Pressure Results

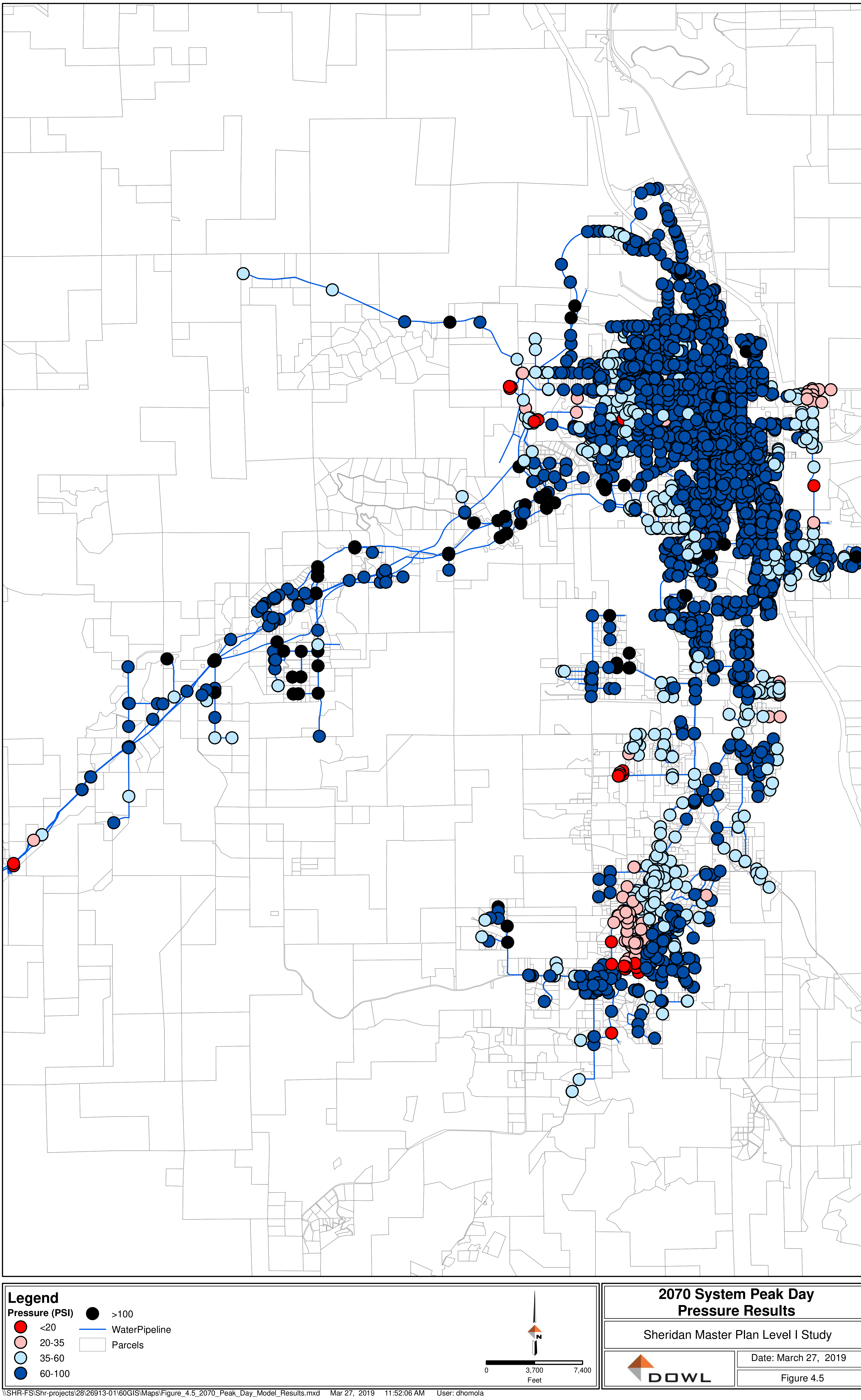
Sheridan Master Plan Level I Study

DOWL

Date: March 27, 2019

Figure 4.4

\\SHR-FS\Shr-projects\28\26913-01\60GIS\Maps\Figure_4.4_2050_Peak_Hour_Model_Results.mxd Mar 27, 2019 11:50:17 AM User: dhomola



2070 System Peak Day Pressure Results

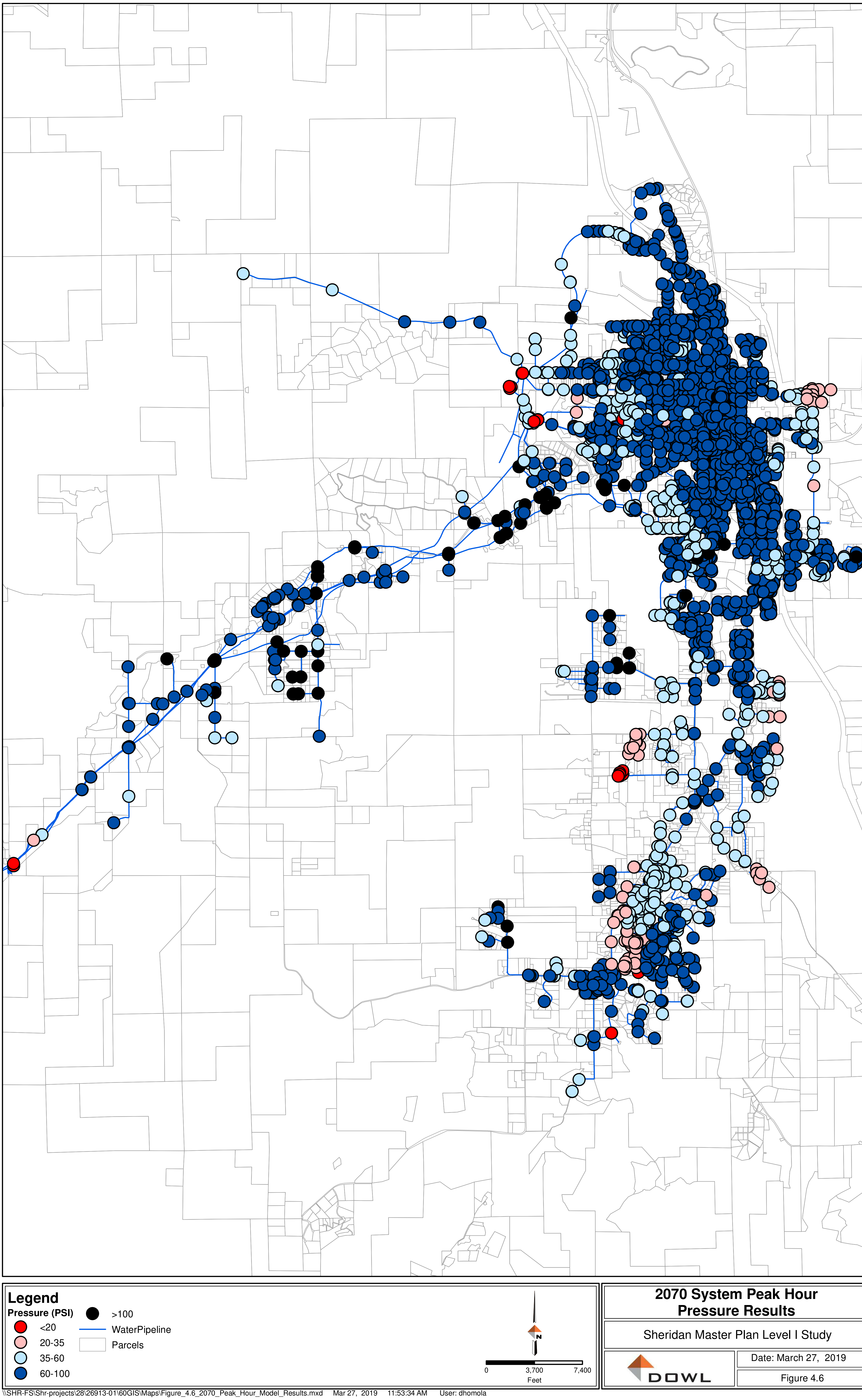
Sheridan Master Plan Level I Study

DOWL

Date: March 27, 2019

Figure 4.5

\\SHR-FS\Shr-projects\28\26913-01\60GIS\Maps\Figure_4.5_2070_Peak_Day_Model_Results.mxd Mar 27, 2019 11:52:06 AM User: dhomola



2070 System Peak Hour Pressure Results

Sheridan Master Plan Level I Study

DOWL

Date: March 27, 2019

Figure 4.6

\\SHR-FS\Shr-projects\28\26913-01\60GIS\Maps\Figure_4.6_2070_Peak_Hour_Model_Results.mxd Mar 27, 2019 11:53:34 AM User: dhomola

4.3.2 Fire Flow Analyses

Fire flow analyses were run to evaluate the ability of the existing system to provide fire flow to certain areas of the system for the existing and future demand scenarios. Although much of the SAWS system was not designed to provide fire flow, the fire flow analysis indicates the availability of water, or the hydraulic capacity of the system. For the fire flow analysis, the "available fire flow" was calculated based on the amount of water available at the listed location such that the residual pressure at that location or elsewhere in the system doesn't drop below 20 psi, during the peak day demand.

Figure 4.7, Figure 4.8, and Figure 4.9 show the results of these fire flow analyses. As the peak day demand increases from existing to 2050 to 2070, the amount of fire flow available generally decreases. However, it appears that most areas of the system will continue to have adequate fire flow available.

4.3.3 Storage Analysis

The system storage is discussed in more detail under the improvements section of the report. However, under the hydraulic modeling task, we evaluated the storage available on each main pressure zone in comparison to the storage required.

Table 4.2 - Existing Water Storage Analysis

Location	Fire Flow Storage Requirement (gallons)	Existing Peak Day Demand	Existing Equalization Storage Requirement	Total Storage Required (gallons)	Storage Available (gallons)
3952 zone	740,000	2680	964,818	1,704,818	4,120,000
4040 zone (SWTP)	740,000	3177	1,143,680	1,883,680	4,000,000
4040 zone (BGWTP)	740,000	362	130,374	870,374	1,250,000
4160 SWTP	320,000	127	45,868	365,868	1,000,000
~4160 BGWTP	320,000	1253	451,228	771,228	2,970,000
Bradford Brinton	320,000	116	41,792	361,792	500,000
Total			2,777,760	3,517,760	13,840,000

Table 4.3 - 2050 Water Storage Analysis

Location	Fire Flow Storage Requirement (gallons)	2050 Peak Day Demand	Equalization Storage Requirement (gallons)	Total Storage Required (gallons)	Storage Available (gallons)
3952 zone	740,000	4989	1,795,914	2,535,914	4,120,000
4040 zone (SWTP)	740,000	2624	944,626	1,684,626	4,000,000
4040 zone (BGWTP)	740,000	1469	528,944	1,268,944	1,250,000
4160 SWTP	320,000	548	197,309	517,309	1,000,000
~4160 BGWTP	320,000	1654	595,537	915,537	2,970,000
Bradford Brinton	320,000	492	176,951	496,951	500,000
Total			4,239,281	4,979,281	13,840,000

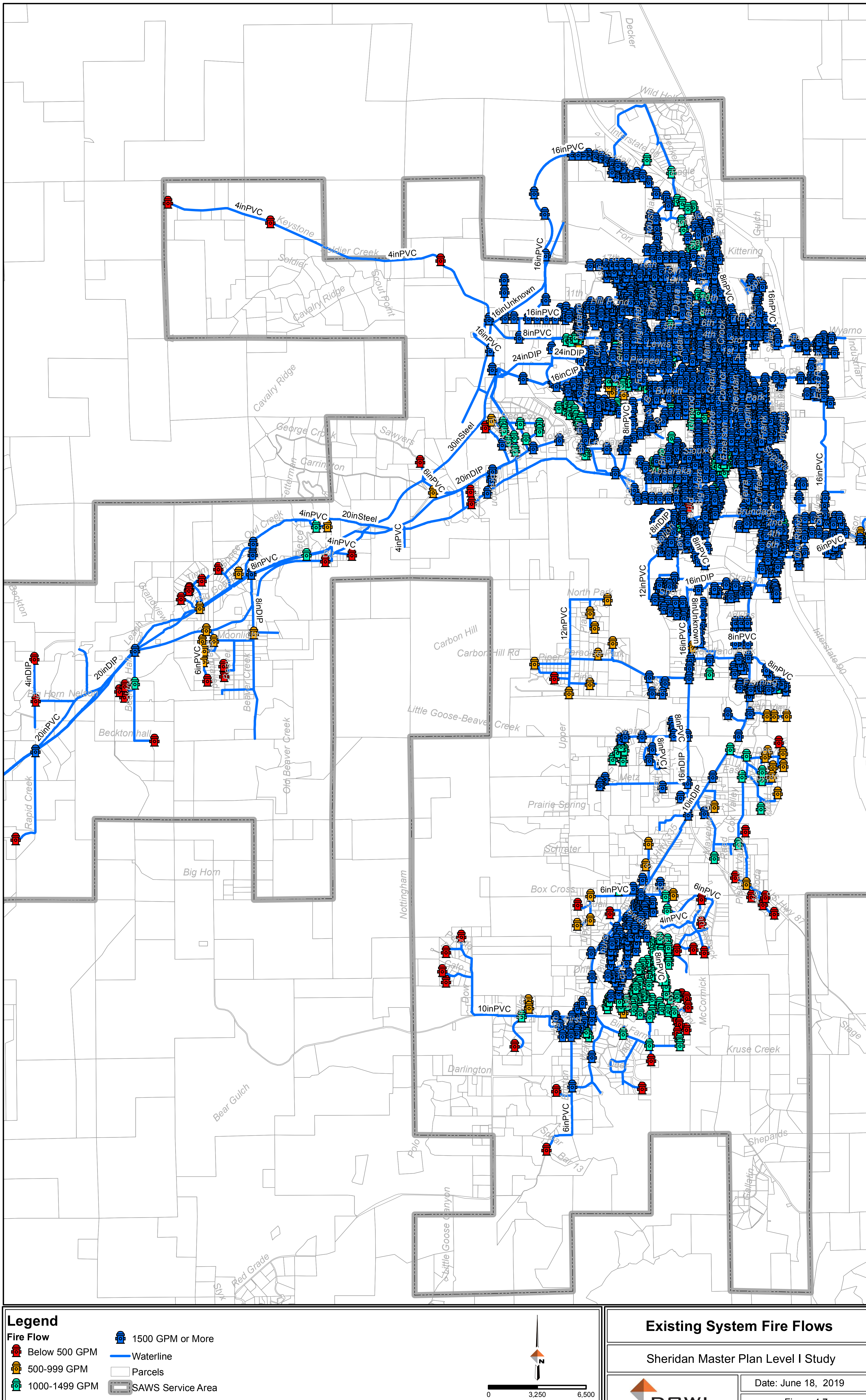
Table 4.4 - 2070 Water Storage Analysis

Location	Fire Flow Storage Requirement (gallons)	2070 Peak Day Demand	Equalization Storage Requirement (gallons)	Total Storage Required (gallons)	Storage Available (gallons)
3952 zone	740,000	5190	1,868,501	2,608,501	4,120,000
4040 zone (SWTP)	740,000	3290	1,184,558	1,924,558	4,000,000
4040 zone (BGWTP)	740,000	1999	719,518	1,459,518	1,250,000
4160 SWTP	320,000	3195	1,150,348	1,470,348	1,000,000
~4160 BGWTP	320,000	2928	1,053,932	1,373,932	2,970,000
Bradford Brinton	320,000	517	186,232	506,232	500,000
Total			6,163,088	6,903,088	13,840,000

From the water storage analysis results, it appears that the system has adequate storage for many years to come. Also, much of this storage can supply other zones, so some redundancy is built into the system. However, in the future, additional storage may benefit some of the areas of the system that are at a distance from existing storage, such as the northeast area of Sheridan. The future growth scenario has a high concentration of growth on the north end of Sheridan, which could eventually stress the existing storage on the 4160 zone. Much of this area can also be served by lower zones, such as the 4040, 3952, and 3890 zones.

It should also be noted that the fire flow storage requirement is fairly conservative, and dependent on local fire marshal recommendations. Much of the rural system is not designed for fire flow. However, the water storage analysis above has assumed that fire flow storage would be provided.

The water storage analysis also shows that the 3952 zone has more than adequate storage for the existing conditions and beyond 2070. This supports the discussion in the recommendations section of this report on modifying some of the 3952 storage to be able to remove it from service.



Existing System Fire Flows

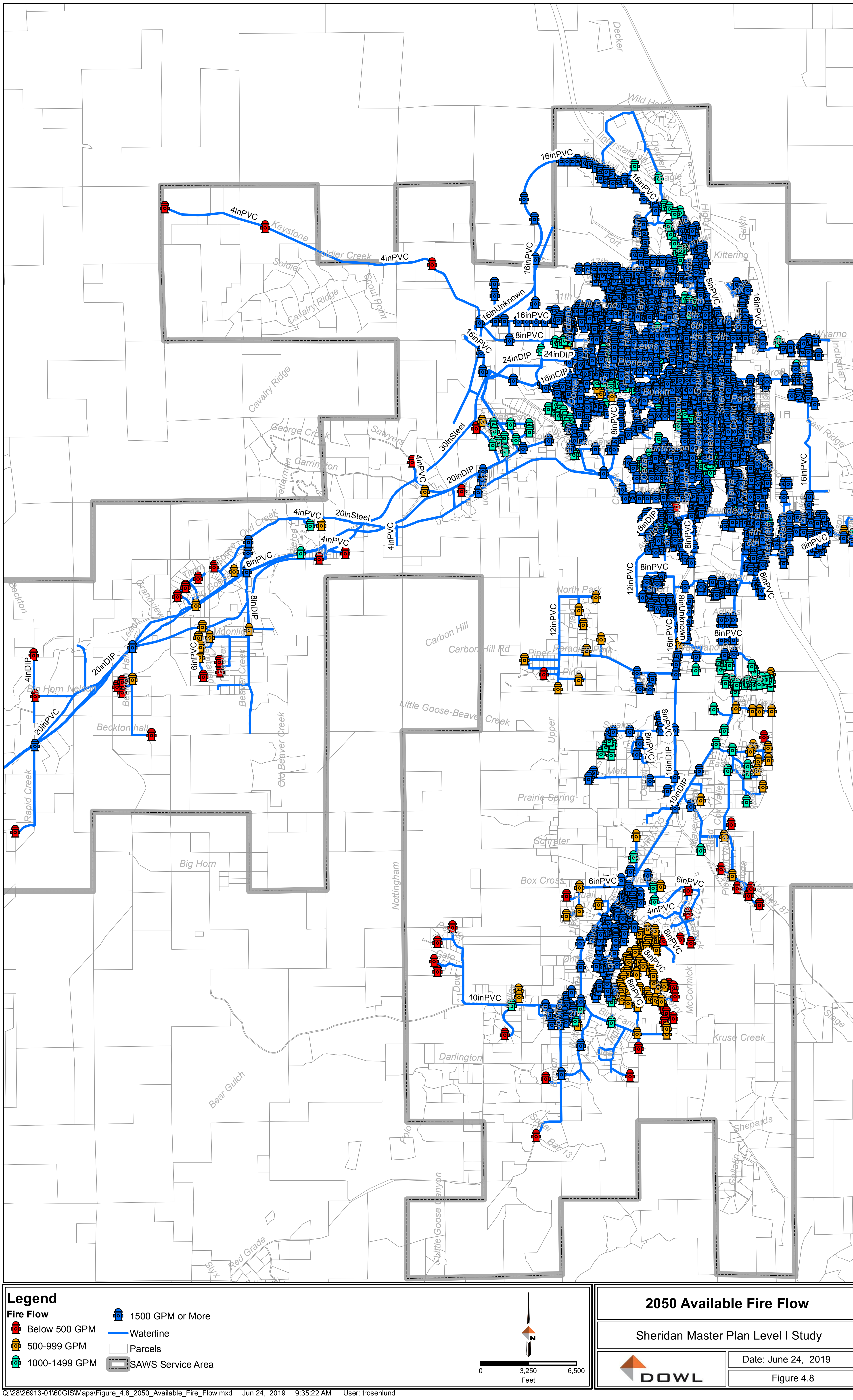
Sheridan Master Plan Level I Study

DOWL

Date: June 18, 2019

Figure 4.7

Q:\28\26913-01\60GIS\Maps\Figure_4.7_Exisiting_System_Fire_Flows.mxd Jun 18, 2019 12:54:03 PM User: trosenlund



2050 Available Fire Flow

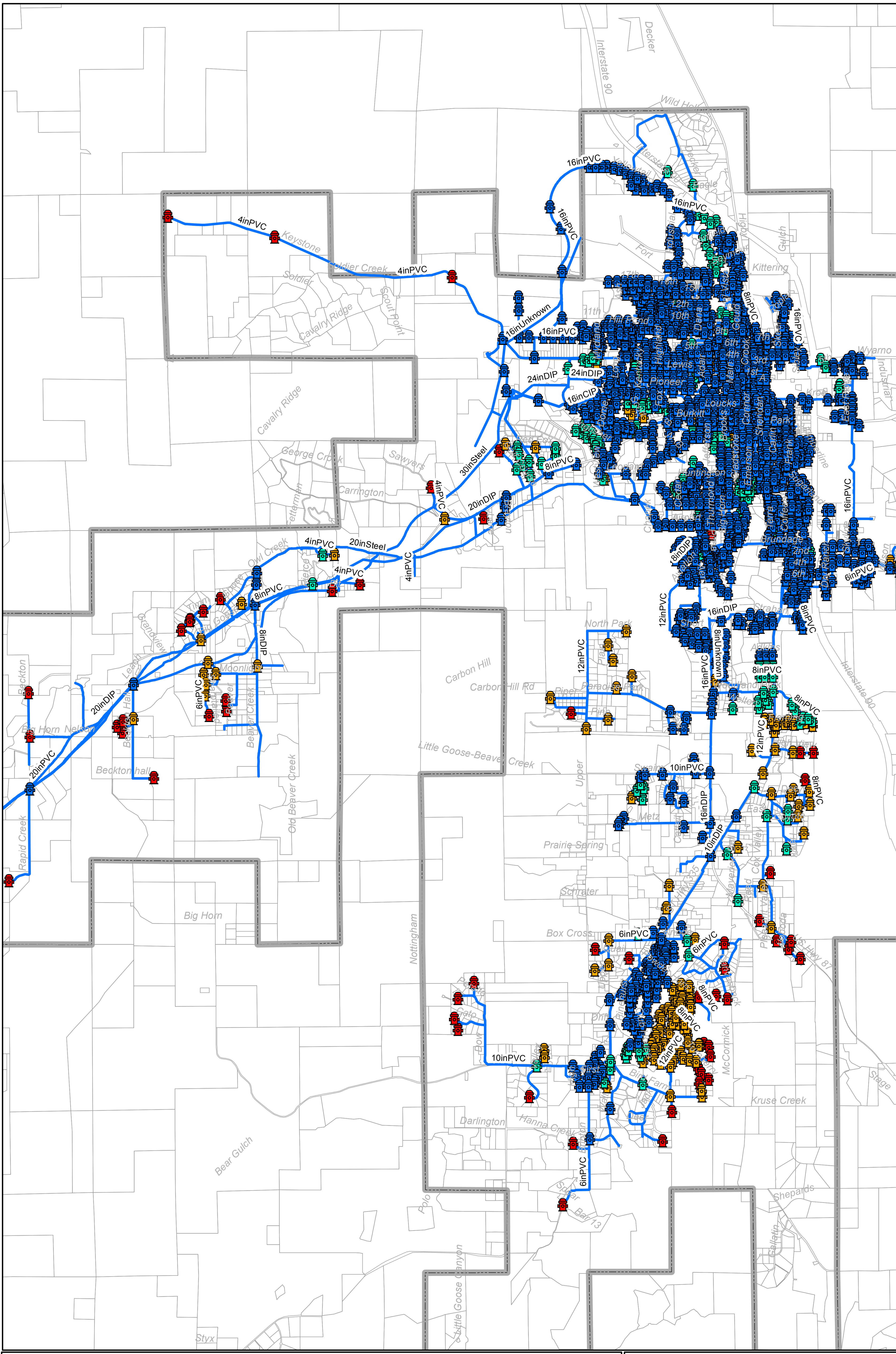
Sheridan Master Plan Level I Study

DOWL

Date: June 24, 2019

Figure 4.8

Q:\28\26913-01\60GIS\Maps\Figure_4.8_2050_Available_Fire_Flow.mxd Jun 24, 2019 9:35:22 AM User: trosenlund



Legend

Fire Flow

- Below 500 GPM
- 500-999 GPM
- 1000-1499 GPM
- 1500 GPM or More
- Waterline
- Parcels
- SAWS Service Area

0 3,200 6,400
Feet

2070 Available Fire Flow

Sheridan Master Plan Level I Study

DOWL

Date: June 24, 2019

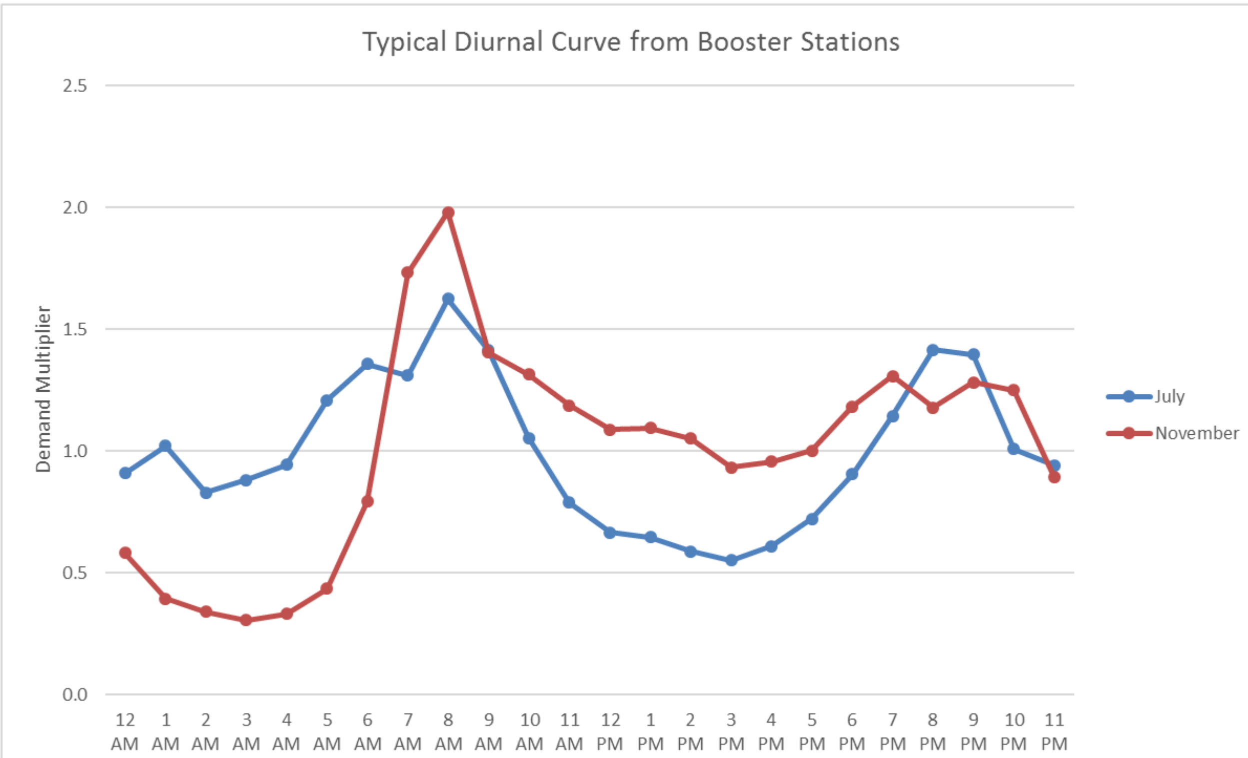
Figure 4.9

Q:\28\26913-01\60GIS\Maps\Figure_4.9_2070_Available_Fire_Flow.mxd Jun 24, 2019 9:37:06 AM User: trosenlund

4.3.4 Extended Period Simulation (EPS)

The extended period simulation was run on the existing system with a reduced or minimum day demand, during which water age was analyzed. A diurnal demand curve is shown in Figure 4.10. A similar curve was applied to the minimum day and average day demands, and water age was evaluated.

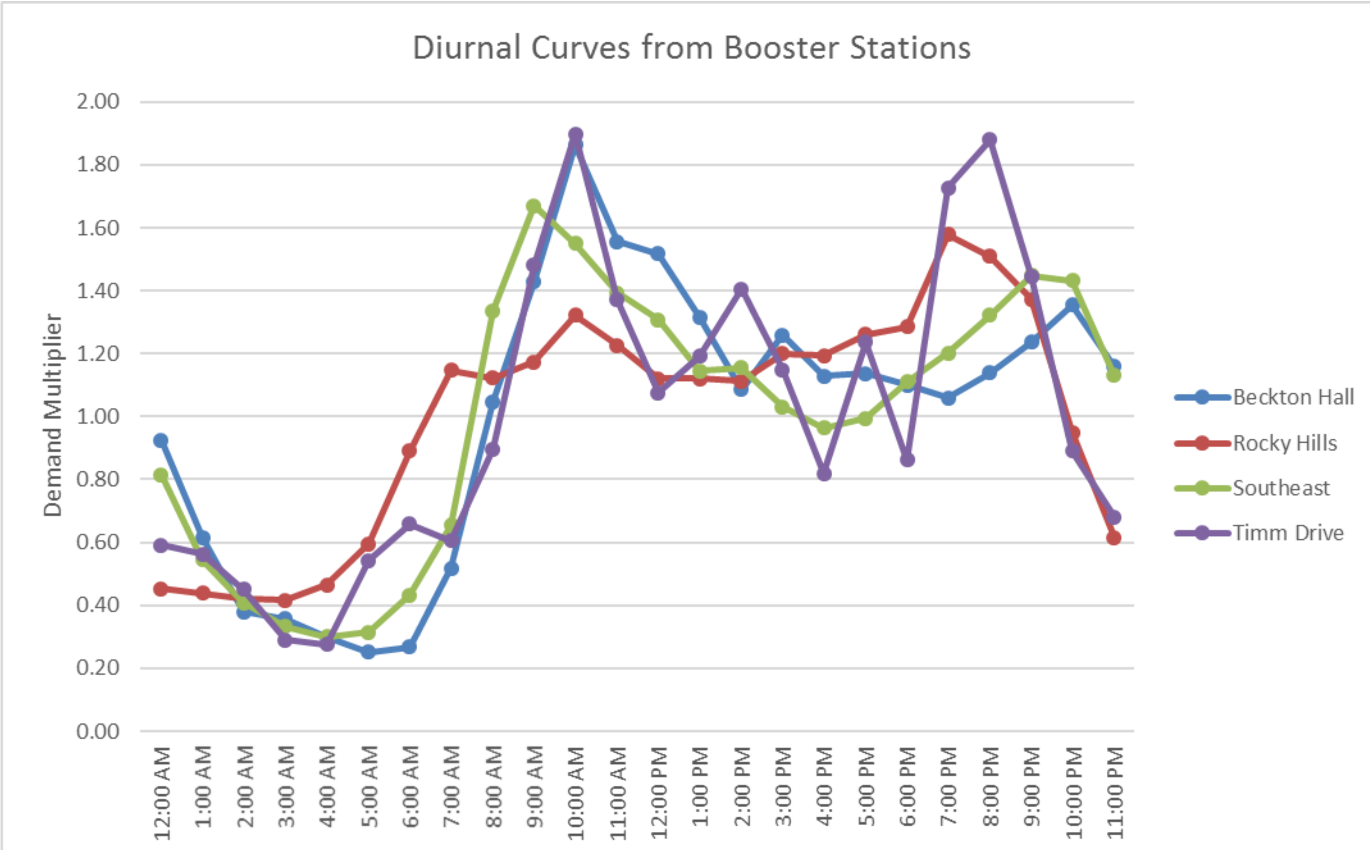
Figure 4.10 – Typical Diurnal Demand Curve



These curves are from the most recent meter data at the booster stations and provide useful information on how demand and demand multipliers vary depending on the circumstances. The Knode subdivision booster station meter data were used because it is a large subdivision that uses treated water for outside watering. This figure compares demand multipliers (not instantaneous demand) from the summer irrigation season to winter-time usage. Since many sprinkler systems run at night, the summer curve is actually flatter than for winter demand where all usage is inside the house.

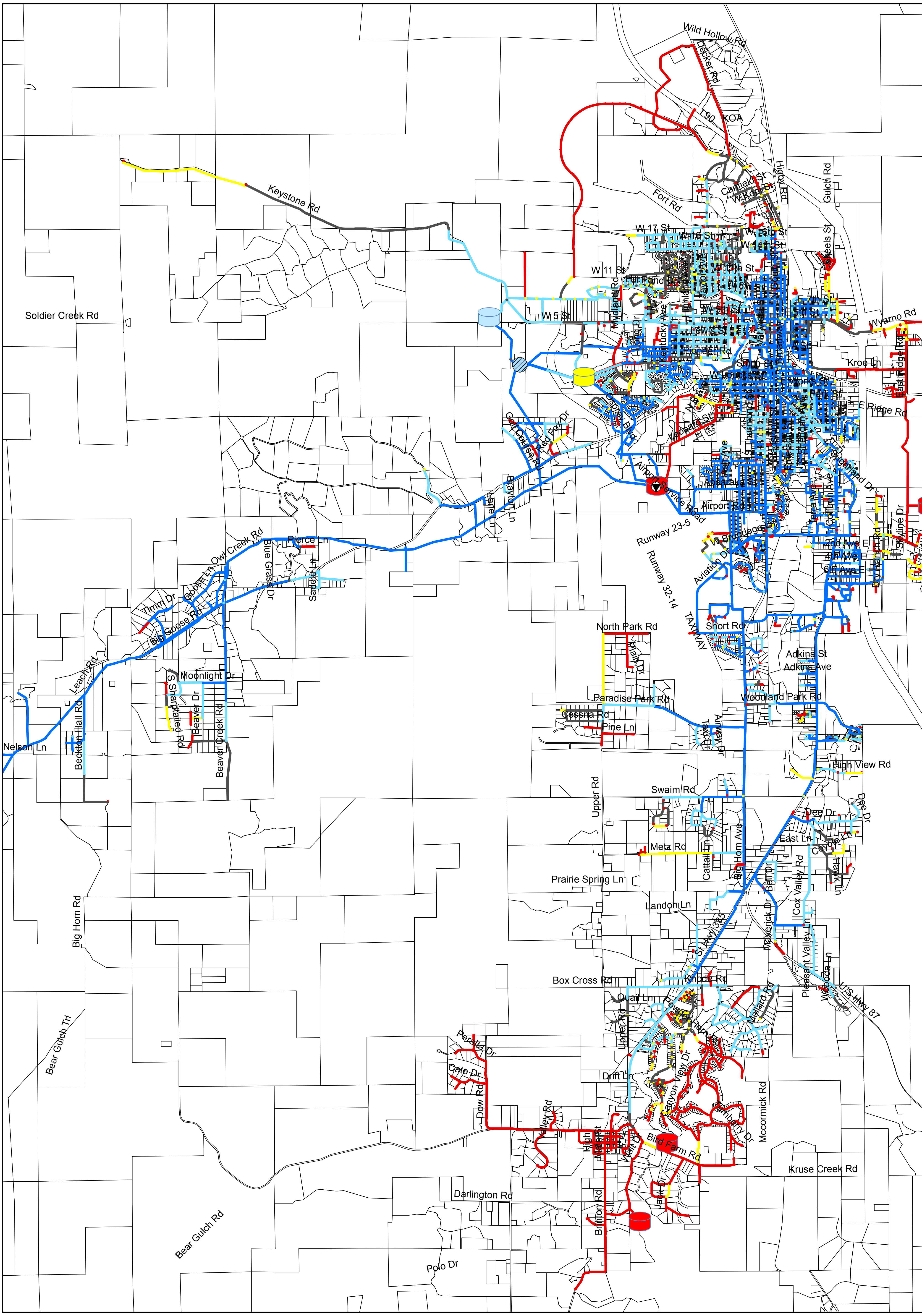
Meter data at other booster stations were also considered. These are shown in Figure 4.11.

Figure 4.11 – Other Diurnal Demand Curves



These diurnal curves are from 4 booster stations, including one larger station and some smaller ones. These curves show how demands peak considerably during times of the day and that the peak demand multipliers are greater for smaller stations with less users (as would be expected). These types of curves will be valuable as new stations are designed because VFD stations pumping into closed systems must meet this peak momentary demand.

Figure 4.12 and Figure 4.13 show the EPS water age results. As shown from the figure, areas on the extremities of the water system have older water. City Utility Maintenance should continue to follow their hydrant flushing plan as they have been to address these issues.



Waterlines - Water Age (Days)

- 0 - 4
- 4 - 8
- 8 - 12
- 12 - 17
- 17 - 21

0 2,700 5,400 Feet

Water Age Analysis Minimum Day Demand (1.8MGD)

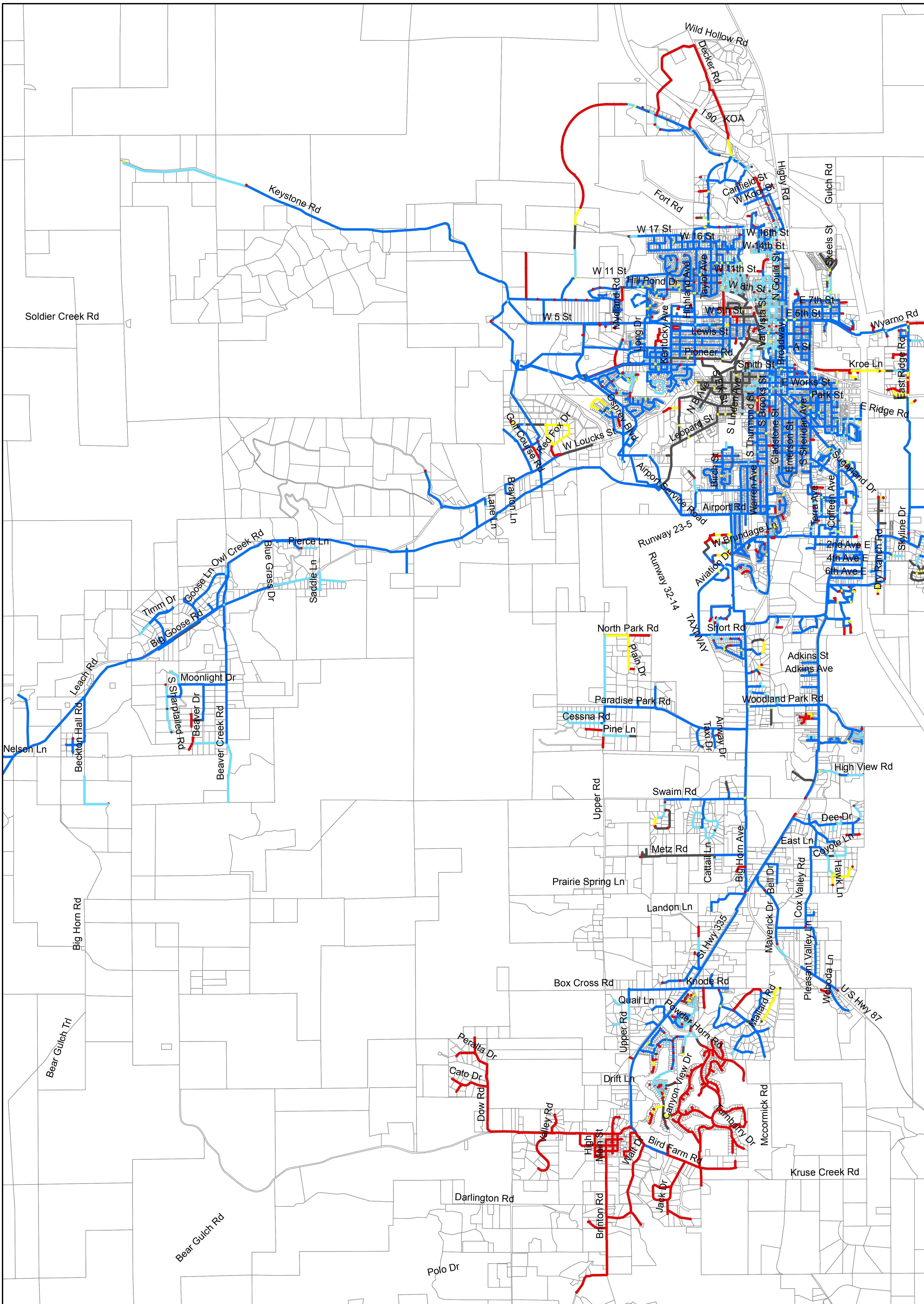
Sheridan Master Plan Level I Study

DOWL

Date: March 18, 2019

Figure 4.12

Q:\28\26913-01\60GIS\Maps\GEMS_for_ArcMap_WaterAge.mxd Mar 18, 2019 10:35:53 AM User: TRosenlund



Waterlines - Water Age (Days)

- 0 - 4
- 4 - 8
- 8 - 12
- 12 - 17
- 17 - 21
- Parcels

0 2,750 5,500
Feet

Water Age Analysis Average Day Demand (4.0MGD)

Sheridan Master Plan Level I Study

DOWL

Date: June 18, 2019

Figure 4.13

Q:\28\26913-01\60GIS\Maps\Figure_4.13_Average_Day_Water_Age.mxd Jun 18, 2019 2:45:19 PM User: trosenlund

4.3.5 Improvement Alternatives

Options were evaluated to improve the two areas with deficient pressures during future demands. These options are described in the following sections:

East Ridge Road/5th Street Area Improvement Options

Option 1 – One way to increase pressure in this area during peak hour demand times is to allow the Southeast tank to feed directly into this area. While this option would supply some additional pressure currently, future demands are too high for this to help much in the long term.

Option 2 – Since this area has adequate pressures during the peak day demand time, but lower pressures during peak hour demands, additional storage on the 4040 zone could be built in this area. The site of this storage and piping to and from the tank needs to be considered carefully, as water quality in a tank located on the far side of a system from the source will tend to “float” on the system and have old water. As the area develops north and east, there is a location or two that may work. Ideally this storage would be fed from a 4160 line and be able to supply the 4040 zone northeast of Sheridan. If this was done, it would help with turnover in the tank.

Option 3 – As demand increases, it may be necessary to install additional west to east transmission capacity in the 4040 zone or 4160 zone. Ideally, this line would come from the 4160 zone, and possibly run from the existing 16-inch Northwest transmission line near the VAMC and down Fort Road, across the BNSF railroad tracks and up Kittering Road. Increased west-east capacity would have the following benefits:

- It would increase the water available during peak hour demand times in the East Ridge Road area.
- It would provide the possibility of filling the Southeast tank with SWTP water. This could be done via a check valve in a bypass line around the Southeast PRV. As the system continues to grow south of Sheridan, it will become more important to preserve the BGWTP water for higher elevation zones.
- It would also supply the northeast Sheridan area with 4160 water, which is important, because some of this area is above the elevation that can be served by 4040 water.

The three options above are all potential solutions, depending on the magnitude of growth that occurs in this area and may all be necessary as the 2070 growth scenario is realized.

Little Goose Valley Supply Improvement Options

Since the Little Goose Valley will eventually experience low pressures due to increasing demand on the 20-inch Big Goose Valley Pipeline, there are a number of improvement options to alleviate these future low-pressure problems. These improvements are:

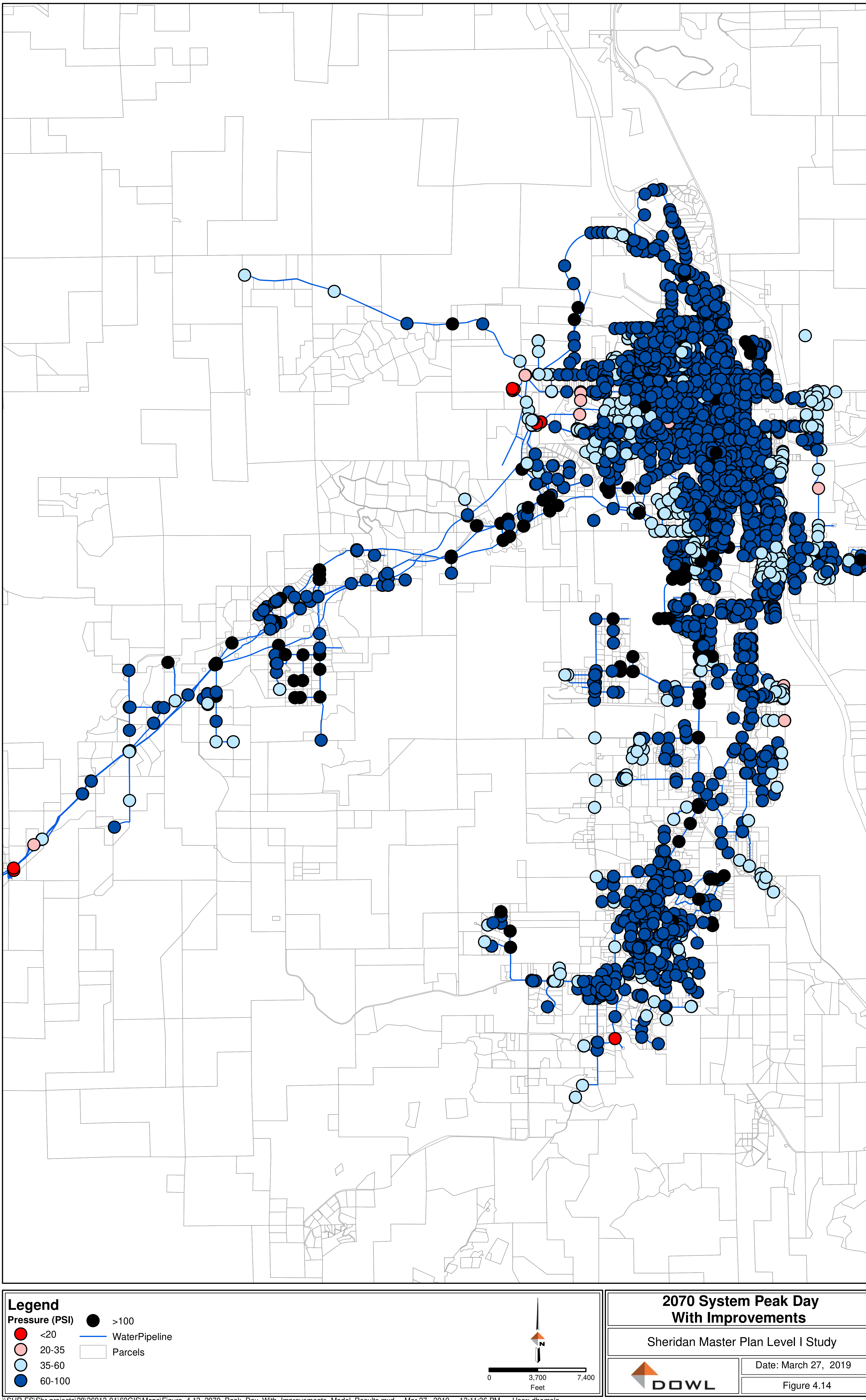
- Proposed Upper Road Transmission Main. This line is discussed in Section 8.2.8 as an important future system improvement to provide a redundant supply to the Little Goose area. Ideally, this line would be installed from Weeping Willow Lane, through the airport (on the west side of the runway), and then south down Upper Road to Box Cross Road and Highway 335. Either a connection from this line to downstream of the Airport pump station or a check valve will be needed when future demands require operation of the Airport pump station. However, installation of this line will provide additional gravity flow capacity and may delay the need for the Airport pump station until after 2070.

- Additional 4160 storage in the Upper Road area. During future peak hour demands, the Big Horn tank must supply water back to the north. This can create low pressures in the Metz Road area. A tank could be installed to the west of Jeffries Draw, depending on growth and demand. Although a tank at 4160 and the new transmission main discussed above will not have adequate pressure to eliminate the Jeffries Draw booster station, this station could pump from this new storage to the higher elevations west of Upper Road, which would help maintain water quality in this tank. Also, depending on growth, it may be beneficial to place a tank west of Jeffries Draw on the Jeffries Draw HGL. This tank would then be able to supply the Jeffries Draw area (and other development west of Upper Road) with higher HGL water, and also be able to supply water into the Little Goose Valley at a 4160 HGL through a PRV station.

The improvement alternatives discussed in this section were input into the hydraulic model and pressure results were analyzed for the 2070 peak day and peak hour demand scenarios. A fire flow analysis was also run for the 2070 peak day demand with these system improvements. Figure 4.14, Figure 4.15, and Figure 4.16 show the modeling results of these improvements.

The 2050 and 2070 peak day and peak hour demands can be met with the following changes/improvements to the system:

- Increase Beckton Hall Road PRV to design setting of 4262
- New and upsized Airport Loop Transmission Main
- New Upper Road Transmission Main
- New 4160 east-west Cross Valley Line
- Adjust the College PRV to limit the amount of water that flows into the 3952 zone at this location.



2070 System Peak Day With Improvements

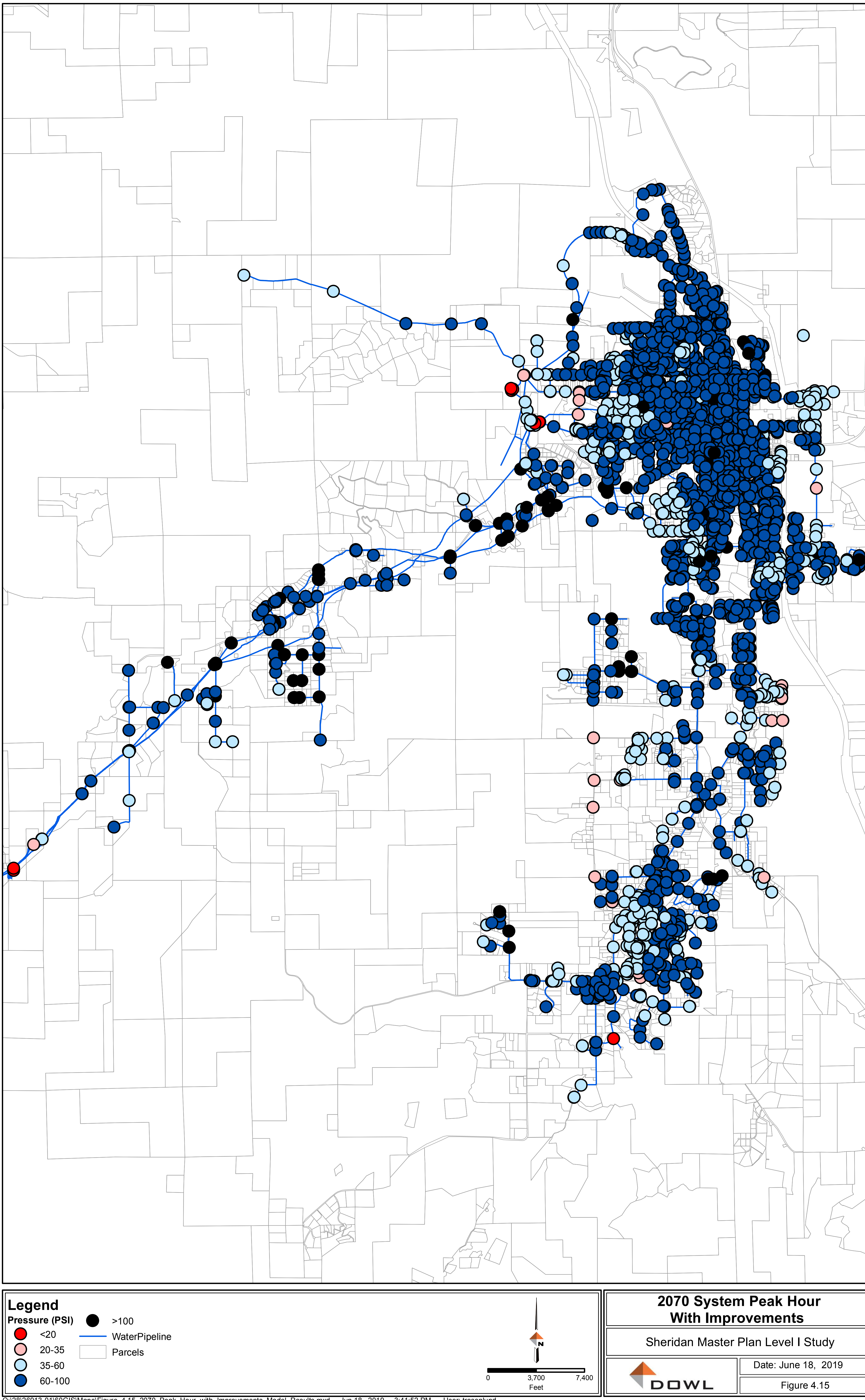
Sheridan Master Plan Level I Study

Date: March 27, 2019

DOWL

Figure 4.14

\\SHR-FS\Shr-projects\28\26913-01\60GIS\Maps\Figure_4.13_2070_Peak_Day_With_Improvements_Model_Results.mxd Mar 27, 2019 12:11:36 PM User: dhomola



2070 System Peak Hour With Improvements

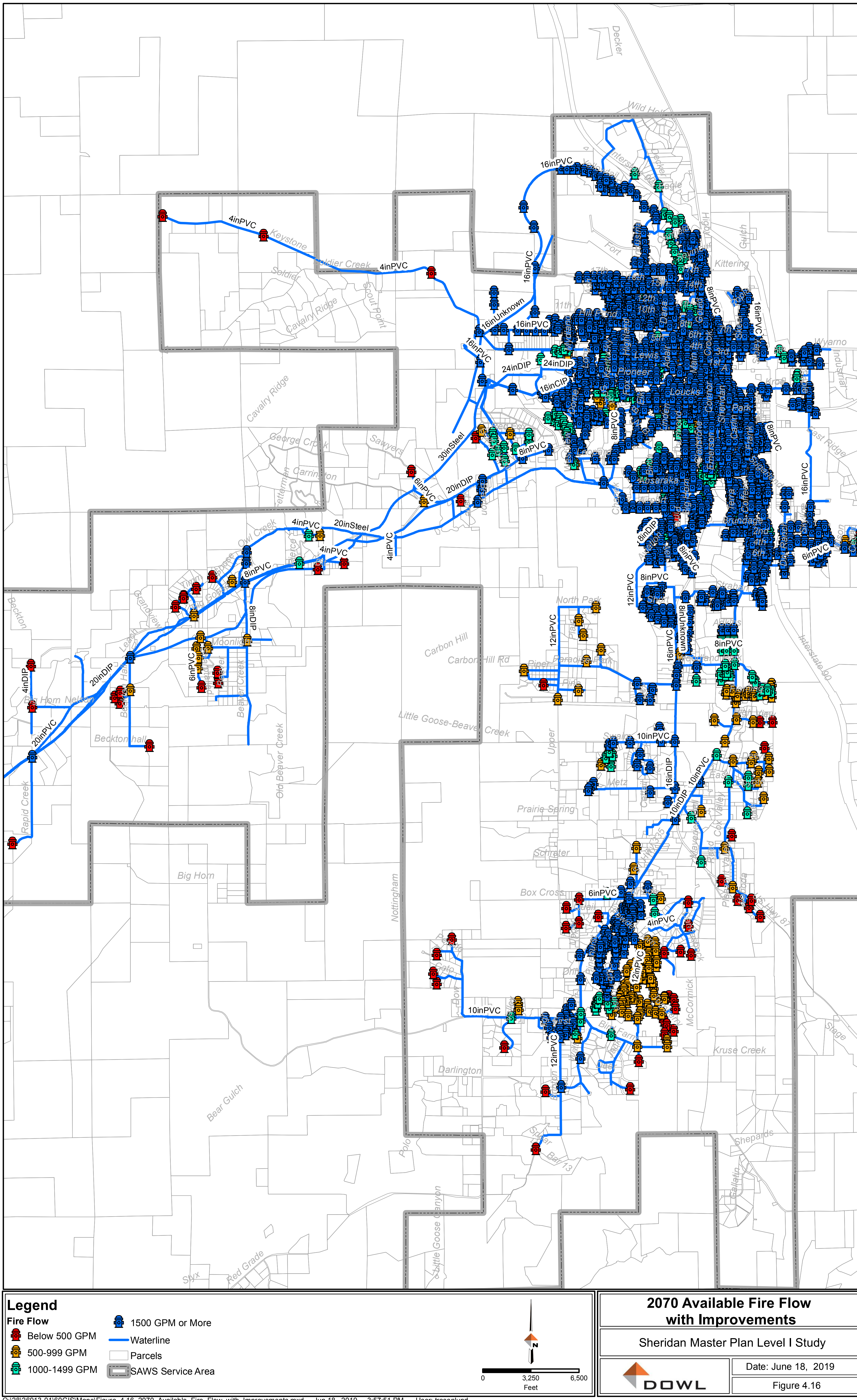
Sheridan Master Plan Level I Study

DOWL

Date: June 18, 2019

Figure 4.15

Q:\28\26913-01\60GIS\Maps\Figure_4.15_2070_Peak_Hour_with_Improvements_Model_Results.mxd Jun 18, 2019 3:41:52 PM User: trosenlund



2070 Available Fire Flow with Improvements

Sheridan Master Plan Level I Study

DOWL

Date: June 18, 2019

Figure 4.16

Q:\28\26913-01\60GIS\Maps\Figure_4.16_2070_Available_Fire_Flow_with_Improvements.mxd Jun 18, 2019 3:57:51 PM User: trosenlund

5.0 WATER SOURCE

5.1 WATER SOURCES AND WATER RIGHTS

This section discusses the water rights for this system, available water supply, reviews recent efforts to acquire additional supplies, updates estimates of future needs, reviews past studies of options for additional supply and updates recommendations on the future long-term water supply needs and options for acquisition.

Previous studies evaluated these topics in detail, and work under those studies was reviewed and referenced for this study. Each of these reports followed the previous one on the list. These previous studies were:

- HKM Engineering, City of Buffalo – Sheridan Area Water System – Lake DeSmet, Level I Study, June 2008.
- DOWL HKM, Sheridan Supplemental Supply Study Level II, Phase I, Final Report, May 2011.
- EnTech Inc., Sheridan Supplemental Storage Level II Phase II Study, Final Report, December 2013.

Another soon to be completed study that will be of value is the Powder/Tongue Northeast River Basin Plan update, which was also funded by the WWDC. This study documents water rights, basin hydrology, flows of rivers and streams, and compiles other data that will be of value for a large municipal water system such as this, especially as it continues to plan for future needs. This will become an important reference to utilize in the future planning for water supply issues for this water system.

As discussed in Section 2.3, Sheridan's water supply comes from the Big Goose watershed with diversions either from the flow of Big Goose Creek, or water released from storage that is then diverted at this same point. These water rights and associated quantities are discussed in more detail below.

All water in Wyoming is owned by the State. Rights to use that water are granted by the Wyoming State Engineer and administered by the Board of Control. Water rights for the Sheridan water system are overseen by the Division 2 Board of Control office located in Sheridan.

Wyoming water law is based on the doctrine of prior appropriation. This means that the first person to put water to beneficial use has the first right to use that water. Commonly referred to as "first in time, first in right", this is a particularly important concept for the Sheridan area water system as discussed later in this section.

A water right provides for the use of a specific amount of water by a specific user, but also defines that right's Point of Diversion, Means of Conveyance, Point of Use and Type of Use. If a water user wishes to modify any of these elements relating to a water right, a petition must be filed with the State Engineer to do so. Changes to a water right involve varying levels of detail and complexity and can, in some instances, result in reduction of the amount of the water right or change in the priority date. Therefore, any water right petition should be initiated only with a full understanding of the potential outcome. The potential consequences and details of water right changes are discussed in more detail later in this section.

The water rights for the Sheridan water system are summarized in the Table 5.1. This summary is from the 2011 Sheridan Supplemental Supply Study Level II, Phase I report, updated for shares acquired from Park and Dome through 2018. This Table 5.1, as well as Table 5.2 and Table 5.3 on available water supply, are discussed in more detail in this report and become very important in the calculation for additional water supply required.

Revisions and additions to previous work used in the analysis of water rights in this Master Plan include:

- Incorporating the additional shares acquired in Park and Dome through 2018.
- Since Sheridan provides the VAMC its raw water supply which can be up to 3.0 cfs, in the past this 3 cfs was subtracted from the available supply. Since the City can use any remaining amount, but the VAMC typically uses less than 1.0 cfs this was overly conservative to the available supply. In the table on Available Supply 1.0 cfs was subtracted during most of the year and 1.5 cfs was subtracted during the higher demand irrigation season. This calculation is still on the conservative side but is more in line with recent practices. The VA also has 60 ac-ft of storage in Park that can be used if their usage increases beyond what it has been in recent years.
- A 90-day irrigation season was used. According to the BOC, Big Goose typically does not go into regulation until about the second week in July (after Rodeo), so this seems correct. So generally, the months of July, August and September are used to represent the irrigation season. Restrictions on Big Goose go off on October 1st.
- A flow of 1 cfs was previously used as passing by the diversions point (not diverted and used) to cover times when flows from storage (or even part of the direct flow right) during the irrigation season that cannot always be diverted due to fluctuating demand or inability to adjust release from storage. It was debated where this allowance was overly conservative, but it was decided to leave this in the calculation since the entire water right cannot always be captured.

- The 569 ac-ft conservation pool in Twin Lakes will continue to not be included in the Available Supply calculations, but this can be used if fish are restocked, so this adds a safety factor to the calculations.

Water rights held by the City and JPB comprise both direct flow rights from Big Goose Creek, storage rights in Twin Lakes and ownership of shares in Park and Dome Lake Reservoirs, which are owned and operated by reservoir companies. The water rights for the two entities are itemized in the following table and described thereafter.

Table 5.1 - Water Rights for Sheridan Area Water System

WATER RIGHT	City			JPB		
	Priority Date	Amount	Comments	Priority Date	Amount	Comments
Big Goose Creek Direct Flow	November 1882	16.0 cfs	October 1 to April 30, up to 3 cfs allocated to VA[1,3]	1989	7.14 cfs	Generally available from October 1 into June
	November 1882	13.0 cfs	May 1 to September 30, up to 3 cfs allocated to VA[2,3]			
	June 29, 1891 to Nov. 23, 1906[6]	1.77 cfs[6]	1. Transfer from Alliance Ditch (Cloud Peak Annex) 2. For 80 days only			
	December 20, 1991	13.33 cfs	Very junior right, so is considered unavailable.			
	December 20, 1991	30.06 cfs	Very junior right, so is considered unavailable.			
Twin Lakes Storage Rights	1928, '55, '62, '89	2,967.7 ac-ft			408.7 ac-ft	
Park Reservoir, prior to 2015	1908, 1909, 1954, 1957, 1959, 1960	20.1 ac-ft[4]			189.9 ac-ft[5]	
Dome Lake Res, prior to 2015	1905, 1906, 1967	17.3 ac-ft[4]			29.4 ac-ft[5]	
Purchased from Park & Dome under the 2015 Level III		153.2 ac-ft	Park = 71.6, Dome = 81.6		75.4 ac-ft	Park = 35.2, Dome =40.2

[1]There may not always be 16 cfs in the creek, especially during the colder parts of winter. Also 16 cfs is not often needed during this period, so diversion is not at this flow rate. Diversions from October 1st through April currently typically remain <8 cfs.

[2]Direct flow right typically does not drop to 13 cfs until into July. So the time period for the reduced 13 cfs water right usually does not exceed 90 days.

[3]Up to 3 cfs can be supplied to the VAMC, but they typically take less than one-half this amount. The remainder can be used by the City.

[4]Total for City in Park = 91.7 ac-ft, and in Dome = 98.9 ac-ft; Total in both = 190.6 ac-ft.

[5]Total for SAWS in Park = 225.1 ac-ft, and in Dome = 69.6 ac-ft; for a total of 294.7 ac-ft.

[6]This direct flow right is also typically lost when Big Goose is regulated.

The water rights for the Sheridan area water system are further described as follows.

- **Territorial Direct Flow Rights –** Several Orders have been issued by the Board of Control (BOC) relating to the City's Points of Diversion and amount of appropriation for its territorial direct flow right. An important relatively recent order was No. 48, relating to diversion at the intake, which was issued in 1996 and provided clarification of the City's rights during stream regulation and appropriations at various Points of Diversion. On page 444 of this order it states that: for the period of October 1st to April 30th the City is allowed to divert 16.0 cfs from its primary point of diversion, and that during the period of May 1st to September 30th, if a call for regulation has been placed on Big Goose Creek, the City shall limit its diversion at this point to 13.0 cfs. (The call for regulation typically does not take place until into July, so this time period typically does not exceed 90 days). Order No. 48 is included in Appendix B.

- **Stream Regulation** – Between May 1st and September 30th (when under non-surplus conditions and a call for regulation has been placed on Big Goose Creek), the City's direct flow right is reduced to 13 cfs and the JPB's right is lost. Regulation occurs when irrigation demands impact the stream, typically in early to mid-July, so for this study, an irrigation season (Big Goose Creek being regulated so more junior water rights are not available) is assumed to be 3 months or 90 days.

- **Transfer from Alliance Ditch (Cloud Peak Annex) –** This water right transfer was completed in October 2009 via an Order issued by the Board of Control. See Appendix B. The City undertook this transfer from a large parcel of land which was annexed into the corporate limits. The extensive transfer process included detaching the right from the land being annexed, changing Point of Use to the municipal service area, moving the Point of Diversion and Means of Conveyance to the City's intake and transmission pipelines, and changing the Use from irrigation to municipal. Three water rights were involved, originally consisting of a flow of 4.46 cfs. The Order ultimately granted 1.77 cfs to be used only during 80 days of each year (281 ac-ft). This effort was a very good example of the complexity of transferring direct flow rights. The original priority dates of the three rights were maintained, however, the amount of the appropriation was reduced by about 60%. The Board made it clear that the transfer was granted largely because the original point of diversion was the Alliance Ditch headgate which is located very near the City's intake. Had the Point of Diversion change involved moving to the City intake from some point considerably downstream, the transfer may not have been granted. The bigger concern with these rights is their priority date. The BOC says that once Big Goose Creek goes into regulation they have to cut back to the 1886 water right for the Boulder diversion at this location on the creek. Therefore this 1.77 cfs cannot be relied upon as being available when Big Goose is in regulation, which is the irrigation season.

- **December 20, 1991 Rights –** Application was made for these rights during development of the regional system in anticipation of increased raw water conveyance capacity associated with the new 30-inch raw water transmission main. Due to their junior date, these rights are not considered usable for purposes of this study.

- **JPB 1989 Direct Flow Right –** Although quite junior, this direct flow right fulfills JPB system demands during the non-irrigation season when Big Goose Creek is not in regulation. When the stream goes into regulation, stored water is used for the JPB system.

- **Twin Lakes Storage Rights –** The Permit Summary from the State Engineer's Office is included in Appendix B. This summary includes a description of the various permits and enlargements of this facility. Twin Lakes is owned solely by the City. Water rights are shared and the operation and maintenance, and releases from the facility are managed by the City.

- **Twin Lakes Conservation Pool –** The permit to enlarge Twin Lakes requires a conservation pool of 569 acre-feet be maintained. If that pool is depleted, the City and JPB are obligated to restock the reservoir with 200 catchable trout (at least 8 inches long) per surface acre of full reservoir, or about 16,000 fish. An estimated cost to restock fish is about $50,000. While this cost is not unreasonable in the event of an emergency, it is not a cost desirable on a routine basis. It is also not good public policy to compromise this fishery. Therefore, for the purposes of this study, the conservation pool is assumed to not be used and is subtracted from the water rights. In addition, the volume of the pool is subtracted from the City and JPB rights respectively based on each entity's proportionate share of water rights in the entire reservoir.

- **10% Conveyance Loss –** In accordance with Board of Control policy, a loss of 10% is assumed for any water released from storage. That is, for any water released from mountain storage, only 90% can be diverted at the intake. This loss is applied in the Practical Available Supply tabulation for all stored water. Under very dry conditions, the BOC can increase this percentage, but for the purpose of this study, a 10% loss will be used and applied to the Practical Available Supply.

- **Shares in Dome Lake and Park Reservoirs –** Unlike Twin Lakes, Dome Lake and Park Reservoirs are owned and operated by non-profit corporations who sell shares to water users. Shares can be exchanged between users, but the water rights are held by the corporation. Having been originally permitted in the early 1900s, most of these water rights pre-date the Yellowstone River Compact. In addition, the Point of Use and Type of Use are very broadly defined in the permit. Therefore, water from these reservoirs can be used for many different purposes (including municipal) within about any lands of the Big Goose Creek drainage without the need to petition for a change in the water right. Therefore shares in these reservoirs can be acquired (and are) for the Sheridan water system. There is an on-going effort and open offer to willing sellers to purchase water from Park Reservoir.

- **VAMC.** In 1903 the City Council granted the VAMC up to 3 cfs of the City's direct flow right out of Big Goose Creek. In recent studies, this flow was deducted from Sheridan's direct flow right of 16 cfs when Big Goose Creek was not in regulation and its 13 cfs when it was in regulation. Since the City can use any of this flow that is not being used by the VA and the City conveys and meters flow to the VA via the 30-inch RWTM, and the VA typically uses <1 cfs, this allowance seemed overly conservative. To be more accurate in the calculations and to still maintain a level of conservatism to the available water supply to this water system (both City and SAWS), this allowance was reduced to 1.5 cfs during the irrigation season (Big Goose Creek is in regulation), and 1.0 cfs for the rest of the year. The VAMC also holds 60 ac-ft of storage in Park Reservoir that they could call for and would be delivered to their facilities via existing pipelines, should their need increase. It does not appear they have utilized this stored water in recent years. The City tracks deliveries to the VA through their master meter so this approach can also be revised in the future if determined necessary. With this deduction of 1.0 or 1.5 cfs, the allowance of water used by the VAMC is taken into account. The VAMC is a significant user and its usage must be included in the overall summary to accurately account for the total water consumed by system users and facilities.

- **Whitney Benefits.** Whitney Benefits holds 171.6 ac-ft of storage in Park Reservoir, and they have granted this water to the City for use in watering green spaces. Water for parks or other green spaces is treated and delivered in the same system as all other water, so this water is essentially combined with all City water that is diverted from Big Goose Creek. The use of Whitney water has been going on for many years and there is currently a 10-year contract for this supply. However, there is no guarantee that it will go on forever. Therefore, it is not included in the calculations of available water supply as shown in Table 5.2. This water is released at the rate of 1 cfs from the time Big Goose goes into regulation to the end of the water year on September 30th, or this supply is depleted, whichever occurs first. This release provides a contingency in the calculation and allows for other releases from storage to be reduced slightly since this water is present in the creek. At 1 cfs, it takes 86.5 days to consume this quantity, which is very close to the assumed time-period for Big Goose to be in regulation, which is 90 days.

- **City and SAWS JPB.** While these two entities each have their own water rights as listed in Table 5.1, per the Ownership Agreement, SAWS may use the portion of the City's senior direct flow right that is beyond their needs at that time.

- **Releases.** Once Big Goose Creek goes into regulation by the Board of Control, the City calls for releases from storage as needed to provide the water supply for the entire system that is beyond their reduced direct flow right. This release includes the 1 cfs of

Whitney water as mentioned above. The typical release rate is 5 cfs from Dome Lake Reservoir and then Park Reservoir. This amount is adjusted as needed by coordinating with the reservoir operators. Storage in Twin Lakes is saved for last (or if the releases from Park and Dome are not sufficient to meet unusually high demand), since the City has total control over its releases from Twin Lakes. This approach maximizes the use of direct flow water and water stored in Park and Dome.

- **Winter Flows.** As discussed, occasionally flows in Big Goose Creek drop to low levels in the winter when it becomes very cold, such that the water rights may significantly exceed the quantity of water available to divert. During these times it should be verified that minimum instream flows are being continually released from the mountain reservoirs, as required by the USFS and/or Wyoming Game & Fish. Reservoirs with minimum release requirements include Park and Sawmill, in addition to Twin Lakes.

As with any water system, not all the water rights can always be put into full production due to limitations in infrastructure or operational constraints. Infrastructure limitations are not currently an issue with the Sheridan water system due to improvements at the intake (completed in 2004) and installation of the 30-inch raw water transmission main (completed in 1996).

There are however, considerable operational constraints on the system due to the nature of the water rights and how they are administered. The following table itemizes the water rights and includes the operational constraints discussed above, to develop a realistic value for the amount of water that is practically available to divert into the Sheridan water system.

Table 5.2 - Available Water Supply for the Sheridan Area Water System – Entire Year

WATER RIGHT	City			JPB			
	Cubic ft/sec (cfs)	Comments/ Adjustments	Total ac-ft available	Cubic ft/sec (cfs)	Comments/ Adjustments	Total ac-ft available	
Direct Flow/Big Goose unregulated*	16	With allocation to VA, use 15 cfs available for 275 days. See Note #1 and discussion.	8,182.0	7.14	Assumed to be available 275 days/year	3,895.0	
	1.77	Available for 80 days, see Order Record No. 70, page 327	281.0				
Direct Flow/Big Goose in regulation*	13	With allocation to VA, use 11.5 cfs available for 90 days. See Note #1.	2053.0	0			
Twin Lakes Storage		2967.7 storage right - 500 conservation pool - 10% conveyance loss	2221.0		408.68 storage right - 69 allocation of conservation pool - 10% conveyance loss	306.0	
Park Reservoir		91.7 ac-ft - with a 10% conveyance loss.	82.5		225.1 ac-ft - with a 10% conveyance loss	202.6	
Dome Lake Reservoir		98.9 ac-ft - with a 10% conveyance loss.	89.0		69.6 ac-ft - with a 10% conveyance loss	62.6	
I							
Subtotal			12,908.5			4,466.2	**17,374.5**
Adjustment for Operational Conditions - see Note #2.			142.5			36	178.5
TOTAL AVAILABLE SUPPLY AT INTAKE			**12,766**			**4,430**	**17,196**

Assumptions:

1. City's territorial direct flow right is not called out of priority.
2. Twin Lakes conservation pool is not depleted.
3. Big Goose is assumed to be unregulated 275 days per year.

***Direct flow rights are only diverted when sufficient demand is present to do so. Unused direct flow rights are "lost" to the system, so the "apparent total available supply" is not actually "available" (usable). Diversions from Oct. thru April currently seldom exceed 7 cfs.

Notes

1. Up to 3.0 cfs is allocated to the VAMC, however what they do not use is available to the City. Since they seldom use over 1 cfs, 1 cfs will be allocated to the VA in the non-irrigation months & 1.5 cfs in the irrigation months. (These allocations are slightly high based on recent years).

2. Under Operational Conditions an additional 1 cfs is subtracted from the available water supply during the irrigation season as "not divertible" as it is difficult to divert all the water available or that is released from storage and passes the diversion. This 1 cfs is split 80/20 City and SAWS.

3. Whitney Benefits has granted their stored water in Park Res to the City for the past several years, and this is continuing at this time. This water is released at the rate of 1 cfs from the time Big Goose Creek goes into regulation till the end of September, thus providing an additional contingency in these calculations during the irrigation season.

4. This amount of water available at the Intake (17,196 ac-ft) can be misleading because much of this water supply is not divertible because it is available when it is not needed, and the creek may not always have 16 cfs in it in the winter.

Table 5.3 - Available Water Supply for the Sheridan Area Water System – Irrigation Season

WATER RIGHT	City			JPB			
	Cubic ft/sec (cfs)	Comments/ Adjustments	Total ac-ft available	Cubic ft/sec (cfs)	Comments/ Adjustments	Total ac-ft available	
Direct Flow/Big Goose unregulated*	16	With allocation to VA, use 15 cfs available for 275 days. See Note #1 and discussion.	0	7.14	Assumed to be available 275 days/year	0	
	1.77	Available for 80 days, see Order Record No. 70, page 327	0				
Direct Flow/Big Goose in regulation*	13	With allocation to VA, use 11.5 cfs available for 90 days. See Note #1.	2053.0	0			
Twin Lakes Storage		2967.7 storage right - 500 conservation pool - 10% conveyance loss	2221.0		408.68 storage right - 69 allocation of conservation pool - 10% conveyance loss	306.0	
Park Reservoir		91.7 ac-ft - with a 10% conveyance loss.	82.5		225.1 ac-ft - with a 10% conveyance loss	202.6	
Dome Lake Reservoir		98.9 ac-ft - with a 10% conveyance loss.	89.0		69.6 ac-ft - with a 10% conveyance loss	62.6	
I							
Subtotal			4445.5			571	**5016.5**
Adjustment for Operational Conditions – - Less loss of 1 cfs as "not divertible". - Less allowance for 10% of Twin Lakes capacity being used outside of the irrigation season.			142.5 222			36 30	178.5 252
TOTAL AVAILABLE SUPPLY AT INTAKE			**4081**			**505**	**4586**

Assumptions:

1. City's territorial direct flow right is not called out of priority.
2. Twin Lakes conservation pool is not depleted.
3. Big Goose is assumed to be unregulated 275 days per year.

***Direct flow rights are only diverted when sufficient demand is present to do so. Unused direct flow rights are "lost" to the system, so the “apparent total available supply” is not actually “available” (usable). Diversions from Oct. thru April seldom exceed 7 cfs.

Notes

1. Up to 3.0 cfs is allocated to the VAMC, however what they do not use is available to the City. Since they seldom use over 1 cfs, 1 cfs will be allocated to the VA in the non-irrigation season & 1.5 cfs in the irrigation season. (These allocations to the VA are high based on recent years).

2. Under Operational Conditions an additional 1 cfs is subtracted from the available water supply during the irrigation season as "not divertible" as it is difficult to divert all the water available or that is released from storage and passes the diversion. This 1 cfs is split 80/20 City and SAWS.

3. Whitney Benefits has granted their stored water in Park Res to the City for the past several years, and this is continuing at this time. This water is released at the rate of 1 cfs from the time Big Goose Creek goes into regulation till the end of September, thus providing an additional contingency in these calculations during the irrigation season.

4. 10% of the available storage in Twin Lakes is subtracted off in Operational Conditions to allow for some diversion of Twin Lakes water at times other than the 90-day irrigation season.

5. The 1.77 cfs in BOC order #70 has priority dates of 1891 – 1906, and since regulation at this particular diversion location is typically back to 1886, it will not be counted on as available during the irrigation season.

Regarding the regulation of Big Goose Creek and more senior water rights:

- **Stream Regulation –** Between May 1 and September 30 (when under non-surplus conditions and a call for regulation has been placed on Big Goose Creek), the City's direct flow right is reduced to 13 cfs and the JPB's direct flow right is lost. Regulation occurs when irrigation demands are placed on the stream in early summer. Regulation typically occurs in early to mid-July, so for this study, an irrigation season (Big Goose Creek being regulated so more junior water rights are not available) is assumed to be 3 months or 90 days.

- **Priority of Rights –** There are six direct flow water rights on Big Goose Creek with higher priority than the City's territorial right, as documented in the following table.

Table 5.4
Senior Direct Flow Rights

Territorial Right	Location	Priority Date	Flow Rate
Flume Ditch	S. side of BG highway, near Kendrick Golf Course (SE¼ Sec 32, T56N, R84W)	10-12-1882	4.86 CFS
Robinson & Hardee	1½ miles east of Beaver Cr Rd intersection (NE¼ Sec1, T55N, R85W)	10-15-1882	3.57 CFS
Daisy	¾ mile west of Beaver Cr Rd intersection (NW¼ Sec 11, T55N, R85W)	10-19-1882	4.88 CFS
Owl	Beckton Road intersection (SW¼ Sec 9, T55N, R85W)	10-20-1882	3.29 CFS
N.B. Held	Just west of City Limits (NW¼ Sec 33, T56N, R84W)	11-01-1882	2.14 CFS
No. 9	Approx 3 miles downstream of City intake	Fall 1882	7.01 CFS
Total Appropriations Senior to City			**25.75 CFS**

Therefore, it is possible that the City's territorial right could be unusable if any of those rights could not be fulfilled and they placed a call on the stream. There is no record of this every occurring, but there have been two instances since 2000 that the City's right was next in line to be called. The City successfully worked with these right holders to keep that from happening.

5.2 FUTURE WATER SOURCES

The 2011 and 2013 Supplemental Supply studies assessed alternatives to provide additional water supply for the Sheridan area water system in great detail. A summary of that assessment and recommendations are included here. This summary includes recommendations for the pursuit of additional supply for this 2019 report. The previous studies provide more detail on the background and their recommendations should that be desired.

Alternatives originally considered in these Supplemental Supply studies for this water system included the following strategies.

- Conservation
  - Reduce water use
  - Improve system efficiencies
    - Shared improvements with agriculture

- Acquire existing water rights
  - From lands that are annexed or come out of production
  - Senior direct flow rights on Big Goose Creek
  - Existing mountain storage, including acquisition of Sawmill Reservoir

- Enlarge existing storage facilities
  - Twin Lakes
  - Sawmill Reservoir
  - Weston Reservoir

- Develop new storage
  - In the Big Horn Mountains
  - Off channel, lower elevation sites
- Owl Creek Drainage
- Gillispie Draw
  - Little Goose Drainage

- Lake DeSmet
- Groundwater

Since the completion of the Supplemental Supply studies, shares of storage Park and Dome Lake Reservoirs continue to be acquired as willing sellers come forward. Per a 2015 WWDC grant, the City and SAWS can acquire up to 2000 ac-ft from Park Reservoir as it becomes available. From a review of the Hydrographer's Reports for the last 10 years, typically at least 2500 ac-ft remains unused at the end of the water year in Park and 1000 ac-ft remains unused in Dome.

As far as additional water supply in the Big Goose Drainage is concerned, the acquisition from Park and Dome was ranked #1. This continued acquisition is strongly supported and recommended by this study.

The 2011 Phase I Supplemental Supply Study and the follow-on 2013 Phase II study examined other options for additional long-term water supply that are not recommended at this time. These are briefly summarized below:

- Sawmill. Due to the asking price, its post-1950 rights, access issues, upgrading needed, and its estimated limited firm yield of 881 ac-ft/year.
- Dome beyond willing sellers coming forward at a reasonable cost.
- Gillespie Draw. Many reasons including the estimated cost, limited size and water quality concerns.
- Weston Reservoir. This is a small (370 ac-ft) reservoir in Big Goose drainage with pre-1950 water rights. Questions have arisen in the past as to whether this reservoir is being used. The outlet gate stays open which allows the majority of the flow in Babione Creek to flow through. It does fill during runoff however, and then releases this stored water during the summer. Weston is owned by the Park Reservoir Company, and according to Mike Connell, President, this flow is used by their associated agricultural rights holders. If Weston was to be acquired for municipal, there is considerable upgrading of the access road and the dam and spillway needed. Considering all of the above, Weston is not seen as part of the future water supply for Sheridan. A considerable investment is needed for a small quantity of water.
- Acquiring abandoned water rights or from development. These should continue to be examined and acquired when advantageous based on the several factors discussed in the Phase I report, but very unlikely to become a significant amount of water. (Developers should evaluate for raw water irrigation systems for the particular development).
- Conservation. While conservation is encouraged, including pricing water with tiered water rates, it is not seen as an approach to reduce the additional long-term supply required.
- Deeper Groundwater. The WWDC funded numerous studies that included hydrogeologic investigations that evaluated local aquifer systems as a source of water for the Sheridan area in the 1980s. The extensive evaluations of the groundwater resource in the Sheridan area are summarized as follows, while more information is detailed in the Supplemental Supply studies. Areas most likely for developing a Madison Aquifer well were identified, since studies suggested this would probably be the most viable aquifer for larger production wells. Two test wells were drilled, including one at the Intake site along Big Goose Creek (which was drilled to 2538 feet). This well yielded about 25 gpm, and the other well (Little Goose

well) yielded about 90 gpm. The Little Goose well was deepened in 1985 with no increase in yield.

- Other Groundwater. The use of individual shallow wells (40 to 300 feet total depth) was dismissed in the 1980's from further consideration due to water quality and quantity problems experienced with existing wells in the Little Goose Valley. It was recommended at that time that the cost per user of a centralized water system using groundwater was cost prohibitive. The Sheridan area water system was constructed partially to resolve problems experienced with groundwater supplied by individual wells. In addition, it was concluded, that exhaustive investigations have proven that groundwater is not feasible for consideration as a source for this regional water system. Based on the results of the previous investigations, groundwater was not considered further for the needed supplemental supply in the previous studies.

Given the above, the following is the recommended approach for additional long-term water supply:

- The acquisition of shares in Park (and Dome) be continued, but it appears this will not total more than 1000 ac-ft so while important and valuable, there are limitations in total volume that will result.

- The significant additional long-term water supply is anticipated to come from Lake DeSmet, with consideration of the streams that supply it as well as the higher elevation reservoirs regarding the location of points of diversion and a WTP. This source also has the advantage in that it is not in the Big Goose watershed. The Lake DeSmet option is discussed further in Section 7.3

5.3 WATER QUALITY

The Sheridan water system receives its water supply from the Big Horn Mountains as snowmelt and runoff from rainfall. This is a very high-quality raw water supply and the operators of the WTPs do an excellent and consistent job of treatment. The maintaining of the treated water quality and the quality throughout the system is a significant responsibility and is taken seriously by all operators of this system.

Drinking water quality is regulated under the federal Safe Drinking Water Act (SDWA). In Wyoming, the enforcement of the SDWA is by the Region 8 Office of the US Environmental Protection Agency (EPA), not the State. Each Public Water System (PWS) must comply with the requirements of this act, even if they obtain their water supply from another system. The Sheridan water system operates under one PWS number (WY5600052).

The SDWA has established maximum contaminant levels (MCLs) for many contaminants that can be found in the water. These limits are established based on demonstrated health concerns. This act has established several separate rules that must be complied with. The rules, list of contaminants, and required monitoring and reporting are available at https://www.epa.gov/dwstandardsregulations. These rules are summarized below for Sheridan:

- Source Water Quality. Water leaving the WTPs must comply with the following:
  - Long Term 2, Enhanced Surface Water Treatment Rule (LT2)
  - Inorganic Chemicals
  - Organic Chemicals
  - Filter Backwash Rule
  - Disinfection ByProducts (total organic carbon or TOC; a 35% reduction is required in the treatment process).

- Distribution Water Quality. Throughout the system, the water quality must be maintained to comply with:
  - The Total Coliform Rule (TCR)
  - Disinfection ByProducts (DBPs) (see discussion below)
  - Lead & Copper Rule
  - The water shall conform to corrosivity requirements
  - The proper chlorine residual shall be maintained.

- Other rules:
  - Certified Operators.
  - Reporting rules (reporting monitoring and water quality results to EPA).
  - Consumer Confidence Rule (CCR) (the annual water quality report that must be provided to all users on the system).

The two rules that are the most challenging are LT2 and DBPs. The recent major WTP upgrade project has made compliance with LT2 much easier. One of the primary requirements of LT2 is consistently maintaining a low treated water turbidity level. Turbidity is to be kept under 0.15 NTUs, which can be a challenge. However, with recent plant improvements, it is working, and the effluent stays <0.05 over 99% of the time. Maintaining this low turbidity level helps remove microbial contaminants that can be a concern with a surface water source and reduces organic levels to help compliance with TOC removal and DBP concentrations. The WTP upgrades included better control – both automatic and operator. The plants are now more automated for greater accuracy of chemical feed. Table 5.4 shows the recorded data on TOC at each WTP in the past and Table 5.5 and Table 5.6 show water quality analytics for past years of BGWTP and SWTP, respectively.

Table 5.4 – TOC History 2010 to 2017

	Sheridan Plant				Big Goose Plant			
Year	**Influent**	**Effluent**	**% Removal**	**Alkalinity**	**Influent**	**Effluent**	**% Removal**	**Alkalinity**
2010	2.6	1.4	41%	30	2.6	1.4	39%	26
2011	2.5	1.3	41%	32	2.6	1.3	41%	29
2012	2.3	1.2	45%	32	2.3	1.2	49%	29
2013	2.3	1.3	40%	31	2.3	1.3	40%	29
2014	2.7	1.5	39%	26	2.8	1.5	40%	27
2015	2.6	1.4	40%	29	2.6	1.4	40%	27
2016	2.3	1.3	40%	27	2.3	1.2	45%	27
2017	2.6	1.6	36%	29	2.6	1.4	45%	27
AVERAGE	2.5	1.4	40%	29.3	2.5	1.3	42%	27.4
PEAK	2.7	1.6	45%	32	2.8	1.5	49%	29

Table 5.5 – BGWTP Yearly Water Analysis 2012 to 2017

CITY of SHERIDAN, WYOMING
BIG GOOSE WATER TREATMENT PLANT
YEARLY WATER ANALYSIS 2012 Through 2017

Date	Temperature Celsius		Color Units		Chlorine (mg/L)	pH Units		Sulfate (mg/L)	Alkalinity (mg/L)		Hardness (mg/L)		Turbidity NTU		TDS (mg/L)		UV 254 TOC		Fluoride (mg/L)		Airport CL2
	Raw	Fin	Raw	Fin	Fin	Raw	Fin	Raw	Raw	Fin	Raw	Fin	Raw	Fin	Raw	Fin	Raw	Fin	Raw	Fin	(mg/L)
2012																					
MIN	0.4	1.3	5.0	0.0	1.1	6.0	5.9	0.0	10.0	13.0	10.0	10.0	0.9	0.0	13.5	31.6	0.0	0.0			0.9
MAX	17.3	18.4	103.0	3.0	2.3	8.0	9.0	1.0	40.0	66.0	38.0	44.0	9.7	0.1	41.2	68.4	0.2	0.0			2.5
AVG	7.2	8.3	25.6	0.5	1.5	6.9	7.5	0.0	26.8	35.3	25.1	27.1	2.1	0.0	29.8	52.0	0.1	0.0			1.4
2013																					
MIN	0.3	1.5	3.0	0.0	1.2	6.0	5.9	0.0	13.0	15.0	10.0	12.0	0.7	0.0	11.8	29.3	0.0	0.0			0.9
MAX	16.8	17.7	390.0	3.0	2.2	8.5	9.3	0.0	44.0	54.0	42.0	44.0	40.3	0.1	45.7	67.3	0.3	0.0			1.6
AVG	6.2	7.5	32.3	0.5	1.5	7.1	7.5	0.0	28.8	34.9	24.9	28.1	2.9	0.0	28.6	47.2	0.1	0.0			1.2
2014																					
MIN	0.6	1.7	5.0	0.0	0.8	6.2	6.0	0.0	12.0	13.0	12.0	12.0	0.6	0.0	12.4	31.2	0.0	0.0	0.0	0.0	0.0
MAX	16.7	17.7	110.0	6.0	2.2	8.9	9.5	1.0	48.0	75.0	48.0	52.0	15.4	0.4	48.8	84.5	0.2	0.0	0.1	0.1	0.1
AVG	5.7	7.0	26.8	0.6	1.6	7.5	7.5	0.0	26.4	33.6	26.7	28.9	1.8	0.0	28.0	48.6	0.1	0.0	0.0	0.0	0.0
2015																					
MIN	0.5	1.6	6.0	0.0	1.1	7.3	5.1	0.0	0.0	0.0	10.0	12.0	0.7	0.0	0.0	21.8	0.0	0.0	0.0	0.0	0.0
MAX	16.3	17.6	380.0	7.0	2.5	8.7	8.8	0.1	36.0	42.0	40.0	50.0	37.4	4.5	52.4	63.9	55.9	2.0	0.6	1.2	2.3
AVG	6.6	8.3	28.4	0.5	1.6	7.9	7.5	0.0	24.2	29.8	26.1	29.8	2.8	0.2	27.1	46.4	11.4	0.7	0.1	0.3	1.4
2016																					
MIN	0.5	1.7	4.0	0.0	1.2	0.0	5.4	0.0	6.0	10.0	10.0	12.0	0.8	0.0	10.9	23.5	0.0	0.0	0.0	0.1	0.9
MAX	16.4	17.8	90.0	4.0	2.3	8.6	9.0	4.0	37.0	44.0	50.0	54.0	7.9	0.1	34.5	55.6	0.9	0.2	0.2	1.2	1.9
AVG	6.6	8.5	26.3	0.4	1.6	7.8	7.6	0.3	25.0	29.8	25.7	29.1	2.6	0.0	24.9	44.6	0.1	0.0	0.1	0.7	1.4
2017																					
MIN	0.1	1.6	7.0	0.0	1.3	6.6	5.8	0.0	11.0	2.0	8.0	15.0	1.0	0.0	12.2	4.4	0.0	0.0	0.0	0.1	0.7
MAX	16.7	18.2	225.0	14.0	2.1	9.0	9.1	8.0	44.0	73.0	46.0	50.0	38.8	0.3	40.0	62.8	0.3	0.0	0.1	1.1	1.9
AVG	6.1	7.9	31.4	0.4	1.6	7.9	7.6	0.8	26.3	33.1	26.9	31.3	3.7	0.0	25.7	47.7	0.1	0.0	0.1	0.8	1.4
2012-2017																					
MIN AVG	0.4	1.6	5.0	0.0	1.1	5.4	5.7	0.0	8.7	8.8	10.0	12.2	0.8	0.0	10.1	23.6	0.0	0.0	0.0	0.0	0.6
MAX AVG	16.7	17.9	216.3	6.2	2.3	8.6	9.1	2.4	41.5	59.0	44.0	49.0	24.9	0.9	43.8	67.1	9.6	0.4	0.2	0.9	1.7
2012-2017	6.4	7.9	28.5	0.5	1.6	7.5	7.5	0.2	26.2	32.8	25.9	29.1	2.7	0.1	27.3	47.8	2.0	0.1	0.1	0.5	1.1

Table 5.6 – SWTP Yearly Water Analysis 2012 to 2017

CITY of SHERIDAN, WYOMING
SHERIDAN WATER TREATMENT PLANT
YEARLY WATER ANALYSIS 2012 Through 2017

Date	Temperature Celsius		Color Units		Chlorine (mg/L)	pH Units		Sulfate (mg/L)	Alkalinity (mg/L)		Hardness (mg/L)		Turbidity NTU		TDS (mg/L)		UV 254 (mg/L)		Fluoride (mg/L)	
	Raw	Fin	Raw	Fin	Fin	Raw	Fin	Raw	Raw	Fin	Raw	Fin	Raw	Fin	Raw	Fin	Raw	Fin	Raw	Fin
2012																				
MIN	2.1	4.6	2.0	0.0	0.8	6.0	6.1	0.0	16.0	14.0	10.0	10.0	0.5	0.0	13.0	40.3				
MAX	19.7	18.9	80.0	3.0	2.1	8.1	8.9	8.6	48.0	60.0	50.0	50.0	8.2	0.1	48.0	77.6				
AVG	8.7	11.6	21.6	0.0	1.4	7.1	7.6	0.5	32.9	38.6	26.8	26.5	1.6	0.0	30.6	56.8				
2013																				
MIN	2.2	6.9	4.0	0.0	1.0	6.4	6.7	0.0	15.0	17.0	10.0	8.0	0.5	0.0	7.5	0.0	7.8	0.0		
MAX	18.2	18.9	280.0	4.0	1.9	9.0	8.8	1.7	55.0	56.0	50.0	56.0	14.5	0.1	61.9	70.0	29.2	0.0		
AVG	8.9	11.6	30.9	0.1	1.4	7.7	7.6	0.4	28.9	31.0	25.5	25.6	1.8	0.0	29.7	45.7	12.5	0.0		
2014																				
MIN	2.0	6.6	3.0	0.0	0.8	6.4	7.0	0.0	2.0	2.0	0.0	0.0	0.4	0.0	13.4	37.1	0.0	0.0	0.0	0.0
MAX	19.0	17.0	265.0	2.0	2.6	8.3	9.1	4.8	50.0	44.0	42.0	54.0	22.2	0.1	56.4	64.1	31.9	0.1	0.4	0.1
AVG	7.6	10.8	25.8	0.0	1.5	7.8	7.7	0.9	27.6	27.7	15.3	15.0	1.5	0.0	28.4	50.7	14.2	0.0	0.0	0.0
2015																				
MIN	2.3	4.7	4.0	0.0	0.8	6.9	6.4	0.0	13.0	7.0	7.0	10.0	0.5	0.0	3.5	30.4	0.0	0.0	0.0	0.0
MAX	17.4	17.2	412.0	7.0	2.6	8.3	8.8	2.0	37.0	42.0	32.0	34.0	38.1	0.3	36.6	58.6	36.4	0.2	0.2	1.0
AVG	8.3	10.4	28.3	0.2	1.5	7.9	7.5	0.4	28.9	29.7	18.9	20.1	1.8	0.0	27.5	49.9	6.7	0.0	0.0	0.6
2016																				
MIN	2.1	4.0	4.0	0.0	1.1	6.8	6.3	0.0	0.0	12.0	15.0	8.0	0.6	0.0	0.0	12.5	0.0	0.0	0.0	0.0
MAX	17.3	17.2	116.0	4.0	2.9	8.7	8.5	14.0	38.0	41.0	44.0	44.0	13.6	1.7	40.1	63.2	1.2	0.8	0.2	1.2
AVG	8.7	10.0	22.7	0.1	1.7	7.8	7.6	6.9	14.0	28.1	26.5	23.5	2.6	0.3	3.1	36.8	0.4	0.2	0.1	0.6
2017																				
MIN	4.0	7.2	7.0	0.0	1.1	7.7	7.5	0.0	33.0	35.0	26.0	28.0	0.5	0.0	31.2	54.7	0.2	0.1	0.0	0.3
MAX	5.8	8.9	22.0	1.0	2.1	8.2	7.9	1.0	35.0	41.0	28.0	30.0	1.6	0.0	35.7	62.5	0.2	0.1	0.1	0.9
AVG	4.8	7.9	10.3	0.0	1.7	8.0	7.7	0.3	33.5	36.5	27.0	29.5	0.8	0.0	33.4	56.9	0.2	0.1	0.0	0.6
2012-2017																				
MIN AVG	2.5	5.7	4.0	0.0	0.9	6.7	6.7	0.0	13.2	14.5	11.3	10.7	0.5	0.0	11.4	29.2	1.6	0.0	0.0	0.1
MAX AVG	16.2	16.4	195.8	3.5	2.3	8.4	8.7	5.4	43.8	47.3	41.0	44.7	16.4	0.4	46.5	66.0	19.8	0.2	0.2	0.8
2012-2017	7.8	10.4	23.3	0.1	1.5	7.7	7.6	1.6	27.6	31.9	23.3	23.4	1.7	0.1	25.5	49.4	6.8	0.1	0.0	0.5

The Sheridan water system has a good history of complying with the SDWA requirements. The most recent CCR (for 2017) again reports “no violations of the SDWA rules”, for example.

DBPs consist of two constituents:

- Total Trihalomethanes (TTHMs), which must be kept under 80 parts per billion (ppb)
- Five Halo Acetic Acids (HAA5s), which must be kept under 60 ppb.

Both DBPs must comply with the MCLs in their locational running annual average of the quarterly samples. TTHMs generally increase in concentration with the detention time in the system, so can be a challenge at the far end of the system such as the Big Horn area.

Temperature also affects DBP levels, so late summer at the far ends of the system are the most concern.

DBP levels are maintained in certain locations by monitoring and periodic flushing. The flushing of lines is a routine practice and should be performed regularly (at least annually) for lines in all systems that do not experience adequate turnover. This is done well in this water system. In order to reduce DBP levels in the Big Horn area, it is proposed to add mixing and aeration to the Big Horn tank. No further improvements are thought to be needed at this time for this water system regarding water quality.

The other two important distribution system rules are lead and copper and TCR. This system has a very good history of compliance with these MCLs.

In summary, the key water quality parameters are summarized as follows, using results from the 2015 – 2017 CCRs. Again, these concentrations are within the requirements of the SDWA.

- Treated water from the WTP:
    - Turbidity levels: Typically 0.03 – 0.04 NTU, range of 0.02 – 0.23 NTU
    - TOC reduction: averages 40 – 43%.
- Water quality throughout the system:
    - TTHMs: average 46 ppb (parts per billion), range 15 – 89 ppb
    - HAA5s: average 43 ppb, range 16 – 89 ppb
    - Lead: range of 0 – 4 ppb, MCL is 15 ppb
    - Chlorine residual: Average of about 1.2 mg/L, range of 0.12 – 2.0 mg/L.

Routine monitoring of water quality is performed both at the WTP to verify the treatment process, and throughout the water system. This monitoring is in addition to the required monitoring and reporting under the SDWA. Most of the QC monitoring at the WTPs is for the basic parameters of temperature, pH, color, alkalinity, hardness, total dissolved solids, fluoride, sulfates and UV 254 for TOC. This is a high-quality water supply that is naturally low in dissolved minerals (TDS) and hardness. Refer to Tables 5.4 – 5.6 for typical routine monitoring data.

Throughout the system, the primary routine parameter monitored is chlorine residual. These measurements are taken in many locations throughout the system. The goal is to maintain a free residual of 0.2 mg/L throughout the system. Records are maintained of this monitoring and if a concern is found, flushing is performed.

With the source water being the Big Goose watershed, it is important to consider how the nature of this watershed affects water quality. A Watershed Control Plan (WCP) was prepared in 2015. This plan was initiated by EPA regulations to help control microbiological pathogens in surface water supplies for municipal water systems. This WCP provides an outline for identification of potential sources of one waterborne pathogen in particular – *Cryptosporidium* (*Crypto*), which is a potential concern in a watershed such as Big Goose. The effort for implementing the plan is a partnership between the City of Sheridan, SAWSJPB, Sheridan County, the US Forest Service, and the Sheridan County Conservation District. One of the implementation steps is additional monitoring for *Crypto*, which has been performed on a monthly basis at the raw water intake facility since 2004. Another important action item is creating an awareness of this watershed being the drinking water source for Sheridan. This is especially important given the recreational nature of this watershed.

Water sampling in recent years has not detected *Crypto* in the raw water source. Having low levels of *Crypto* in the raw water source and an effective treatment process is very important because *Crypto*, unlike bacteria, are not easily killed with chlorine. The recent upgrading of the WTPs with the resulting low treated water turbidity levels (typically less than 0.04 NTUs as noted above), is an effective way to provide assurance that this drinking water supply is as free of *Crypto* as is reasonably possible.

The capacity and baffling of the clearwells at each WTP satisfy the CT requirements (free chorine residual level and contact time) as required for these plants. The added 1.5 MG storage at the BGWTP, and the recent upgrading of the 4 MG tank at the SWTP help with this point considerably.

Another water quality concern that has been discussed recently and is worth mentioning is the impact a wildfire would have on water quality (see the summary of the related study in Section 2.2.3). A wildfire in one of several critical locations in the Big Goose watershed would have major negative impacts on water quality. This problem has occurred at other water systems in the west that have watersheds in their nearby mountains, such as in Colorado. Sediment loadings can increase significantly which by itself causes a major impact to the facilities and treatment capabilities. Organic levels also increase exponentially causing both treatment and finished water quality problems. If fire suppression chemicals are used on the fire, these also result in a negative impact water quality.

One last water quality concern that just came up this spring was a very high turbidity event in the raw water supply due to a landslide above the intake facility (landslide was caused by heavy rainfall), that brought a substantial loading of soil and sediment into Big Goose Creek. While the raw water turbidity typically remains under 700 NTUs during spring runoff, and there is only one event in recent memory where it exceeded 1000 NTUs, this 2019 landslide event resulted in short-term turbidity levels of 3400 NTUs. This level of turbidity was difficult for the SWTP to treat and the BGWTP was shut down for about 2 days.

This page intentionally left blank.

6.0 GROWTH AND DEMAND PROJECTIONS

6.1 POPULATION AND POPULATION GROWTH

This section discusses population and population growth projections for the study area. Historical information on population growth, population projections, and various sources for estimated population growth were considered. Sources reviewed, and a summary of their projections include:

Sheridan Supplemental Supply Study Level II, Phase I, Final Report; DOWL HKM; May 2011.

Following their analysis this Phase I study used a 2% annual growth rate for City and 3% for SAWS.

Sheridan Supplemental Storage Level II Phase II Study, Final Report; EnTech Inc.; December 2013.

This Phase II study used the same 2% growth rate for the City and 3% for SAWS, for a 50-year period, to the year 2063. These growth rates were then used to estimate the additional water supply needs for the Sheridan area water system.

Buffalo – Sheridan Area Water Supply – Lake DeSmet, Level I Study; Final Report; HKM Engineering; June 2008.

This study estimated an annual growth rate for the first 10 years (through 2016) of 2.2%, but also presented a lower growth scenario of 1.3%. It then used an annual growth rate of 1.5% for the next 40 years. At the time of these projections, there was considerable growth taking place due to energy development (primarily coal bed methane), which has since cooled.

Sheridan Joint Planning Area Land Use Plan; Orion Planning – Design; 2017.

This study states that “beginning in the 1990’s the City has had a relatively stable growth rate of approximately 1.3% per year”.

The US Census 1970 – 2010, shows Sheridan County averaging 0.83% growth, and the City of Sheridan averaging 0.80% growth.

The State Economic Analysis Division of the Department of Administration & Information uses lower growth projections of 0.65% for both Sheridan County and the City of Sheridan.

Based on the growth of the number of water taps over the past 11 years, there has been a growth rate of 1.66% for the SAWS service area and 1.21% for the City. Both of these service areas continue to experience growth.

Starting from the year 2019, estimates for 30 and 50-year projections (actually 31 and 51 years to consider water needs for the years of 2050 and 2070), were prepared.

The above sources illustrate that different growth rates may occur. The increase in water users has been steady, significant and is expected to continue. It is believed that the growth that was happening prior to the 2011 and 2013 Supplemental Supply studies was unusually high for this area, and growth rates of 2% and 3% will not be used for this study. As noted above the most recent local planning document states that "in recent years the City has had a relatively stable growth rate of approximately 1.3% per year."

As discussed in the next section, Equivalent Dwelling Units (EDUs) will be used when assessing the current service area and estimating the future numbers, both for EDUs themselves and the more important water needs. While population projections will be made, projections for EDUs are the more important criteria. EDUs may grow faster than population as businesses are added that have larger meters and service lines with limited additional population, so it is recommended to use a growth rate at least equal to what is used for population. Also, as we look to future water needs, if more water than necessary is obtained, it will be there for a future beyond what is projected, but it will not be a wasted effort. These analyses and projections need to be periodically reviewed and updated.

Therefore, when all is considered, it is recommended that a growth rate of 1.75% be used for future population projections and for the number of both users and EDUs. The same rate will be used for estimated growth for both the City and SAWS service areas.

In summary, this growth rate is believed to be appropriate for the following reasons:

- The 2% and 3% growth rates of the 2011 and 2013 studies have been determined to be too high and should not be used at this time.
- The latest planning document (see above) states a growth rate of 1.3% for the City. The growth rate in the rural (SAWS) service area has been higher.
- The growth in number of users (taps) in recent years has been 1.66% for SAWS and 1.21% for the City.
- With this being a regional system (serving both in-town and rural users), and with the issues that exist with water supply for homes that are not on this system, the growth rate on this water system will be greater than the growth rate in the County as a whole.

Therefore, this growth rate is seen as being only slightly conservative (includes a modest factor of safety) considering the estimated growth rates of 1.3% and 1.66% stated above. It is also believed that slightly conservative is preferred when securing additional water supply due to the long-term nature of this endeavor.

Using a 1.75% growth rate for population and the number of users and EDUs, the following table summarizes current and projected future population, users and EDUs. These projections use the equation $Nt = Pe^{(rt)}$, where Nt = the number at a future date, P = present number, r = rate of increase, and t = time period. For these projections, the estimated number of users on this water system in January 2019 is used as the starting point, and these are converted to EDUs (discussed in the next section). Thirty and 50-year projections are made, with 2050 and 2070 used for the future years representing these long-term periods. The "current" population for the City of Sheridan is the 2018 estimated population by the Wyoming Department of Information & Administration, Economic Analysis Division, increased slightly to represent January 2019.

Table 6.1 - Current and Projected Population and EDU Numbers

Entity	Current	Estimated 2050	Estimated 2070
City			
Users	7732	13,300	18,870
Population	18,400	31,650	44,900
EDUs	10,655	18,330	26,000
SAWS			
Users	1866	3210	4550
Population	4300	7390	10,490
EDUs	1925	3310	4700
Total System			
Users	9598	16,510	23,420
Population	22,700	39,040	55,390
EDUs	12,580	21,640	30,700

6.2 GROWTH AREAS

From the population and EDU projections above, the expected growth in the system in the next 30 years includes about 9,000 EDUs. In 50 years, it is expected that there will be 30,700 EDUs total.

To evaluate the ability of the system to supply this growth (as discussed in Section 3.1) it is necessary to identify the likely locations of where this growth will occur. Through discussions with City, County, and SAWS staff, the most likely locations of growth will be growth in and around the City of Sheridan within the Urban Services Boundary and locations adjacent to the existing water system.

For locations within the Urban Services Boundary, it was assumed that this property will develop at a similar density to the existing City of Sheridan. It is noted that sanitary sewer will eventually need to be extended to properties within the Urban Services Boundary to achieve a density greater than 2-acre lots.

Fill-in growth was identified by first selecting any unserved parcels (parcels with no water service) within the Urban Services Boundary, as well as parcels with service but larger than 5 acres. Floodplain areas, steep slopes, water bodies and other undevelopable land such as parks and opens spaces were removed from the possible fill-in areas. A density of 2.83 EDU per acre was used. This number was based off a sample of existing and recently developed subdivisions in the City of Sheridan.

Table 6.2 - Existing EDU Density in Residential Subdivisions

Subdivision	Service Area	Developed Acres	Total EDU	EDU/ACRE
Downer	USA	94.3	357.2	**3.79**
Eastern Hills & Rocky Hills	USA	53.3	54.0	**1.01**
Mountain Shadows	USA	39.1	87.6	**2.24**
North Heights	USA	48.9	235.9	**4.82**
Osprey	USA	27.6	64.8	**2.35**
Poplar Grove	USA	18.4	46.0	**2.50**
South Hill Area	USA	437.6	1408.1	**3.22**
Westco	USA	18.3	11.8	**0.64**
Woodland Park	USA	16.0	79.0	**4.94**
Average				**2.83**

Outside of the Urban Services Area, but within the SAWS boundary the areas most likely to develop were identified as discussed below.

Unserved property and property with service but greater than 10 acres was identified. Floodplains, steep slopes, water bodies and other undevelopable land such as green spaces, parks, and golf courses, etc. was removed from the possible “likely to develop” growth areas. A density of 0.38 EDU per acre was used for new development in the SAWS area. This number was based off a sample of existing subdivisions in the SAWS area. Table 6.3 lists a sampling of rural residential subdivisions and their EDU per acre density. This density was applied to areas within the SAWS service area adjacent to the existing SAWS infrastructure.

Table 6.3 - Existing EDU Density in Rural Residential Subdivision

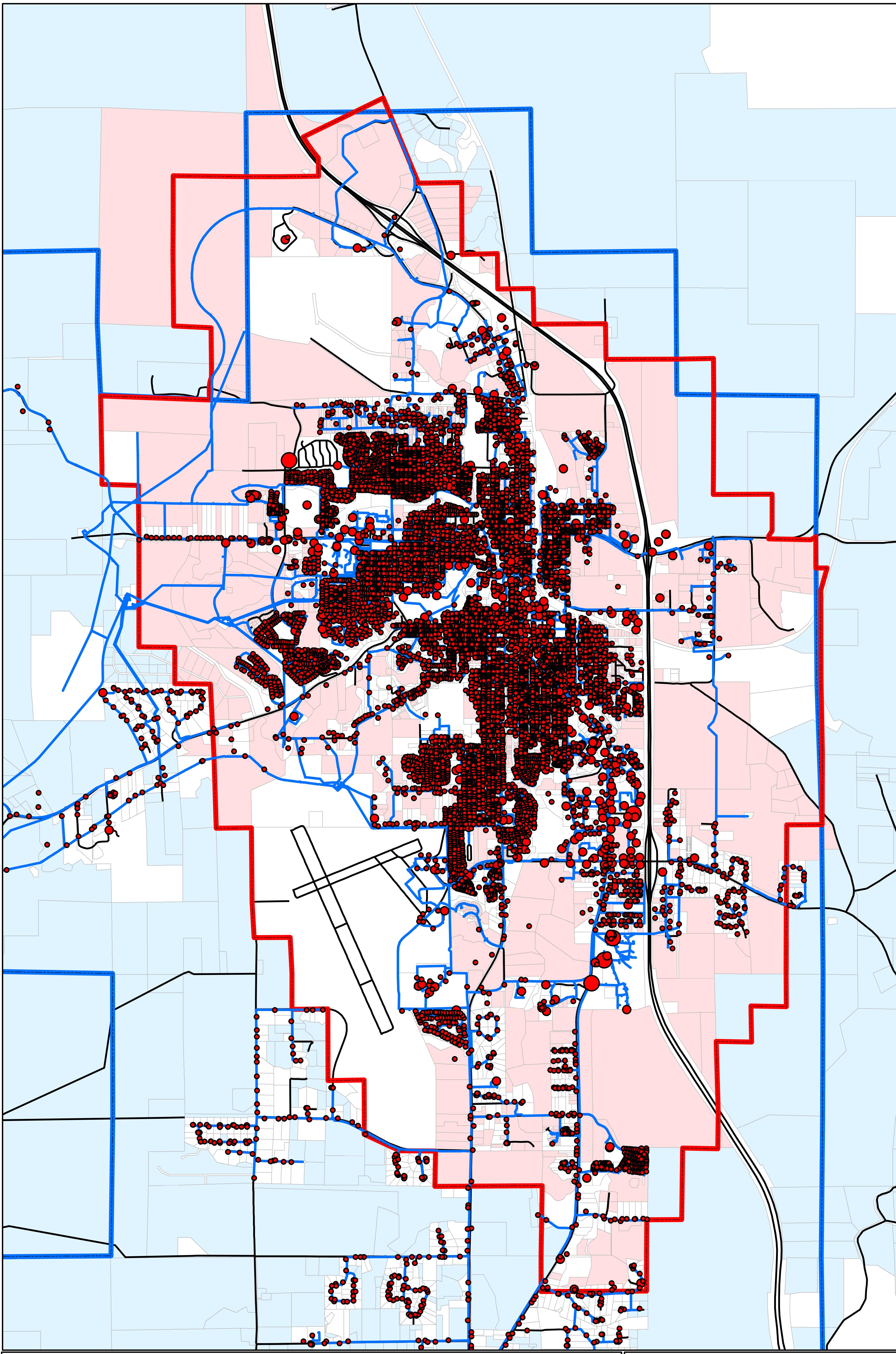
Subdivision	Service Area	Developed Acres	Total EDU	EDU/ACRE
Big Horn Valley Estates	SAWS	31.4	13.0	**0.41**
Don Ena	SAWS	161.3	56.0	**0.35**
Jeffries Draw	SAWS	78.1	38.0	**0.49**
Knode	SAWS	195.9	96.0	**0.49**
Paradise Park	SAWS	224.7	39.0	**0.17**
Parker Draw	SAWS	136.9	30.0	**0.22**
South Home Ranch	SAWS	52.8	27.0	**0.51**
Average				**0.38**

Developable areas within the USA are shown in Figure 6.1 and developable areas in all of the SAWS boundary are shown in Figure 6.2.

To fulfill the number of EDUs in the future growth scenarios, EDU densities were assigned to the developable areas. Areas with the highest potential for growth were used in the 2050 growth scenario, such as already platted lots and areas identified in other studies or through discussions with staff as having potential for future growth. Some of the areas with high potential for growth in the near future include the area near the new North Sheridan I-90 interchange, property to the north of 5th Street and East of I-90, and the area south of Sheridan College adjacent to Coffeen Avenue. In the SAWS area, the property with high potential for growth was assumed to be property closest to existing pipelines and property at elevations low enough to be served without pumping. After the number of EDUs to satisfy the 2050 EDU number was reached, property was identified for growth for the 2070 growth scenario. The 2070 growth is anticipated to occur as the next logical places to grow after the property shown in the 2050 scenario is developed.

Future growth areas for 2050 are shown in Figure 6.3 and growth areas for the 2070 growth scenario are shown in Figure 6.4. Figure 6.5 shows the 2050 and 2070 growth scenarios together. The locations of these future EDUs were then input into the model and evaluated as discussed in Section 4.3.

This page intentionally left blank.



Legend

Current EDU

- 1 - 1.77 EDU
- 1.77 - 25 EDU
- 25 - 50 EDU
- 50 - 100 EDU

- Waterlines
- Roads
- USA Boundary
- SAWS Boundary

Developable Parcels

- USA
- SAWS
- NOT DEVELOPABLE/DEVELOPED

Developable Within USA

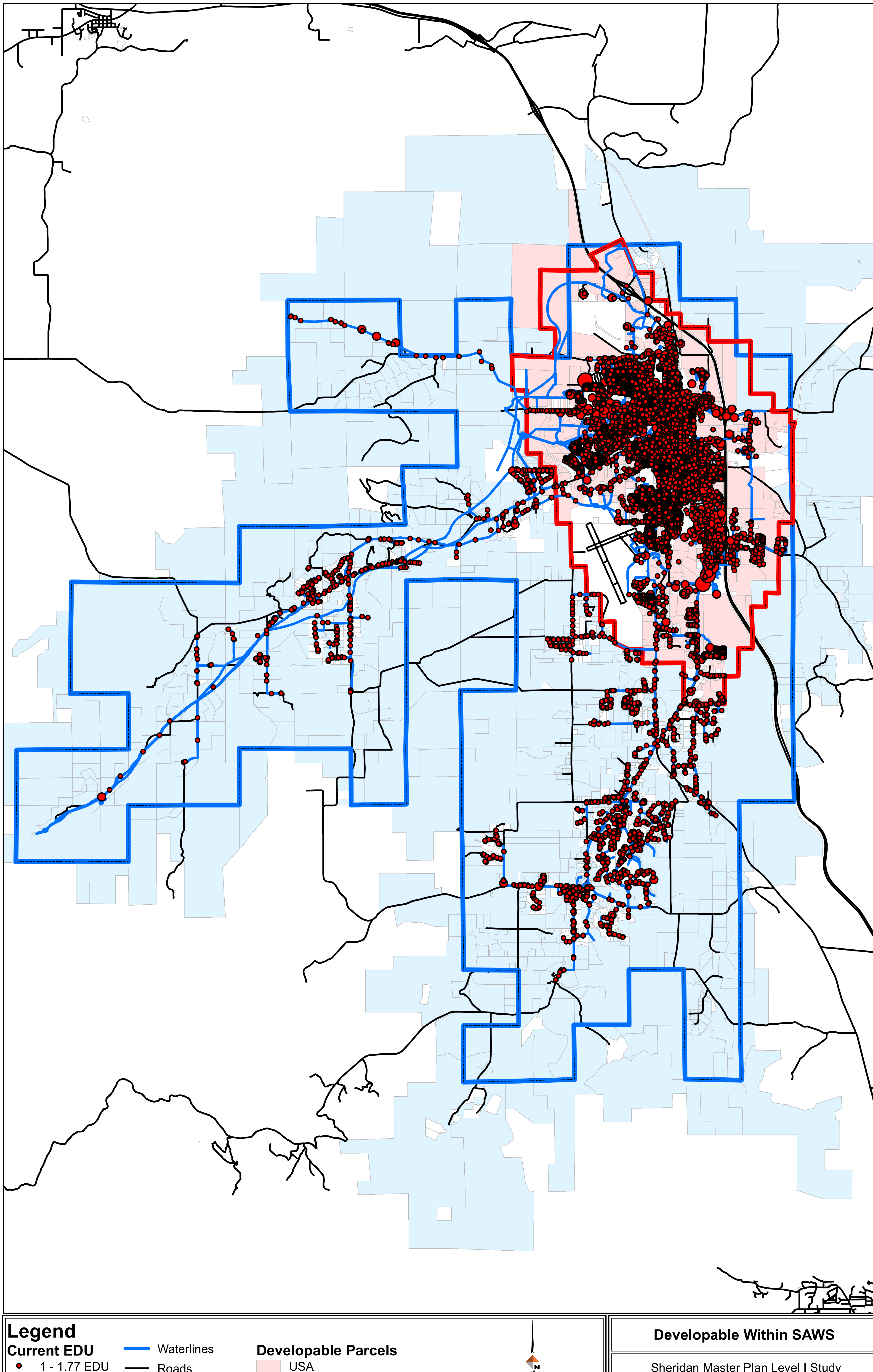
Sheridan Master Plan Level I Study

DOWL

Date: June 19, 2019

Figure 6.1

Q:\28\26913-01\60GIS\Maps\Figure_6.1_Developable_Within_USA.mxd Jun 19, 2019 9:15:37 AM User: trosenlund



Developable Within SAWS

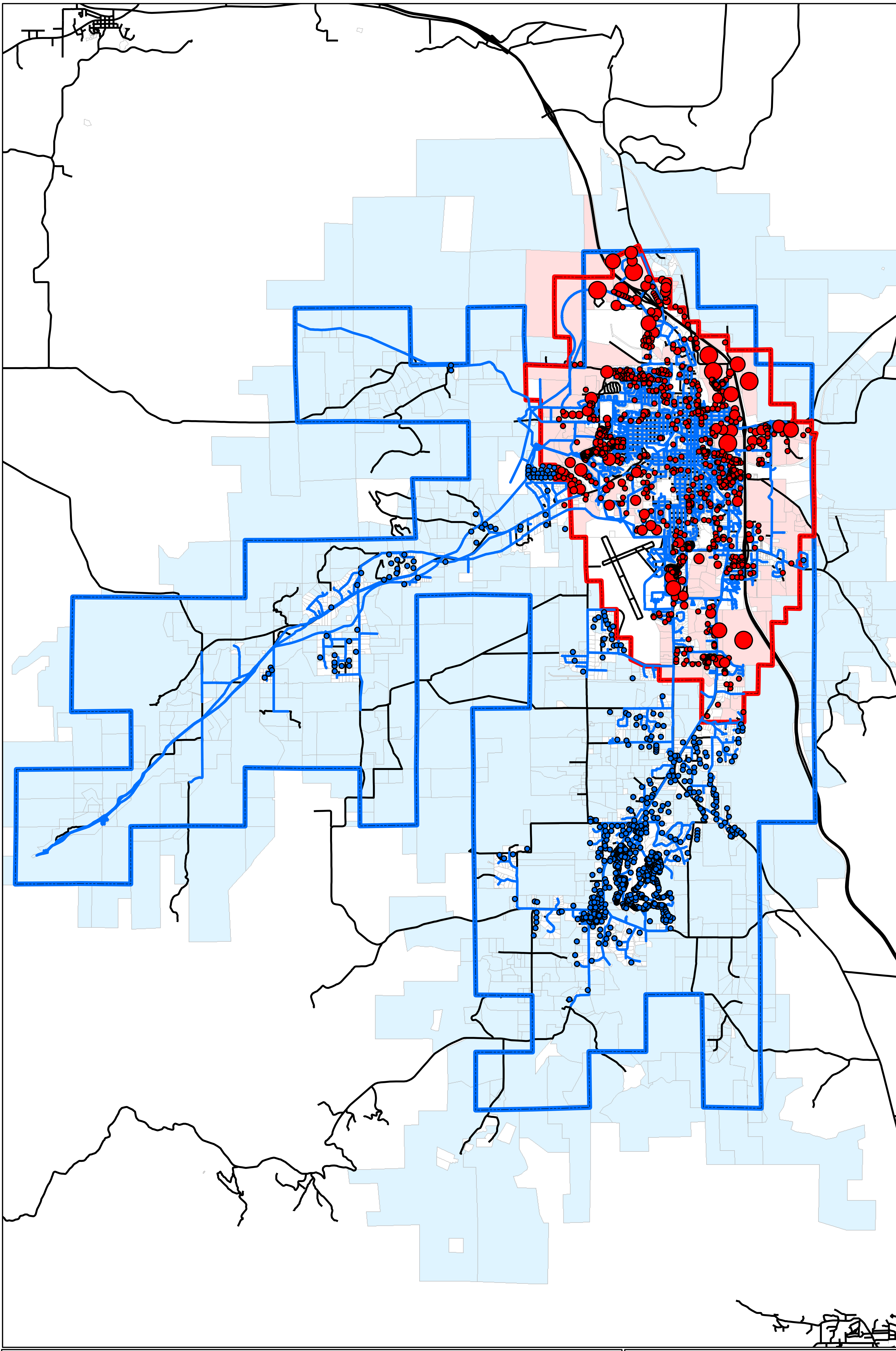
Sheridan Master Plan Level I Study

DOWL

Date: June 19, 2019

Figure 6.2

Q:\28\26913-01\60GIS\Maps\Figure_6.2_Developable_Within_SAWS.mxd Jun 19, 2019 9:25:56 AM User: trosenlund



Legend

USA
- 1.77 EDU
- 1.77 - 25 EDU
- 25 - 50 EDU
- 50 - 100 EDU
- 100 - 200 EDU
- >200 EDU

SAWS
- 1.77 EDU
- 1.77 - 25 EDU
- 25 - 50 EDU
- 50 - 100 EDU
- 100 - 200 EDU
- >200 EDU

- Waterlines
- Roads
- USA Boundary
- SAWS Boundary

0 0.75 1.5
Miles

2050 Projected Growth Areas/EDUs

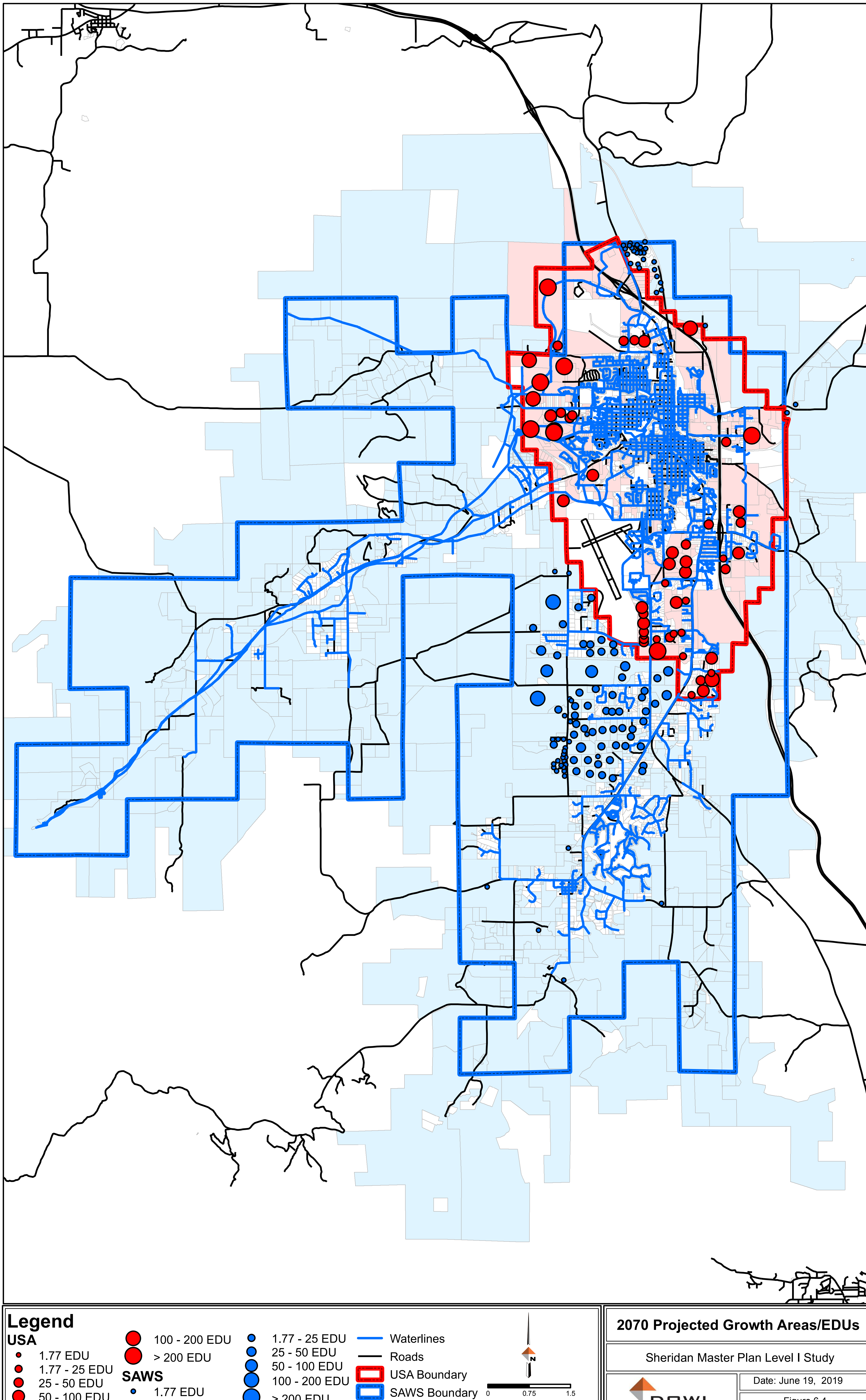
Sheridan Master Plan Level I Study

DOWL

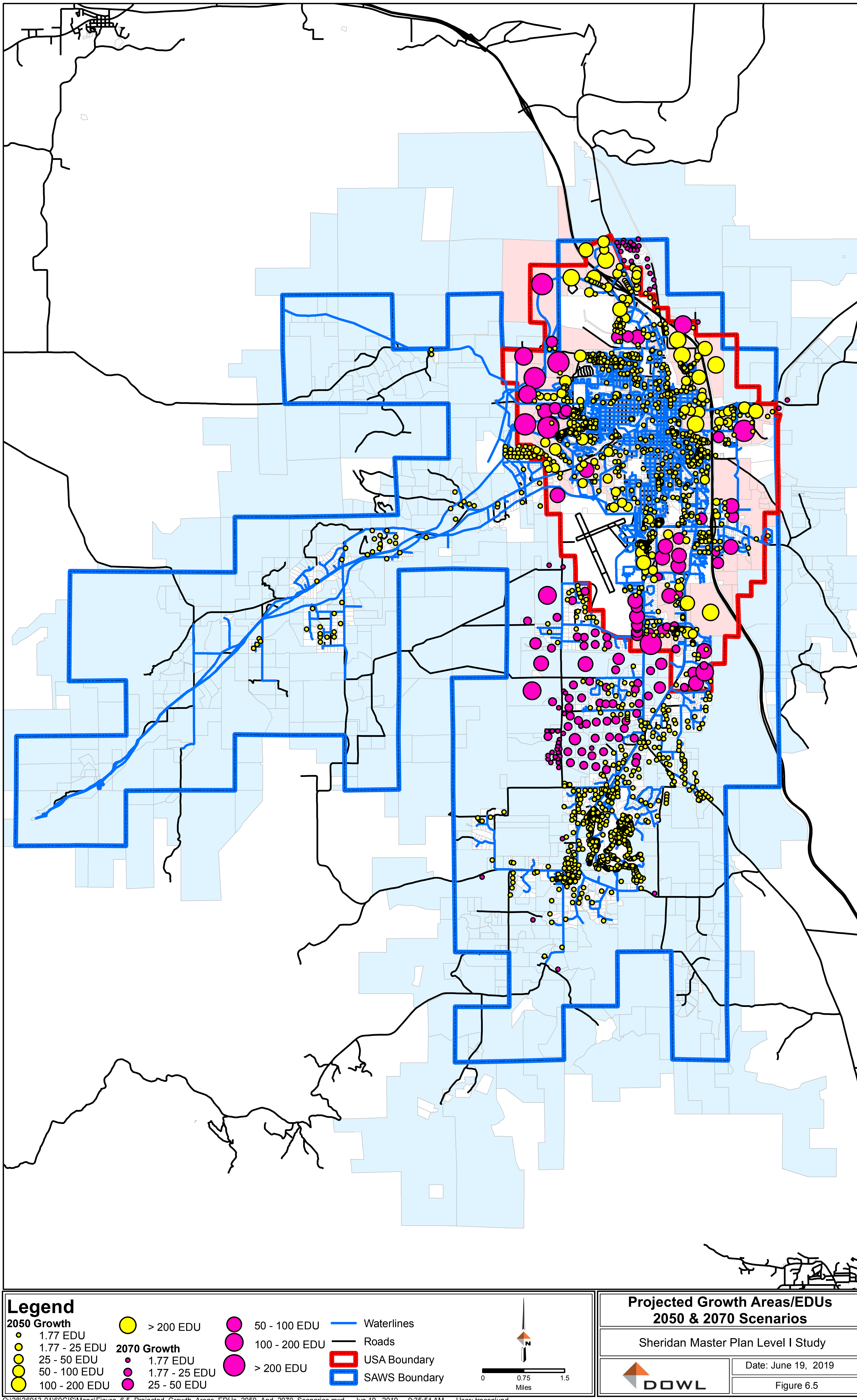
Date: March 25, 2019

Figure 6.3

\\SHR-FS\Shr-projects\28\26913-01\60GIS\Maps\Figure_6.3_2050_Projected_Growth_Areas_EDUs.mxd Mar 25, 2019 4:58:13 PM User: dhomola



Q:\28\26913-01\60GIS\Maps\Figure_6.4_2070_Projected_Growth_Areas_EDUs.mxd Jun 19, 2019 9:33:07 AM User: trosenlund



Legend

2050 Growth
- 1.77 EDU
- 1.77 - 25 EDU
- 25 - 50 EDU
- 50 - 100 EDU
- 100 - 200 EDU
- > 200 EDU

2070 Growth
- 1.77 EDU
- 1.77 - 25 EDU
- 25 - 50 EDU
- 50 - 100 EDU
- 100 - 200 EDU
- > 200 EDU

- Waterlines
- Roads
- USA Boundary
- SAWS Boundary

0 0.75 1.5
Miles

Projected Growth Areas/EDUs
2050 & 2070 Scenarios

Sheridan Master Plan Level I Study

DOWL

Date: June 19, 2019

Figure 6.5

Q:\28\26913-01\60GIS\Maps\Figure_6.5_Projected_Growth_Areas_EDUs_2050_And_2070_Scenarios.mxd Jun 19, 2019 9:35:54 AM User: trosenlund

6.3 EDUs

To standardize water user data, Equivalent Dwelling Units will be used. EDUs equate users to an equivalent unit. EDUs are used to estimate and compare water from per user to the overall water demand. They are also used for future projections as they provide a more realistic estimate of future needs than does either population or the number of user accounts by themselves. EDUs take into account that larger meters (and their service lines) place more demand on the system and use more water than do users with smaller meters or service lines. EDUs also equate the number of users with different size meters (or service lines) to a single number. The number of user meters in this water system tabulated by meter size as of August 2018 are shown in Table 6.5.

EDUs are calculated based on the standard ¾-inch meter (or 5/8 x 3/4 meter) being 1. This is also the standard size for meters in the City system with 89% of the services having a ¾-inch meter, and in the SAWS system with 98% of their meters being ¾-inch. The equivalency table is based on the comparison of sizes (area of the circle) to the ¾-inch size. For the 6-inch and 8-inch meters, considerations to the high flow capabilities of these meters was also used in the calculation and stating of the equivalency multiplier as the maximum flow rate is not strictly a ratio of the size. The EDU equivalencies for 6 and 8-inch meters are as were used in the Sheridan Supplemental Storage Level II Studies.

The multiplying factors to obtain EDUs based on meter size are shown in Table 6.4.

Table 6.4 - EDU Equivalency Multipliers

Meter Size	EDU equivalency multiplier to the ¾-inch meter	High Normal Flow Rate (gpm)[1]	Maximum Flow Rate (gpm)[1]
5/8-inch	1	10	20
¾-inch	1	15	30
1-inch	1.77	25	50
1½-inch	4	50	100
2-inch	7.1	80	160
3-inch	16	175	350
4-inch	28	300	600
6-inch	60	675	1350
8-inch	80	900	1600

[1]From AWWA M22, Table 6-1. Positive Displacement meters through 2-inch, and Compound meters >2-inch.

The number of EDUs on the Sheridan Water System in August 2018 is shown in Table 6.5.

Table 6.5 - EDUs on the Sheridan Water System

City of Sheridan System

Meter Size (inches)	Number of Meters	EDUs
5/8	188	188
3/4	7113	7113
1	333	589
1.5	159	636
2	164	1164
3	27	432
4	5	140
6	4	240
8	1	80
Totals	7994	10,582

SAWS JPB System

Meter Size (inches)	Number of Meters	EDUs
5/8	3	3
3/4	1831	1831
1	15	27
1.5	4	16
2	8	57
Totals	1861	1934

6.4 WATER USAGE FROM BILLING RECORDS

Existing water usage was estimated using population data, user metering data, other meter readings within the water system, and previous studies. The City of Sheridan recently replaced their user meters with an advanced meter infrastructure (AMI) system. (The project was completed in September 2018.) This new system allows better access to water usage information than previously was available. This study examined some of the 2018 AMI data to compare water usage calculated from these data to other more complete and longer-term water quantity data. Information from this brief analysis of the AMI data is presented in this section.

First, the AMI data were obtained from user billing records for July 2018 and November 2018 to identify data during a peak demand time during irrigation and a minimum demand time without irrigation. The data were grouped by the type or class of service in the records obtained. Water usage rates per tap and per EDU were calculated. Table 6.6 and Table 6.7 show these data.

Table 6.6 - July Water Usage

JULY USAGE NUMBERS					
CLASSIFICATION	**GPD**	**TAPS**	**EDUs**	**GPD/TAP**	**GPD/EDU**
APARTMENT	128,675	110	388	1170	332
COMMERCIAL	644,664	833	1778	774	363
EDUCATIONAL	19,109	23	361	831	53
GOVERNMENT	61,737	29	166	2129	373
HOSPITAL/NURSING	85,525	5	61	17,105	1395
LIGHT INDUSTRY	48	1	1	48	48
NO SERVICE	338,800	627	773	540	438
OUTSIDE CITY	104,024	338	429	308	243
PARKS/RECREATION	91,324	17	77	5372	1187
RECREATIONAL	23,569	7	44	3367	539
RESIDENTIAL	2,579,036	6002	6222	430	415
SAWS	449,807	1765	1837	255	245
SAWS NO SERVICE	8,534	97	97	88	88
SUMMER TAP	456,053	90	298	5067	1529
TRAILER PARK	120,341	16	180	7521	667
Water Card	12,361	128	128	97	97
Grand Total	**5,123,607**	**10,089**	**12,712**	**508**	**403**

Table 6.7 - November Water Usage

NOVEMBER USAGE NUMBERS					
CLASSIFICATION	**GPD**	**TAPS**	**EDUs**	**GPD/TAP**	**GPD/EDU**
APARTMENT	87,034	112	394	777	221
COMMERCIAL	365,281	855	1840	427	199
EDUCATIONAL	40,449	23	361	1759	112
GOVERNMENT	16,674	29	166	575	101
HOSPITAL/NURSING	30,682	5	61	6136	501
LIGHT INDUSTRY	38	1	1	38	38
NO SERVICE	15,533	244	331	64	47
OUTSIDE CITY	42,305	337	428	126	99
PARKS/RECREATION	3532	17	77	208	46
RECREATIONAL	5022	7	44	717	115
RESIDENTIAL	785,135	6314	6536	124	120
SAWS	272,834	1830	1902	149	143
SAWS NO SERVICE	2422	43	43	56	56
SUMMER TAP	21,083	109	381	193	55
TRAILER PARK	76,947	16	171	4809	449
Watercard	4204	131	131	32	32
Grand Total	**1,769,175**	**10,073**	**12,735**	**176**	**139**

Table 6.6 and Table 6.7 show that most categories of accounts have lower water usage in the winter than the summer, which is to be expected. For example, the average water usage in July was about 400 gpd/EDU and the usage in November was about 140 gpd/EDU. These data also show that the water usage per EDU is more consistent across the types of accounts than the water use per tap.

Tables 6.6 and 6.7 present a snapshot of one month to illustrate what data are available from the new AMI system. One month of data is not sufficient to establish average usage rates or criteria. Also, the reports from the accounting system for these user's needs scrutiny and filtering when these data are analyzed. For example, some sewer accounts are included, and some accounts called "no service" include water usage. Additional work and more data (such as at least 3 years' worth) are needed to more fully determine per user or per EDU consumption data that may be able to be obtained from this new system.

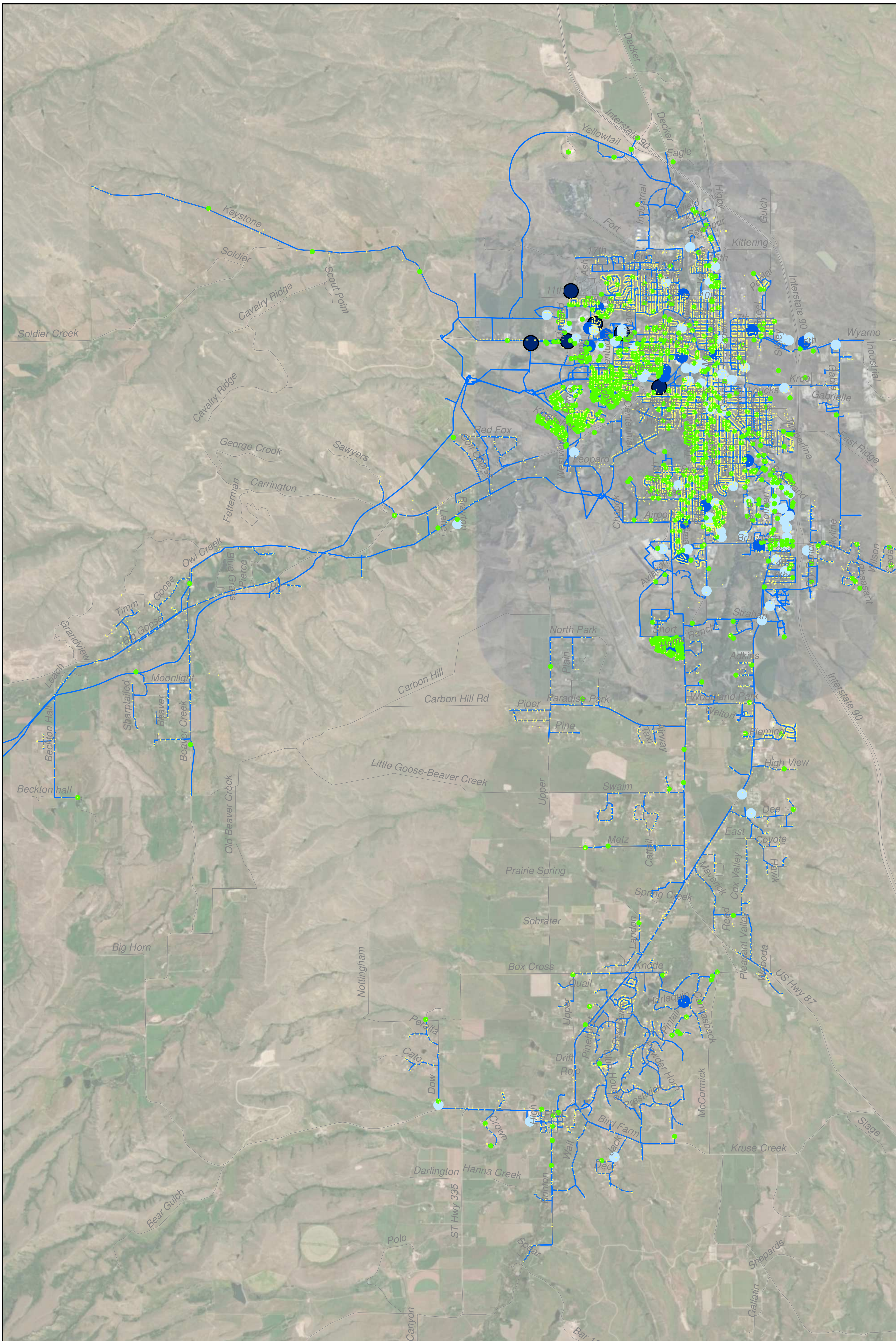
Several of the accounts (over 700) in the July data had no or very low water usage. Therefore, a second calculation was made without accounts that used less than 20 gpd. Many of these accounts are probably inactive or questionable. These same calculations on gallons per day used in Table 6.6 are repeated in Table 6.8 for this comparison. This second table is presented to illustrate this difference and to make the point that as user data from the new AMI system is used, as may be done to estimate the water demand by a new subdivision that fits one of these categories for example, that a close examination of and understanding of the data from this accounting system is needed before it is applied in any manner.

If these very low water usage accounts are removed from the calculation, it brings the average water usage up to about 440 gpd/EDU; again emphasizing the importance of the close examination of user categories, user numbers, EDU calculations and water demands obtained from the AMI system and how these may be applied.

Since the data in Tables 6.6 – 6.8 are just snapshots, they are not used as the system design criteria are developed and future water needs are calculated.

Table 6.8 - July Water Usage with Low Usage Accounts Removed

JULY USAGE NUMBERS - with 20 gpd and less removed					
CLASSIFICATION	GPD	TAPS	EDUs	GPD/TAP	GPD/EDU
APARTMENT	128,675	107	381	1203	338
COMMERCIAL	643,665	690	1582	933	407
EDUCATIONAL	19,100	21	300	910	64
GOVERNMENT	61,704	25	158	2468	391
HOSPITAL/NURSING	85,525	5	61	17,105	1395
LIGHT INDUSTRY	48	1	1	48	48
NO SERVICE	337,945	445	573	759	590
OUTSIDE CITY	103,807	300	382	346	272
PARKS/RECREATION	91,318	14	59	6523	1550
RECREATIONAL	23,569	6	37	3928	643
RESIDENTIAL	2,577,504	5725	5941	450	434
SAWS	449,232	1666	1735	270	259
SAWS NO SERVICE	8,368	57	57	147	147
SUMMER TAP	456,030	80	274	5700	1662
TRAILER PARK	120,341	16	180	7521	667
Water Card	12,279	43	43	286	286
Grand Total	**5,119,110**	**9201**	**11,720**	**556**	**437**



Legend

July Usage (GPD)

- 0.000000 - 1000.000000
- 1000.000001 - 5000.000000
- 5000.000001 - 15000.000000
- 15000.000001 - 30000.000000
- 30000.000001 - 70000.000000
- Waterline

0 2,950 5,900
Feet

N

2018 July Usage Data

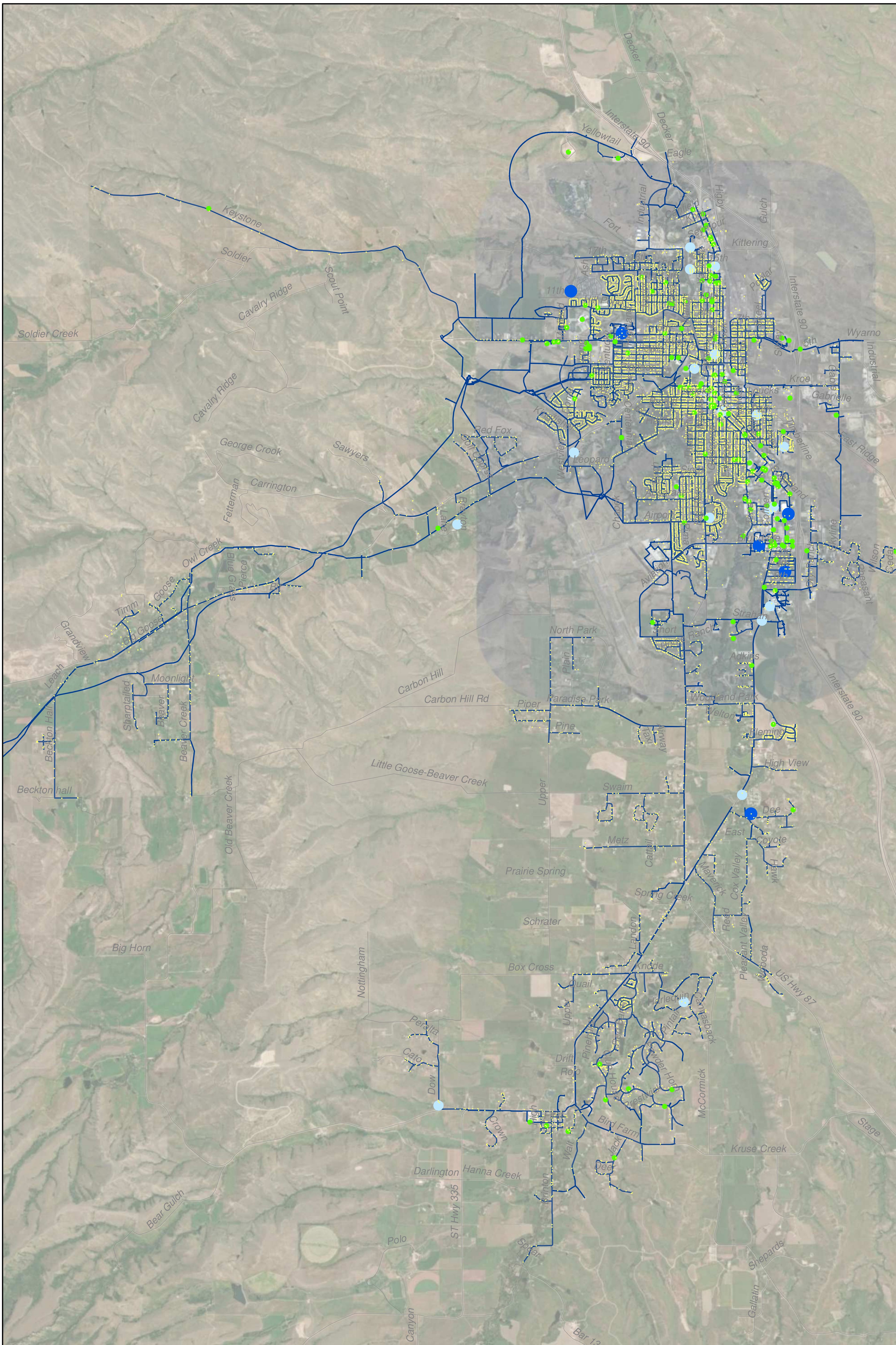
Sheridan Master Plan Level I Study

DOWL

Date: April 02, 2019

Figure 6.6

\\SHR-FS\Shr-projects\28\26913-01\60GIS\Maps\Figure_6.6_July_Usage_Data.mxd Apr 02, 2019 10:21:51 AM User: dhomola



Legend

November Usage (GPD)

- 0.000000 - 1000.000000
- 1000.000001 - 5000.000000
- 5000.000001 - 15000.000000
- 15000.000001 - 30000.000000
- 30000.000001 - 70000.000000
- Waterline

N

0 2,950 5,900
Feet

2018 November Usage Data

Sheridan Master Plan Level I Study

DOWL

Date: April 02, 2019

Figure 6.7

\\SHR-FS\Shr-projects\28\26913-01\60GIS\Maps\Figure_6.7_Nov_Usage_Data.mxd Apr 02, 2019 10:26:22 AM User: dhomola

As can be seen form the data above, the majority of the accounts are in the residential category. Previous studies and modeling efforts by DOWL on the SWS have identified a large difference in residential water usage depending on the type of development. The main difference is whether or not the development has a secondary source of water for irrigation. However, other factors such as lot size, household income, and other factors play a part in the water usage per tap. To further illustrate this, billing data from several representative subdivisions were isolated and tabulated as shown in Table 6.9.

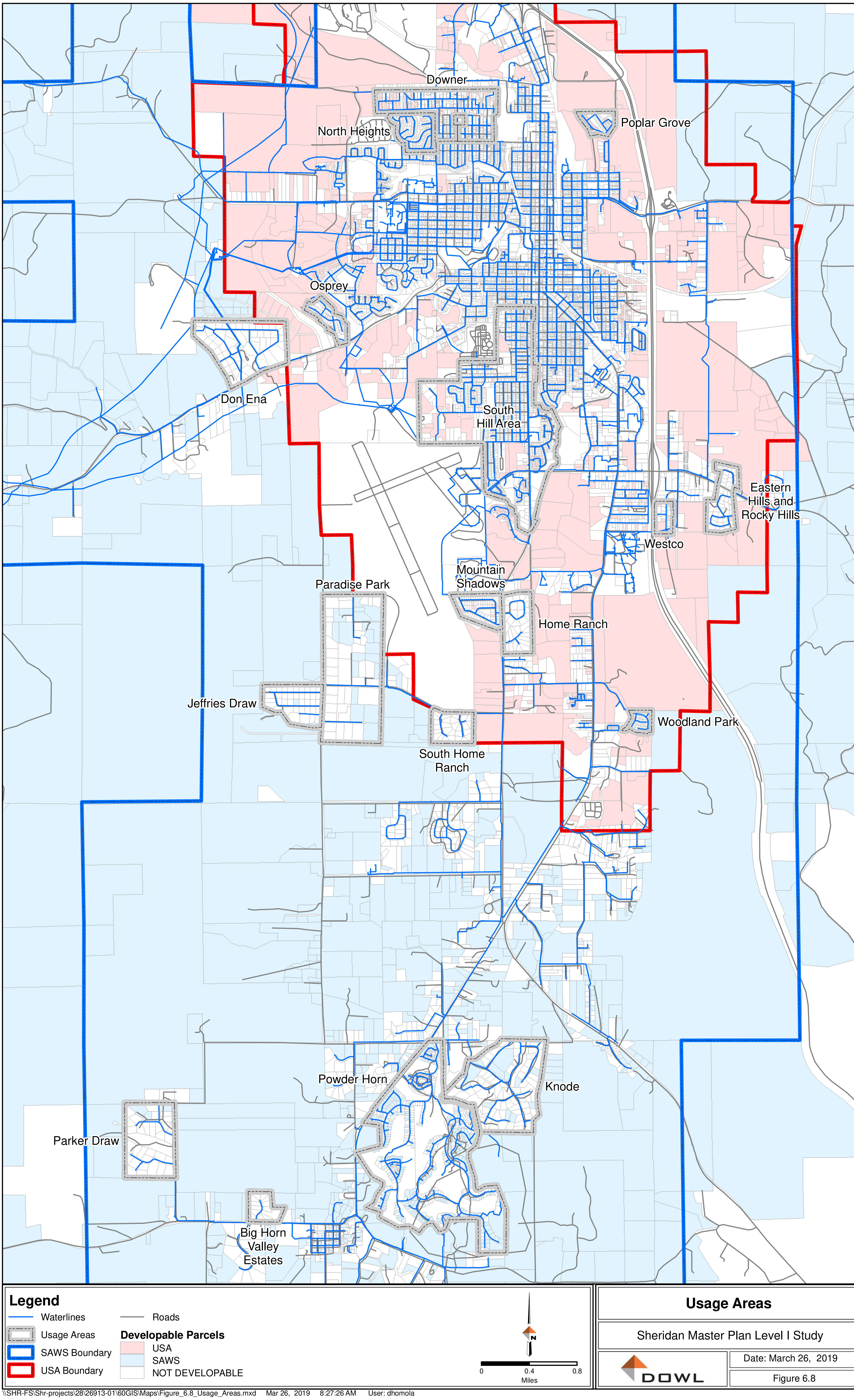
Table 6.9 - Water Usage for Key Subdivisions

Subdivision	July Usage		November Usage	
	GPD/TAP	GPD/EDU	GPD/TAP	GPD/EDU
Don Ena	182	162	117	105
Eastern Hills	379	386	122	124
Knode	371	376	122	123
Mountain Shadows	1563	1428	136	124
Osprey	1019	1010	125	124
Powder Horn	125	129	113	118
Soldier Creek	351	322	137	126
South Hill	592	531	125	112
All others	494	389	189	149
Total	**504**	**408**	**177**	**143**

Table 6.9 shows a large difference in the per tap or per EDU usage, depending on the type of subdivision. The locations are shown in

Figure 6.8. The Powder Horn is a retirement/golf community with larger lots and more expensive homes. The Powder Horn also has its own irrigation system, so only uses domestic water from SAWS. The gpd/EDU number doesn't vary much for the Powder Horn between the summer and winter months. On the other hand, the Mountain Shadows Subdivision has medium-sized lots, relatively expensive homes, and no secondary irrigation system. The gpd/EDU number for Mountain Shadows increases by a factor of 10 in the summer.

This page intentionally left blank.



Usage Areas

Sheridan Master Plan Level I Study

Date: March 26, 2019

Figure 6.8

\\SHR-FS\Shr-projects\28\26913-01\60GIS\Maps\Figure_6.8_Usage_Areas.mxd Mar 26, 2019 8:27:26 AM User: dhomola

6.5 DESIGN CRITERIA

6.5.1 Summary of Design Parameters

This section establishes the design criteria for this water system based on the data gathered and summarized. Design criteria are important as the capacity and capability of the existing system are assessed and how water system infrastructure, water rights are considered, and long-term water supply needs for the future are estimated. Recent historical usage, usage trends, population growth, population projections, and local design standards were considered to establish these criteria. The design criteria from the 2008 master plan and in the 2017 City Design Standards were also reviewed as these tables were updated for this report.

As previously discussed, the recently completed advanced metering system for all the users on this water system is providing improved information on the number of users, their location, and considerably more usage data (not just total monthly usage). Since this advanced metering system has just recently been completed, historical data is limited, as is its ability to assist with the establishment of these design criteria. Therefore, the design criteria presented in this report should be reviewed in three or four years and updated as necessary.

Table 6.10 of these criteria is divided into two important parts that require explanation and distinction in their usage. The left-hand columns cover quantities as metered at the user meters while the right-hand columns include a prorated share for users of the water delivered to the WTPs for treatment. Since a quantity of water must be delivered to the WTPs that may not be treated and/or accounted for through user meters, a multiplier is applied to each user's usage, to cover the total quantity of water that needs to be delivered to the WTPs.

The right-hand columns of Table 6.10 and Table 6.12 include the quantity of water that must be diverted and delivered to the two WTPs to supply current users. These quantities include all metered points of delivery, even parks, green areas, and other points that may not be revenue-producing customers. In Table 6.12, projections of water quantity needs for 2050 and 2070 are estimated based on applying the growth rate discussed in Section 6.1 to current quantities.

There are several important comments to make regarding the design criteria tables:

- Considerable usage and other flow data are maintained on this water system from reservoir releases, diversion quantities at the intake facilities, quantities entering the water plants, treated quantities leaving the plants, and usage throughout the system, including non-revenue usages such as at parks, green areas and recreational fields, and for flushing hydrants to maintain water quality. These were considered to the extent possible in these total quantities, summaries and conclusions.
- In some cases, water needs during the Irrigation Season are broken out from other calculations such as total water needs, average day or peak day. This primarily is done for water rights issues, and how water rights during the irrigation season (time when Big

Goose Creek is being regulated by the BOC) will someday approach existing water right amounts and become a limiting factor relating to the projections for future needs. The estimates for per EDU or total water needs during the irrigation season do not come into consideration for every calculation, but are presented for use for when they do.

- The number of users and EDUs on the combined City/SAWS system vary depending on when the count is made. Table 6.1 lists the current numbers that were used in this study, and the estimated future numbers for users and EDUs in 2050 and 2070.
- The Estimated Future Water Supply needs (total water supply needs) at the four raw water delivery points (BGWTP, SWTP, Kendrick Golf Course and the VAMC) are ultimately the quantities for total water supply to be provided in the future years that were considered (see Table 7.15).
- Table 7.15 includes calculations by MGD, cfs and ac-ft, as these different units all are applicable depending on whether flows in Big Goose Creek, water rights or water needs in the water system are being considered.
- The Estimated Future Water Supply needs for users (Table 6.12) is the quantity of treated water (so does not include the raw water provided to Kendrick and the VAMC).
- Since water availability and water rights from the Big Goose source are limited and this limitation becomes an issue in the future projections, Table 7.14 was prepared documenting the calculations for how Future Water Supply needs were estimated and then compared to water availability and water rights.
- Losses, apparent losses and non-revenue water must be accounted for in the overall water supply and calculations of water needs. These are discussed in Section 7.1.2.
- With the new user meters it is relatively easy to add and then average water consumed per user or per EDU for an average day, peak day or other time period. However, as discussed in this report, quantities of consumption by users must also add their appropriate share of total water delivered to the WTPs for treatment since that is the quantity of water that is diverted from the creek and provided for treatment, even though it is not all ultimately consumed by the user. (This is a water rights issue as well as a water quantity issue.) This multiplier was estimated to be 1.3, as discussed in the report.
- The gallons per user or per EDU calculated in Table 6.6 and Table 6.7 show the data available from the new metering system and how the users are broken out within the accounting system by category. Since they are only one month each, these per user or per EDU quantities are not what were used in developing the design criteria presented. For example, there is a classification called “No Service” yet there is water usage shown. These classifications need to be reviewed and better understood the next time per user or per EDU calculations are made (see next bullet).
- Since the new user meters are believed to be very accurate but only one year of data were available for use in this study, that year was not a peak water usage year, and some of these users were actually added during the course of the year, it is recommended that when at least 3 to 4 years of data are available from the new user meters, that these calculations be repeated to confirm or adjust the criteria as needed.

- Not all of these criteria apply to every use of these numbers, so it is possible to develop simpler tables based on the needed application.
- The per EDU usage rate also depends on the type of development. See the discussion on variations in usage depending on the development that follows.

Table 6.10 - Design Criteria Table – Usage GPD/EDU

	Usage (GPD/EDU) Metered at User			Usage (GPD/EDU) With Share of all Water to WTPs		
	Average Day (year-round)	Peak Day	Average Day Irrigation Season	Average Day (year-round)	Peak Day	Average Day Irrigation Season
City (and DNISD)	250	680	510	325	880	660
SAWS-JPB	200	540	400	260	700	520
City – Residential Only	220		500	280		650
Rural – with secondary irrigation	140		150	180		200

Table 6.11 – Other Design Criteria

OTHER DESIGN CRITERIA	
Irrigation Season – in-house usage only	80 gpcd
Irrigation Season – total usage	275 gpcd
Average Day to Peak Day	2.70
Average Day to Peak Hour	4.20
Persons per Residential Account	2.3
Persons per EDU (average)	1.8
FIRE FLOWS (2 hrs, except industrial = 3)	
Single Family Residence	1000 gpm
Residential areas	1500 gpm
Commercial	2500 gpm
Industrial	3500 gpm

Table 6.12 - Estimated Water Needs

TOTAL SYSTEM DEMAND (By user, at WTP influent)	2019 GPM	MGD	2050 GPM	MGD	2070 GPM	MGD
Average Day	2,775	4.0	4,800	6.9	6,800	9.8
Peak Day	7,500	10.8	12,900	18.6	18,300	26.4
Peak Hour	11,650	--	20,100	--	28,500	--
Ave Day – Irrigation Season	5,550	8.0	9,600	13.8	13,600	19.6

Regarding fire flows, not all of the SWS is designed for fire flows. Many areas within the SAWS utilize a rural design approach which only provides domestic demand.

It is noted that the Downer Improvement and Service District is served by the SWTP, so its usage is included with that plant and the City.

<u>Variations in usage depending on the development.</u>

An analysis of the user meter data from 2018 from the new AMI metering system that allows such an analysis, illustrates major differences in water usage per user depending on a variety of factors such as lot size, age of the subdivision and in particular, whether there is a separate secondary irrigation system. Based on an analysis of several subdivisions or service areas within both the City and SAWS systems, the Table 6.13 is presented to assist with setting design guidelines for the water needs for new developments based on their particular circumstances. Having a secondary irrigation system cuts down on water needs – the total water quantity that needs to be supplied by the system, the peak supply rate, and with regards to water rights, the amount that must be supplied during the irrigation season when Big Goose Creek is under regulation. Therefore, encouraging the creation of a separate irrigation system pays dividends.

An anticipated purpose for Table 6.13 is to help both design engineers and system managers to establish a proper supply requirement for a new development in the Design Report for the project, and then to size facilities appropriately and consider the impact on water rights. Actual water usage rates should be checked and verified during design.

Table 6.13 – Differences in Water Usage by Subdivision

SUBDIVISION	Irrigation	Location	Average July Usage (GPD/EDU)	Average Lot Size (acres)	Average usage rate (gpd/acre)
POWDER HORN	Secondary Source	SAWS-JPB	129	1.74	510
DON ENA	Secondary Source	SAWS-JPB	129	3.12	57
PARKER DRAW	Secondary Source	SAWS-JPB	151	3.94	41
SOUTH HOME RANCH	Secondary Source	SAWS-JPB	157	1.93	83
BIG HORN VALLEY ESTATES	Secondary Source	SAWS-JPB	162	2.45	72
JEFFRIES DRAW	Secondary Source	SAWS-JPB	191	2.53	79
DOWNER	Varies	City	205	0.26	1150
PARADISE PARK	Varies	SAWS-JPB	206	4.45	48
E. HILLS AND ROCKY HILLS	Varies	SAWS-JPB	290	1.10	282
WESCO	Varies	City - Com	296	1.67	221
WOODLAND PARK	No Secondary	City	377	0.20	1951
NORTH HEIGHTS	No Secondary	City	381	0.21	1931
KNODE	No Secondary	SAWS-JPB	429	2.79	172
POPLAR GROVE	No Secondary	City	503	0.27	2913
SOUTH HILL AREA	No Secondary	City	515	0.34	2173
OSPREY	No Secondary	City	1003	0.35	2897
MOUNTAIN SHADOWS	No Secondary	City	1555	0.48	3000

Table 6.13 shows the large variation in water usage, and also provides some typical water rates based on the type of subdivision (average lot size, subdivision location, and irrigation source). As discussed earlier in this report, whether or not a secondary irrigation source is present affects the water usage the most.

6.5.2 City Design Standards and DEQ Criteria

The City of Sheridan/SAWS adopts the most current version of Chapter XII of the Wyoming Department of Environmental Quality, Water Quality Rules and Regulations, as the design standards for water distribution systems, source water facilities, transmission mains, water storage structures and pumping facilities, and includes the changes noted below:

- A per capita usage table (Table 301-1 in the design standards) is referenced. We recommend replacing portions of this table with parameters from the design criteria table (Table 6.10), as appropriate.

- The system shall provide static pressure ranging from forty (40) psi to one hundred ten (110) psi during average day conditions. The system shall maintain a twenty (20) psi minimum residual pressure at the finished floor elevation of the highest unit proposed during peak day plus fire flow demand or peak hour demand, whichever demand is greater, and a thirty-five (35) psi minimum residual pressure during the peak hour demand. The maximum pressure fluctuation at any location in the distribution system between peak hour demand and minimum hour demand should not exceed 30 psi.

- Subject to the following minimums, fire flow will be calculated according to the latest adopted edition of the "International Fire Code," published by the International Code Council, as amended by Sheridan City Code, and will be added to the maximum day hourly flow to adequately size the system for fire flow conditions. Unless in conflict with the "International Fire Code" as determined by the City Fire Code Official, fire flows shall meet the following minimum requirements:

Zoning Type	Fire Flow (gpm)	Duration (hours)
Single Family Residential (Less than 3,500 SF)	1000	2
All Other Residential	1500	2
Commercial	2500	2
Industrial	3500	3

Note: We recommend the wording above say that "the fire flow be added to the maximum day flow."

- *Add the following language at the end of Subsection 14-b-iii:*
  The design must be in substantial conformance with the latest Master Water Plan(s) for the City of Sheridan, Downer Neighborhood Improvement and Service District, and the Sheridan Area Water Supply Joint Powers Board. Twelve-inch mains shall be grid paced at approximately one-mile intervals. Eight-inch mains shall be grid spaced at approximately ¼-mile intervals, subject to the approval of the Public Utilities Director. Pipes will be designed so the maximum velocity obtained will be less than five feet/sec, excluding fire flow.

  Fire sprinkler lines shall be installed at right angles to the distribution main or lateral and be extended directly to the property line. No horizontal bends or offsets are to be installed in these lines. The size of the fire sprinkler lines shall be determined by the needed fire flow required for the building sprinkler system. A post-indicator valve, if required, must be installed in the City right-of-way or easement.

- *Add the following language at the end of Subsection 14-b-v:*
  Fire hydrants shall be spaced per Appendix C in the latest edition of the International Fire Code, subject to the approval of the City Fire Code Official.

- *Delete subsection 14-b-vi in its entirety and insert the following:*

  All waterlines shall be looped if at all practical. Permanent dead-end lines are prohibited with the exception of lines extending into cul-de-sacs serving no more than twenty (20) single-family residential units or equivalent demand. For those dead-end lines that are allowed as describe above shall be terminated with a fire hydrant or other flushing device. Dead-end lines may be allowed within the SAWSJPB distribution system provided it is justified by hydraulic analysis, meets demand requirements, includes fire flows when required, and terminates with a flushing hydrant or device.

- *Add a new subsection immediately after Subsection 14-b-vii:*
  (viii) Services. The International Plumbing Code, latest adopted edition shall be generally used as the basis of design for water service lines. There shall be only one tap and water service line from the main to the property line for each lot. Multiple services on one lot may be divided at the property line with each individual service having a meter and a curb stop. Where multiple structures are on one lot which could be subdivided in the future, one tap and water service line from the main to the property line for each main structure will be allowed only upon approval by the Public Utilities Director. Services larger than 2-inch must be approved by the Public Utilities Director and will require a "Permit to Construct." That portion of the service line between the main and the property line shall be one continuous length of Type K copper pipe or HDPE pipe, installed perpendicular from the main to a meter pit or curb stop and box at the property line.

  Service lines shall be installed at least ten feet laterally, from any foreign non-potable conduit and a minimum of five (5) feet from the side property line of the lot being served. In accordance with the International Plumbing Code, water and sewer services can be installed within the same trench provided the sewer service piping system is constructed using schedule 40 PVC.

  When serving lots at the end of a cul-de-sac, the length of the service line between the main and the property line shall not exceed seventy (70) feet.

  Under no circumstances shall any tap be made on a fire hydrant lateral line.

  Service lines shall be adequate to supply the requirements of the property being served. The minimum size allowed for a water service line is 1-inch with a ¾-inch meter. The corporation stop, the meter, and that portion of the service pipe between the meter and the corporation stop on the main, shall all be of the same size for services larger than 1-inch in the City of Sheridan. For individual service lines, larger than 1-inch, used for (a) domestic flows and (b) fire suppression system supply, the meter(s) used to record domestic and irrigation flows (non-fire suppression supply) may be of a different size than the shared service pipe as long as the meter is sized appropriately for the anticipated flows. The size for a service line from the City water main to any unit being served shall be selected such that the following design criteria are not exceeded during total peak demand flow:

  - Eighty (80) percent of the manufacturer's maximum meter capacity.

- Service line pipe flow velocity does not exceed 15 feet per second.
- The pressure drop from the City water main to any unit being served shall not be greater than thirty (30) psi and the minimum residual pressure at the finish floor elevation to any unit shall not be less than twenty (20) psi.

The water requirements of the property being served shall be defined as “total peak demand flow.” Peak domestic water requirements shall be calculated in accordance with the latest edition of the International Plumbing Code and the American Water Works Association M22 Standard. The irrigation demand flow and continuous load demands (when applicable) shall be added to the peak design flow to get the total peak demand.

Meter pits are required on all water service connections in areas served by the SAWS JPB and DNISD. For areas served by the City of Sheridan, meters will be installed accordingly:

- All meters shall be installed within a full-depth basement, or in a location within 3 feet of the access if in a crawl space.
- The service line between the curb-stop and the meter shall be a single, continuous (un-spliced) section and will be buried to prevent future connections prior to the meter.
- If the aforementioned requirements above cannot be met, a meter pit to be located immediately after the curb stop will be allowed, provided the meter pit conforms to the other requirements within adopted City Standard Specifications.
- Depending on the hazard classification of the building, an appropriate backflow prevention device may be installed in the meter pit; however, for high-hazard installations, the required backflow prevention device might need to be installed within the mechanical room of the new building provided appropriate floor drains exist to dispense water discharged from the device during a back-pressure situation.
- *Add a new subsection 14-b-ix:*
  (ix) Easements and Right-of-Ways

  The minimum width right-of-way or easements for City use in which a water main will be installed is twenty (20) feet. If the final depth as measured from finished grade to the top of the water main exceeds 6.0 feet, the following table shall be used to determine the minimum width of right-of-way or easement required: (see table in the design standards).

- *Add a new subsection 14-b-x:*
  (x) Fittings. Water main shall be designed to minimize the number of fittings. All fittings shall be in conformance with the City Standard Specifications.

  - *Delete Subsection 14-c in its entirety and insert the following:*
    (c) Valves. Valves shall be provided on water mains so inconvenience and sanitary hazards will be minimized during repairs. Valves shall be located at not more than five hundred (500) foot intervals on distribution and lateral mains and one thousand (1000) foot intervals on transmission mains. Valves will be placed at all pipe junctions so that the total number of valves at the junction is one less than the number of branches, except as otherwise approved by the Public Utilities Director. Line valves shall also be placed:

  - Such that no more than one (1) fire hydrant is isolated at any one time.
  - At each end of a line running through an easement on private property.
  - On each side of a creek, channel crossing, or Arterial Street/Highway crossing.
  - On fire hydrant laterals.

  - *Delete Subsections 4-f-i and 14-f-ii in their entirety and insert the following in their place:*
  - Excavation. Shall be in conformance with the City Standard Specifications and O.S.H.A. Regulations.
  - Bedding. Shall be in conformance with the City Standard Specifications.

  - *Add the following language at the end of Subsection 14-f-v:*
    Water mains shall have a minimum cover of six (6) feet and a maximum cover of seven (7) feet to top of pipe, except as otherwise approved by the Public Utilities Director.

  - *Delete Subsections 14-i in its entirety and insert the following:*
    i. Cross Connection Control. All water services connected to the public water system shall comply with the City's "Cross Connection Control Program" as described within City of Sheridan Ordinance No. 1946.

  - *Transmission Lines 16-Inch and Larger:*
  - No person shall in any manner tap or make any connections for the purpose of providing water to serve areas outside current service boundaries.

  - No person shall tap or connect to any 16-inch and larger water transmission pipeline unless the applicant has been granted written permission by the Public Utilities Director.

  - No installation of a utility transmission line, conduit, or underground structure should be nearer than twenty (20) feet clear separation from the outside surface of all 16-inch and larger transmission pipelines when it is required to run parallel to said pipeline(s). No installation of a utility transmission line, conduit, or underground structure should be nearer than two (2) feet clear separation above or below the outside surface of all 16-inch and larger transmission pipelines when it should be required to cross said pipeline(s).

- *DEQ Requirements for Service Connections:*
  Any potable water supply service connection from any public water supply to the building shall require a "Permit to Construct" from the City of Sheridan if any of the following conditions exist:

  - A tee must be installed in order to make the connection, or
  - Fire hydrants will be installed, or
  - The service line is larger than two (2) inches, or
  - Any appurtenance will be connected to the service line that will have an adverse impact on the quality or quantity of the supply.
  - The service connection is tied to the City of Sheridan's water system and is outside the City Limits.
  - The information to be submitted as an application for "Permit to Construct" shall include plan drawings, valve arrangements, material information, hazard classification for cross-connection control (back-flow) prevention, mechanical room schematics, and hydraulic calculations.

- *301.30 Pump Stations*
  Pump stations shall be designed to the current standards of the Wyoming Department of Environmental Quality, Water Quality Division. Pump stations shall include necessary control and telemetry equipment, compatible with the City's existing system, for remote operations of the facility.

6.5.3 Design Criteria for Specific Components

The following sections on Tanks, Booster Stations, PRV stations, Pipe and SCADA present additional design criteria as part of this Master Plan for these important and frequently used components of this water system as it continues to expand.

Tanks

For the purposes of this study, the WYDEQ guidelines will be followed which state: "Water systems serving in excess of 500,000 gallons on the design average daily demand shall provide clearwell and system storage capacity equal to 25% of the design maximum daily demand, plus added fire storage based on recommendations established by the State Fire Marshall or local fire agency." Most of the pressure zones within the City of Sheridan have some industrial or commercial areas, which govern the required storage for fire flow. That amount is 3500 gpm for 3 hours, or 630,000 gallons. For areas with only residential demands, the required fire flow storage is 1500 gpm for 2 hours, or 180,000 gallons.

Booster Stations

Booster stations are smaller stations that serve a closed distribution system for a subdivision or an area that is above the HGL of the source main for the area, so pumping is necessary to provide the proper pressure. These are VFD stations that maintain a constant downstream pressure. They are also differentiated from what are called pump stations, which are larger stations whose purpose is to fill a storage tank, or a VFD station that is designed for fire flows. One difference with these larger stations is that they will be housed in above-ground buildings.

Booster stations may be housed in underground insulated precast concrete vaults based on past experiences and as long as they meet DEQ requirements, applicable codes and have the design approved by Utility Maintenance. There currently are 14 booster stations in the SAWS portion of this water system. This section discusses criteria for new booster stations that may be added to the system in the future to serve areas of higher elevation. While this section provides minimum requirements and guidelines, each station must be considered and designed based on its circumstances.

Booster stations are designed to meet the peak domestic demand for their service area with appropriate additional capacity for reasonably anticipated growth. They are not designed for fire flows. Since they pump into closed systems, they must meet peak momentary demand which is greater than peak hour demand.

A Design Report must be prepared for each station that documents the design, the results of a hydraulic analysis (covering both the existing system and the impact on the existing system, and the proposed extension of service) and the sizing of the station. This report is to be prepared by the design engineer for the project and shall be reviewed and approved by the water system entity.

Requirements for a Booster Station include:

- A design report as mentioned above that clearly outlines the project, the station, its location, its service area, system hydraulics, and other appropriate information.
- Civil, electrical and mechanical design drawings as needed for the specific project.
- Compliance with Chapter 12 of DEQ Rules and Regulations, and a Permit-to-Construct.
- All-weather road access and parking adjacent to the station.
- Appropriate title to the land, or permanent easements approved by the entity.

- A site drawing showing drainage, electrical power from the utility, and topographic information.

- Auxiliary power per DEQ Chapter 12 8.d.

- Integration into the existing SCADA system for booster stations. Appropriate monitoring and alarm functions shall be provided.

- A minimum size of 10’x10’x8’, with an opening sized for easy access and future replacement of equipment.

- Appurtenances within the station to include: multiple pumps, VFD controls, flow meter, upstream and downstream pressures gauges, isolation valves and check valves for each pump, and a hose bib for sampling,

PRV Stations

Pressure reducing valve (PRV) stations are used to reduce pressure from a main line into a service area, or on a main as the elevation drops. PRV stations allow the system to maximize the value of gravity flow while controlling pressure as needed throughout the system. This section discusses basic design requirements. There are many options with these valves, and due to the pressure reduction and range of flow to be required, there are opportunities for differences in the design with the number of PRVs in the station and their features. Specific designs are required by someone who is knowledgeable on how the water system operates in the location of the proposed station.

Requirements for a PRV Station include:

- A design report that clearly outlines the project, the station, its service area, system hydraulics, the existing system that serves this area, its elevation, and other appropriate information.

- Establishing the range for the design flow. Are fire flows included? What is the maximum flow for domestic demand? What is the potential for growth of the service area? What is the minimum flow to be accommodated through the valves? What is the pipe size into the station?

- The determination of the static (maximum) pressure coming into the new station, and what this pressure drops off to during peak demands. Also determine the downstream reduced pressure to be maintained. Compare these pressures on the cavitation potential chart.

- From the above two bullets, determine the valve sizes. Verify the headloss through the valves at max flow is acceptable. Review the design charts for the flow range and valve sizes selected. If two valves are used, verify there is an overlap in the flow ranges.

- Vaults shall be insulated underground precast concrete in most cases. They shall be water tight. The minimum size for a single PRV shall be 6-foot round, and for two valves in parallel shall be 8-foot round. The size of the vault shall be determined by the size of valves and appurtenances to be included in the vault. Room shall be provided for operations and replacement of all equipment. Larger sizes may be 10-foot round, 10’x12’ rectangular, or other sizes and the circumstances may require.

- Entrances shall typically be 36”x36” (minimum) insulated Bilco-type hatches.

- Appurtenances shall include: isolation valves for each PRV, upstream and downstream pressure gauges with isolation valves, a hose bib, means for easy removal of each PRV, and pipe stands.

- Valve features: is electrical control needed or is control simply hydraulic; provide epoxy in and out, stainless steel fasteners, springs and trim, stainless steel pilot tubing, wye strainer and isolation valves on the pilot, position indicator, means of draining valve body, opening speed control (typically), appropriately selected springs for the pressure range,

- Other considerations include possibly a normally closed bypass around the vault, eye hooks in ceiling above valves, the possible need for cavitation control, the possible need for low flow trim or low flow bypass, the possible need for metering, specialty valve stems for infrequent use installations, whether another function is needed such as check, flow control, pressure relief or pressure sustaining, whether a strainer is needed ahead of the PRV, whether an air release valve should be provided, whether electricity is needed for the station, and ventilation in the vault.

- Consider whether the station should have SCADA included for monitoring.

- Typically, two valves are provided per station in a parallel set up, with a larger valve and a smaller valve to cover the flow range. In smaller stations a single valve may suffice. Verify the flow range is covered, including low flows. Size the two valves together and establish their separate downstream pressures.

- Consider what will happen if the PRV fails. This scenario should be reviewed with UM, including types of failure and potential impact on the system.

Pipe

Pipe material selection and allowable pressure for each run of pipe are important design decisions, and require careful selection based on the size (design flow rate), pressure and role in the system. The hydraulic model shall be used as the flow range to be expected is established. As greater future flows are considered, the pressure range, the likelihood of surge pressure, and an assessment of size options and headlosses as different size pipes are compared. Other considerations include the tapping for laterals and services (both initially and potentially in the future), whether the pipe is a sole source transmission or a distribution line (that may even be looped) and the experience and desires of the system owner.

Based on the above, the pipe material, size and pressure rating will be determined. Pipe materials for the Sheridan system include:

- PVC for most applications depending mostly on size and pressure.
- Steel pipe for larger sizes and higher pressures.
- HDPE for directional borings such as under creeks. Typically compare to fusible PVC. HDPE is preferable for pipe-bursting for transmission lines with limited taps.
- Restrained joint pipe when needed such as fusible PVC, Certa-lok PVC, welded steel, or the use of restrained joints.
- Ductile iron to be used under strictly controlled circumstances with an appropriate design. One consideration with DIP is zinc-coated pipe wrapped in antibacterial polywrap. Even this protection may not be sufficient in very corrosive soils.

All metallic pipe and metallic appurtenances shall be lined and coated, and have cathodic protection (galvanic anodes) applied. The cathodic protection for steel pipe shall be designed by a someone with the appropriate expertise.

The Sheridan water system includes some PCCP pipe, which has performed acceptably. The use of any other type of pipe such as PCCP shall be considered based on the specific reasons and discussed with City staff.

The hydraulic analysis needs to consider the actual internal diameter of the pipe and its realistic long-term friction factor. Installation methods such as bedding material and placement are also important design steps. Also to be considered during design are special applications such as directional borings, pipe bursting, creek or wetland crossings, steep slopes, expansive soils or unstable soils.

The pipe design, including a discussion of the above considerations shall be included in the project's design report. Compliance with DEQ chapter 12 is also needed.

For most applications for 20-inch and smaller pipe, PVC pipe per AWWA C900-16 (DR18 minimum) will be the best choice. This is based its cost, constructability, hydraulic properties, resistance to corrosion, owner acceptance, ability to handle most pressures, its limited flexibility, ease in going from standard push-on joints to restrained joints, and its capability to accommodate future connections. In larger sizes where other materials may become more cost-competitive to PVC, or for higher pressures or when difficult installation conditions apply, other materials will be considered as presented by a knowledgeable designer.

SCADA

The Supervisory Control and Data Acquisition (SCADA) system is an essential part of this water system due to its complexity and large geographical area. New facilities are to be accommodated into the existing SCADA system (including its radio frequency) as determined by the City. Added SCADA stations shall be brought into the existing system, with the existing infrastructure used to the extent practical.

The SCADA system is invaluable for its monitoring and alarm functions, even if "control" through SCADA is limited. Each expansion of the SCADA system requires project specific considerations. Opportunities to monitor trends and produce concise reports from the SCADA system shall be sought out.

Considerations for monitoring and alarms at each site shall include:

- Pressures in and out of pump stations and control valves
- Flow rates
- Tank levels
- Pump run indication
- High or low pressure at key locations
- Low tank level
- High or low flow rates
- Pump called for but did not start, or pump failure
- Power failure
- Low temperature (such as inside a pump station)
- Unauthorized entry
- Wet floor.

6.6 WATER SERVICE BOUNDARY

A water service boundary was established for the Sheridan Water System when the SAWS JPB was created in 1988. This service area represents the area for which a water system master plan was originally developed. This boundary includes the City and adjoining served by SAWS, as this is basically one water system. The core transmission and supply system were designed to serve the area where users which originally signed up could be effectively served. Additional lines and other facilities can be expanded throughout this service area as needed due to serve future development as properly planed and approved by the City or SAWS JPB.

In establishing the original service boundary, consideration was given to areas where development was then thought most likely to occur. Areas with approved and platted subdivisions were included when possible. Some topographic restraints and public interest also helped define this area. This area has not changed since it was originally established.

Over time it has been encouraged that growth occur within the water system service area. Other planning tools such as zoning, subdivision regulations and other requirements were in place that could also be used to direct growth into that area. It was also believed that the water system itself would attract new growth, since water would be readily available to new users, and this has been the case.

It was known that even over time, the entire water service area would likely not fully develop. Also, even the core water system facilities such as pipelines and treatment plants, which were proposed at that time, were not adequate in size to accommodate the full build-out of this area. As we look back at the establishment of this service boundary almost 30 years ago and look forward to how it can serve into the future, it is believed that the original development plan and criteria used are still basically sound. The population served continues to grow, and it is time to reassess this boundary.

Even as we project 50 years into the future, much of the area included within the service boundary is likely to remain undeveloped. During the development of the original master plan, it was assumed that rural areas would continue to develop with densities of two to five acres per lot. Similar densities (on average) are still expected. These must follow City or County requirements and depend on the location of the development and whether or not sewer is provided. Greater densities make projects more cost-effective, in that more users per mile of pipe are available to pay the project costs. Infill development is also being encouraged by growth policies.

This study recommends that the service area boundary for the Sheridan water system be extended in the north and northeast as this part of the City is growing. This is an area that is desired to be served by central water and sewer facilities and should be included in the water service boundary.

Even though some of the areas included in the original service boundary, particularly on the extreme west and the extreme south, appear quite unlikely to develop in the foreseeable future, it is not recommended that the original service boundary be contracted at this time. There will be many areas within the service boundary that will not develop. However, since the landowners of those outlying areas understand that they are within the boundary, it may not be easy to contract the boundary. Just because an area is within the boundary does not mean it must be served if the SAWS JPB decides it is too expensive to serve based on the number of users gained.

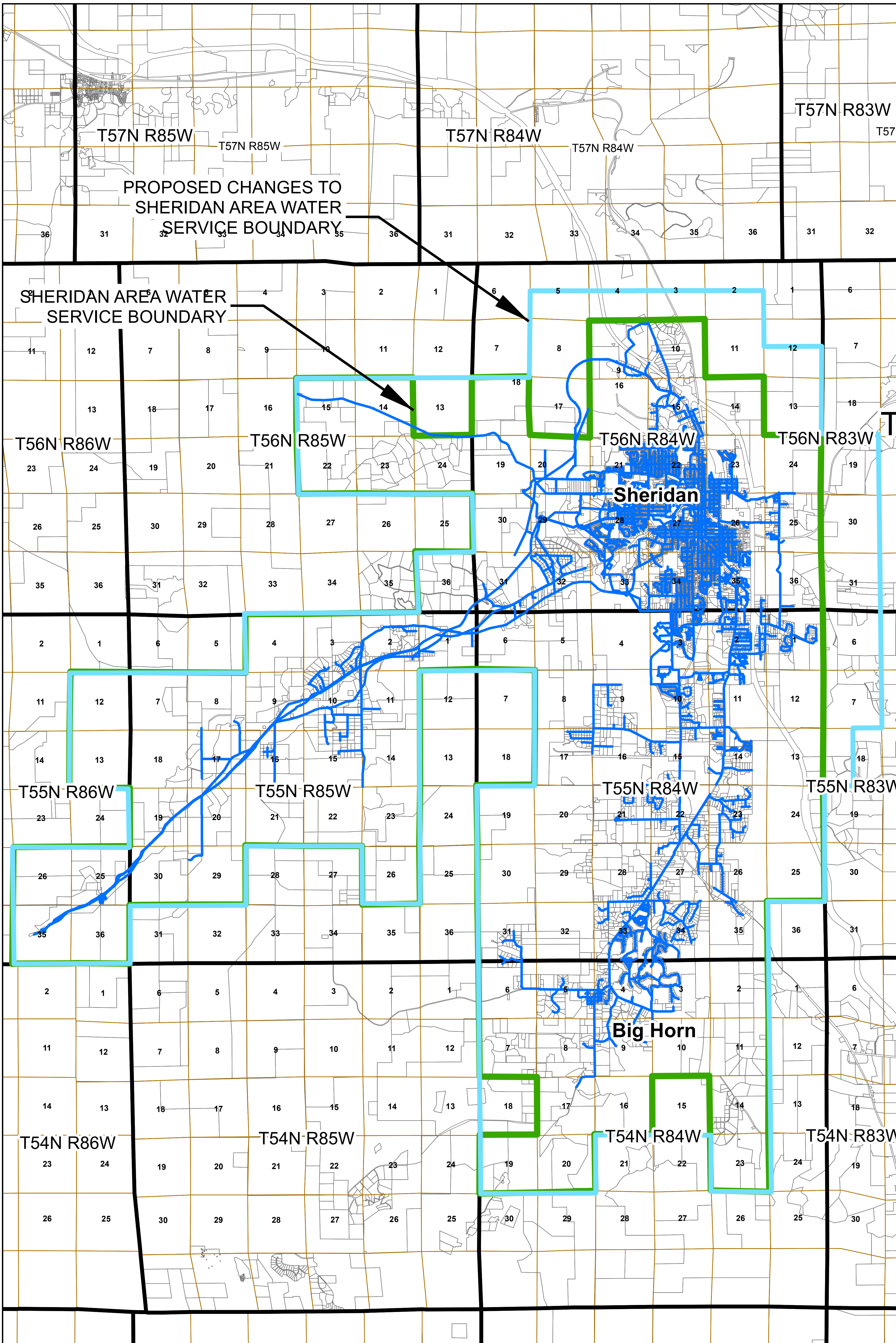
Another possible consideration as the water service boundary is reviewed is conservation easements. Conservation easements have been obtained on many tracts of land extending northeasterly from the Big Horn Mountains and Forest Service land, from Story north to Dayton. Some conservation easements exist on land included within the southern part of the service area in the Big Goose valley and around the town of Big Horn. The exact location of these conservation easements is not being presented in this report. While these conservation easements indicate that these lands will not be developed, it is not believed their presence should be used to exclude land from the service boundary which is currently included.

Conservation easements can change over the years and more land will eventually be added. Also, some users exist within these conservation easements, such as the existing ranch homes. A limited number of future users could be added in compliance with the conservation easement. Therefore, these will not be used to adjust the service boundary.

The location of potential future growth areas was considered for the possible changes in the service boundary for the Sheridan water system. Both the current and proposed changes in the service area boundary are shown in Figure 6.9

The current service boundary is designated with the State Engineer's Office as the area that may receive water from the Sheridan water system and the City and SAWS water rights. Therefore, if this boundary is modified, a change must be filed with the SEO. If the City and SAWS agree to these (or a modification of these) changes, they need to finalize the modified boundary and submit this to the SEO to assure documentation of the use of their water for municipal purposes is fully in order.

This page intentionally left blank.



Legend

- WaterPipeline
- Proposed SAWS Boundary
- Water Service Boundary - Water System
- township
- section
- Parcel Boundary

SAWS Water Service Boundary

Sheridan Master Plan Level I Study

Date: June 25, 2019

DOWL

Figure 6.9

Q:\28\26913-01\40Study\11 Final Report & Deliverables\GIS\Maps\Figure_6.9_Water_Service_Bound_Map_11x17.mxd Jun 25, 2019 8:56:35 AM User: trosenlund

6.7 POLICY ISSUES

Sound policies are an important part of the proper management of water supply, water system infrastructure and managing a water system. The City and SAWS have several important policies in place. These policies, their purpose and some recommendations for adjustments are included in this section. With this shared system, policies that coordinate the management of this system, its water supply and its service area form the foundation for system management.

A summary of current pertinent policies or policy considerations include:

- Maintaining water rates and connection fees that cover the true cost of not only paying for the operating and administrative costs, and debt repayment while setting aside reserves for both future system upgrades and emergencies, but for securing adequate long-term water supplies.

- Having a rate structure that encourages conservation and the wise use of water, as well as the availability of water and the capacity to pursue additional water supply. This includes a tiered rate structure so the cost per 1000 gallons increases with usage. This tiered rate structure already exists and has been working well. The recent water rate study and updating of the financial plan for this water system recommended rates be increased 2.5% every other year to maintain the adequacy of the tiered rate structure (see Section 9.2).

- Providing an incentive for land being developed that has agricultural water rights, for those rights to be maintained for outside watering of the subdivision once it is developed (see next item). For SAWS, include limitations in the Water Service Agreement for the use of water for outside use (to what extent can SAWS water be used for outside watering).

- Provide incentives and the means to allow a developer with water rights of value to provide those in exchange for considerations on their plant investment fees or PIFs. This is already being done by the City, as covered in Resolution 73-07.

- Have a policy in place to address the unusual year of significant drought and limited water supply (see discussion later in this section).

- Update agreements between the City and SAWS (as needed) to address policy issues relating to water rights issues and other areas of common interest.

The two primary agreements with the City are the original Ownership Agreement and Operating Agreement, both dated May 15, 1990. (See Appendix B for these documents).

Key provisions from the Ownership Agreement pertaining to this study are as follows:

- The City's annexation of areas adjacent to the City.
- Acquisition of additional water supplies.

Pertinent sections from the Operating Agreement relating to this study address:

- Construction of additional facilities (and the sharing of costs for these facilities).
- Design and construction of facilities to follow City Standards.
- How rules and regulations may be amended, including connection and extension policies, fees and other items, and that these changes will be implemented according to the Operating Agreement.
- That both entities allow water to pass freely between each other's facilities, and that water treated by one's WTP can be used within another's service area.
- That PIFs be equitably divided based on who is serving the area, including which plant the water is coming from.

Regarding the calculation of current operating costs – the cost sharing ratio of operating (O&M) costs for facilities that benefit both the City and the SAWS JPB service areas is calculated each January by a using a count of the number of water services in each system and calculating the ratio (or percentage share between the City and SAWS). This ratio has been recently running about 80/20.

A table was prepared in the 2008 Level I study summarizing the various facilities within the overall water system and the ownership of facilities. At the time of their construction and at the time of the development of that table, loans were in place on many of these facilities. The 1990 Ownership Agreement stated how the ownership of many of the facilities changed when the loans were paid off. The original loans on the construction of the regional project (SAWS' systems and improvements to the City's system) have been paid off. The only project within that table that still has a loan as of this date is the 20-inch Big Goose Pipeline.

Ownership. The following summarizes the ownership of the key parts of the SWS that were constructed under the regional project in the 1990's or early 2000's:

- Twin Lakes. The enlargement of Twin Lakes is owned 33% SAWS and 67% City. This allocates 410.68 ac-ft of the 1856.6 ac-ft enlargement to SAWS. Ownership of the dam and other structures is by the City.
- Big Goose WTP. This WTP is owned 71.3% by SAWS and 28.7% by the City.
- Sheridan WTP. The City owns 100% of this WTP.

- Big Goose Distribution System. SAWS owns of 100% of these facilities.
- Big Horn Distribution System. SAWS owns of 100% of these facilities.
- Little Goose Distribution Facilities. Ownership of the majority of the Little Goose project is by SAWS. With the repayment of the loans, the areas shown in Exhibits B&C of the Ownership agreement become the City's.
- West Sheridan (West Loucks) System. The City owns these facilities.
- 30-inch Raw Water Transmission Main. The City owns this transmission main.
- 20-inch Big Goose Pipeline. This line is owned 71.3% by SAWS and 28.7% by the City. Also refer to the specific agreement between the City and SAWS for this project.
- Intake Facilities. The City owns these facilities.
- Future Water Supply. The balance in this account for long term water supply is 33% SAWS and 67% City. As of April 30, 2019, the balance in these two accounts totals $3,812,563.

The following paragraphs discuss various aspects of these agreements and provide some recommendations for consideration.

Obtaining additional supply. The primary condition relating to long-term water supply is contained in Section I.A.9 of the Ownership Agreement. It states that new water supplies are to be purchased from the $3 million special account and shall be shared between JPB and the City on a 33%:67% ratio. The $3 million account (more with accumulated interest as noted above) is an excellent source for local matching funds for a larger project. This account is proving valuable by being used to help purchase additional shares in Park Reservoir, matching a 2015 WWDC 67% grant for this purpose.

Annexation by City. Another significant issue is as the City grows, how areas next to the City are handled when the City annexes them. It is the City's policy that areas within the City should be served by City utilities. This policy is supported because it brings efficiency to overall operations. This is particularly true if sewer is also involved. As SAWS users are annexed, an equitable procedure must be followed to allow water service to be furnished by the City. As discussed under the Ownership Agreement, this is negotiated on a case-by-case basis.

Ownership of lines constructed under the SAWS project near the City is complex. Some of these lines reverted to City ownership upon repayment of their loans, and some remained with SAWS. The above summary of Ownership is believed to be the current ownership giving that most project loans have been paid off. Refer to the Ownership Agreement in the Appendix for any additional information.

Issues to be addressed in these annexation negotiations include:

- The water supply for these users should come from City water rights rather than SAWS.
- The responsibilities of operation and maintenance of the lines will be with the City.
- The ownership of any water lines in an area that is annexed by the City should probably transfer to the City. Factors to consider include: any debt remaining on those lines, whether ownership transfers to the City upon repayment of debt anyway, and the PIFs associated with users on these lines. A factor with PIFs is the original SAWS users (if they signed up prior to June 21, 1989) paid no PIFs, so there are no funds in the PIF account associated with the users on the particular line being considered. The original debt including any debt on primary supply and transmission facilities that serve the particular area should be paid off so should not be a factor.
- The transfer of the users from SAWS to the City may take place and needs to be discussed when this occurs. As discussed earlier in this section, the sharing of operating costs for this system is calculated each January based on the number of users within each jurisdiction. So adjustments will be made in the sharing of operating costs as any transfer of users takes place.
- The capacity of transmission mains and other supply facilities (storage and pumping) need to be considered as any changes in the allocation of the capacity of these facilities from that as originally set up, is proposed due to an annexation. The capacity of pertinent facilities in the area should be assessed for both how they serve the area being annexed, and also how they may serve areas beyond the annexed area (if any) and hold reserve capacity to serve future growth. An engineering assessment of capacity may be needed that includes the establishment of both current and future populations, their estimated water usage (under average, peak day and peak hour conditions), modeling of the portion of the system in question, a list of assumptions made, and a brief report summarizing the results of the study.
- While it is important to document all the factors considered and the decisions made regarding these items for each area that is annexed, the requirement that these are considered on a case-by-case basis is valid, and there is probably no one-size-fits-all.
- The settlement shall comply with provisions of the Ownership Agreement.

MOU between County and City. Sheridan County and the City of Sheridan have a Memorandum of Understanding addressing development within the one-mile area around the City. This was done with the understanding that development within one-mile of the City limits may someday be within the City and should be designed and approved using standard regulations and guidelines that are appropriate for future annexation into the City. This MOU states the following regarding water and sewer services:

"Subdivisions within the SAWS service area are to make application to SAWS for water supply. If SAWS service is unavailable, or declines to provide service, the subdivision may request water from the City. Wastewater collection by the City is required for subdivisions in this area unless there are extraordinary circumstances, therefore, sewer service will be by the City."

Water Rates. The recently reviewed and revised rate structures utilize an increasing tiered structure that charges a higher amount per 1,000 gallons as consumption increases. As a result, it encourages conservation. There are two rates in this tiered structure. If greater conservation was needed (not seen as needed at this time since this rate structure provides a significant incentive for conservative usage), a third higher rate could be used for monthly usage above a certain amount. (See Section 9.2)

PIFs. Plant Investment Fees (fees charged to new users to help pay for the value of the water system they are buying into and their use of a portion of the capacity of this system, including its water rights). It is recommended that the PIF be considered in two parts – the value of the infrastructure and the value of water supply. So if a developer or user does not use water for outside use (possible they either have agricultural water rights for the land involve and set up a separate raw water irrigation system or provide water from Park Reservoir to cover their outside use) they would pay a reduced PIF.

The amount of water per user (1 EDU) can vary from 0.2 to 0.6 ac-ft depending on how this is calculated. For example, is only water needed for a 90-day irrigation season considered, given that there is water available in Big Goose Creek when it is not in regulation by the BOC? With water being worth $4200/ac-ft (maybe estimate at $5000/ac-ft to cover some inflation and acquisition costs), this additional amount to the PIF can vary from $1000 to $3000.

The Powder Horn is an example of how using previous water rights for a secondary irrigation system can significantly reduce the impact of the new demand on the water system. Their per EDU usage during the irrigation season is considerably less (and does not increase that much from the non-irrigation season) as compared to developments that use treated water for irrigation. Again, an alternate approach to this is for water to be obtained from say Park Reservoir and transferred to the City or SAWS.

PIFs were analyzed in the recent financial study by Raftelis Financial Consultants. Refer to the discussion in Section 9.2.

Extension of new lines. Another policy is the procedure for extension of water service. This item requires those that are extending a line to serve growth, that it be properly sized and designed, and then paid for by those benefiting.

Future growth considerations should be per the master plan for the area. It is important that all lines fit into a master plan as they are constructed so bottlenecks are not created because a small line was installed for one development, when in the future, it is desired to extended that main further to serve other areas. Developers could be compensated for the cost to upsize the line from what is initially required, to what the master plan requires. This upsizing would typically be for materials only.

Committed Users. In some locations, commitments have been made to serve certain properties in the future. As new developments are proposed, it is important to clarify the understanding of the number of lots and their estimated usage that will be served.

Once consideration here is to place a value on holding this capacity until a new user connects. In the meantime, these reservations for future service must be tracked so they are accounted for as the impact of additional users are assessed for that particular part of the system.

Conservation Plan. One of the requirements of the U.S. Army Corps of Engineers 404 Permit for the construction of the Twin Lakes enlargement was for the City and SAWS to develop an acceptable water conservation plan. The purpose for this plan was to reduce per capita usage by 12% in order to extend the life of the capacity of the new Twin Lakes Reservoir. It was determined several years ago that this water system is in compliance with this conservation plan. This calculation is based on total volume of water diverted from Big Goose Creek. Therefore, it includes water used for all purposes, including hydrant flushing, street washing, system leakage and other accounted-for or unaccounted-for uses, in addition to the quantity of water that flows through the individual users' meters.

Drought Response Plan. The City of Sheridan also has a Drought Response Plan from 2003. The goal of the drought response plan is to preserve an adequate water supply to protect public health and safety regardless of the severity or longevity of the drought. This plan establishes response stages that were established based on the anticipated water supply and water use requirements of the community. This plan provides for the curtailment of certain water uses depending on the severity of the drought and the status of and use of the volume of water in Twin Lakes during the irrigation period.

7.0 DISCUSSION ON WATER RIGHTS, WATER DIVERSION, USAGE AND THE FUTURE

7.1 OVERVIEW OF AVAILABLE, DIVERTED AND USED QUANTITIES

This section reviews water quantities available, diverted, delivered, treated, used and estimates losses to be taken into account. Some of this analysis is used to develop the very important Design Criteria table in Section 6.5.

Since the new advanced metering system for users was in place in 2018 and these meters provided more accurate and more complete user meter readings, data for the year 2018 were analyzed extensively. However, several years were compared to obtain more accurate averages and ranges for water needs, so diversion and usage data from the time period of 2012 to 2018 were also used. Water demand in 2018 was slightly below average, so 2018 data were not used directly. Specifics and factors for usage per EDU, entity (SAWS or City), irrigation season vs non-irrigation season, peaking factors, and losses will be mostly derived from adjusted 2018 data.

The accuracy of meter readings is always a question and must be considered. Just because there is a difference in two readings (raw water leaving the intake vs the quantity showing up at the four delivery points, for example) does not mean there is a "loss". It can be meter readings are not as accurate as we would like. Some larger meters do not cover low flows very well for example, yet when there is a large range of flows to cover, the meter must be sized for the high flows. It can also be difficult to downsize to a smaller meter and then upsize to the pipe size again.

Prior to the new user meters, due to the age of the previous user meters, it was assumed the user meters were under-registering, therefore some of the "loss" between the WTPs and the users was due to under-registering, not an actual loss. With the new user meters, this is no longer an issue. There are still "losses" such as discussed below, but under-registering of user meters should not be occurring.

This analysis in this section will be conducted through the following steps:

1. Consider the water available in Big Goose Creek at the diversion.
2. Tabulate the history of diversions and establish the typical diversion rate for each month to be considered for this study.
3. Tabulate the raw water deliver to the four points and discuss any differences in these quantities vs what leaves the intake facilities (is diverted from Big Goose Creek).
4. Consider water available in reservoir storage and released so it can be diverted from Big Goose Creek at the intake site.

5. Consider the amounts of raw water delivered to these four locations. For the two WTPs include water used within the WTP and treated water effluent quantity.
6. Tabulate usage at the taps (users). Virtually all usage points are now metered, including parks and other green spaces. So even if these meter readings are not billed, they are totaled for usage and can be included. The readings from 2018 will be totaled and summarized, and then scaled up since overall 2018 was a lower than normal year for consumption (usage).
7. Discuss and estimate the losses between any of the points above so they are accounted for.
8. Estimate total water needs – diverted, delivered to the WTPs, raw water delivered to Kendrick and the VAMC, and consumed by users. Break out by averages for the year, peak demands, irrigation season (for water rights consideration) and the non-irrigation season. Enter appropriate parameters into the Design Criteria table. Then estimate for the future years of 2050 and 2070 based on the growth rates and other criteria established.
9. Provide tables (in this section) that summarize this analysis.

7.1.1 Water Available and Diverted:

Flows in Big Goose Creek at the diversion point are summarized as follows. These data came from the soon-to-be-completed Powder-Tongue River Basin Plan

Table 7.1 - Water Flows in Big Goose Creek at USGS Station

	Normal Year		Dry Year	
Month	Ac-Ft	Ave cfs	Ac-Ft	Ave cfs
January	1966	32.0	1624	26.4
February	2004	36.0	1332	24.0
March	2633	42.8	1814	29.5
April	2626	44.1	2234	37.5
May	14,060	229	8240	134
June	23,528	395	8590	144
July	7095	115	3657	59.5
August	3509	57.1	3033	49.3
September	2899	48.7	2582	43.4
October	2709	44.1	2434	39.6
November	2431	40.9	2269	38.2
December	2113	34.4	1978	32.2
Total	**67,573**	**93.3**	**39,785**	**54.9**

The Dry Year flows are not minimums. Minimum flows can take place for part of a month, for example. Also, during very cold weather, the creek can freeze over more, significantly reducing the flow. It is possible during winter and very cold temperatures when overall demand is down, and the diversion rate may not need to exceed say 7cfs, that it is difficult to divert the 7 cfs.

The City and SAWS hold considerable water in storage as summarized in Table 5.1. This water can be released as needed, which can occur during low creek flow times of winter or peak irrigation season (the creek is depleted by agricultural diversions) or other times when demand exceeds either the creek flow or the water rights.

The next location to consider is the intake facilities. The following table summarizes diversions at the intake that are used for the analysis in this master plan.

At the intake facilities, water is diverted and preliminarily treated to remove sand, sediment, and organic debris that can be screened out. The quantity of water measured as diverted is from the two meters in the 16-inch and 30-inch pipelines that leave the site. Any screen washings or other streams from these pre-treatment facilities are returned to the creek (in compliance with the DEQ-issued Discharge Permit for this site), so this amount of diverted water is not counted in the quantities.

The following table shows diverted quantities by month for 2012 – 2018, max year quantities, 2018 quantities (since 2018 data is used throughout this study), and since 2018 was a below average year for diversions, this table includes “typical” quantities to be used as current needs are assessed and projections are made for the future.

Raw water leaving this site through these two pipelines is delivered to the BGWTP, the SWTP, Kendrick Golf Course, and the VAMC. Meters are in place at all these delivery points, so flows leaving the intake can be compared to flows received at these locations.

On average, there is an 8% “loss” in this delivery. It is not believed that these transmission mains leak this quantity of water, so metering discrepancies may be an issue. In any case the quantity of flow leaving the intake must be provided, with allowances for losses applied to the water quantities as they enter the WTPs and then as the water is accounted for throughout the entire water system. The following tables document water quantities that are used in this study and are discussed further below.

This page intentionally left blank.

Table 7.2 – Average Monthly Diverted Flow in Past 10 Years

Month	Total Average Flow (CFS)	Average Monthly Total Diverted - (MGD)	Max Year - 2012/2013 - Monthly Average Flow (CFS) **	Max Year - 2012/2013 - Monthly Total Diverted (MGD) **	2018 Monthly Average Flow (CFS)	2018 Monthly Total Diverted (MGD)	Average Monthly Diverted Adjusted for this Study (CFS)	Average Monthly Diverted Adjusted for this Study (MGD)
January	4.6	3.0	4.5	2.9	4.6	3.0	4.6	3.0
February	4.6	3.0	4.3	2.8	3.8	2.5	4.5	2.9
March	5.1	3.3	4.5	2.9	4.1	2.7	4.6	3.0
April	4.6	3.0	4.4	2.9	3.2	2.1	4.6	3.0
May	6.7	4.3	9.2	5.9	6.5	4.2	8.0	5.2
June	9.5	6.2	12.9	8.3	10.0	6.5	12.4	8.0
July	14.1	9.1	18.2	11.7	14.8	9.6	17.0	11.0
August	13.4	8.6	16.6	10.8	12.4	8.0	16.0	10.3
September	10.2	6.6	12.9	8.4	10.4	6.7	12.4	8.0
October	6.3	4.1	5.9	3.8	5.5	3.6	6.3	4.1
November	4.5	2.9	4.3	2.8	4.1	2.7	4.6	3.0
December	5.0	3.2	4.3	2.8	4.2	2.7	4.6	3.0
Average	**7.4**	**4.8**	**8.5**	**5.5**	**7.0**	**4.5**	**8.3**	**5.4**

** Values in black box were taken from 2013 (no data recorded during these months in 2012)

Table 7.3 – Total Water Usage 2012 – 2017

TOTAL WATER USAGE														
Year	**SWTP Raw Water Influent**			**BGWTP Raw Water Influent**			**Kendrick Golf Course**			**VA Medical Center**			**All Entities**
	Total (MG)	**Avg. Day (MGD)**	**Peak Day (MGD)**	**Total (MG)**	**Avg. Day (MGD)**	**Peak Day (MGD)**	**Water Usage (MG)**	**Average Day (MG)**	**Peak Day Usage (MGD)**	**Annual Water Usage (MG)**	**Average Day (MG)**	**Peak Day Usage (MGD)**	**Total Annual Water Usage (MG)**
2012	1,356	3.7	8.8	374	1.0	2.4	81.6	0.5	0.6	147.3	0.4	1.3	1959.0
2013	1,170	3.2	8.7	331	0.9	1.6	67.4	0.4	0.7	61.2	0.2	1.2	1629.6
2014	1,179	3.2	7.4	263	0.7	1.1	70.3	0.4	0.4	48.1	0.1	0.8	1560.4
2015	1,227	3.4	7.5	323	0.9	2.3	89.6	0.5	0.5	44.4	0.1	0.9	1684.0
2016	1,193	3.3	8.5	258	0.7	1.1	99.1	0.5	0.7	93.0	0.3	0.9	1643.1
2017	1,124	3.1	7.1	375	0.0	2.1	79.9	0.5	0.6	39.1	0.1	0.5	1618.0
Average	**1,208**	**3.3**	**8.0**	**321**	**0.8**	**1.8**	**81**	**0.5**	**0.6**	**72**	**0.2**	**1**	**1,682**

Table 7.4 – Water Flows at the BGWTP

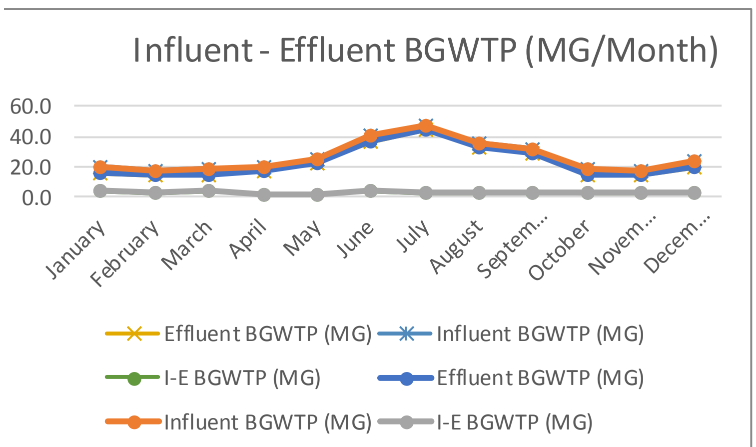
BIG GOOSE WATER TREATMENT PLANT FLOWS - 2018						
MONTH	AVERAGE DAY PLANT RAW WATER INFLUENT (MGD)	MAX DAY RAW WATER INLFULENT (MGD)	TOTAL PLANT RAW WATER INFLUENT (MG)	AVERAGE DAY PLANT EFFLUENT (MGD)	MAX DAY PLANT EFFLUENT (MGD)	TOTAL PLANT EFFLUENT (MG)
Jan	0.8	1.5	20.2	0.6	1.6	16.2
Feb	0.6	1.5	17.5	0.5	1.8	14.5
Mar	0.6	0.9	18.4	0.5	1.0	14.9
Apr	0.6	0.8	19.4	0.6	0.8	17.1
May	0.8	1.3	25.2	0.8	1.3	23.3
Jun	1.3	2.5	40.3	1.2	2.6	36.3
Jul	1.5	2.2	47.2	1.4	2.3	44.3
Aug	1.2	1.6	35.9	1.1	1.5	33.2
Sep	1.1	1.5	32.4	1.0	1.4	28.7
Oct	0.6	1.0	18.2	0.5	0.8	15.0
Nov	0.6	0.9	17.4	0.5	0.9	14.8
Dec	0.8	1.9	23.6	0.6	1.6	19.8
Total, Ave., or	0.9	2.5	315.6	0.8	2.6	278.2

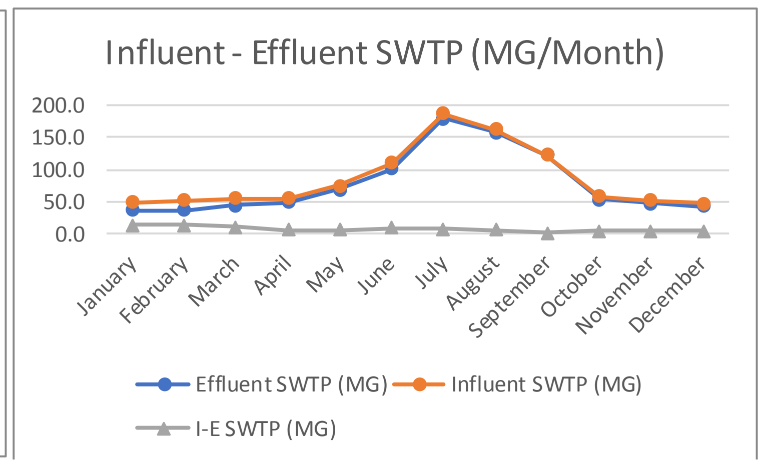
Table 7.5 – Water Flows at the SWTP

SHERIDAN WATER TREATMENT PLANT FLOWS - 2018						
MONTH	AVERAGE DAY PLANT INFLUENT (MGD)	MAX DAY PLANT INFLUENT (MGD)	TOTAL PLANT INFLUENT (MGD)	AVERAGE DAY PLANT EFFLUENT (MGD)	MAX DAY PLANT EFFLUENT (MGD)	TOTAL PLANT EFFLUENT (MGD)
Jan	1.8	2.3	49.1	1.3	2.0	36.1
Feb	1.8	2.7	51.6	1.3	1.9	37.3
Mar	1.8	1.9	54.7	1.4	1.7	44.4
Apr	1.8	2.3	54.6	1.6	2.3	48.7
May	2.4	3.3	75.2	2.2	3.1	69.3
Jun	3.7	6.0	109.8	3.2	5.2	93.2
Jul	6.0	7.3	186.5	5.8	7.0	178.7
Aug	5.3	6.9	163.0	5.1	6.7	157.2
Sep	4.1	5.0	123.0	4.1	4.9	121.8
Oct	1.9	2.2	58.2	1.7	2.4	53.5
Nov	1.7	2.1	52.4	1.6	2.0	47.4
Dec	1.5	1.8	47.3	1.4	1.6	42.2
Total, Ave., or	2.8	7.3	1025.4	2.6	7.0	929.7

Table 7.6 – Comparison of WTP Influents to Effluents

Month	Effluent			Influent			Difference			
	Effluent BGWTP (MG)	Effluent SWTP (MG)	Total Effluent Treated (MG)	Influent BGWTP (MG)	Influent SWTP (MG)	Total Influent Treated (MG)	I-E BGWTP (MG)	I-E SWTP (MG)	I-E Total Treated (MG)	% Difference
January	16.2	36.1	52.2	20.2	49.1	69.3	4.0	13.0	17.0	25%
February	14.5	37.3	51.8	17.5	51.6	69.1	3.0	14.3	17.2	25%
March	14.9	44.4	59.3	19.0	54.7	73.7	4.0	10.4	14.4	20%
April	17.1	48.7	65.8	19.4	54.6	74.1	2.3	5.9	8.3	11%
May	23.3	69.3	92.6	25.2	75.2	100.4	2.0	5.9	7.8	8%
June	36.3	101.3	137.7	40.3	109.8	150.0	3.9	8.5	12.4	8%
July	44.3	178.7	223.1	47.2	186.5	233.7	2.9	7.8	10.7	5%
August	33.2	157.2	190.5	35.9	163.0	198.8	2.6	5.8	8.4	4%
Septembe	28.7	121.8	150.5	32.4	123.0	155.4	3.7	1.2	4.9	3%
October	15.0	53.5	68.5	18.2	58.2	76.4	3.2	4.7	7.9	10%
November	14.8	47.4	62.2	17.4	52.4	69.8	2.6	5.1	7.7	11%
December	19.8	42.2	62.0	23.6	47.3	71.0	3.8	5.2	9.0	13%
Total 2018	278.2	937.9	1216.1	316.2	1025.4	1341.7	38.0	87.6	125.6	9%





This page intentionally left blank

7.1.2 Discussion of Water Losses

As mentioned above, there are losses throughout this system that must be accounted for. From discussions with the water system operators and from experience with this system, it is believed these losses are small in the grand scheme and this is a fairly "tight" system. Periodic leak detection surveys are conducted on parts of the system and small leaks are found and repaired.

Leaks typically come from the following sources:

- General small leaks at joints in pipe and next to valves or fittings.
- Joint leaks in older pipe that do not have rubber gaskets.
- Leaks at old hydrants (virtually all of these leak)
- Leaks at hydrants that do not shut off drip tight.
- Leaks from corrosion pin holes in iron pipe.
- Leaks at service taps or at connections within service lines.

While the quantity of leakage from these sources is uncertain, based on experience and discussion with operators on what they see in the system, it is believed the quantity may be about 10-15% of the quantity of water supplied into the system.

Other reasons for water losses, whether real or due to a metering discrepancy include:

- Water diverted from the primary flow paths at the intake or through the WTPs as part of the treatment process. Some of this water is recycled at the WTPs (such as filter backwash water), but the sludge drying process has losses and occasionally discharges from these facilities takes place.
- Water uses at the WTPs.
- Under reading of meters. (This should not be an issue with new user meters).
- Any unmetered taps.
- Water flushed from the system to maintain water quality, after leak repairs, to fill street cleaning trucks, to verify the operation of fire hydrants, or other reasons.
- From an analysis of the monthly data, the percentage for loss is greater in the non-irrigation season than in the irrigation season. There are two likely reasons for this:
    - There is a "fixed" amount of typical loss through joints or connections that are not water tight, so the percentage is less during the higher usage months.
    - Meters typically have greater errors in measurement at low flows, so a meter may be "oversized" at lower flows contributing to less accurate meter readings.
- Regarding stored water, releases from storage, diversions at the intake, and water that is available but not diverted, are all important to estimate, take into account, and minimize.

When all the above is considered and from an analysis of the data in the previous tables, the following are the "loss factors" calculated and used in this study:

- From the intake facilities to the delivery to the two WTPs, Kendrick and the VAMC – 8%. Since this "loss" should not vary from lower demand times to higher demand times, as discussed in relation to Table 7.13, these losses are incorporated into this table as 0.4 MGD, not a percentage.
- Within the two WTPs (Influent vs Effluent):
  - BGWTP – 12%
  - SWTP – 8.5%
- From WTP Effluent to the user meters – >13%
- From WTP Influent to the user meters – about 30%

From the above, when considering treated water quantity requirements, WTP influent will be used as that is the quantity of water delivered to be treated. There are losses and uses within the WTPs and then losses from the WTP to the user meters, but the important quantity is the amount that must be supplied to the WTPs. Also, the influent meters at the WTPs are believed to be more reliable than the effluent meters.

Since quantities during the irrigation season are more critical than other times of the year, this analysis must also consider this time of greater demand.

When utilizing water quantities that pass through the user meters, a factor of an additional 30% is applied to approximate the quantity of water delivered to the WTPs. This is the per capita or per EDU quantity needed to support this user.

In summary, water availability (including water rights) must be considered based on current usage and projected into the future for estimated needs. Based on the stream flows, water rights, and water availability in Big Goose Creek, there is currently adequate water supply during the nine months out of the year when the creek is not in regulation. Irrigation season thus is the critical time as demands increase considerably, stream flow reduces, and water rights become more important.

7.1.3 Water Demand Trends

This section compares water demand on this system from the tables of the influent flows to the two WTPs from what was developed in the 2008 Level I study (covering the years 1997 through 2006) to this Level I study (covering the years 2012 through 2018). The influent meters at the WTPs are used for consistency, and influent flows to the WTPs includes all water delivered for treatment so includes any losses, apparent losses or non-revenue uses between the WTP and users, discussed in the above section. From this study, Tables 7.3 – 7.5 were used. Table 11 from Appendix 4 of the 2008 study was referenced.

Table 7.7 - WTP Influent Flows – Comparisons of Time Periods

Time Period	Item	Sheridan WTP			Big Goose WTP			Total		
		Ave. Total	Ave. Day	Peak Day	Ave. Total	Ave. Day	Peak Day	Ave. Total	Ave. Day	Peak Day
1997 - 2006	Ave. Year	1157 MG	3.2 MGD	8.1 MGD	422 MG	1.2 MGD	2.0 MGD	1579 MG	4.4 MGD	10.1 MGD
	Peak Year	1356 MG	3.7 MGD	9.1 MGD	451 MG	1.2 MGD	2.2 MGD	1807 MG	4.9 MGD	11.3 MGD
2012 - 2018	Ave. Year	1182 MG	3.2 MGD	7.9 MGD	320 MG	0.8 MGD	1.8 MGD	1507 MG	4.0 MGD	9.7 MGD
	Peak Year	1356 MG	3.7 MGD	8.8 MGD	374 MG	1.0 MGD	2.4 MGD	1730 MG	4.7 MGD	11.2 MGD

Observations from the above table:

- There are many similarities between the two time periods, and overall the amount of water delivered to the two WTPs has not increased even with an increase in the number of users served.
- The two peak years (1998 and 2012) are very similar, and again, the peak year has not increased during this 20-year period.
- With the way the SWS is designed, such that most of the supply into the system is by gravity, the percentage each WTP contributes to the total can vary depending on how the system is operated. Some areas can be served by either WTP. It appears the role of the BGWTP has decreased over time. The operational costs of each WTP and how best to deliver water to the many pressure zones on this system can be adjusted to maximize efficiencies.
- When considering the increased number of users and the usage by these users, it appears the primary reasons for not seeing an increase in overall quantities of water delivered to the WTPs include efficiencies gained in managing water between the WTPs and the users. These reasons include reductions in losses, leakage, non-metered users, and more efficient use of non-revenue water in the overall operation of the system.

Table 7.8 – Summary of User meters Compared to WTP Effluents

Month	Metered (MG)	BGWTP (MG)	SWTP (MG)	Total Treated (MG)	Treated minus metered (MG)	% difference
January	49.2	16.2	36.1	52.2	1.1	2%
February	44.7	14.5	37.3	51.8	7.1	14%
March	49.8	14.9	44.4	59.3	9.5	16%
April	60.3	17.1	48.7	65.8	5.5	8%
May	101.7	23.3	69.3	92.6	-9.2	-10%
June	159.3	36.3	101.3	137.7	-21.6	-16%
July	198.8	44.3	178.7	223.1	24.2	11%
August	162.0	33.2	157.2	190.5	28.5	15%
September	82.2	28.7	121.8	150.5	68.3	45%
October	53.5	15.0	53.5	68.5	15.0	22%
November	51.2	14.8	47.4	62.2	10.9	18%
December	51.1	19.8	42.2	62.0	10.9	18%
Total	1063.9	278.2	937.9	1216.1	152.2	13%

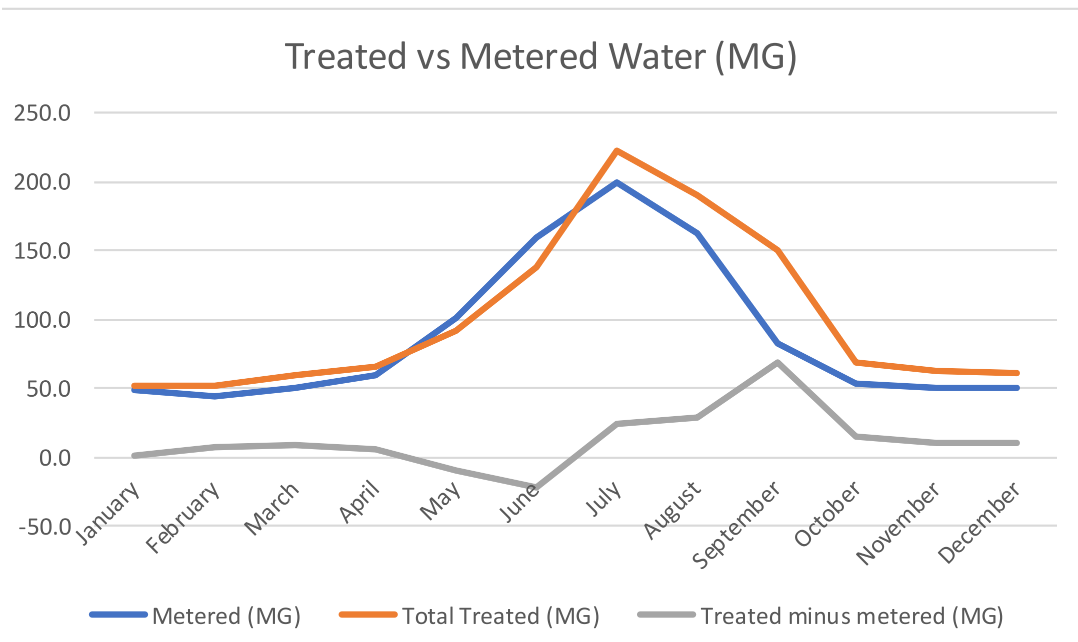


Table 7.9 – Summary of User Meters Compared to WTP Influents

Month	Metered (MG)	BGWTP (MG)	SWTP (MG)	Total Treated (MG)	Influent minus metered (MG)	% Difference
January	49.2	20.2	49.1	69.3	20.0	29%
February	44.7	17.5	51.6	69.1	24.4	35%
March	49.8	19.0	54.7	73.7	23.9	32%
April	60.3	19.4	54.6	74.1	13.7	19%
May	101.7	25.2	75.2	100.4	-1.4	-1%
June	159.3	40.3	109.8	150.0	-9.2	-6%
July	198.8	47.2	186.5	233.7	34.9	15%
August	162.0	35.9	163.0	198.8	36.9	19%
September	82.2	32.4	123.0	155.4	73.2	47%
October	53.5	18.2	58.2	76.4	22.9	30%
November	51.2	17.4	52.4	69.8	18.6	27%
December	51.1	23.6	47.3	71.0	19.9	28%
Total	1063.9	316.2	1025.4	1341.7	277.8	21%

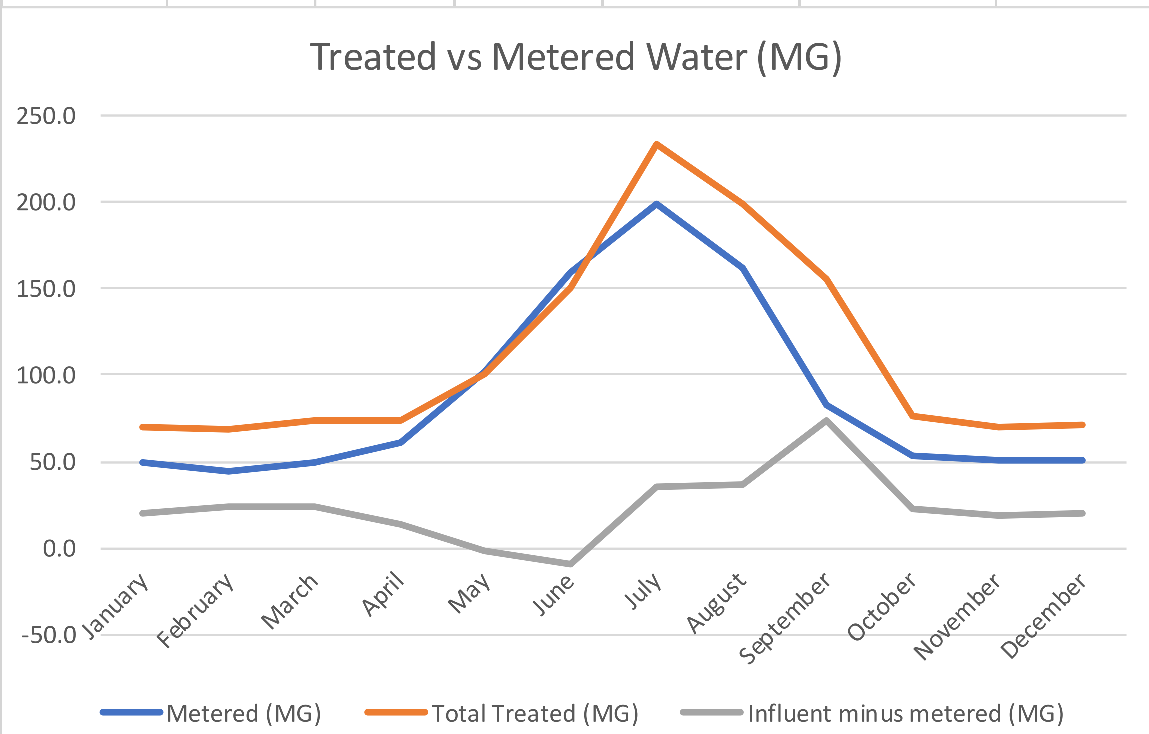


Table 7.10 – Comparison of Intake Diversion to WTP Influent and Raw Water Use

Month	Total Influent to WTPs (MG)	Golf Course (MG)	VAMC (MG)	Total Influent plus Raw Water Use (MG)	Total Diverted (MG)	Diversion minus treated minus raw (MG)	% Difference
January	69.3	0.0	1.8	71.0	92.2	21.1	23%
February	69.1	0.0	2.4	71.5	68.7	-2.7	-4%
March	73.7	0.0	2.8	76.5	83.0	6.5	8%
April	74.1	0.0	2.9	77.0	62.7	-14.3	-23%
May	100.4	14.4	2.3	117.0	130.1	13.1	10%
June	150.0	26.4	3.0	179.4	194.7	15.3	8%
July	233.7	24.3	14.3	272.3	296.8	24.6	8%
August	198.8	23.5	5.2	227.5	249.3	21.8	9%
September	155.4	21.3	2.8	179.5	201.6	22.1	11%
October	76.4	20.8	2.1	99.3	111.1	11.7	11%
November	69.8	0.0	2.4	72.2	80.2	8.0	10%
December	71.0	0.0	2.3	73.2	84.4	11.2	13%
Total 2018	1341.7	130.7	44.0	1516.4	1654.8	138.4	8%

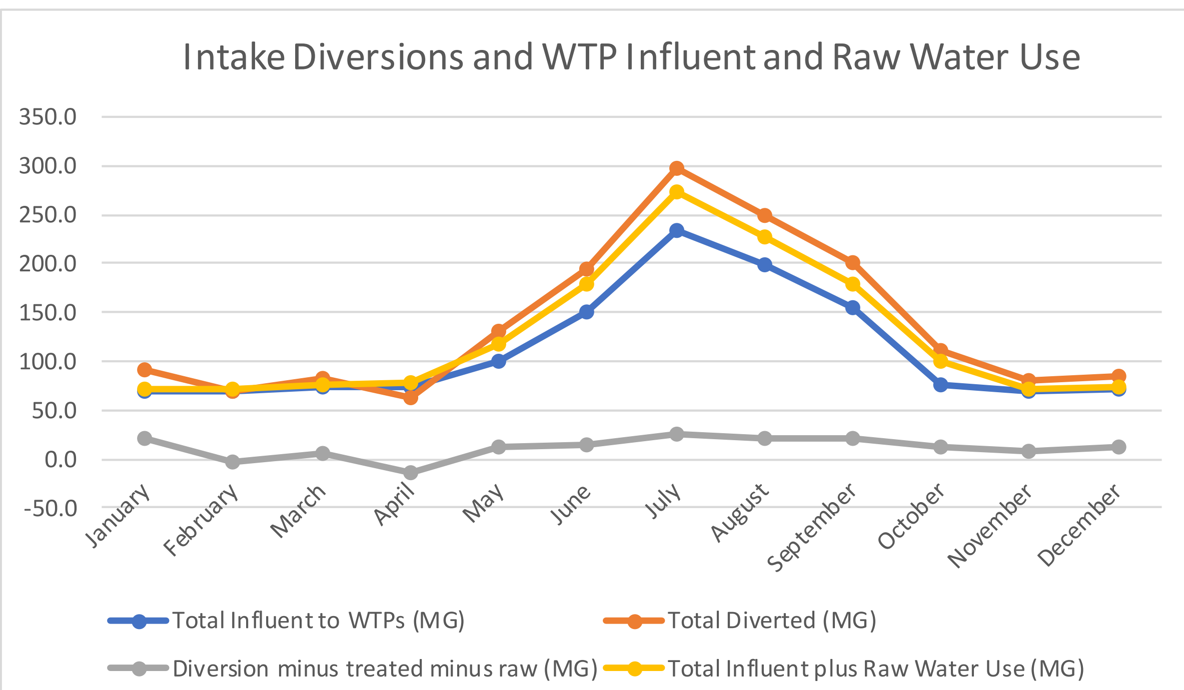


Table 7.11 – Summary of Water Use from Customer Meter

Summary of Annual Water Use From Customer Meters				
Month	Use by type (GPD/EDU)			Total
	Residential	SAWS	Overall	Monthly
January	126	145	138	51.11
February	115	141	133	49.23
March	105	125	121	44.68
April	118	145	135	49.82
May	159	139	162	60.34
June	280	190	276	101.74
July	440	260	431	159.29
August	494	410	538	198.84
September	395	334	437	161.97
October	178	219	221	82.18
November	123	146	144	53.47
December	116	140	136	51.21
Average - 2018	221	199	239	88.66

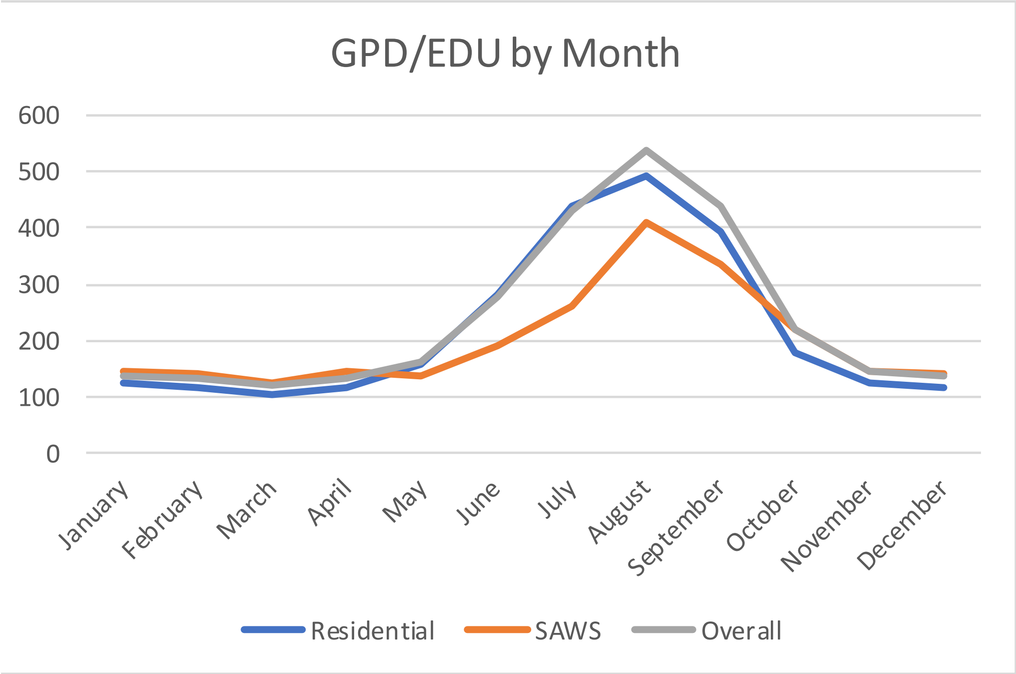


Table 7.12 – Average Annual Usage per EDU

	Usage CUFT	EDU	Annual Usage (Gal)	Avg GPD/EDU
APARTMENT	4775400	388	35,719,995	252
COMMERCIAL	22163999	1,744	165,786,709	260
EDUCATIONAL	1626970	361	12,169,735	92
GOVERNMENT	1689164	159	12,634,950	218
HOSPITAL/NURSING	1908462	61	14,275,293	638
HYD NO SERVICE	131638	0	984,649	
Hydrant	5873	0	43,933	
LIGHT INDUSTRY	8955	1	66,982	184
NO SERVICE	8739540	741	65,371,760	242
OUTSIDE CITY	3792543	435	28,368,222	179
PARKS/RECREATION	1833551	74	13,714,962	505
RECREATIONAL	382842	43	2,863,657	181
RESIDENTIAL	64704091	6,174	483,986,598	215
SAWS	17364151	1,833	129,883,848	194
SAWS NO SERVICE	442235	92	3,307,918	99
SUMMER TAP	8039111	294	60,132,549	560
TRAILER PARK	4212278	178	31,507,837	485
Water Card	408661	0	3,056,786	
WC NO SERVICE	740.10784	0	5,536	
Grand Total	142230203	12580	1,063,881,919	232

Table 7.13 - Irrigation vs. Non-irrigation Flow Comparison

Irrigation Season (3 months)					
Year	**Sheridan WTP INFLUENT MG**	**BGWTP INFLUENT MG**	**Kendrick MG**	**VA MG**	**Total MG**
2012	647.81	159.46	44.91	89.36	941.54
2013	598.54	122.91	36.94	32.21	790.6
2014	508.98	106.02	36.38	16.24	667.62
2015	534.61	142.49	44.07	14.22	735.39
2016	620.55	114.56	47.43	53.27	835.81
2017	519.95	145.31	49.06	15.97	730.29
AVG	**571.74**	**131.79**	**43.13**	**36.88**	**783.54**
AVG DAY	**6.35**	**1.46**	**0.48**	**0.41**	**8.71**
PEAK YEAR	**647.81**	**159.46**	**49.06**	**89.36**	**945.69**
PEAK MONTH	**249.48**	**65.91**	**18.78**	**34.36**	**368.53**
PEAK DAY	**8.68**	**2.42**	**0.69**	**1.3**	**13.09**
Non-Irrigation Season (9 months)					
Year	**Sheridan WTP INFLUENT MG**	**BGWTP INFLUENT MG**	**Kendrick MG**	**VA MG**	**Total MG**
2012	708.43	241.40	36.73	57.98	1044.54
2013	571.06	207.61	30.48	28.94	838.09
2014	670.47	156.87	34.59	31.83	893.76
2015	691.95	180.13	45.48	30.2	947.76
2016	572.26	143.26	51.67	39.76	806.95
2017	603.75	229.94	30.81	23.22	887.72
AVG	**636.32**	**193.20**	**38.29**	**35.32**	**903.14**
AVG DAY	**2.31**	**0.70**	**0.14**	**0.13**	**3.28**
PEAK YEAR	**708.43**	**241.40**	**51.67**	**57.98**	**1059.48**
PEAK MONTH	**172**	**44.06**	**18.76**	**25.62**	**260.44**
PEAK DAY	**7.08**	**2.76**	**0.65**	**1.07**	**11.56**

7.2 WATER RIGHTS AND FUTURE WATER NEEDS

This section discusses Sheridan's water rights and provides estimates of future water needs and then an estimate of when additional water supply will be needed. The following statements regarding water availability, water needs, and water rights are used in this assessment:

- The City's direct flow right of 16.0 cfs and the SAWS JPB's of 7.14 cfs apply when a call for regulation has not been placed on Big Goose Creek by the BOC.
- A call for regulation typically is placed in early July and lasts until September 30th. The duration of this call can include more days, but this length covers most years. Provisions, such as having sufficient water in storage need to be maintained as a contingency against a longer period.
- When a call for regulation has been placed, the SAWS right goes to 0 and the City's drops to 13.0 cfs. This 13 cfs also covers the VAMC and their usage is included in these calculations.
- A call for regulation on the creek at the location of the City's diversion point typically goes back to 1886 right away, so the 1.77 cfs with priority dates of 1891 to 1906 right is also lost.
- The start of the release of water from agriculture storage in the mountain reservoirs typically occurs at the same time as the call for regulation of Big Goose.
- Only the water needed will be diverted from the creek, so if the demand is <16 cfs, it will remain in the creek. Therefore, the total available water supply of 17,196 ac-ft (Table 5.2) can be misleading.
- During the winter, particularly in early winter such as November and December when there is little snow for insulation and it becomes very cold (below zero), springs can freeze and the flow in the creek can drop to 7 cfs or even less. So either the demand must be less than 7 cfs or there may need to be a release from storage in the winter. The historic diversions in the November through March time period have been running <6 cfs, so this situation appears to be manageable under most conditions at this time.
- Table 7.14 analyzes current water needs and those for the future years of 2050 and 2070 during three time periods. These are:

   - <u>October thru April.</u> The creek should not be in regulation during these months and demands drop off considerably with limited to no irrigation. Historic diversions and demands are similar enough that these months can be assessed together.

- May and June. Demands are increasing in May and can be high in June. Typically, a call for regulation has not yet been placed, so these two months are different than the others and are considered separately.
- July thru September. This is the irrigation season as discussed throughout this report. Demands are at their maximum and a call for regulation has typically been placed on Big Goose. With a growing population these months become of most concern and water from storage will be needed to satisfy demands.

- The BOC's implementation of the decree resulting from the settlement of the *MT v WY* water rights case must be considered but is not believed to have a major impact.

The Design Criteria in Table 6.10 presents the per EDU demands and the current and future water needs for this water system. Population and EDU projections are made in Table 6.1 and these result in the estimated total water needs for 2019, 2050 and 2070 for the City and SAWS users shown in Table 7.14.

Also to be included are the raw water needs of the VAMC and Kendrick Golf Course. These are included in Table 7.15, along with the treated water needs. Table 7.15 also estimates these water needs for the future years of 2050 and 2070 and presents these water supply quantities in different ways such as the annual average, the irrigation season, and with different units that apply depending on how these quantities are being considered.

A few comments on these tables:

- Water to users is the influent flows to the WTPs. This is water that is diverted for treatment as opposed to raw water usage. The influent meters at the WTPs are also considered to be more accurate than some other measuring locations.

- There are water uses within the WTPs and losses or apparent losses from the WTP to the user meters. All user meters are new so should be accurate. A multiplier of 1.3 is used to cover these losses or apparent losses when only the water quantity that passes through the user meters is being considered. This multiplier is included in Table 7.15.

- There are also losses, or apparent losses, between the point of diversion on Big Goose and the four points of delivery of raw water. In 2018, this quantity was about 0.4 MGD. Since this quantity should be fixed (not increase as usage increases), 0.4 MGD is added to the quantities used or estimated to be needed in the future at these four points. This 0.4 MGD (0.62 cfs) is not included in Table 7.15, but is included as total water supply is projected for the future and compared to water rights, such as in Table 7.14.

- The water needs of Kendrick Golf Course and the VAMC are not expected to increase, so they remain the same during this planning period.

- Another consideration is the capacity of the raw water diversion and transmission facilities. These capacities are estimated to be sufficient until after 2050. See additional discussion in Section 7.3.

Following the assessment of the above, the resulting conclusions and estimates of time periods for these water supplies are made:

- City.
  - If the City's direct flow right of 16 cfs is available until July 1st, per Table 7.14 this demand is reached in about 2050 when considering May/June needs.
  - Existing storage (Table 5.3) should cover the needs beyond the year 2050 (Table 7.14). The estimated year this will be exceeded is 2057, but this will require periodic recalculation and consideration of additional water supply obtained from Park and Dome.
  - The allowance for 10% of Twin Lakes capacity to be used outside of the irrigation period covers times in June, early October or even winter, when additional flow may be needed. This quantity provides an additional 3 cfs for 42 days. If this water is used in the fall or winter, this volume in Twin Lakes will refill during spring runoff.
- SAWS.
  - SAWS's direct flow right of 7.14 cfs should cover their peak withdrawal rates beyond the course of this study (>50 years), as long as the creek is not in regulation. So they do not need to use storage unless Big Goose is in regulation or the water is not present in the creek.
  - Their total current storage available (for the irrigation season) is 505 ac-ft (571-66) per Table 5.3. It is estimated that this storage will be depleted shortly after 2050.
- Total Water Rights and Water needs.
  - As noted above, the existing direct flow rights and stored water provide sufficient supply per the estimates past the year 2050.
  - The direct flow rights for the City, SAWS and the VAMC when Big Goose Creek is not in regulation (and there is sufficient water in the creek) are: 16.0 + 1.77 + 7.14 = 24.9 cfs. This quantity takes the system through this entire planning period, when the creek is not in regulation, there is sufficient water in the creek, and demands are as estimated in Table 7.14.
  - If the combined system has 4586 ac-ft available in the irrigation season, there is sufficient water supply into the 2050's (estimate of 2055).
  - Currently the withdrawals from Big Goose run <5-6 cfs in October – April. When the 15 cfs (16.0 – 1.0 for the VA) plus the 7.14 cfs for SAWS are used in Table 4, it shows a total water supply available that is not realistic since this much water is not needed and therefore is not diverted. If the entire system needs 12,280 ac-ft in 2070

    (Table 7.13), and if the direct flow during October through April is assumed to average 9.1 cfs, there is about 11,635 ac-ft available. So the future need for additional water during the peak usage months is emphasized.
  - To get to the year 2070, additional stored water is needed, since it is very unlikely that the direct flow right can be increased.
- Considering the City with its obligations to the VA and Kendrick (but excluding SAWS).
  - In 2050 (from Table 7.13) they need 8127 ac-ft (8597 – 470 for SAWS); and for the irrigation season: 4149 – 470 = 3679 ac-ft.
  - They have 4081 ac-ft for the irrigation season, so are good till 2055.
  - In 2070 (from Table 7.13) they need 11,866 – 663 = 11,203 ac-ft; and for the irrigation season: 5751 – 663 = 5088 ac-ft.
  - They will need an additional 1007 ac-ft (5088 – 4081 ac-ft)
  - Estimated direct flows (these include the VA and not SAWS):
  - 2050: October – April = 6.0 cfs; May – June = 13.6; July – September = 21.4 cfs.
  - 2070: October – April = 8.0 cfs; May – June = 18.5; July – September = 29.3 cfs.
  - If the VA is taken out, it reduces by 0.5, 0.6, 0.8 cfs for these three time periods.
  - The City has 16.0 cfs in the non-irrigation season and 13.0 during irrigation.
  - The City also has the 1.77 cfs right but if this is needed when Big Goose Creek is in regulation (irrigation season) and is not available during regulation, it is of limited value. It can be used when Big Goose is not in regulation but demands >16 cfs.
  - Conclusions:
    - October – April: Good throughout.
    - May – June: Are getting close to the 16 cfs right in 2050 and will exceed it on some days, so may need to use some stored water by about 2050.
    - July – September: Needs are well above the direct flow right, so need to acquire additional stored water.
    - From Table 7.14, if the need in May – June + July – September is:
      a. 2050: (30.4 ac-ft – 3.4 for SAWS) x 60 days + (47.6 ac-ft – 5.2 for SAWS) x 90 days = 5436 ac-ft
      b. 2070: (41.7 ac-ft – 5.0 for SAWS) x 60 days + (65.4 ac-ft – 7.3 for SAWS) x 90 days = 7431 ac-ft.
      c. Demand is increasing by 100 ac-ft per year for the 20 years.
    - Table 5.3 shows 4081 ac-ft available for the irrigation season. If we include 16 cfs in direct flow available for May – June this adds 1785 ac-ft, so now have 5866 ac-ft available.
    - When considering the available direct flow and stored water for these five months, we will run out in about 2054.

This page intentionally left blank.

Table 7.14 - Estimated Future Water Needs with a Comparison to Water Availability and Water Rights

This table covers influent flows to the WTPs, so it includes the per EDU share of water all water apparently lost between the WTP influent and user meters (a 1.3 multiplier).

Kendrick, the VAMC, and the on-average 0.4 MGD “lost” between the intake and the delivery points to the 4 locations that receive this raw water are included as noted below.

	Usage (GPD/EDU) – With share of water as delivered to WTPs[1]													Total MGD			Total CFS			Ac-Ft/day					
	Ave. Day: Oct thru April	Ave. Day: May & June	Average Day Irrigation Season (July thru Sept)	EDUs	Average MGD For period indicated[3]			Total MGD for City & SAWS Combined[3]			Adders for VAMC, Kendrick, Raw water losses[2,3, 4]			Oct – April May – June July – Sept[3]			Oct – April May – June July – Sept			Oct – April May – June July – Sept			Total Ac-Ft ****	Ac-Ft for 90-day Irrigation Season (July – Sep) ****	SAWS only For the 90-day irrigation season (ac-ft)
City – 2019	170	410	660	10,655	1.8	4.4	7.0	2.1	5.1	8.0	0.8	1.3	1.7	2.9	6.4	9.7	4.5	9.9	15.0	8.9	19.6	29.8	5772	2682	
SAWS – 2019	150	340	520	1925	0.3	0.7	1.0	-	-	-	-	-	-	-	-	-	0.5[6]	1.1[6]	1.5[6]	1.0[6]	2.2[6]	3.0[6]	5358[4]	2547[4]	276
City – 2050	170	410	660	18,330	3.1	7.5	12.1	3.6	8.6	13.8	0.8	1.3	1.7	4.4	9.9	15.5	6.8	15.3	24.0	13.5	30.4	47.6	9011	4284	
SAWS – 2050	150	340	520	3310	0.5	1.1	1.7	-	-	-	-	-	-	-	-	-	0.8[6]	1.7[6]	2.6[6]	1.6[6]	3.4[6]	5.2[6]	8597[4]	4149[4]	470
City – 2070	170	410	660	26,000	4.4	10.7	17.2	5.1	12.3	19.6	0.8	1.3	1.7	5.9	13.6	21.3	9.1	21.0	33.0	18.1	41.7	65.4	12,280	5886	
SAWS – 2070	150	340	520	4700	0.7	1.6	2.4[5]	-	-	-	-	-	-	-	-	-	1.1[6]	2.5[6]	3.7[6]	2.2[6]	5.0[6]	7.3[6]	11,866[4]	5751[4]	663

[1]As discussed in the report, these quantities are an estimate of the usage in GPD/EDU, times a multiplier of 1.3 to cover all apparent losses between WTP influent and the user’s meter.
[2]VAMC = 0.3 MGD for Oct-April, 0.4 MGD for May-June, and 0.5 MGD for irrigation season; Kendrick = 0.1 MGD for Oct-April, 0.5 MGD for May/June and 0.8 MGD for irrigation season; raw water losses = 0.4 MGD year-round.
[3]The breakout of the 3 quantities is for: October – April, May – June, July – September. The number of days used in the calculations are 215, 60 and 90 respectively.
[4]The VAMC is included in the Adders to establish the totals (footnote #2 above), but in following previous protocols and considering their direct flow right, a deduction for the VA has taken place in the water rights Table 5.2 and 5.3, so the ac-ft provided to the VA is not included in the amounts with footnote #4 in the two columns ****. The reduction amounts are 414 ac-ft for the average usage for the year, and 135 ac-ft for the 90-day irrigation season.
[5]The maximum estimated demand for SAWS only is <4 cfs, so as long as their 7.14 cfs right is available, they do not need to use storage. Storage is only for the irrigation season.
[6]These estimated amounts for SAWS in cfs and ac-ft are included in the immediately above quantities but are broken out as shown here in case a calculation for SAWS only is desired.

This page intentionally left blank.

7.3 RECOMMENDATIONS:

When considering the overall system, additional water supply should be acquired by about 2050. From the above analysis, the amount and process are recommended as follows:

1. Continue to acquire stored water in Park and Dome Lake Reservoirs as possible to increase the stored water quantities for future use. Since 2015, about 228 ac-ft have been acquired. At this time, maybe assume that the total amount to be acquired (since 2015 when the increased effort was started) will not exceed 500 ac-ft.
2. With limitations in the raw water supply facilities in the Big Goose Valley and other concerns such as a possible wildfire and the entire supply being in this watershed, it is recommended that the majority of the additional supply needs beyond about 2050 be obtained from another location.
3. Lake DeSmet source. Within 5 years, review and revise the calculations for water use, population growth and future needs included in this study. Then begin the process of investigating another water source for long-term supply that is not in the Big Goose watershed. As discussed in the report, that source is Lake DeSmet (or Piney Creek (or reservoirs that serve Piney Creek) that supplies Lake DeSmet). The major additional long-term water supply for the Sheridan water system (SWS) is believed to be Lake DeSmet and the process of planning this acquisition and the infrastructure should begin at least 20 years before the water is needed (which could be taken as about 2050 as currently estimated). This is a complex project that will need to be implemented in phases. The plan to be developed needs to include:
    a. Water rights and exchanges. Will the supply come out of Lake DeSmet or can exchanges be made that will allow the diversion of water at a higher elevation? Exchanges are possible but are complicated in this location with three ditches coming out of Piney Creek at Story and many exchanges and agreements are already in place. Agricultural usage and designations are also issues. More research is needed on how this will work and if the quantity of exchange water from a higher elevation will be worth it for determining where the diversion will be located.
    b. Select where the point of diversion will be. If some water (but not enough) is available at a point where diversion can be by gravity, are two diversion points needed, with one being at the lower elevation of the diversion to Lake DeSmet on Piney Creek (at the vertical shaft leading to the tunnel)?
    c. Where will the WTP be built?
    d. What additional area will be served (such as the Story/Banner area)? While a central water system for the 700 homes, cabins and businesses in Story may seem feasible, construction will be very expensive with the rocky ground and there does not seem to be any current interest in such a system. There are also wildfire concerns for Story given its location in the forest. A central water system with some level of fire protection would be very valuable regarding

this matter. This entire situation requires a thorough review and input from the residents as the time for final decisions approaches. Seek to obtain the level of interest in Story particularly. If this community was added as a community served by a central water system, it would help facilitate this major project.

e. Will any diversion and pipeline facilities be combined with any infrastructure constructed by the State of Wyoming to run water into the Tongue River watershed to supplement any calls for water by Montana?
f. What quantity of water should be brought into the SWS from this source?
g. The additional water supply to be obtained from this source needs to be set and acquired. Currently Sheridan County holds 2500 ac-ft in Lake DeSmet for municipal use, which is a significant quantity but may not be sufficient to make the sizeable investment required. More water is available, but which rights the additional supply comes from and the yield of these rights needs to be determined. It is preliminarily recommended at this time that a goal of 7500 to 10,000 ac-ft of firm yield of senior rights be obtained, if possible.
h. Lake DeSmet's water rights are very complex, with several issues needing to be thoroughly vetted early on, including:
    i. Lake DeSmet's volume is often presented as 234,987 ac-ft, but this is at the maximum water surface elevation of 4620. The lake is not operated at 4620 and its annual firm yield is what's important not its volume. (Firm yield is its dependable yield during a critical dry period that is determined by a hydrology model using historical records).
    ii. The lake is generally operated at an elevation of about 4611, and at this elevation it has a capacity of about 205,000 ac-ft.
    iii. The estimated annual firm yield of Lake DeSmet has been calculated at 64,500 ac-ft.
    iv. Lake DeSmet has 13 storage rights with priority dates of 1906 through 1968. The storage right from which water is obtained and its priority date are critical. The 1968 right is of no value for a municipality, for example.
    v. There are many supply rights to these storage rights, and where the supply comes from must also be determined. Supply should come from Piney Creek, not Clear Creek.
    vi. Water rights from the appropriate senior water right with its known firm yield must be clarified. The firm yield has been calculated for the many storage rights.
i. A preliminary engineering report (Level II Study) for water availability and rights, and infrastructure needed and a cost estimate, must be prepared.
j. Since this area includes several historical, environmentally sensitive and geotechnically challenging issues, the PER needs to address these topics in its analysis (on a preliminary basis).

k. The routing of the primary supply main into the SWS and its interconnections to the existing system is needed and is critical. Through the Little Goose Valley, it should maximize the benefit to the SAWS system such as probably following McCormick Road to place a transmission main in that location (see 8.2.12). This task will be part of this Level II study.
l. A funding plan and construction schedule then follow.
m. Significant other aspects of a Level II study to develop Lake DeSmet as the future water source include water quality (both of Lake DeSmet at different locations and Piney Creek at the diversion dam), hydrology, water rights and water supply, and the infrastructure of the existing facilities. The 2008 Level I study investigated water quality and other aspects of Lake DeSmet to a significant level. Hydrology modeling for the Counties Coalition developed a very good hydrologic model for this facility and its water rights, as well as the nearby creeks. Other studies also exist on this facility. Those should all be used as part of this future Level II study.

7.4 CAPACITY OF RAW WATER SYSTEM COMPONENTS

This discussion covers the capacity of the infrastructure in the Big Goose Valley. Currently the entire water supply, followed by the raw water diversion, pretreatment, pipelines and supply facilities to the four delivery points (including the two WTPs) are in the Big Goose watershed and Big Goose Valley. This works well because everything is established, is in generally good condition, is concentrated in this location for easier operation, can continue to serve well into the future with additional capacity available, and maximizes the benefits of gravity flow.

As additional water supply is needed, there are multiple questions to be answered as to where this supply should come from. These include:

- What is the realistic additional supply that can be acquired in the Big Goose watershed?
- Should this major water system have two sources for at least a limited redundancy, especially as it continues to grow and serve more residents? One driving concern here is a possible wildfire in this watershed.
- Since this is a regional system and efficiencies are gained with regionalization as opposed to multiple smaller systems, should the service area of this system be expanded as new areas request water service?
- As the existing water supply infrastructure in this valley approaches its capacity, should investment continue to be made in expanding it, or in conjunction with the other items above, should new infrastructure that expands capacity be designed and constructed in another location?

The following section focuses on the last bullet.

Water availability – Big Goose Creek and Reservoirs

The water supply available from Big Goose Creek and mountain reservoirs is summarized in Table 5.1 through 5.3 and is discussed in Section 5.1. A couple points from these quantities:

- Per Table 5.3, there is 4586 ac-ft available for the 90-day irrigation season. This provides 16.6 MGD for every day. Since running at 16.6 MGD every day is unlikely, it appears we can assume about 20 MGD will be available on maximum demand days.

- Prior to the irrigation season (Big Goose not in regulation), the direct flow rights exceed the estimated water needs for the planning period.

- Therefore, the considerations of water availability vs estimated water needs primarily focuses on the available supply during the irrigation season.

From Table 7.14, the estimated water needs, including all four delivery points, for the Peak Day and for the Average Day during the 90-day irrigation season are presented below. Also included in these quantities is the 0.4 MGD that is "lost" prior to delivering the raw water to these points. This loss is discussed in Section 7.2.

Raw Water Supply	2050	2070
Peak Day	21.1 MGD	28.9 MGD
Day in the Irrigation Season	15.5 MGD	21.3 MGD

Therefore, by about 2050, it appears we will approaching the available supply from this watershed during peak days and during the irrigation season.

Water diversion capacity at the Intake – Dam, pipelines and pretreatment facilities.

This discussion utilizes the *1999 Big Goose Creek Diversion Level II Study* and the *2004 Operation & Maintenance Manual for the Sheridan water Supply Intake Facilities* as references.

The capacity for diverting flow from Big Goose Creek and into the two 520-foot pipelines that bring water to the pretreatment facilities at this site was estimated at:

- If the water level is at top of dam = 27.5 MGD (elevation of about 4616.2)
- If the water level is 0.5 feet above the top of dam = 31.3 MGD (1999 report)

The estimated flow-through capacities of the pretreatment facilities are:

- Primary flow path of travelling screen and presedimentation basin: 16-17 MGD
- Flow path through old travelling screen and presedimentation basin (not currently operational) was estimated at 9-10 MGD.

Therefore, the total flow through capability of this facility was estimated to be 25-26 MGD. This depends partly on the elevation of the water surface at the diversion dam. It also depends on raw water quality (amount of debris and turbidity in the creek). There is also an older flow path that could be placed into service in an emergency should flows slightly exceed this rate, or one of the above two paths be out of service, but this is for an emergency or short-term period and should not be considered part of the capacity.

Recommendations are made for upgrading the old travelling screen/presedimentation basin. If these upgrades are made, a trial run should be made to maximize the flow through the entire facility to verify the total capacity.

Raw water transmission main (RWTM) pipeline capacity

The primary RWTM is the 30-inch steel line which was constructed in 1996. This is the only line that can deliver raw water to all four points – the two WTPs, Kendrick golf course and the VAMC.

The other two RWTMs are:

- 16-inch (OD) line from the intake to the BGWTP. This line is used to provide the water supply to the BGWTP. The 30-inch line can also provide this water supply if valves are opened and closed.
- 20-inch DIP. This line is in poor condition, is not used, and cannot be placed into service without major rehabilitation.

The starting HGL at the east edge of the intake facilities for these gravity flow lines should be at least 4600 (likely a couple feet more). So 4600 was used as a starting HGL in the hydraulic calculations.

This discussion utilizes the *1994 Sheridan Area Water Project 30-inch RWTM Design Report* and the *1996 Operation & Maintenance Manual for the 30-inch RWTM* as references.

16-inch steel line should have a capacity of at least 4 MGD (2800 gpm) (which this the capacity of the BGWTP), with the elevation drop available and estimated required pressure at the WTP influent (assumed to require an HGL of 4500 at the influent control valve). This pipeline was lined in 2009 with cement mortar. The resulting ID and friction factor are estimated. If an exact flow capacity is needed, a flow test is required. If this RWTM cannot keep up with demand required by the BGWTP, the 30-inch RWTM can be used.

The capacity of the 30-inch RWTM was estimated at 30 MGD (20,800 gpm) in the above referenced reports. This assumes an ending HGL at the delivery point to Kendrick and the VAMC of about 4160, and a C factor of 140. There is considerable pressure reduction taking place at Beckton Hall Road, and this reduction was recently changed from simple PRVs to a hydropower generator to take advantage of the cutting of head taking place. This maximum flow-through capacity stated assumes virtually all head loss is due to friction at the resulting velocity. Therefore, there would be no generation of electricity at this flow rate. Some replumbing inside the Beckton vault will also be required.

The C factor of 140 is high, though it may be correct. Given the above, it should be assumed the 30 MGD capacity is a maximum, and for some level of conservatism, a slightly lower capacity maybe should be assumed. When forecasting many years into the future, a flow capacity of about 28 MGD may be a better estimate.

Water Treatment Plants

The BGWTP and SWTP have rated capacities 4.0 MGD and 14.0 MGD respectively, for a total treated water capacity of 18 MGD. With some of the raw water supply going to the VAMC and Kendrick, the current maximum raw water supply for this system is about 20 MGD. The WTPs can have their capacity increased to match the other raw water capacities mentioned above; therefore, reaching a total system capacity of 26 to 27 MGD is possible. This could involve increasing the capacity of each WTP by 3-4 MGD, which would be difficult and expensive. For one thing, the size of each WTP site would have to be increased (more land acquired), which is especially difficult at the BGWTP.

Given all of the above, when it is projected that the Peak Day needs of this entire water system will start exceeding 20 MGD on a regular basis, and even assuming the SWTP has possibly had a 5 MGD expansion so the total capacity is now 25 MGD, it appears we may be approaching the practical limits of the overall capacity of the Big Goose water supply and infrastructure.

If one of the WTPs is expanded, additional study is needed to select which one. The BGWTP has the advantage of its higher elevation, while the SWTP will be more easily expanded at lower cost. Piping and valving allow both WTPs to serve beyond their current primary service areas. Land availability is an issue, and both sites will require additional land for an expansion. This will likely be an easier task at the SWTP. The 20-inch treated water pipeline has a capacity of about 7.8 MGD as discussed in its design report, so an approximate doubling of the capacity of the BGWTP is possibly without adding pipeline capacity.

Summary

When considering the above – the water supply available from this watershed, the estimated water needs in 2050 and 2070, and infrastructure capacity issues – it appears it may not be practical to expand the infrastructure beyond the above capacities discussed of 25 to 27 MGD. Since additional supply will likely be needed after about 2050 and as discussed elsewhere in this report, the majority of that supply will come from another direction, the quantity of the water supply and the capacity of the infrastructure for that supply in the Big Goose Valley, may both be reaching their limits at these capacities.

Table 7.15 - Estimated Water Supply Needs

Condition	SWTP			BGWTP			VAMC			Kendrick			Total		
YEAR	2019	2050	2070	2019	2050	2070	2019	2050	2070	2019	2050	2070	2019	2050	2070
Average Annual (mgd)	3.2	5.5	7.8	0.8	1.4	2.0	0.3	0.3	0.3	0.4	0.4	0.4	**4.7**	**7.6**	**10.5**
Peak Day (mgd)	8.4	14.5	20.5	2.4	4.1	5.9	1.1	1.1	1.1	1.0	1.0	1.0	**12.9**	**20.7**	**28.5**
Irrigation Season (mgd)	6.5	11.2	15.9	1.5	2.6	3.7	0.5	0.5	0.5	0.8	0.8	0.8	**9.3**	**15.1**	**20.9**
Irrigation Season (ac-ft/day)	19.9	34.2	48.6	4.6	7.9	11.2	1.5	1.5	1.5	2.5	2.5	2.5	**28.5**	**46.1**	**63.8**
Annual Average (ac-ft/day)	9.8	16.9	23.9	2.5	4.3	6.1	0.9	0.9	0.9	1.2	1.2	1.2	**14.4**	**23.3**	**32.1**
Irrigation Season (cfs)	10.0	17.2	24.4	2.3	4.0	5.6	0.8	0.8	0.8	1.2	1.2	1.2	**14.3**	**23.2**	**32.0**
Annual Average (cfs)	4.9	8.4	12.0	1.2	2.1	2.9	0.5	0.5	0.5	0.6	0.6	0.6	**7.2**	**11.6**	**16.0**

This page intentionally left blank.

8.0 RECOMMENDATIONS AND COST ESTIMATES

8.1 GENERAL MATERIALS AND EQUIPMENT RECOMMENDATIONS

The following general recommendations are made relating to certain materials and equipment to be designed into new projects. These recommendations are made based on the long-term experience with this water system and for general compatibly within the system. These recommendations are very brief, and specific designs are needed for each project with the materials and equipment (as well as the overall design) presented in the project's Design Report. Also refer to Section 6.5.2 regarding the City's Design Standards and Section 6.5.3 for additional design criteria on certain system components.

- Water Tanks. Continue to use concrete tanks buried to the within 18 inches of the roof.
- Pumps. Use VFDs even if the station is pumping into a tank, so it can work at variable speeds if the tank is offline. Consider two pumps for the design flow rate (as opposed to only one) if that station may operate at a lower than its design flow rate much of the time. Provide one pump for backup. Consider how emergency power will be provided.
- Control Valves. Utilize diaphragm actuated control valves such as by Cla-Val or Singer.
- Pipe. Use AWWA C900-16 PVC pipe for all applications of 20-inch and smaller and for pressures <150 psi. When sizes are >20-inch and for higher pressures, evaluate alternatives and discuss with the City. In most cases the alternatives will be either PVC or catholically protected steel. See discussion under Airport Transmission Main.
- Corrosion protection. With corrosive soils in this area, all buried metallic components will require proper corrosion protection design, including cathodic protection.

8.2 RECOMMENDED CAPITAL IMPROVEMENTS.

This section discusses the condition of the various components within this water system and presents recommended capital improvements. Many of these recommended improvements include cost estimates so the project can move into Level III. Some of these improvements are not eligible under the WWDC program, but the cost estimates remain in the same format. Since likely only one project will advance to a Level III application in next funding cycle, cost estimates need to be reviewed and revised as Level III applications are made in the future.

In a couple cases, recommendations are made for a Level II study, because it a more complete preliminary engineering analysis and associated cost estimate is required before they can proceed to the design phase.

A major benefit of this Level I study is the significant upgrading of the hydraulic model for this system. This upgrading included both structural (piping and valves, etc) and in the more accurate locating and quantifying of the demands. This model needs to be utilized during final design of these proposed improvements to verify assumptions made at this time and to fine tune the important details associated with major improvement projects such as these.

This water system and these proposed improvements are discussed starting with the raw water diversions and pretreatment, then raw water transmission and delivery, WTPs, and then treated water transmission, storage, pumping and pressure control.

Lastly there is a discussion on future projects that came out of this Level I study. Some of these are many years out so a cost estimate is not included at this time. As the time for the project approaches, a brief preliminary engineering analysis and report is needed, along with a cost estimate and funding plan.

8.2.1 Intake Facilities

The Intake Facilities consist of the diversion facilities on Big Goose Creek, pretreatment and site piping to deliver the water supply to the raw water transmission mains. Pretreatment consists of a removal of sand and other debris present in the water diverted, principally with the use of travelling screens and sedimentation. The primary flow path through these facilities was constructed in 2004 and is working well. One recent improvement in the sedimentation basin was to add a skimmer to remove more floating material. This has reduced the plugging of the PRVs and conflict with the in-line generator at Beckton Hall Road.

What was the primary flow path prior to 2004 should be kept available for service, primarily as a back-up but also for additional capacity should that be needed. The additional capacity may apply particularly when debris loads are heavier, and a slower flow-through rate is desired. This flow path requires some upgrading to make it fully operable. This upgrading is discussed in the next paragraph. The other improvement at this location is the rehabilitation of the 1908 sedimentation basin. This should be kept in service as it allows diversion at the original diversion structure further upstream, providing a benefit in the flexibility of the operation, should that be needed.

One possible upgrading at this site that is not included in the discussion below is the idea of running the two presedimentation basins in series. The concern that would be addressed by doing this is the event of a wildfire in the watershed that will significantly change and increase the suspended material present in the creek that will need to be removed. In the past, in a couple rare occasions when there was a major rainfall event in a particular location that significantly increased the turbidity level, diversions were basically stopped for a day while the increased turbidity level passed. This would not be possible in the case of a wildfire, as the event will be of long duration. To run the water from the primary (rectangular) sedimentation basin back through the circular basin, a pumping station will be needed. This will require low head, high volume pumps. The station itself and piping connections to the outlet of the larger basin and inlet of the circular one are required. The proposed improvements to the circular basin that are discussed below are also needed. This concept requires a preliminary design before it can move forward.

Therefore, the improvement project at the intake facilities at this time consists of the following:

- Upgrading the 1908 sedimentation basin (approximately 2200 sq ft of surfacing to be repaired).
    - Remove the sediment in the bottom of the basin
    - Bush hammer the surface to remove loose materials
    - Sand blast the surface for preparation of the new coating
    - Application of 1 coat of SikaQuick Smooth (or approved equal)
    - Application of 2 coats of SikaTop 107 (or approved equal)
- Old travelling screen building. One of the 24-inch butterfly valves in the lower level does not operate, but if the effort is made to replace one of these, the second one should also be replaced.
    - Replace two 24-inch butterfly valves in the lower level of the travelling screen building.
- Old Presedimentation Basin.
    - Replace the actuator on the valve in the vault beside the building.
    - Replace the motor and scrapper in the old presed.
    - Recoat the outside of the presed's dome. Similar approach to the 1908 basin presented above.
- Install a new perimeter fence. This existing fence is in poor condition and should be replaced. It is believed it is on the property line, but this should be confirmed with a legal survey of the boundary. A solid perimeter fence is also important with the neighboring ranching activities with their livestock and horses.

A cost estimate for these improvements at the Intake Facilities is shown in

Table 8.1.

Table 8.1 - Intake Facilities Improvements Cost Estimate

Preparation of Final Design, Specs, Bidding (10%)	$ 69,500		
Permitting and Mitigation	$ -		
Legal Fees	$ -		
Acquisition of Access & Easements	$ -		
Pre-Construction Costs (Subtotal)		$ 69,500	
Cost of Components:			
Mobilization	$60,000		
Upgrading 1908 Basin	$70,000		
Replacing two 24" valves	$60,000		
Actuator at Presed	$50,000		
Motor & Scraper for Presed	$340,000		
Recoat dome	$150,000		
Perimeter fence	$25,000		
Total Cost of Components	**$695,000**		
Construction Engineering Cost	$ 69,500		
Components & Engineering Cost (Subtotal)	$ 764,500		
Contingency (Subtotal 15%)	$ 114,675		
Construction Cost Total		$879,175	
Total Project Cost		**$948,675**	

8.2.2 Raw Water Transmission Facilities

The raw water transmission facilities include the following:

- 16-inch steel main between the Intake and the BGWTP.
- 30-inch steel main between the Intake and the SWTP, with connections to the lines suppling Kendrick Golf Course and the VAMC.
- Meters in manholes where these two lines leave the Intake.
- Connections to the BGWTP and SWTP with meters and control valves.
- Connections to Kendrick and the VAMC with meters.
- A major pressure reduction and control facility at Beckton Hall Road.
- A major pressure reduction and flow control facility at the SWTP to control the flow of water into the WTP and reduce the pressure to a manageable level.
- Other appurtenances to the primary transmission main (the 30-inch RWTM).
- A 20-inch DIP transmission main that was used until about 1996, which now is in too poor of condition to be used. This condition is caused by corrosion from the soil.

The 30-inch RWTM is in very good condition and has adequate capacity to provide raw water to all of these facilities for what is expected to be the duration of the planning period. Like the 20-inch DIP line mentioned above, the 30-inch line is buried in corrosive soils. However, it has an AWWA tape coating and cathodic protection systems. These provisions should extend the life of this pipeline indefinitely as long as the impressed current cathodic protection (CP) system is maintained. There are three deep ground bed anode CP points on this line. Regular readings need to be taken with periodic adjustments made with the rectifiers. At some point another deep ground bed may need to be added, but this is well in the future.

With the 16-inch line supplying the BGWTP, these raw water transmission facilities are believed to provide adequate service at this time. However, there is no redundancy to the 30-inch RWTM so if was out of service, this water system would be affected in a major way. There has been desired expressed for a backup transmission main, so this concept is discussed and presented here. (If the 30-inch RWTM was down for a relatively short time, the BGWTP could be ramped up to its capacity, and it could supply the Northwest and 4MG tanks and therefore their service areas, up to this capacity).

The entire route of the Big Goose Valley is private ownership and running a new line through the valley would likely result in the need to acquire at least 80 easements (based on the 20-inch treated water line project from about 10 years ago). This would be difficult and expensive and may not be worth the cost for a backup line. It is believed the easements for the 20-inch DIP are mostly still in place (and are believed to be mostly 30 feet wide), so if this line could be refurbished, it may be much easier than constructing a new line. This idea is presented here, but if this particular project is to move forward, a more detailed assessment of easements and construction issues and costs is needed.

One way to rehabilitate an old DIP is to pipe burst it with HDPE pipe that has an adequate pressure rating. HDPE must be used for this because of its properties of flexibility, weldability, toughness, pressure rating and past history with similar projects. This line is believed to be in poor condition its entire length, so a pipe bursting project would have to run the entire length of about 11 miles. Since this is a major project, it was discussed with a contractor with the capability to complete it. This contractor was Titan Technologies of Boise, Idaho. Sometimes pipe bursting goes up one pipe size, but with the length, material (DIP rather than CIP), pressures and overall scope, it was recommended to stay with the same nominal size. Therefore, 20-inch AWWA C906 DR9, DIPS, HDPE is recommended. The estimated cost for this project is presented in the following table.

One issue is that with relatively thick-walled HDPE as needed for pipe bursting and the pressures experienced, the pipe internal diameter (ID) is reduced, impacting its hydraulics. The resulting ID is 16.5 inches. The estimated capacity of such a line is about 4000 gpm or 5.75 MGD. This assumes a 400-foot headloss due to friction. So if the starting HGL is 4600 feet, it will deliver water to Kendrick, the VAMC and the SWTP at about 4200 feet, which is above the minimum. Some pressure reduction would still be needed to make sure the pressure in the line does not exceed about 225 psi under a static or lower flow conditions.

This flow is not sufficient to be a backup to the 30-inch RWTM, but it would be very advantageous to have this line available for even 5.75 MGD, which will likely be sufficient in an emergency.

However, this is a difficult and expensive project and would likely not be worth the cost as presented below. If a second RWTM is proposed in the Big Goose Valley, a Level II study is needed to more fully compare options of rehabilitation to new and analyze other issues related to construction. Table 8.2 presents the cost estimate for this option which provides value for initial considerations and comparisons.

Table 8.2 – 20" Raw Water Pipeline Cost Estimate

Preparation of Final Design, Specs, Bidding (10%)	$ 1,435,000	
Permitting and Mitigation	$ 20,000	
Legal Fees	$ 20,000	
Acquisition of Access & Easements	$ 100,000	
Pre-Construction Costs (Subtotal)		$ 1,575,000
Cost of Components:		
Mobilization	$250,000	
Pipe Bursting 58,000' @ $225/foot	$13,050,000	
New Gate Valves @ $25,000 ea	$50,000	
PRV Station	$1,000,000	
Total Cost of Components	**$ 14,350,000**	
Construction Engineering Cost	$ 1,435,000	
Components & Engineering Cost (Subtotal)	$ 15,785,000	
Contingency (Subtotal 15%)	$ 2,367,750	
Construction Cost Total		$18,152,750
Total Project Cost		**$19,727,750**

8.2.3 Big Goose WTP

The BGWTP is in generally good condition, has sufficient capacity and provides a very high level of treatment. As discussed in Section 2.3.3, it was recently upgraded in its level of treatment (along with the SWTP) to help it maintain compliance with LT2, the most complex and restrictive rule under the SDWA for treated water being supplied to a public water system. The major result of this upgrade project is a consistently low finished water turbidity.

There are three improvements at this WTP that are proposed however. These are:

- Converting the chlorination system from gas to onsite generated sodium hypochlorite. This change would make it identical to the chlorination system at the SWTP. This change is made for safety and staying in compliance with the ever more stringent rules dealing with 1-ton cylinders of gaseous chlorine. Housing at the BGWTP exists, so this is project is primarily a change in equipment.

- Utilidor between the WTP building and the piping/pumping room at the clearwell. The ground has shifted periodically over the years, breaking pipes and making it difficult to maintain continuity in water lines, chemical lines, communication lines and electrical lines. A modest utilidor will address these issues and make it easier for the operators to maintain the facilitates.

- Sludge drying capacity. The lagoons at this site receive both filter backwash water and sludge from the bottom of the sedimentation basins. After settling, water is recycled back into the WTP, but drying is ultimately needed to allow the disposal of the sludge. It has always been a challenge to have enough drying capacity and time at this location. The improvement would either mean an additional drying bed or a mechanical means to conduct the final drying of the sludge to free up a basin for use. Another drying bed will require additional land, which while possible may not be easy to obtain. Both options require site piping and valving to incorporate them into the existing facilities.

One other possible future improvement that should be mentioned is the installation of plate settlers in the sedimentation basins at the BGWTP and the 1994 basins at the SWTP. These were considered for installation under the recent upgrading project discussed in 2.3.3, but were not ultimately included. The unusually high raw water turbidity event experienced this past spring (see discussion in 5.3 Water Quality), created a condition that was very difficult to treat and the BGWTP was even shut down for about two days. It is believed plate settlers would have helped lower the turbidity level of the chemically conditioned and settled water that was delivered to the filters, which would have improved the filtration process. These should be considered for installation at a future time.

There has been some concern expressed about the electrical supply to the BGWTP and its capacity to take on the additional power requirement of generating chlorine onsite. A verification of the power supply was made with MDU. They indicated that they have a 300kva transformer serving the WTP and therefore have sufficient power to supply the proposed chlorination facility.

Table 8.3 shows the cost estimate for this option.

Table 8.3 – Big Goose WTP Improvements Cost Estimate

Preparation of Final Design, Specs, Bidding (10%)	$ 90,500		
Permitting and Mitigation	$ -		
Legal Fees	$ -		
Acquisition of Access & Easements	$ -		
Pre-Construction Costs (Subtotal)			$ 90,500
Cost of Components:			
Mobilization	$75,000		
Chlorination System	$180,000		
Utilidor	$350,000		
Sludge Drying	$300,000		
Total Cost of Components	**$ 905,000**		
Construction Engineering Cost	$ 90,500		
Components & Engineering Cost (Subtotal)	$ 995,500		
Contingency (Subtotal 15%)	$ 149,325		
Construction Cost Total			$1,144,825
Total Project Cost			**$1,235,325**

8.2.4 Metering

Having reliable master meters at select locations in this water system is very important it its proper management. Key master meter locations include:

- In the two pipelines leaving the Intake (16-inch and 30-inch)
- Water entering the two WTPs (BGWTP and SWTP)
- Water leaving the 30-inch RWTM and being delivered to Kendrick Golf Course (8-inch connection and meter) and the VAMC (6-inch connection and meter)
- Treated water leaving the clearwells at the BGWTP and the SWTP
- Water being delivered to the DNISD
- Water being delivered to the South Hill area
- At the end of the Big Goose 20-inch pipeline as it heads south at the airport in the 24-inch transmission main.

Many of these meters have been replaced in recent years and are believed to be in good condition. Some questions on the accuracy of meters and which meters are the most accurate have surfaced as the flow data from various points in the system were accumulated and analyzed under this study. Another issue with flow data is its accessibility. These readings need to be brought into the SCADA system for not only easy monitoring but for tracking and the ability to create summary reports.

There are two SCADA systems within this water system. the primary system reports to the SWTP, which covers the above flow meters, and the newer system monitors the booster stations and some of the PRV stations throughout the system, and reports to a computer at Utility Maintenance for the operators of these facilities. The booster stations were upgraded recently under a SAWS project and new identical flow meters were installed in 16 stations. A system is being set up as how to create summary reports that are useful, sufficiently detailed and yet of reasonable length. It is believed that the metering system for the booster stations will work satisfactorily for this purpose.

The PLC project that upgraded the original SCADA system was completed in 2018 and seems to be working fine. There were gaps in the accumulation of some data but that appears to be in the past. Continued tabulation, reporting, summarizing and analyzing of flow data will continue and if discrepancies are found that can be tracked to meter accuracy, corrections should be made even if it means installing a new meter. The management of these data and continuing to reduce apparent water loss will become more and more critical as the system continues to grow.

Based on the above assessment, the following upgrades in master meters are recommended:

- Address the issue of inaccurate metering of low flows leaving the 4MG tank at the SWTP. These two 24-inch meters do not cover low flows (flows less than 400 gpm) and there are discrepancies with the influent meters that should be resolved. These meters are oversized, but they were installed in the pipes that carry the water leaving this tank. Since this is the largest tank on the system and contributes the most water to the system, accurate flow readings in this location is very important.

- A new meter at the transition from the 20-inch to 24-inch lines listed above (last bullet), and the placing into service the meter in what will be a nearby manhole for flow into the South Hill area. These two metering improvements are included in the Airport Transmission main project described later in this section.

The cost estimate below is for the meter installation to measure flows leaving the 4MG tank as discussed above. There are two transmission lines leaving this tank, one heading to the southeast and one to the northeast, both lines provide primary supply to the City and the 4040 and 3952 pressure zones. It is important to obtain daily and monthly flows, but it is also important to obtain peak flows as those are the flows that are satisfying the peak demands in much of the system. The SWTP operates at a steady rate to provide the peak day demands, but the flow rates leaving the 4MG tank vary as needed to satisfy the peak hour demands within the areas it serves.

Therefore, a new metering set-up is proposed on these two transmission mains to accurately cover the flow range. Various meters were investigated to select the best one for its ability to measure the wide flow range and cover low flows. Mag meters appear to be the best choice not only for their flow range, but their low headloss. They must be properly sized however, and a 24-inch meter is too large. To cover the entire flow range better, especially the lower flows, two meters will be installed for each main. Meters of the proper size cannot be accommodated in the existing vault below this tank, therefore they will be housed in a new vault immediately downstream of the existing vault on these lines. Since these two lines are only about 5 feet apart (center of pipe to center of pipe), all meters can be housed in one vault. To save on the cost of the vault, the new manifolds will be located outside of the vault.

The vault will be insulated, precast concrete with a hatch and vertical steps. Each meter will have isolation valves so it can be removed from service, with flow continuing. Readings from these meters will be incorporated into the SCADA system at the SWTP.

Since the Airport Transmission main project also involves a new master meter, this project at the 4MG tank could be included in that one for efficiency and for uniformity on the meters obtained and the incorporation of readings into the SCADA system. It is also recommended that this project proceed to design and construction soon so the accurate gathering of flow data can take place.

The estimated cost for the meter installation in the transmission mains leaving the 4MG tank as discussed above, is presented in Table 8.4. Figures illustrating this concept are included in the appendix.

Table 8.4 – Metering Upgrades at 4MG Tank Cost Estimate

Preparation of Final Design, Specs, Bidding (10%)	$ 34,500		
Permitting and Mitigation	$ -		
Legal Fees	$ -		
Acquisition of Access & Easements	$ -		
Pre-Construction Costs (Subtotal)			$ 34,500
Cost of Components:			
Mobilization, Bonds, Insurance		$35,000	
Vault		$60,000	
Piping, Valves, Meters, Fittings		$230,000	
Electrical & SCADA		$20,000	
Total Cost of Components	**$ 345,000**		
Construction Engineering Cost	$ 34,500		
Components & Engineering Cost (Subtotal)	$ 379,500		
Contingency (Subtotal 15%)	$ 56,925		
Construction Cost Total			$436,425
Total Project Cost			$470,925

8.2.5 Booster Stations and Control Valves

As discussed in Section 2.3.8, this water system includes 14 booster stations and 4 pump stations. It also includes about 50 PRV stations, plus other control valve stations. Thanks to recent upgrading projects, most of these facilities were significantly upgraded in the last couple years and are in good condition. These upgrading projects proved that mechanical equipment such as heavily used pumps and all control valves have a life of about 20 to 25 years, so periodic continued upgrading of especially control valve stations is needed in the future.

With the 20-inch Big Goose pipeline in place, the Airport pump station is not needed at this time and should not be needed for many years to come. The Airport Transmission Main project is important as the existing transmission main is nearing the end of its life. As the new main is installed, the bypassing (with closed valves that can be opened when needed) of the Airport pump station should be done, with new meter installed outside of the pump station as discussed under Metering. This will allow the Airport pump station to be shut down and not heated for now. Therefore, this is a pump station "improvement" but would be accomplished under the Airport Transmission main project.

There is also one replacement PRV station recommended in the Airport Transmission Main project.

8.2.6 Storage

As discussed under Section 2.3.7, there are 13 MG of gravity storage throughout this water system. These tanks are not only positioned at several locations in the system, but on several pressure zones to provide gravity flow under varying demand conditions for dependable supply. These tanks are all concrete and buried up to the roof which helps protect both the tank materials and the water inside. Therefore, the condition of these tanks is generally good.

There are three improvement projects recommended involving gravity storage tanks. These are:

- North Low tanks.
- South Low (Airport) tanks.
- Big Horn tank. This tank is located near the far end of the system and therefore the water it holds has some of the longer age. This has resulted in disinfection byproduct (DBP) levels that are higher than desirable. It is proposed to install an aeration system in this tank to remove volatile components of the DBPs to reduce the concentrations.

Improvements at the North Low and South Low tanks consist of the elimination of some facilities that are very old and in poor condition, and new piping and valving to not only improve the pipe and valves available for use (improve the operation of these tanks), but to improve the flow through the tanks (improve turnover and therefore water quality). This project will allow one or two of the tanks at each location be removed from service since three tanks with a total storage volume of 2 MG at each location on the 3952 zone is not needed at this time. Also, the operation of these facilities will be improved if the storage volume is reduced.

At each location there is a 1 MG tank and two 0.5 MG tanks. So if only one tank is used, it will typically be the 1 MG tank, but the others will be kept available should the 1 MG tank be down for maintenance or more storage volume be needed in the future.

Table 8.5 shows the cost estimate for the North and South Low tanks improvements and Table 8.6 the aeration improvements at the Big Horn tank.

Table 8.5 – North and South Low Tanks Improvements Cost Estimates

Preparation of Final Design, Specs, Bidding (10%)	$	77,000		
Permitting and Mitigation	$	-		
Legal Fees	$	-		
Acquisition of Access & Easements	$	-		
Pre-Construction Costs (Subtotal)			$	77,000
Cost of Components:				
Mobilization		$80,000		
North Low Tank		$360,000		
South Low Tank		$330,000		
Total Cost of Components	**$**	**770,000**		
Construction Engineering Cost	$	77,000		
Components & Engineering Cost (Subtotal)	$	847,000		
Contingency (Subtotal 15%)	$	127,050		
Construction Cost Total				$974,050
Total Project Cost				**$1,051,050**

Table 8.6 – Big Horn Tank Aeration Improvements Cost Estimate

Preparation of Final Design, Specs, Bidding (10%)	$	16,000		
Permitting and Mitigation	$	-		
Legal Fees	$	-		
Acquisition of Access & Easements	$	-		
Pre-Construction Costs (Subtotal)			$	16,000
Cost of Components:				
Mobilization		$20,000		
Modification to Tank & Electrical		$50,000		
Mixing & Aeration		$90,000		
Total Cost of Components	**$**	**160,000**		
Construction Engineering Cost	$	16,000		
Components & Engineering Cost (Subtotal)	$	176,000		
Contingency (Subtotal 15%)	$	26,400		
Construction Cost Total				$202,400
Total Project Cost				**$218,400**

There are no new tanks proposed on this water system at this time. As this system grows, additional storage will be needed to adequately serve users by gravity flow to meet peak demands. (Two possible new tanks are included in the discussion of possible future system expansions to serve growth, including the Woodland Park School area in 8.2.11.)

Locating storage is very important as it must be close to the demand and set into the system so that adequate turnover takes place. Which pressure zone the next storage tank will be on is also an important decision to be made during the preliminary design phase of the project. Another factor is the design of the system for providing fire flows. In the original 1990 Level II study, only select portions of the rural service areas in the Big Goose, Little Goose and Southeast areas were designed for fire flows. If the areas where fire flows are to be provided are to increase in the future as the density of housing also increases, this will significantly affect the design of new storage tanks. Where fire flows are to be provided therefore becomes an important future issue for the those involved in planning the development of the rural areas around the City.

8.2.7 Transmission

Generally, the network of transmission mains is solid for the existing area and users served, and most of the existing mains are in good condition. There are transmission improvements proposed however, and these are discussed in the following paragraphs.

Airport Transmission Main

The Airport Transmission Main is the highest priority because the existing DIP is in deteriorated condition and should be replaced before failures become more frequent. Its deteriorated condition is due to corrosion from the soil. It is noted that this main appears to have also been polywrapped. This is a critical main for both the City and SAWS service areas so planning needs to proceed so upgrading takes place before its condition worsens. It is noted that in the 2008 Level I Study it recommended that the replacement of this pipeline become a project in about 10 years. Significant failures have occurred in this line in the past due to corrosion, and a replacement project is needed before its overall condition deteriorates much more.

This transmission main supplies water to:

- The Airport Complex
- The Airport Industrial Park
- Supplements supply to the South Hill area
- The State Girls School
- Sheridan College
- Southeast Sheridan
- The Highway 87 area south of the college to Woodland Park School
- The entire Little Goose and Big Horn service area.

Therefore, its design and construction, and proper connections to these other service areas is very important. It is proposed to follow basically the same route as the existing main, but since there is no redundancy with this line, it will be offset from the existing main as it is installed so the existing main can remain in service until the connections are made.

The existing main is DIP and, as noted, this material has not fared well in Sheridan's corrosive soils. The selection of pipe materials with the new main is an important step. With sizes from 16-inch to 24-inch and operating pressures up to 160 psi, this selection is very important. The options include:

- Coated DIP
- Steel
- PCCP
- DR18 PVC
- DR14 PVC

Based on the experiences with DIP in this water system and the generally corrosive soils conditions, going back in with even coated DIP is not the first choice. Steel pipe has been used successfully in larger diameters and higher-pressure applications, but it requires a high-quality coating and lining, and cathodic protection, making its cost significantly higher than some other materials if they can be made to work. Steel pipe is also more difficult to tap for laterals that will likely be needed on this new main in future years. PCCP has been used affectively with at least one main in this system, but this is not a standard material and is expensive to tap or repair in the future. Also like steel, its costs will be higher than other materials so there needs to be another reason for its use.

PVC has been found to be an affective material in this water system as long as the pressures are moderate and where sizes are typically 20-inch or less. A comparison of the two options listed above is needed however, in the analysis considering PVC pipe. Only recently has the thicker-walled DR14 pipe become available in 20 and 24-inch, so they can now be compared.

Following is a comparison of the characteristics of these two PVC pressure-rated pipes.

PVC Pipe	Factory Rating	Short-term Rating	Suggested Rating	ID's for 16-inch	IDs for 20-inch	IDs for 24-inch
DR18	235 psi	376 psi	180 psi	15.47”	19.20”	22.93”
DR14	305 psi	488 psi	230 psi	14.91”	18.51”	22.11”

The factory rating is the standard working pressure rating for the pipe, while the short-term rating is the surge pressure it should be able to accommodate on a periodic basis. AWWA C900 uses a 2:1 safety factor for their working pressure rating of the pipe. The suggested rating is a reduced design working pressure for a more conservative approach. Since this a critical transmission main, does not have a redundant supply line for the service areas above, can experience relatively high pressure, has experienced surge pressures in the past, and the desire is for a very long life of this main, the selection of this pipe material is very important. Also, the 20-inch Big Goose pipeline provides water by gravity flow and has pressure reduction at Beckton Hall Road. If it ever is desired to increase the flow in the Big Goose line to all the service areas listed above, the pressure can be increased so there should be some conservatism in the stated maximum pressure to be experienced of 160 psi.

As these two materials are compared, the following factors should be considered:

- DR18 seems to provide an adequate pressure rating, but due to the list of concerns above, DR14 provides greater assurance it will stand up over time.
- DR14 costs about $8, $12, and $18 per foot more for the 16, 20 and 24-inch sizes.
- The slightly smaller size of the DR14 pipe creates a slightly greater headloss at high flow rates, but since there is sufficient pressure present, this should not be an issue.

Based on the above, it is recommended that this preliminary design and cost estimating be done with DR14 pipe for conservatism, with a final decision to be made during final design.

The location and lengths of this transmission main are shown in Figure 8.1. In addition to this transmission main serving the areas mentioned above, there is an 8-inch DIP main of the same vintage that is the primary transmission main into the airport complex. This main and the PRV station that reduces the pressure into the airport complex, should also be included in this improvement project.

This project would also take off line (for now) and winterize the Airport pump station. This station should be kept available for possible future use, however. The smaller VFD pump in particular, may be valuable to place back on line to cover lower (and variable) flows (<2000 gpm) that may be needed under certain conditions. Since this is a VFD pump, it should be able to pump into a system that at least temporarily, is a closed system.

Also as discussed in Section 8.2.4, the meter project at the 4MG tank could possibly be included in this Airport Transmission Main project. Another transmission improvement that should be included in this project is a bypass around the Southeast PRV on the East Ridge Road transmission main. This PRV station allows water in the Southeast tank to flow north on East Ridge Road. Having this bypass around this control valve will allow flow to the south if needed, and will also help address the pressure concerns at East 5th Street and East Ridge Road as the demand in the vicinity of this intersection increases. This situation is discussed in Section 4.3.5.

The tentative plan for financing this project is discussed in Section 9.5.1. Since additional grant funding may be available this summer, it is recommended this project proceed with funding applications. An additional benefit with proceeding sooner is that hopefully there will be less money spent on repairing major failures of the existing line and accommodating emergency situations from the loss of the existing line, and to place available funds into the new transmission main.

The estimated cost for this transmission main project is shown in Table 8.7

Table 8.7 – Airport Transmission Main Cost Estimate

Preparation of Final Design, Specs, Bidding (10%)	$ 321,160	
Permitting and Mitigation	$ 10,000	
Legal Fees	$ 10,000	
Acquisition of Access & Easements	$ 90,000	
Pre-Construction Costs (Subtotal)		$ 431,160
Cost of Components:		
Mobilization	$300,000	
7400' of 24" Main @ $156/ft	$1,154,400	
3900' of 20" Main @ $125/ft	$487,500	
6100' of 16" Main @ $97/ft	$591,700	
Borings (600 @ $500/ft)	$300,000	
Metering Upgrade & SCADA	$100,000	
Replace 8" DIP Lateral to Airport (2000' @ $49/ft)	$98,000	
New PRV Station on 8" Lateral	$80,000	
Southeast PRV Bypass	$100,000	
Total Cost of Components	**$3,211,600**	
Construction Engineering Cost	$ 321,160	
Components & Engineering Cost (Subtotal)	$ 3,532,760	
Contingency (Subtotal 15%)	$ 529,914	
Construction Cost Total		$4,062,674
Total Project Cost		$4,493,834

8.2.8 Upper Road Water Main

The proposed Upper Road transmission main is shown in Figure 8.2. This main provides a parallel transmission main from the airport area, south into the Little Goose valley. It provides some redundancy for the 16-inch transmission main along Girls School Road. The 1990 Sheridan Area Water System Master Plan showed this line as a future transmission main into the Little Goose service area as the area grows. Not only does it provide redundancy, but it also allows service along Upper Road to current residents and future users. To provide more complete redundancy and capacity, this line should eventually be extended all the way to Boxcross Road and then continuing down Upper Road until it reconnects with the 16-inch main along Highway 335.

The recommended project at this time runs to Metz Road and then connects to that main, as shown in Figure 8.2. There are PRV stations on Paradise Road and Swaim Road, but not Metz, as it was intended that this loop eventually be made. If the Upper Road line is run to Metz under a Phase I project, it can eventually be extended all the way to 335 under a Phase II project. It is possible (and more efficient) to do this all as one, but phasing is more financially manageable.

Extending this line as shown will also allow the relocation and reduction in size of the Paradise Park booster station as it will only need to serve the Piper and Cessna areas.

The northern connection to the existing transmission main can either be at Weeping Willow Lane or near the Airport pump station. While a final analysis and decision will be required during design, it is believed that the connection at Weeping Willow has several advantages and therefore it is the proposed connection point at this time. This connection point and proposed transmission main are also discussed in the Modelling section (4.3.5).

The connection at Weeping Willow allows the main to be installed through the airport on the west side of the runway so there are no crossings of the runway involved. It also provides for a longer run of parallel (redundant) transmission main. Also importantly, it increases the capacity of the 20-inch Big Goose transmission main, thus extending the time period for when the Airport pump station will be needed again (see 2.3.6 and 4.3.5).

A check valve will be needed in this line at its connection point to the 20-inch Big Goose pipeline at Weeping Willow to accommodate the operation of the Airport pump station, should it be needed in the future. However as stated above, the installation of this line will provide additional gravity flow capacity and should delay the need for the Airport pump station until after 2070.

It is recommended that the size of this line be 16-inch (or possibly 20-inch) from Weeping Willow onto the Airport, and then 16-inch to the location of the existing 12-inch main on Upper Road. The line south on Upper Road will need to be either 12-inch or 16-inch south to Metz Road. The final run to Highway 335 can probably be 12-inch. The larger size through the Airport and past the Girl's School to the connections on Paradise, Swaim and Metz allows greater supply to the Girl's School Road main and across the valley to Southeast Sheridan, should that level of supply be needed in the future. Final sizing must be made during design depending on the design flows determined at that time, and level of redundancy to the Girl's School line desired.

Pressure will need to be considered in the final selection of pipe material. The extension down Upper Road is proposed to be DR18 PVC. DR14 PVC should be considered for the northernmost runs of pipe (highest pressure) (see discussion above under Airport Transmission Main comparing DR18 to DR14), with a final decision made during design. The pipe from Weeping Willow to the top of the hill at the airport should be Certa-Lok or Fusible PVC (DR14), or possibly welded steel for the run up the hill, identical to the 20-inch line at Weeping Willow Lane.

An alternative connection point to the one shown in Figure 8.2 was originally considered for this project. This would have shortened the length of required waterline to connect to existing and would connect at the end of Short Road on the southeast corner of the high-pressure line circling the Girls School. This route would require the new waterline to cross the Airport runway. DOWL visited with the Airport Manager about the possibility of crossing the runway with a line and while they were not totally opposed to the idea, there were some major difficulties. The line would need to be installed by boring across the runway and taxiway with a bore length of about 900 feet. While this length of bore is usually feasible, the soil in this area is known to be very rocky so it would very likely be impossible to successfully make this bore.

Given that the other connection point presented above has so many advantages as discussed, this longer route is strongly recommended. Again, see Figure 8.2.

Table 8.8 shows an estimated cost for this transmission main project based on the assumed pipe sizes which will need to be confirmed during design.

Table 8.8 – Upper Road Water Main Cost Estimate

Preparation of Final Design, Specs, Bidding (10%)	$ 407,750	
Permitting and Mitigation	$ 10,000	
Legal Fees	$ 10,000	
Acquisition of Access & Easements	$ 90,000	
Pre-Construction Costs (Subtotal)		$ 517,750
Cost of Components:		
Mobilization	$200,000	
6,100' of 20" Main @ $125/ft	$762,500	
29,000' of 16" Main @ $96/ft	$2,601,000	
2100' of 12" Main @ $65/ft	$124,000	
Connection to Weeping Willow & Slope to Airport	$220,000	
Paradise Park Booster	$120,000	
Connections	$50,000	
Total Cost of Components	**$4,077,500**	
Construction Engineering Cost	$ 407,750	
Components & Engineering Cost (Subtotal)	$ 4,485,250	
Contingency (Subtotal 15%)	$ 672,788	
Construction Cost Total		**$5,158,038**
Total Project Cost		$5,675,788

8.2.9 East-West Cross Valley Transmission Main

As discussed in Section 4, it will eventually be necessary to install additional west to east transmission capacity in the 4040 zone or 4160 zone, if growth occurs as projected. This line will come from the 4160 zone and run from the existing 16-inch northwest transmission line near the VAMC and down Fort Road, across the BNSF railroad tracks and up Kittering Road. This proposed transmission main is shown in Figure 8.3.

Final planning, budgeting and design of this East-West Cross Valley Transmission Main needs to be conducted in conjunction with the next potential project – the Northeast Transmission Main.

Figure 8.3 illustrates the East-West Cross Valley Transmission Main project and Table 8.9 shows an estimated cost.

Table 8.9 – East-West Cross Valley Transmission Main Cost Estimate

Preparation of Final Design, Specs, Bidding (10%)	$ 198,280	
Permitting and Mitigation	$ 10,000	
Legal Fees	$ 10,000	
Acquisition of Access & Easements	$ 90,000	
Pre-Construction Costs (Subtotal)		$ 308,280
Cost of Components:		
Mobilization	$100,000	
14,600' of 16" Main @ $93/ft	$1,357,800	
BNSF Railroad Bore (300' @$350/ft)	$105,000	
Additional Restoration/crossings	$250,000	
4160 to 4040 PRV Station	$120,000	
Connections	$50,000	
Total Cost of Components	**$1,982,800**	
Construction Engineering Cost	$ 198,280	
Components & Engineering Cost (Subtotal)	$ 2,181,080	
Contingency (Subtotal 15%)	$ 327,162	
Construction Cost Total		**$2,508,242**
Total Project Cost		$2,816,522

8.2.10 Northeast Transmission Main Project

The Northeast Transmission Main Project includes two primary segments:

- Extension from the end of the existing 16-inch line on Skeels, north to Kittering.
- An extension from this point east, across I-90 and then looping back into the 16-inch main on East Ridge Road to the south.

When the time comes for this main to be extended, the need may initially only be on Skeels, so the cost estimate below can be modified for the reduced project. Eventually, if growth occurs as is expected, the extension will be needed across I-90 and connecting to East Ridge Road and East 5th Street. There is higher ground in this potential service area, so this 4040 HGL main cannot serve this entire area. This matter is discussed in the Modeling section of 4.3.5. Also refer to the East-West Cross Valley Main presented in 8.2.9.

The extension on Skeels of the 4040 HGL main can serve the immediate area to Kittering adequately, and this extension will likely be needed prior to the other mains discussed in this section.

At the time one or more of these mains (or phases of a main) are needed, this matter should be reviewed again based on the size and elevations of the service area, updated overall system demands, and the entire preliminary design remodeled for HGLs, pipe sizes, connections, need for a PRV station, etc. This preliminary design needs to be summarized in a design report with a revised cost estimate for the specific project at that time. It is believed the work in this Level I is sufficient that once this project-specific PER is prepared, that the project can move into the WWDC Level III program with a revised cost estimate.

Figure 8.4 illustrates this project. The cost estimate is presented in Table 8.10.

Table 8.10 – Northeast Transmission Main Extension

Preparation of Final Design, Specs, Bidding (10%)	$ 126,470	
Permitting and Mitigation	$ 10,000	
Legal Fees	$ 10,000	
Acquisition of Access & Easements	$ 50,000	
Pre-Construction Costs (Subtotal)		$ 196,470
Cost of Components:		
Mobilization	$100,000	
10,900' of 16" Main @ $83/ft	$904,700	
I-90 (400' @$350/ft)	$140,000	
Additional Restoration/crossings	$100,000	
Connections	$20,000	
Total Cost of Components	**$1,264,700**	
Construction Engineering Cost	$ 126,470	
Components & Engineering Cost (Subtotal)	$ 1,391,170	
Contingency (Subtotal 15%)	$ 208,676	
Construction Cost Total		**$1,599,846**
Total Project Cost		$1,796,316

8.2.11 Woodland Park School Area Project

This project will create the next higher pressure zone above (southeast of) the new Woodland Park School area to increase the pressure in the higher ground in this location. This project will connect to water lines in and better serve the east end of Highview Road and Dee Drive to the south. The new pressure zone will be at 4160. Currently this area is in the 4040 zone. It is proposed to modify the Highway 87 (Big Horn wye) PRV station to provide 4160 water by gravity north up Highway 87 in the existing main, and then install PRV stations in the laterals coming off this line such as for the McNally and Woodland Hills subdivisions. A tank will be needed so fire flows and peak demands can be satisfied in this new service area. This project and its connection to Dee Drive will eliminate the need for the Dee Drive booster station. Eventually an extension should be run from this main and the new 4160 tank to the north, under I-90 and connect to the southern side of the Eastern Hills Subdivision (or Highway 14 main). This connection will allow service to the higher ground on the east side of I-90 and then supplement supply into the area currently served by the Southeast pump station. (and reduce the need for this pump station). This project also significantly improves the water supply to an area close in to the City promoting growth in an area designated for growth and not promoting growth in outlying areas (per the local Comprehensive Plans).

Figure 8.5 illustrates this project and Table 8.11 shows the estimated cost.

Table 8.11 – Woodland Park School Area Project

Preparation of Final Design, Specs, Bidding (10%)	$ 317,100	
Permitting and Mitigation	$ 5,000	
Legal Fees	$ 10,000	
Acquisition of Access & Easements	$ 50,000	
Pre-Construction Costs (Subtotal)		$ 382,100
Cost of Components:		
Mobilization	$100,000	
12" Main Along Hwy 87 - 1,000 @ $65/ft	$65,000	
12" Main to Tank - 6,100 @ $65/ft	$396,500	
8" Main to Woodland, High View, and Dee Dr. - 3,500ft @ $49/ft	$171,500	
12" Main Across I-90 to East Hills - 13,200ft @ $65/ft	$858,000	
I-90 Bore (800' @350/ft)	$280,000	
0.5 MG Tank and Appurtenances	$1,000,000	
3 PRV Stations	$300,000	
Total Cost of Components	**$3,171,000**	
Construction Engineering Cost	$ 317,100	
Components & Engineering Cost (Subtotal)	$ 3,488,100	
Contingency (Subtotal 15%)	$ 523,215	
Construction Cost Total		**$4,011,315**
Total Project Cost		$4,393,415

8.2.12 Other Transmission Main Projects

During the time of the preparation of the 2008 Level I study the Sheridan area was growing significantly due to energy development. There were several future main extensions preliminarily proposed to serve growth areas, provide looping, and overall strengthen the network of water mains throughout the system. Some of these projects have been constructed, and most of the other preliminary recommendations still hold today. As these improvements become needed and move into final planning for design and construction, the hydraulic model must be used to establish design flow rates, for pressure assessment, for sizing, for final routing and connections into the existing system, and overall design. The scope and estimated cost of the project will need to be revised from that preliminarily presented in the 2008 study or this Level I based on this work and made current, so funding and final planning can proceed.

The following is a summary of other proposed or preliminarily identified projects. These projects should continue to be considered in the future, with final planning, cost estimates and then designs completed (or revised as the case may be) when they are ready to move forward.

For proposed projects that are particularly complex as to their role in the system and design flow rate (such as the McCormick Road transmission main discussed below), a Level II study is needed because this main may become part of the new water supply from the south and many factors associated with this transmission main depend on the overall design of this major project. For other projects, such as replacing the old CIP/DIP transmission mains when needed, information presented in this Level I study along with hydraulic modeling that uses the water demands developed for the project's service area, a project-specific PER should be prepared. This report needs to summarize the above hydraulic analysis, state how the main fits into the overall system, describes the project and its need, develops a design criteria table, and an estimated cost for the project. The process of preparing a project-specific PER to be used in an application for Level III funding needs to be reviewed with the WWDO. The draft of the PER then also needs be reviewed by the WWDO, with revisions made as necessary to fit into their Level III program.

- McCormick Road transmission main. Also refer to the discussion under the recommended Level II Study for the development of the Lake DeSmet water source and the infrastructure needed to bring water into the SWS (Section 7.3). A new transmission main will be needed from the Lake DeSmet source, passing through Banner and down Highway 87 and Bird Farm Road, and then running north on McCormick Road from its intersection with Bird Farm Road. There are many potential users along Highway 87 and Bird Farm Road, and this transmission main should be routed to maximize its location for adding users. Laterals will also be needed to serve this expanded area of service.

  A McCormick transmission main should connect into the SAWS system on Bird Farm Road (both the 4276 pressure zone of Bradford Brinton tank and the 4160 zone of the Big Horn tank), at Knode (eliminating the Knode booster station), on Highway 87 near Circle 8 Drive, and to the main running north of Highway 87 near the Big Horn wye. The McCormick Road transmission main will be configured to provide water into the Girl School Road transmission main, the Upper Road transmission main and the Highway 87 (Coffeen Avenue) transmission main. Exactly how these connections are made and how supply is brought into the City's service area will be determined under the recommended Level II study. A major decision point at that time will be the design flow rate of the infrastructure to bring a second water supply from the south (Lake DeSmet) into the SWS. This will not only affect the design of the McCormick transmission main, but additional transmission mains that will be needed to deliver this supply.

- Coffeen Avenue transmission main. This line is being replaced under a WYDOT project and is paid for by WYDOT.

- Keystone line. The water main going out Keystone Road is only 4-inch which limits is ability to serve additional users. Following the upgrading of the two booster stations on this line and connecting this line closer to the Northwest tank, as well as a more detailed hydraulic analysis, it has been determined that it can serve a limited number of additional users. Since the potential for development in this area is limited due to zoning and conservation easements, a plan for upgrading this line is not presented at this time. This has been analyzed previously and when the need arises, those previous plans should become the starting point for a plan to increase the capacity of the system out Keystone Road prepared.

- Water line around the landfill. This will be an extension off the 16-inch East Ridge Road transmission main to serve users around the landfill. These residences are currently on wells and there is a concern that contamination from the landfill may impact these wells. This line would create a loop to serve these future users.

- Replacing CIP and DIP transmission mains. The corrosive soils in the Sheridan area have significantly impacted (deteriorated) many CIP/DIP mains that were installed in this system prior to 1980. The transmission main in the most need of replacement at this time is the Airport transmission main, and this study proposes it for replacement in a Level III project. There are other iron transmission mains in the system that will need to be replaced in the coming years. It is proposed that as they are scheduled for replacement that the process summarized in the introduction to this section (see 8.1 and intro to 8.2) for such a project be followed for funding under the WWDC program. This includes a discussion with WWDO staff and preparing a project-specific PER to their standards. This PER should include a summary of pertinent information from this Level I, and project specific analysis of the current situation with recommendations for the replacement line and a project cost estimate. This PER will then be submitted, along with an application into the Level III program.

  CIP/DIP transmission mains that appear to be the highest priority are the two 24-inch lines that leave the SWTP and head to the southeast and northeast respectively. These mains then downsize to 20-inch or 16-inch as they carry 4040 water into the City's system. The 20-inch line near the Fairgrounds and on Kentucky has failed several times, as has the 16-inch running down the hill from the location of the North Low Tanks. These are critical mains and are slowly deteriorating form soil corrosion. With the number and length of these mains, a plan should be developed soon for their phased replacement.

The following steps are recommended regarding the older DIP/CIP transmission mains. The goal with this process is to make informed decisions, obtain grant funding, and schedule projects prior to significant investments on repairs.

- When leaks/breaks are repaired, carefully document the pipe condition, surrounding soils, and apparently reason for the leak. Also take photographs.
- Keep a file of these records for use in a future funding application.
- Document conditions that may have caused the break, for example, was there was a pressure surge. Iron pipe in good condition can typically survive a pressure surge, where pipe in a deteriorated condition cannot.
- Document the location and operation of valves used to shut down the line. Are valve improvements needed in order to properly isolate the line?
- Conduct a leak survey on some of these mains to obtain a representative picture of existing leakage.
- Conduct a condition assessment of one these mains that is believed to be in a condition of concern. This should be an evaluation of the pipe wall integrity (metal content and thickness) and provide an estimate of remaining life (if possible).
- Identify potential projects – starting and ending points, etc.
- Use the model to verify sizes and connection points of the new pipe.
- Prioritize these potential projects and work them into the capital improvements plan (CIP) as possible in future years.

- Connection between Powder Horn and Knode. The eastern parts of the Powder Horn subdivision (portions of the Powder Horn at higher elevations) are served off the Bradford Brinton tank pressure zone (4276). If a connection is made between a water main in the northeast corner of the Powder Horn and the southeast corner of Knode, supply could be provided to the portion of Knode that is served by the Knode pump station. This would reduce the need for this pump station, provide improved flows to Knode (limited fire flows) and better supply during a power outage.

8.2.13 Water Main Cost Estimates

The following tables develop the unit costs for water mains (installed pipe and their appurtenances) used in these estimated costs. These estimated costs are for the conditions or applications as stated for each table. These estimated costs do not include the following items:

- Mobilization, Bonds and Insurance
- Borings, highway or river crossings
- Major appurtenances such as metering, control valves, vaults
- Major resurfacing such as replacement crushed base or asphalt
- Easements and their acquisition

- Engineering or any professional services
- Environmental services or project permitting
- Geotechnical issues or materials testing
- Temporary controls beyond routine practices
- Project administration costs

Table 8.12 – DR18 PVC Pipe Cost

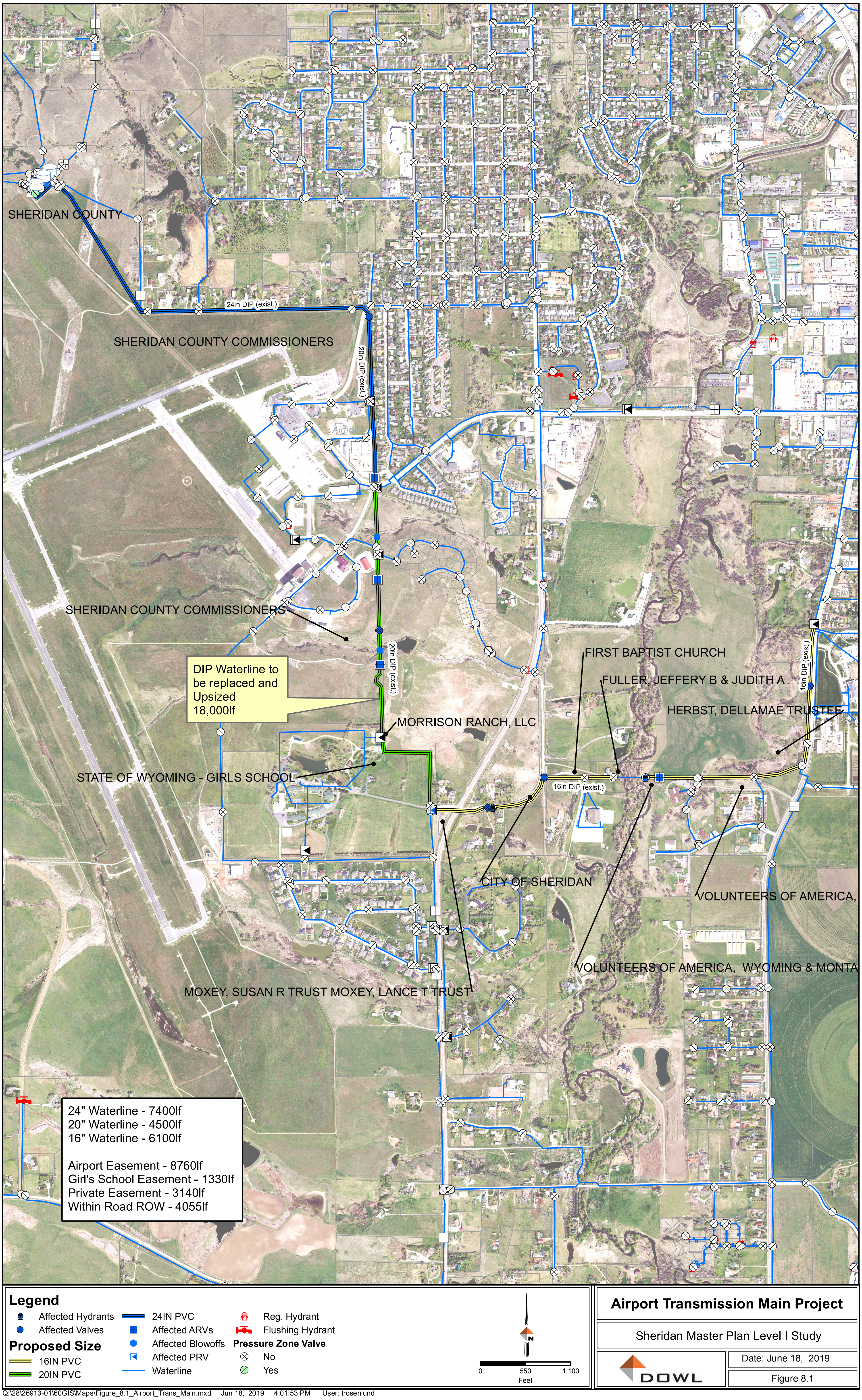
ITEM	4"	6"	8"	10"	12"	16"	20"
Pipe	$4.0	$5.0	$11.0	$14.0	$20.0	$32.0	$51.0
Installation	$18.0	$18.0	$21.0	$22.0	$23.0	$25.0	$28.0
Bedding	$2.0	$3.0	$3.0	$3.0	$4.0	$4.0	$5.0
Replacement Foundation or Backfill/Grubbing	$0.5	$0.5	$0.5	$1.0	$1.0	$1.0	$1.0
Utility Locations & Crossings/Fence crossings	$1.0	$1.0	$1.5	$1.5	$1.5	$2.0	$2.0
Traffic Control/Surveying Control	$1.0	$1.0	$1.0	$1.0	$1.0	$1.0	$1.0
Connection to Existing Lines/Stubouts for laterals	$0.5	$0.5	$1.0	$1.0	$1.0	$1.0	$2.0
Basic Surface Restoration	$4.0	$4.0	$4.0	$5.0	$5.0	$6.0	$6.0
Valves (1/4000 feet)	$0.5	$0.5	$1.0	$1.0	$1.5	$2.0	$2.0
Fittings (~4 per mile)	$1.0	$1.5	$1.5	$1.5	$2.0	$2.5	$3.0
Hydrant Assemblies/Flushing (1/4000 feet)	$1.5	$1.5	$2.0	$2.0	$2.5	$2.5	$3.0
Service Line Allowance (tap, corp, curb)	$0.5	$0.5	$0.5	$1.0	$1.0	$2.0	$2.0
Air Release Valves (1 per mile)	$0.5	$0.5	$1.0	$1.0	$1.5	$2.0	$2.5
SUBTOTAL - Pipe & Appurtenances	**$35**	**$38**	**$49**	**$55**	**$65**	**$83**	**$109**

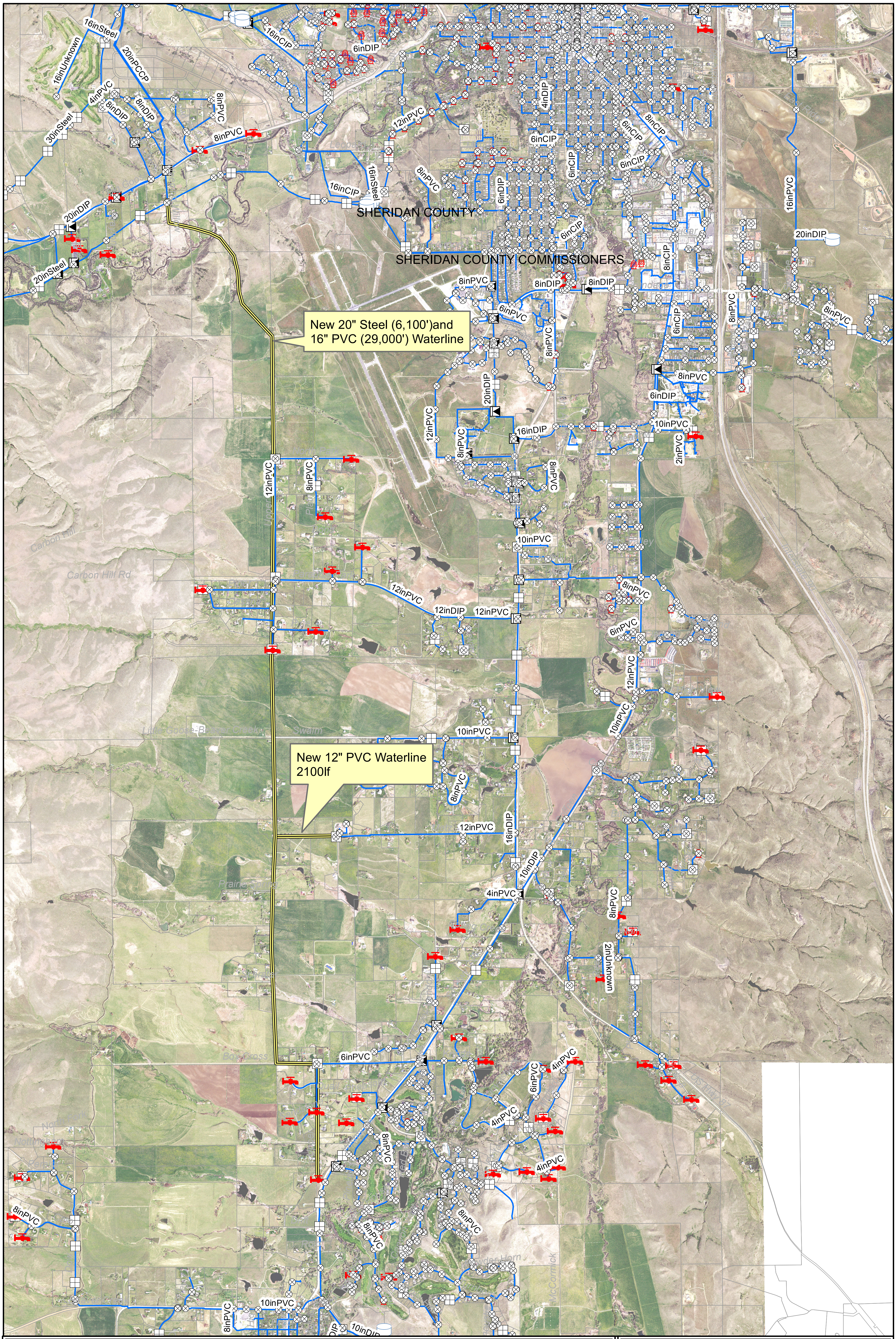
Table 8.13 – Large Diameter PVC Pipe Cost

ESTIMATED COST FOR PVC Transmission Main - Airport Line				
ITEM	**DR14 24"**	**DR18 24"**	**DR14 20"**	**DR14 16"**
Pipe	$90.0	$70.0	$62.0	$40.0
Installation	$30.0	$29.0	$29.0	$25.0
Bedding	$5.0	$5.0	$4.0	$4.0
Replacement Foundation or Backfill/Grubbing	$1.0	$1.0	$1.0	$1.0
Utility Locations & Crossings/Fence crossings	$2.0	$2.0	$2.0	$2.0
Traffic Control/Surveying Control	$1.0	$1.0	$1.0	$1.0
Connection to Existing Lines/Stub outs for laterals	$4.0	$4.0	$4.0	$4.0
Basic Surface Restoration	$6.0	$6.0	$6.0	$6.0
Valves (1/3000 feet)	$4.0	$4.0	$4.0	$3.0
Fittings (~4 per mile)	$4.0	$4.0	$3.0	$3.0
Hydrant Assemblies/Flushing (1/3000 feet)	$4.0	$4.0	$4.0	$4.0
Service Line or Lateral Allowance (connections)	$2.0	$2.0	$2.0	$2.0
Air Release Valves (1 per mile)	$3.0	$3.0	$3.0	$2.0
SUBTOTAL - Pipe & Appurtenances	**$156**	**$135**	**$125**	**$97**

Table 8.14 – 16-inch Pipe Cost

ESTIMATED COST FOR 16-INCH PIPE - RURAL SETTING				
ITEM	**DR18 PVC**	**DR14 PVC**	**DIP**	**PCCP**
Pipe	$32.0	$40.0	$53.0	$110.0
Installation	$25.0	$25.0	$35.0	$40.0
Bedding	$4.0	$4.0	$6.0	$6.0
Replacement Foundation or Backfill/Grubbing	$1.0	$1.0	$1.0	$1.0
Utility Locations & Crossings/Fence crossings	$2.0	$2.0	$2.0	$2.0
Traffic Control/Surveying Control	$1.0	$1.0	$1.0	$1.0
Connection to Existing Lines/Stubouts for laterals	$1.0	$1.0	$1.0	$2.0
Basic Surface Restoration	$6.0	$6.0	$6.0	$6.0
Valves (1/4000 feet)	$2.0	$2.5	$2.0	$3.0
Fittings (~4 per mile)	$2.5	$3.0	$2.5	$3.0
Hydrant Assemblies/Flushing (1/4000 feet)	$2.5	$3.0	$2.5	$4.0
Service Line or Lateral Allowance (connections)	$2.0	$2.0	$2.0	$2.0
Air Release Valves (1 per mile)	$2.0	$2.0	$2.0	$3.0
SUBTOTAL - Pipe & Appurtenances	**$83**	**$93**	**$116**	**$183**


SHERIDAN COUNTY
24in DIP (exist.)
SHERIDAN COUNTY COMMISSIONERS
20in DIP (exist.)
SHERIDAN COUNTY COMMISSIONERS
DIP Waterline to be replaced and Upsized 18,000lf
20in DIP (exist.)
MORRISON RANCH, LLC
STATE OF WYOMING - GIRLS SCHOOL
FIRST BAPTIST CHURCH
FULLER, JEFFERY B & JUDITH A
HERBST, DELLAMAE TRUSTEE
16in DIP (exist.)
16in DIP (exist.)
CITY OF SHERIDAN
VOLUNTEERS OF AMERICA,
VOLUNTEERS OF AMERICA, WYOMING & MONTA
MOXEY, SUSAN R TRUST MOXEY, LANCE T TRUST
24" Waterline - 7400lf
20" Waterline - 4500lf
16" Waterline - 6100lf
Airport Easement - 8760lf
Girl's School Easement - 1330lf
Private Easement - 3140lf
Within Road ROW - 4055lf
Legend
Affected Hydrants
Affected Valves
Proposed Size
16IN PVC
20IN PVC
24IN PVC
Affected ARVs
Affected Blowoffs
Affected PRV
Waterline
Reg. Hydrant
Flushing Hydrant
Pressure Zone Valve
No
Yes
N
0
550
1,100
Feet
Airport Transmission Main Project
Sheridan Master Plan Level I Study
Date: June 18, 2019
Figure 8.1
DOWL
Q:\28\26913-01\60GIS\Maps\Figure_8.1_Airport_Trans_Main.mxd Jun 18, 2019 4:01:53 PM User: trosenlund



Legend

- Existing Waterline
- New Waterline
- Fire Hydrant
- Flushing Hydrant
- WaterValves

0 1,625 3,250
Feet

Upper Road Transmission Main Project

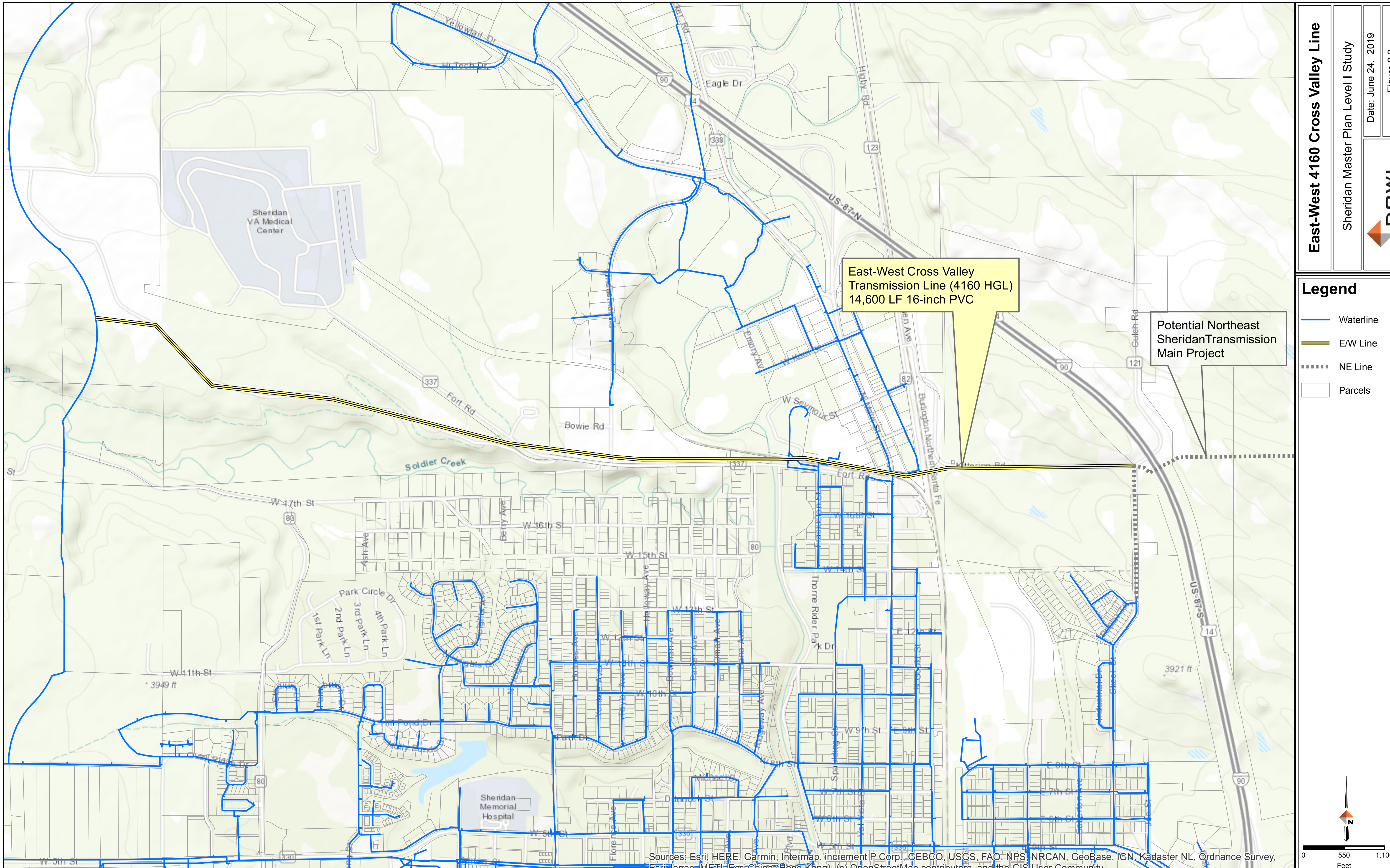
Sheridan Master Plan Level I Study

DOWL

Date: May 21, 2019

Figure 8.2

Q:\28\26913-01\60GIS\Maps\Figure_8.2_Upper_Road_Trans_Main.mxd May 21, 2019 3:18:51 PM User: trosenlund



East-West 4160 Cross Valley Line

Sheridan Master Plan Level I Study

Date: June 24, 2019

Figure 8.3

DOWL

Q:\28126913-01\160GIS\Maps\Figure_8.3_East_West_Cross_Valley_Line.mxd Jun 24, 2019 9:58:12 AM User: trosenlund

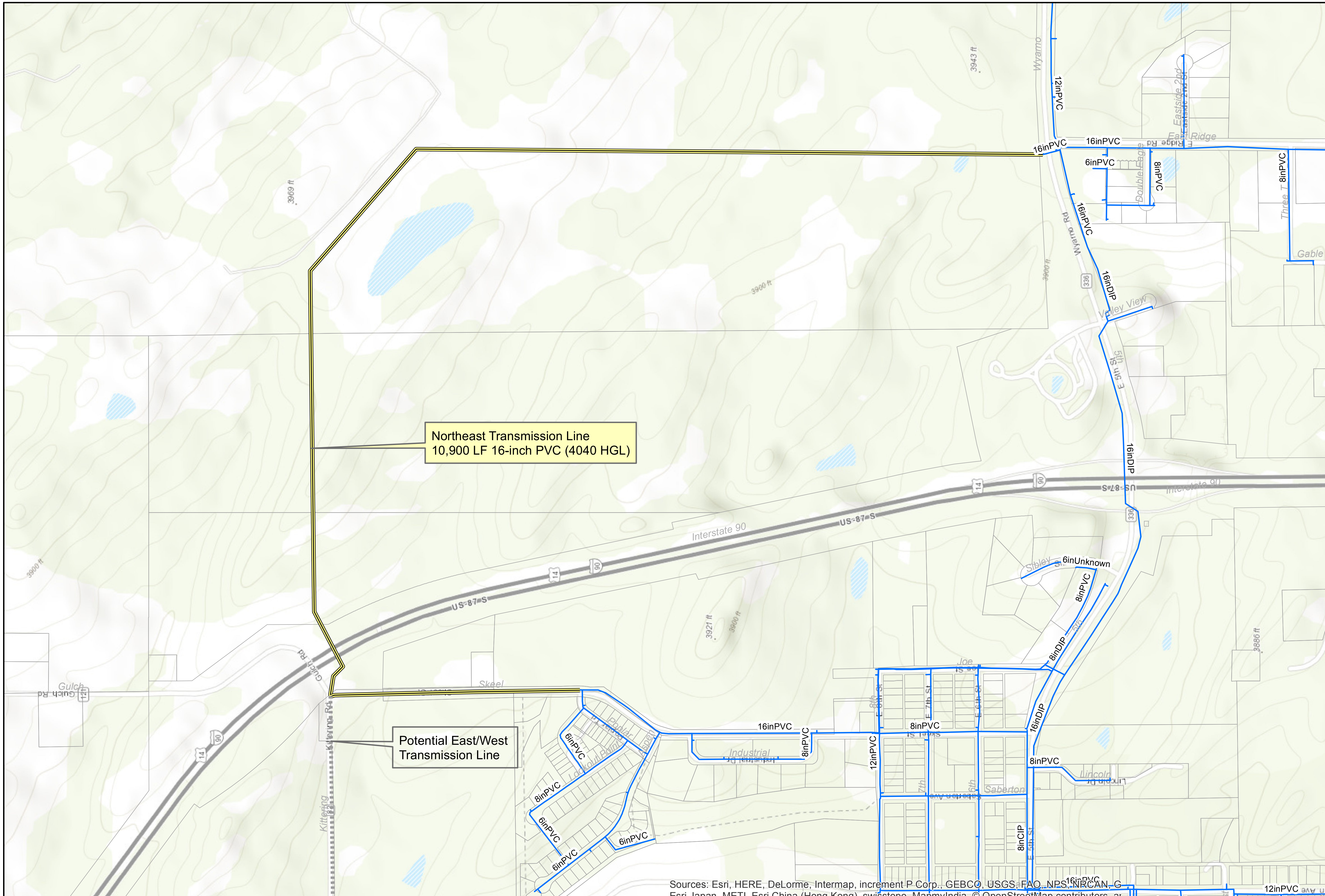
Northeast Sheridan Tranmission Line

Sheridan Master Plan Level I Study

Date: May 29, 2019

Figure 8.4

DOWL

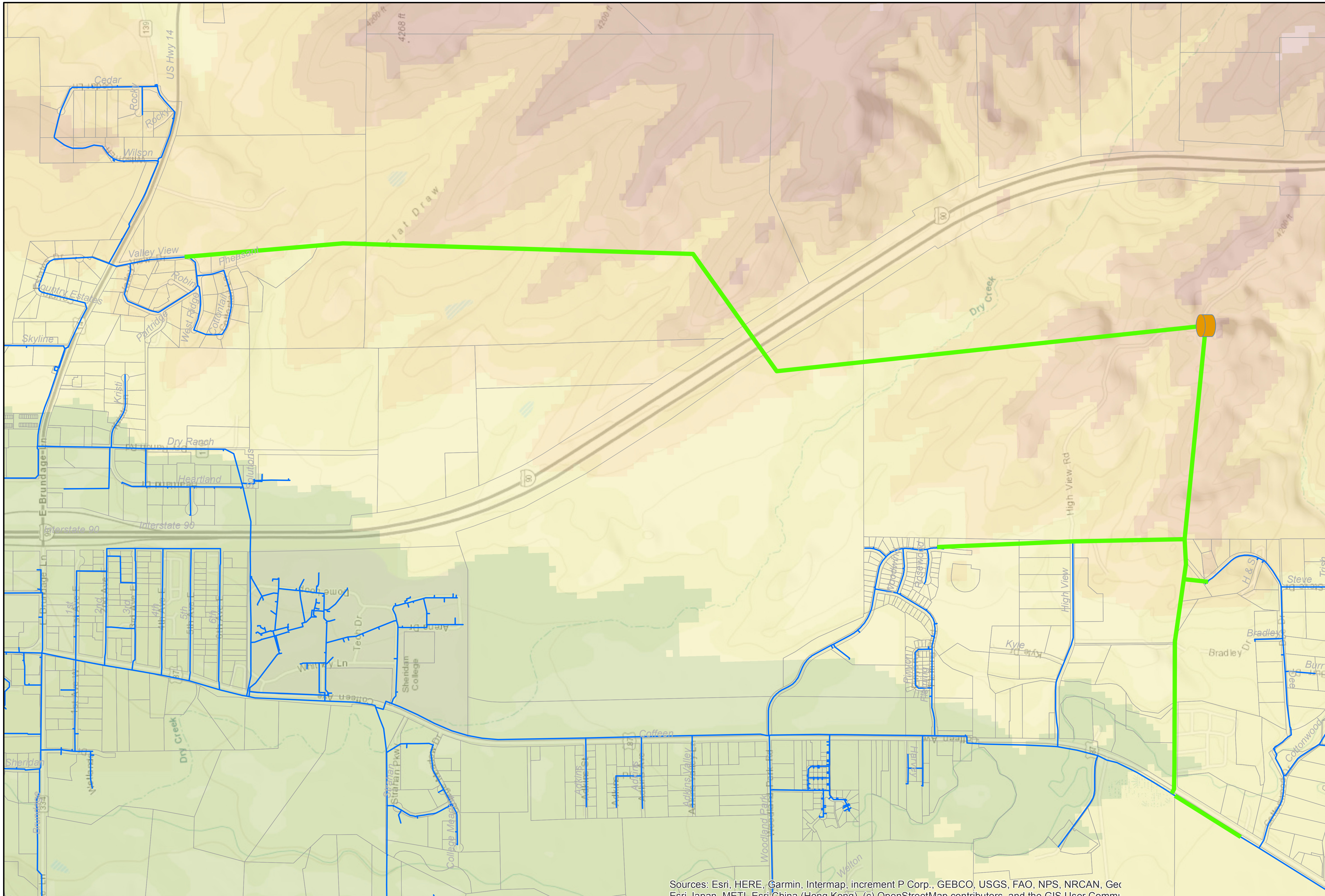


Legend

- E/W Line
- NE Trans Line
- WaterPipeline
- Parcels

0 330 660
Feet

Q:\28126913-01\160GIS\Maps\Skeels_Transmission_Line.mxd May 29, 2019 4:26:45 PM User: trosenlund



Woodland Park Area Project

Sheridan Master Plan Level I Study

Date: May 22, 2019

Figure 8.5

DOWL

Legend

- WoodlandTank
- Proposed Line
- Water Pipeline
- CountyRoads
- Parcels

Zone

- 3837
- 3952
- 4040
- 4160
- 4276
- 4390
- 4506
- 4622

0 550 1,100
Feet

Q:\28\28913-01\60GIS\Maps\WoodlandParkProject.mxd May 22, 2019 11:04:24 AM User: trosenlund

9.0 WATER SYSTEM FINANCING

9.1 INTRODUCTION

This section presents a summary of the financial aspects of the City of Sheridan and SAWS JPB water systems, and funding sources for projects that are recommended in this Level I study. The existing water rates, plant investment fees (PIFs) and other charges relating to this water system are presented. Funding sources are also discussed, with preliminary recommendations on a funding plan made. Monthly rates are also compared to the AWWA standard of 2.5 percent of the median household income (MHI). Per the Wyoming Department of Administration & Information, the MHI for Sheridan County is $56,455, or $117.61/month (2.5% of $56,455 ÷ 12 months).

9.2 RATES AND CHARGES

This section summarizes the current water rates, PIFs and other charges by the City and SAWS. The City rates are covered in their Resolution 30-17, while SAWS' are covered in their resolution 18-07-11. These resolutions and other financial information are included in Appendix G. The City has charged for water based on 100 cubic feet (748 gallons) in the past, and they now have converted to gallons as the unit of measurement. Therefore, some of their rates are based on increments of 748 gallons, as compared to increments of 1000 gallons as is used by SAWS. Water charges shown for usage are monthly.

City Water Rates and Fees:

Meter Size (inches)	Minimum Water Use (Gallons)	Monthly Minimum Charge- Inside City	Monthly Minimum Charge- Outside City
≤3/4	1,496	$18.88	$23.60
1	2,992	$22.26	$27.82
1 1/2	5,984	$27.66	$34.56
2	8,976	$33.04	$41.30
3	22,440	$56.63	$70.80
4	37,400	$83.60	$104.51
6	74,800	$150.26	$188.77
8	149,600	$302.02	$377.54

For water used in excess of the minimum usage included in the minimum charge, charges shall be assessed based upon two tiers shown below. For water use above the minimum allowance in the above table, the following charges apply

Charges per 748 gallons	
Inside City	Outside City
$1.37	$1.73

The above rate is the Tier 1 rate per 748 gallons above the base rate. The Tier 1 rate applies up to the following gallon amounts based on the meter size.

Meter Size (inches)	Tier 1 Use (gallons)
≤¾	5,984
1	11,220
1½	22,400
2	33,660
3	84,524
4	140,624
6	280,500
8	561,000

The following charges per 748 gallons apply in Tier 2, which is for quantities that are above the minimum amounts listed in the table above for Tier 1, based on the meter size.

Charges per 748 gallons	
Inside City	Outside City
$1.87	$2.34

Water Plant Investment Fees (PIF):

Line & Meter Size	Customer Class	Inside City	Outside City
3/4″ x 5/8″	Small Commercial Base Fee	$1,230.00	$1,537.50
3/4″ x 5/8″	Small Multi-Family Base Fee	$1,980.00	$2,475.00
3/4″ x 5/8″	Single-Family Residential and All Other Base Fee	$3,000.00	$3,750.00
1″ x 1″	All	$5,010.00	$6,262.50
1 1/2″ X 1 1/2″	All	$9,990.00	$12,487.50
2″ x 2″	All	$15,990.00	$19,987.50
3″ x 3″	All	$35,010.00	$43,762.50
4″ x 4″	All	$63,000.00	$78,750.00
6″ x 6″	All	$129,990.00	$162,487.50
8″ x 8″	All	$240,000.00	$300,000.00

Water Connection Fees

Line & Meter Size	Meter Fee	Tapping Fee	Radio Read	Total
3/4″ line with 5/8″ meter	$180.00	$181.00	$200.00	$561.00
1″ line with 1″ meter	$240.00	$190.00	$200.00	$630.00
1 1/2″ line with 1 1/2″ meter	$460.00	$245.00	$200.00	$905.00
2″ line with 2″ meter	$585.00	$313.00	$200.00	$1,098.00
3″ meter	$2,100.00	N/A	$200.00	$2,300.00
4″ meter	$3,250.00	N/A	$200.00	$3,450.00
6″ meter	$5,800.00	N/A	$200.00	$6,000.00
8″ meter	$9,950.00	N/A	$200.00	$10,150.00

SAWS JPB Water Rates and Charges

The following are the minimum base rates for all customers.

Meter Size	Base Rate
¾-inch	$48.75
1-inch	$74.74
1½-inch	$89.31
2-inch & larger	$93.24

The following tiered rates apply to all customers and all meter sizes:

Usage Rate	
0 – 8,000 gallons	$1.87/1000 gallons
8,000 gallons and greater	$3.93/1000 gallons

SAWS JPB connection and PIFs are as follows:

Meter Size (inches)	One-time Plant Investment Fee (PIF)	Corporation Stop (on the main)	Meter	Radio Read	Total
¾	$5,380	$216	$192	$300	$6,088
1	$12,440	$234	$288	$300	$13,262
1½	$24,880	$336	$576	$300	$26,092
2	$39,810	$372	$798	$300	$41,280
3	$79,630	*	*	*	*
4	$124,410	*	*	*	*
6	$248,830	*	*	*	*

Based on a water usage of 10,000 gallons per month, the following sample rates result for ¾-inch and 1-inch meters.

Table 9.1 Average Monthly Water Bill

	City – Inside City Rate	City – Outside City Rate	SAWS JPB
¾-inch 10,000 gallons	$36.14	$45.32	$71.57
¾-inch 20,000 gallons	$61.14	$76.61	$110.87
1-inch 10,000 gallons	$35.10	$44.03	$97.56
1-inch 20,000 gallons	$57.28	$71.88	$136.86

Review of Rates and Charges

The City and SAWS recently completed a Water Rate and Fee Study that evaluated rates, PIFs (Plant Investment Fees) and other fees (by Raftelis Financial Consultants, July 2018) and produced a financial model for these systems. With the recent completion of this work, additional recommendations for changes in rates or PIFs are not included in this Level I study at this time. The financial model developed will be used to verify funding plans for projects as well as annual budgets, debt repayments and other costs associated with these water systems. The model will thus be used to recommend needed rate increases to help pay for projects as they are prepared to move forward. This analysis will depend on the funding package for that project and the grant/loan mix. Therefore, projects resulting from this study may impact rates, but those impacts cannot be determined at this time, but rather will be assessed as specific projects come up for funding and any grant or loan applications for those projects are prepared. Therefore, both this Financial Plan and the work completed in this Level I study will be used to adjust rates as needed in the future to maintain the financial soundness of both the City of Sheridan and the SAWS JPB.

A few specific points from the Raftelis study:

- A goal was to develop a financial plan for the water enterprise to ensure financial sufficiency, meet O&M costs, ensure sufficient funding for capital replacement and refurbishment needs and improve the financial health of the enterprises.
- Another goal was to develop sound and sufficient reserve fund targets.
- PIF were studied in detail. This included their purpose, pricing objectives and policy goals, system capacity, the cost of the system, and generally accepted methodology for determining PIFs. The PIFs were reviewed and no changes were recommended.
- The 10-year financial plan included projections of rate revenue, other revenue, annual expenses and anticipated capital projects. This financial model can now be used to plug in projects resulting from this study as applications for those projects are developed.
- To meet the funding requirements projected, 2.5% rate increases are needed in the even numbered fiscal years from 2020 through 2026.
- The priorities for Sheridan’s rate structure were: conservation/wise use of water, essential use affordability, and revenue stability.
- The study included a recommended rate for the delivery of raw water.
- Payments on debt in FY2018 totaled $416,000. With several SRF loans closing on recent projects, the debt service is expected to reach $1.01 million in FY2023. (These

updated debt payment amounts need to be included in the model as it is used in planning for additional projects).

- Debt service coverage is required to be 1.10. The City targets coverage at 1.20.

- The City maintains two separate reserves. These are:

    - Operating reserve equal to 25% of annual O&M expenses

    - Capital reserve of $1.2 million, which equals two years of repair and replacement projects.

9.3 BUDGET

Both the City and SAWS JPB have a positive history of developing budgets that cover the costs of operating their water systems and setting aside reasonable reserves. Budgets for the upcoming FY are being adopted at this time. These budgets are included in Appendix G. These budgets are also being incorporated into the financial model discussed above for use in confirming any needed water rate increases. The financial model analyses of the financial impact new projects being considered will include the incorporation of budgets as summarized in this section. Additional coordination and information will be needed to conduct these analyses, including the funding plans for the presented projects.

9.3.1 Operating Expenditures

Operating expenditures in the budget include the following categories:

- Salaries and wages
- Employee benefits
- Purchased Water
- Purchased Power
- Materials, chemicals, supplies
- Professional services (engineering or legal)
- Rental equipment or property
- Transportation
- Laboratory and Office Expenses
- Insurance
- Advertising

9.3.2 Loans and Debt Obligations.

This portion of the budget covers the principal and interest payments required to retire debt obligations. The coverage ratio used for this debt (such as 1.2) must also be included. These two systems are currently closing out several SRF loans on recently completed projects, so the debt obligations are being updated in the financial model at this time. When debt payments commence is also important and this time can vary from the start once the construction project to project closeout, depending on the funding source.

9.3.3 Revenue

This portion of the budget covers the anticipated revenue generated by water sales, PIFs and other fixed fees.

9.3.4 Reserves

Reserve accounts are needed to cover future costs and emergencies. Typical reserve accounts are:

- Debt Retirement Reserves – Reserve accounts for debt repayment are not necessarily maintained, however a coverage ratio is included in the calculations to help assure adequate funds are available for the loan payments.

- O&M Reserves – 3 months (25% of the annual budgeted amount for O&M) is maintained in a reserve account.

- Capital Improvement/Replacement Reserves – Funds specifically set aside for the future replacement of equipment and facilities. This is calculated based on depreciation, with 1 year's accumulated depreciation maintained.

9.4 FUNDING OPPORTUNITIES

In Wyoming there are several funding programs to assist communities in making improvements to public water systems. Without these programs, projects such as some of the improvements recommended in this study could be difficult to afford. Both the City and SAWS have taken advantage of these programs in the past and should be able to continue to do so in the future. If these entities were to finance larger projects without any state or federal assistance, the impact to each water user would result in much higher rates to complete the recommended projects.

Following is an overview of funding opportunities for the water system improvements proposed in this Level I study.

9.4.1 Wyoming Water Development Commission (WWDC)

The WWDC funds projects associated with development of water supplies, storage and pumping, and transmission. It does not fund water distribution or water treatment projects. Funding packages can be comprised of a grant and loan mix or grant funding with matching funds from other sources. Loans are provided at 4% interest, usually with a term of 20 years. In recent years, sources for loan dollars have typically been directed to other financing entities (e.g. DWSRF, RD/RUS).

For final design and construction costs of eligible project components, the WWDC typically provides up to 67% in grant funding. This is their Level III program.

The WWDC has three distinct development accounts: 1) New Development, 2) Rehabilitation, and 3) Dams and Reservoirs. A project must fall under one of these programs to receive funding. It is anticipated that improvements recommended in this Level I study should generally be eligible for Level III funding under the New Development account. If an existing facility is rehabilitated, it's possible the Rehabilitation account could apply.

The WWDC has three levels of project development. Level I is preliminary analysis and comparison of development alternatives. Level II is more detailed study to determine the technical and financial feasibility of specific projects, with more detailed cost estimates.

Level III projects cover the final design and construction of projects. Those costs can be defined in Level I or Level II reports and funding applications based on these reports. Larger Level III projects can also include a preliminary design component to further refine conceptual designs from previous studies.

Project priorities are defined within the WWDC Operating Criteria to facilitate efficient and effective distribution of funds (http://wwdc.state.us/opcrit/final-opcrit.html). Of the nine types of projects described in the Operating Criteria, multipurpose projects, including larger, regional systems are ranked first priority, storage projects are ranked second, and water supply projects are ranked third. Projects within the Sheridan water system should typically qualify under the regional systems criteria.

Applications for Level III projects must be submitted by a formal, legal entity such as a municipality, joint powers board or special district. New project applications require an application fee of $1,000 and the application deadline for new projects is March 1st of each year. Ongoing project applications must be submitted by September 1st. Any WWDC application resulting from this study will be considered by WWDC to be an Ongoing Project.

Accepted applications are included in the funding bill for the Legislature to consider the following spring. Funding requests from passed legislation should typically become available following the Governor's signature and action by the WWDC. This should be in about May. Contracts must then be signed by both parties. Funds should be fully available for use by the sponsor before the end of June, working closely with the WWDO's project manager.

In most cases, the recommended improvements resulting from this study should all be eligible for WWDC funding (see discussion below). At the usual 67% grant funding under the Level III program, this funding source constitutes the highest percentage of grants and greatest likelihood of funding of any of the subsequently discussed funding programs. Therefore, WWDC grant funding is considered the primary funding mechanism for the recommended improvements.

Initial indications of the eligibility of projects under the WWDC Level III program are:

- Eligible: Airport Transmission Main, North and South Low Tanks Improvements, and Metering at the 4MG Tank. Also, future transmission main projects as they are prepared to proceed.

- Not eligible: Improvements at the BGWTP and the Aeration in the Big Horn Tank.

- Need further discussion: Improvements at the Intake Facilities. Presedimentation is probably not eligible.

9.4.2 RD/RUS

USDA's Rural Development/Rural Utility Services (RD/RUS) program has provided a considerable amount of funding in loans and grants for water projects in Wyoming, including for the Downer water system and parts of the SAWS system. The program funds projects for entities that serve less than 10,000 people, so does not apply to City projects. The Wyoming program has had limited grant funding available each year, but usually has adequate loan funds. The program has been recently actively recruiting projects for funding. However, this program's funding depends on Congressional action each year, so funding can vary. As final funding packages are prepared, the staff in the Casper RD/RUS office need to be contacted to verify funds available, the terms and other program requirements. RD/RUS funding can match the WWDC grant discussed.

One consideration for the RD/RUS program, and to a degree the SRF and SLIB programs discussed in the next sections, is the annual median household income (MHI). The MHI for Sheridan and Sheridan County and their percentages of the state average are listed below.

- City of Sheridan: $52,666 (86.43% of state)
- Sheridan County: $56,455 (92.64% of state)

Criteria for eligibility for RD/RUS funding include a community population below 10,000, the MHI below the state MHI and a demonstrated health and safety concern. To receive up to 75% grant funding, the MHI must be below 80% of the State MHI. To receive up to 45% grant funding, the MHI must be below the State MHI. RD/RUS conducts a comprehensive financial review including examination of the utility's rate structure and ability to pay when determining the percentage of grant eligibility for a specific project. This financial review will be used to determine the ultimate grant level. The grant level also of course depends on the availability of grant funds, so even though an entity may be eligible for a grant, it is does not mean that these funds will be available in the amount requested.

As the proposed project and its estimated costs are finalized as well as the commitment by the entity that is responsible for the funding, a meeting is needed with the RD/RUS staff to assess the availability of grant funding, the application process, deadlines for obligation, and other program requirements. Timing is important as it could be that grant funds are no longer available at the time of the application but could become available in the next fiscal year. If RD/RUS grant funds are highly desirable to make the project affordable for the residents, it may pay to wait for the next round of grant funds.

The loan terms for RD/RUS funding are reviewed and possibly adjusted quarterly. Currently the loan rate is 3.5% (typically for 30 years), for a project in Sheridan County. The Casper office of RD/RUS will work to obtain the lowest interest rate possible.

It is required that project funding received from RD/RUS be bonded. Either general obligation bonds or revenue bonds can be issued, which are then purchased by RD/RUS to secure the funding. General obligation bonds require a vote of the general public and do not affect an entity's bonding capacity. Revenue bonds may be executed by the entity's board but affect a community's bonding capacity.

RD/RUS requires a Preliminary Engineering Report (PER) and Environmental Report of the project be prepared prior to funding. These WWDC-funded Level I and Level II reports provide a good basis for the required PER. Again, discussions with staff are needed to verify compliance.

If environmental impacts to historic or cultural resources, wetlands or floodplains, or prime agricultural lands are identified during the environmental review (ER), mitigation must be included in the project development plans. The ER process required by RD/RUS is different from and more involved than that for the SRF program which is discussed in the next section. This process follows the National Environmental Policy Act (NEPA) requirements. Conducting an ER to address these requirements can be relatively expensive and time consuming. One must also work closely with the RD/RUS staff to verify the latest requirements are being followed and that all requirements are being addressed. A good place to start is to conduct the ER for the SRF program as discussed in the next section to verify initial clearances, and then work with RD/RUS to incorporate their additional requirements. This additional effort and costs are best incorporated into the design phase work, when it is certain RD/RUS funding will be obtained, prior to incurring these additional costs.

The PER, the ER and an application are needed to obligate RD/RUS funds.

9.4.3 State Revolving Fund (SRF)

The Drinking Water SRF (DWSRF) program provides low interest loans (2.5% for 20 years or 2.5 % for 30 years, depending on the hardship status) for many project types. A loan origination fee of 0.5% also applies. Virtually all components of a public water supply system, including treatment and distribution, are eligible for SRF funding. SRF monies are frequently used as matching funds for state grant programs. There currently are sufficient loan funds available in the DWSRF.

At times the SRF program has Special Program Incentives which include 0% interest loans for Green Projects and at times, partial principal forgiveness (essentially grants). There is currently no principal forgiveness available, but this could return in the future, so as funding packages are finalized, the possible availability of principal forgiveness should be verified.

The amount of loan principal forgiven under the Special Incentives Program is based on an entity's MHI and its rank relative to the state's MHI. As noted above, Sheridan County's MHI is slightly below the statewide MHI, therefore projects should be eligible (as they have been in the past) for some principal forgiveness when (if) it becomes available. This means that an SRF loan would essentially be part grant, while the remainder would be a loan at 2.5% for 20 years (or possibly 30 years).

The status of principal forgiveness and how this applies to a project area with this MHI should be checked each year as the funding package is finalized and adjusted accordingly with the special incentives program used if possible.

This program has become very popular statewide and is being used frequently to match funds from other grant programs, particularly WWDC.

It may also be possible to access the Green Project funds, which apply to more efficient use of electrical power, for one criterion. Green funding has been awarded to projects which can demonstrate a 20% reduced power consumption from existing conditions. With the water treatment plant and extensive pumping involved with the current supply, if a new source requires less pumping and maybe even take advantage of artesian pressure in a well, it may be possible to acquire Green funds. Since this possibility is unknown at this time, Green funds should not be assumed in the funding scenario but should be inquired about at the time applications are finalized.

Green Projects qualify for the same principal forgiveness as conventional projects and are then given a loan for the remainder of project costs at 0% interest. If Green funding is used for the project, it would only apply to the costs of the pumping improvements.

Application to the SRF program can be made at any time and consists of a two-part process. Part I is a simple application form intended to provide general information about the project. If Part I is approved by the State Loan and Investment Board (SLIB), a Part II application must be submitted within 45 days to complete the application process. Part II is much more detailed and includes the financial submittal and the environmental review.

SRF funding is authorized every other month during the year by the SLIB at its regular meetings held in even numbered months. Applications are due 6 to 8 weeks before the SLIB meeting. Funds are available within a relatively short period of time following approval of an application.

Projects must be included on the state's Intended Use Plan (IUP) in order to be eligible for SRF funding. The IUP is updated only once per year, usually in February, so it is important to get a project listed even if SRF funding is uncertain. It is recommended that possible projects be added the IUP next year if they are not already on it.

The SRF program requires an environmental review (ER) process that involves contacting various federal and state agencies to determine potential environmental impacts. An Environmental Assessment (EA) must be prepared and a public notification process conducted.

This ER is called the State Environmental Review Process (SERP), which is similar to a review under the National Environmental Policy Act (NEPA). Environmental reviews for SRF projects are normally one of two kinds, either involving a simple categorical exclusion (cat-ex), or involving a somewhat more detailed Environmental Assessment and a Finding of No Significant Impact (EA/FNSI). Projects such as replacement of water mains or modifications to treatment plants within the existing plant site are often eligible for a categorical exclusion, which is basically an exemption from the full EA/FNSI process. Projects constructing new facilities on sites that did not previously have them usually require an EA/FNSI. A public meeting and letters to agencies are required in either case.

Categorical Exclusion – After providing DEQ with all documents related to the public meeting and letters to agencies, and if DEQ says you can move forward with a cat-ex, a draft Categorical Exclusion Determination is to be sent to DEQ for review. Upon approval the cat-ex is to be published in a local newspaper.

Environmental Assessment and Finding of No Significant Impact – If DEQ says the project cannot be a cat-ex, an EA will need to be prepared for the proposed project and submitted to DEQ for review. If there are no significant adverse environmental impacts and no significant public opposition to the project, DEQ will approve a Finding of No Significant Impact. After DEQ approves the FNSI, it must be published at least once in a local paper of general circulation and DEQ must be provided an affidavit of publication. The published FNSI opens a 30-day formal public comment period. DEQ will address any comments relating to the project. If there are no comments, expiration of the 30-day comment period ends the environmental review process.

First round SRF funds also have requirements for American Iron & Steel (AIS) and Davis-Bacon wage scales, so these must be taken into consideration as final decisions are made.

Capacity Development worksheets have been developed for both entities for recent projects, so they will be updated as needed as future projects are prepared to move forward. Both entities meet the requirements of capacity development.

9.4.4 Mineral Royalty Grant Program

The Mineral Royalty Grant (MRG) Program administered by the State Loan and Investment Board (SLIB) has historically been a significant supporter of infrastructure projects in the state.

To be eligible to apply for funding, the project must be on the current WYDEQ's Intended Use Plan (also used for SRF funding). This program can supply up to 50% of project costs for normal projects, and up to 75% of costs for "hardship" projects.

The legislature appropriated $22 million to the program for the 2018-2020 biennium, down from recent previous biennial appropriations. If mineral royalty payments which fund this program improve in coming years, it is possible that additional appropriations will be made into this grant program.

An applicant such as the City or SAWS are eligible for grants that will pay a portion of the project costs and can apply for a grant under this program. However, competition for this funding is high as many types of projects are eligible, including streets and roads, all components of water and wastewater treatment, emergency vehicles, landfills, solid waste transfer stations and rolling stock, water distribution and wastewater collection. It is not uncommon for grant applications to total twice the available funding. However, with the health and safety issues mentioned above the below average MHI of this county, the MRG program should be considered at the time the final funding package is assembled. With the reduced funding this biennium the prospects for MRG are uncertain but should remain in consideration.

9.4.5 Abandoned Mine Lands (AML)

Many years ago, the AML program provided funding for public facility projects to mining-impacted counties. This program has not funded public facility projects in recent years due to the amount of funds available and the need to provide priority to the reclamation of eligible AML projects. This has changed for 2019 however, so the AML program should be considered at this time. The AML program recently provided the requirements for their public facilities program and are receiving applications for projects until July 15, 2019. AML has about $20 million available for eligible entities within Wyoming for these types of projects. Public entities within Sheridan County that meet the entity requirements of their program are already eligible. After this year, it is believed the allocation of these funds back to Wyoming (anticipated to be about $40 to $45 million per year) will only cover obligations for abandoned mine lands projects. This program should continue to be monitored in future years to see if public facilities return for funding, however that seems unlikely. Therefore, if grant funds are to be requested for a project on the SWS from the AML program, an application should be made by July 15th of this year.

While the complete application to AML has not been investigated, a few observations include:

- Both municipalities and JPBs are eligible applicants.
- Applications must follow AML's specific format.
- The following are important criteria in their evaluation of the application. It appears that drinking water projects that fit these criteria may fare well.

- The significance and immediacy of health and safety risks and the effectiveness of the project in reducing those risks.
- Infrastructure relating to basic public services benefit.
- The degree of benefit to the overall community.

- The use of AML funds to match other funds "may enhance the opportunity to be selected for funding is positive to the application".

Public facility projects are scored against other public facility projects (not AML projects) and health and safety are important criteria. AML grants for public facilities will be overseen by the SLIB, just as MRG funds are. Staff will review and rank the applications and the SLIB Board holds the ultimate authority to approve any public facilities projects. Cities, towns, counties, districts and JPBs are eligible for AML funding. There will be an environmental process required following NEPA, which will likely be similar to the above summarized requirements.

With the immediate deadline approaching and also the possibility of Level III funding through the WWDC available, it is recommended that the project determined to be the highest priority be considered for a combination of WWDC and AML funding.

9.4.6 One Percent Taxes

In Sheridan County, both the 5th penny and 6th penny sales taxes are in place. Income from these taxes can be used for certain projects, as determined by the governing bodies. There is significant competition for the revenue raised by the 5th penny, and the 6th penny tax is designated for specific capital projects. Therefore, this funding source will not be a primary funding source for projects but might be able to be worked in to help with matching funds. Also, since projects presented in this study are likely new to previous lists of projects for 1% funding, they probably cannot be funded under current plans for these funds.

These sources must be kept in mind as funding packages are finalized and discussed with the governing entities as to the likelihood of their availability for the project. Since these are most likely only matching funds and may not even be available for projects recommended by this study, they will not be developed into funding scenarios at this time.

9.4.7 Reserves

Both the City and SAWS JPB have reserves to help with funding of projects. These are most likely available for use as some of the matching funds to grants that will fund most of the project's cost, or for smaller projects. Reserves will be worked into the final funding packages as they are developed, as determined appropriate for the particular project.

9.4.8 IUP

The drinking water Intended Use Plan is compiled annually and administered by the DEQ, WWDO and Office of State Lands and Investments (OSLI). The IUP identifies the proposed uses of funds available through the DWSRF for the upcoming year. Including projects on the list keeps them eligible for funding by the DWSRF program. The DWSRF is the typical source for loan funds for water projects on the SWS.

The following projects are listed on the FY2020 DWSRF IUP:

- Sheridan water main replacements. Replace old, deteriorated and undersized water mains and appurtenances.
- Sheridan main extensions. Extend water mains to serve areas that currently have water of inadequate quantity and/or quality. Extend and loop transmission mains to eliminate deadends and provide redundancy.
- Sheridan/SAWS treatment plant upgrades. Miscellaneous upgrades at the two WTPs.
- Sheridan water storage improvements. Review and evaluate tanks within the overall water system to eliminate EPA deficiencies. Improvements include upgrades to hatches, screens, flap gates and appurtenances, replacement of aged and corroded piping, potential removal of some tanks from the system.
- Sheridan intake improvements. Improvements to the intake facilities that serve the Sheridan and Big Goose WTPs. Include improvements to SCADA, electrical, screening, piping/valves, flow measurement, security and energy efficiency.

Based on the listing of the above projects, it appears DWSRF funding should be available for the projects that are presented in this study. Since most of the projects presented will not be pursued for funding in FY2020, the IUP should be reviewed and updated in February 2020 for any projects presented in this study, or other potential projects that may surface up to that date.

9.5 FUNDING SCENARIO ANALYSIS

9.5.1 Scenario Analysis Financial Modeling

As discussed previously in this section, the City and SAWS have detailed financial models that have been prepared by Raftelis Financial Consultants, a consulting firm that specializes in such financial analyses. These financial models (for both entities) are currently being updated by Raftelis to incorporate several project loans that have been recently or are being closed, as well as the financial impacts of projects from this study (based on the assumed funding scenarios as presented), and the budgets for the new FY. The City is also incorporating their recently updated capital improvements plan These revised models will be available for assessing the potential impacts on water rates and other financial factors and considerateness, as Level III funding applications are finalized for submittal.

These models will also be used in future years to confirm the funding plan for projects, both the proposed funding plans for projects for which funding is currently being sought which will be followed by the final funding based on the results of those applications, and for future projects when it is decided to proceed with them. A major part of these analyses is the impact each particular plan will have on water rates and currently planned water rate increases.

The updated models were used to assess the apparent impact on water rates for the projects and scenarios presented below. This was done to help make final decisions on funding applications at this time, and to serve as examples of how these models can be used to consider projects and funding scenarios in the future. The results of these modeling runs are included in Appendix G.

The four funding scenarios typically considered in WWDC funded master plans are as follows:

1. No funding assistance. In this case, self-funding with either a bank loan or the use of municipal bonds and then a rate increase to pay off the debt. A 15-year note with 4% interest for this scenario.
2. Funding from WWDC – 67% Grant for WWDC eligible components and 33% Loan at 4% for 20 years for the remainder of the project costs.
3. 67% Grant from WWDC for eligible components, 33% Loan from DWSRF, with loans also covering the non-eligible components. Loans for this scenario are a 20-year note at 2.5% interest.
4. 67% Grant from WWDC, and additional grants from the DWSRF (the DWSRF program does not have grants but does periodically have loan forgiveness, however, this cannot be counted on), RD/RUS (City is not eligible), SLIB (MRG), Wyoming Business Council or DEQ's AML program, to replace some of the loans for the 33% share or loans for the non-WWDC eligible components. In this scenario, the AML program appears to be particularly attractive for funding packages prepared in July 2019.

Of the above scenarios the two considered for the projects discussed below are #4 to take advantage of what is believed to be a one-time opportunity for an AML grant, and #3 as it is an attractive and most likely funding scenario for a WWDC eligible project to achieve the combination of the most grant funding and the lowest loan rate.

The two projects considered for funding applications at this time and for which the financial scenarios were prepared by Raftelis and are included in the Appendix are:

- The Airport Transmission Main project. The SAWS JBP will be the lead entity for this project as it significantly benefits the SAWS service areas (for at least 50% of the flows carried in this main) as discussed in section 8.2.7. With the availability of AML grants for a project such as this, both Level III and AML grant funds are considered in the analyses presented. The remaining costs are assumed to be split 50/50 by SAWS and the City, as both entities benefit from this key transmission main. This is also overall the highest priority project presented in this Level I study.

- The North and South Low Tanks Improvement Project. This project has the City as the lead entity so the impact on its financial situation is assessed in the modeling runs. This project is eligible for a WWDC Level III grant. It has not yet been decided by the City as to when they may submit a Level III application, and the modeling runs are presented to help with this decision. If an application is made in a future year, the funding scenario can be re-run using the parameters established at this time.

Since it appears WWDC Level III and AML grant applications will be submitted for the Airport Transmission Main project by the SAWS JPB this summer, the financial model for the SAWS JPB was used to compare the financial impacts using the four typical funding scenarios listed on the previous page. The results of this analysis of these four scenarios are summarized on the following four tables. These tables illustrate the impact these different scenarios may have and the huge advantage maximizing grant funds has as final plans for projects move forward.

Table 9.1 through Table 9.5 show the results of the analyses summarized above for SAWS. The tables show the proposed funding scenario, the year the projects are anticipated to be built, projected revenues and expenses for the SAWS JPB, existing debt service, and resulting reserves and required rates.

In summary, the financial analysis shows that the SAWS JPB will be able to afford the planned projects with WWDC grants combined with SRF loans. The best option is funding scenario 4, if the SAWS JPB can also obtain an AML grant for the Airport Transmission Main project.

The examples presented in this study as to both the use of the financial models and how the timing of projects and different funding scenarios affect rates, should help with the decisions by these two entities as to when projects advance.

Table 9.2: Funding Scenario Analysis 3: SAWS-JPB with Self Funded Bond

Bond Term (years) 15

Improvement Projects	2019 Cost	Const. Year	Project Cost In Project Year	% SAWS Responsibility	% Grant	% Loan	Rate %	Annual Payment	Orig. Fee %	Orig. Fee
Intake Facilities	$ 950,000	2020	$973,750	20%	0%	100%	4.00%	$17,078	0.5%	$4,869
New Airport Transmission Main	$ 4,020,000	2021	$4,223,513	50%	0%	100%	4.00%	$188,034	0.5%	$21,118
New Upper Road Transmission	$ 6,000,000	2025	$6,958,161	100%	0%	100%	4.00%	$622,695	0.5%	$34,791
Big Horn Tank Aeration	$ 218,400	2024	$247,100	100%	0%	100%	4.00%	$22,113	0.5%	$1,235
			$0			100%		$0	0.5%	$0
			$0			100%		$0	0.5%	$0
			$0			100%		$0	0.5%	$0
			$0			100%		$0	0.5%	$0
			$0			100%		$0	0.5%	$0

Operating Budget

Assumptions and Initial Values

Operations Cost Escalation	2.0%	SAWS EDUs	1,934	SAWS Mo. Rate	$ 48.75
Capital Cost Escalation	2.5%			Water cost $/1000 gal	$ 1.87
Indirect Cost Escalation Rate	3.5%	Ave. Monthly Water Use SAWS (gallons)	6,250		
SAWS EDU Growth Rate	1.0%				
Other Revenue Escalation Rate	0.5%	Median Hhld Income (Sheridan Cty)	$ 56,455		
Monthly fee escalation rate	3.0%				

Annual Water Usage

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Number of Taps SAWS	1,934	1,944	1,953	1,963	1,973	1,983	1,993	2,003	2,013	2,023
Water Usage SAWS (kgal)	145,050	145,775	146,504	147,237	147,973	148,713	149,456	150,204	150,955	151,709

Operating Expenses

Operating Costs	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Operating and Maintenance	$ 1,017,935	$ 1,038,294	$ 1,059,060	$ 1,080,241	$ 1,101,846	$ 1,123,882	$ 1,146,360	$ 1,169,287	$ 1,192,673	$ 1,216,527
	$ -									
Subtotal O&M Expenses	$ 1,017,935	$ 1,038,294	$ 1,059,060	$ 1,080,241	$ 1,101,846	$ 1,123,882	$ 1,146,360	$ 1,169,287	$ 1,192,673	$ 1,216,527
Emergency Fund	$ 101,794	$ 103,829	$ 105,906	$ 108,024	$ 110,185	$ 112,388	$ 114,636	$ 116,929	$ 119,267	$ 121,653
Existing Debt Retirement	$ 440,592	$ 473,358	$ 473,358	$ 473,358	$ 473,358	$ 473,358	$ 473,358	$ 473,358	$ 473,358	$ 473,358
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1	$ 2	$ 3
Total Expenses	$ 1,560,321	$ 1,615,481	$ 1,638,324	$ 1,661,623	$ 1,685,388	$ 1,709,629	$ 1,734,354	$ 1,759,575	$ 1,785,300	$ 1,811,540

Future Debt Service (new projects)	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Intake Facilities	$ -	$17,078	$17,078	$17,078	$17,078	$17,078	$17,078	$17,078	$17,078	$17,078
New Airport Transmission Main	$ -	$188,034	$188,034	$188,034	$188,034	$188,034	$188,034	$188,034	$188,034	$188,034
New Upper Road Transmission	$ -	$ -					$622,695	$622,695	$622,695	$622,695
Big Horn Tank Aeration	$ -	$ -				$22,113	$22,113	$22,113	$22,113	$22,113
	$ -	$ -					$0	$0	$0	$0
	$ -	$ -					$0	$0	$0	$0
	$ -	$ -					$0	$0	$0	$0
	$ -	$ -					$0	$0	$0	$0
	$ -	$ -								
Total New Debt Service Budget	$ -	$ 205,112	$ 205,112	$ 205,112	$ 205,112	$ 227,226	$ 849,921	$ 849,921	$ 849,921	$ 849,921
Annual Revenue Requirement	$ 1,560,321	$ 1,820,594	$ 1,843,436	$ 1,866,735	$ 1,890,501	$ 1,936,854	$ 2,584,275	$ 2,609,496	$ 2,635,222	$ 2,661,461

Projected Revenue

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Water Rate $/1000 gal	$ 1.87	$ 1.87	$ 1.93	$ 1.98	$ 2.04	$ 2.10	$ 2.17	$ 2.23	$ 2.30	$ 2.37
Monthly Rate	$ 48.8	$ 50.5	$ 52.2	$ 54.0	$ 55.9	$ 57.9	$ 59.9	$ 62.0	$ 64.2	$ 66.4
Retail Rate Revenues	$ 1,402,634	$ 1,449,443	$ 1,506,305	$ 1,565,403	$ 1,626,825	$ 1,690,663	$ 1,757,013	$ 1,825,973	$ 1,897,646	$ 1,972,139
Development Fees	$ 107,600	$ 107,600	$ 107,600	$ 107,600	$ 107,600	$ 107,600	$ 107,600	$ 107,600	$ 107,600	$ 107,600
Interest Earnings	$ 43,722	$ 43,941	$ 44,160	$ 44,381	$ 44,603	$ 44,826	$ 45,050	$ 45,275	$ 45,502	$ 45,729
Other Income (Non-operating)	$ 95,091	$ 95,901	$ 95,901	$ 95,901	$ 95,901	$ 95,901	$ 95,901	$ 95,901	$ 95,901	$ 95,901
Projected Net Debt Proceeds	$ 455,742									
Total other Capital Inflows	$ 455,742	$ 272,600	$ 282,182	$ 292,100	$ 302,368	$ 312,996	$ 323,998	$ 335,386	$ 347,175	$ 359,378
Total Annual Revenue	$ 2,314,118	$ 1,722,043	$ 1,788,486	$ 1,857,503	$ 1,929,193	$ 2,003,659	$ 2,081,010	$ 2,161,359	$ 2,244,821	$ 2,331,517
Additional Revenue Needed (annual)	$ (753,797)	$ 98,551	$ 54,950	$ 9,232	$ (38,692)	$ (66,805)	$ 503,265	$ 448,137	$ 390,401	$ 329,944
Base Rate Increase Needed per EDU/m	$ (32.48)	$ 4.23	$ 2.34	$ 0.39	$ (1.63)	$ (2.81)	$ 21.05	$ 18.65	$ 16.16	$ 13.59

Financial Analysis Summary

Average EDU Monthly Charge										
EDU Base Rate Used	$ 49	$ 50	$ 52	$ 54	$ 56	$ 58	$ 60	$ 62	$ 64	$ 66
Total Monthly Charge Per EDU needed	$ 16	$ 55	$ 55	$ 54	$ 54	$ 55	$ 81	$ 81	$ 80	$ 80
Percentage of Median Household Income										
% of MHI	0.35%	1.16%	1.16%	1.16%	1.15%	1.17%	1.72%	1.71%	1.71%	1.70%
Total Unallocated Reserves Available	$ 753,797	$ 655,246	$ 600,297	$ 591,065	$ 629,757	$ 696,561	$ 193,296	$ (254,841)	$ (645,242)	$ (975,186)

Table 9.3: Funding Scenario Analysis 3: SAWS-JPB with WWDC Grant and WWDC Loan

Loan Term (years) 20

Improvement Projects	2019 Cost	Const. Year	Project Cost In Project Year	% SAWS Responsibility	% Grant	% Loan	Rate %	Annual Payment	Orig. Fee %	Orig. Fee
Intake Facilities	$ 950,000	2020	$973,750	20%	67%	33%	4.00%	$4,371	0.5%	$4,869
New Airport Transmission Main	$ 4,020,000	2021	$4,223,513	50%	67%	33%	4.00%	$49,724	0.5%	$21,118
New Upper Road Transmission	$ 6,000,000	2025	$6,958,161	100%	67%	33%	4.00%	$166,398	0.5%	$34,791
Big Horn Tank Aeration	$ 218,400	2024	$247,100	100%	67%	33%	4.00%	$5,909	0.5%	$1,235
			$0			100%		$0	0.5%	$0
			$0			100%		$0	0.5%	$0
			$0			100%		$0	0.5%	$0
			$0			100%		$0	0.5%	$0
			$0			100%		$0	0.5%	$0

Operating Budget

Assumptions and Initial Values

Operations Cost Escalation	2.0%	SAWS EDUs	1,934	SAWS Mo. Rate	$ 48.75
Capital Cost Escalation	2.5%			Water cost $/1000 gal	$ 1.87
Indirect Cost Escalation Rate	3.5%	Ave. Monthly Water Use SAWS (gallons)	6,250		
SAWS EDU Growth Rate	1.0%				
Other Revenue Escalation Rate	0.5%	Median Hhld Income (Sheridan Cty)	$ 56,455		
Monthly fee escalation rate	3.0%				

Annual Water Usage

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Number of Taps SAWS	1,934	1,944	1,953	1,963	1,973	1,983	1,993	2,003	2,013	2,023
Water Usage SAWS (kgal)	145,050	145,775	146,504	147,237	147,973	148,713	149,456	150,204	150,955	151,709

Operating Expenses

Operating Costs	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Operating and Maintenance	$ 1,017,935	$ 1,038,294	$ 1,059,060	$ 1,080,241	$ 1,101,846	$ 1,123,882	$ 1,146,360	$ 1,169,287	$ 1,192,673	$ 1,216,527
	$ -									
Subtotal O&M Expenses	$ 1,017,935	$ 1,038,294	$ 1,059,060	$ 1,080,241	$ 1,101,846	$ 1,123,882	$ 1,146,360	$ 1,169,287	$ 1,192,673	$ 1,216,527
Emergency Fund	$ 101,794	$ 103,829	$ 105,906	$ 108,024	$ 110,185	$ 112,388	$ 114,636	$ 116,929	$ 119,267	$ 121,653
Existing Debt Retirement	$ 440,592	$ 473,358	$ 473,358	$ 473,358	$ 473,358	$ 473,358	$ 473,358	$ 473,358	$ 473,358	$ 473,358
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1	$ 2	$ 3
Total Expenses	$ 1,560,321	$ 1,615,481	$ 1,638,324	$ 1,661,623	$ 1,685,388	$ 1,709,629	$ 1,734,354	$ 1,759,575	$ 1,785,300	$ 1,811,540

Future Debt Service (new projects)	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Intake Facilities	$ -	$4,371	$4,371	$4,371	$4,371	$4,371	$4,371	$4,371	$4,371	$4,371
New Airport Transmission Main	$ -	$49,724	$49,724	$49,724	$49,724	$49,724	$49,724	$49,724	$49,724	$49,724
New Upper Road Transmission	$ -	$ -					$166,398	$166,398	$166,398	$166,398
Big Horn Tank Aeration	$ -	$ -				$5,909	$5,909	$5,909	$5,909	$5,909
	$ -	$ -					$0	$0	$0	$0
	$ -	$ -					$0	$0	$0	$0
	$ -	$ -					$0	$0	$0	$0
	$ -	$ -					$0	$0	$0	$0
	$ -	$ -								
Total New Debt Service Budget	$ -	$ 54,094	$ 54,094	$ 54,094	$ 54,094	$ 60,004	$ 226,402	$ 226,402	$ 226,402	$ 226,402
Annual Revenue Requirement	$ 1,560,321	$ 1,669,575	$ 1,692,418	$ 1,715,717	$ 1,739,483	$ 1,769,632	$ 1,960,756	$ 1,985,977	$ 2,011,702	$ 2,037,942

Projected Revenue

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Water Rate $/1000 gal	$ 1.87	$ 1.87	$ 1.93	$ 1.98	$ 2.04	$ 2.10	$ 2.17	$ 2.23	$ 2.30	$ 2.37
Monthly Rate	$ 48.8	$ 50.5	$ 52.2	$ 54.0	$ 55.9	$ 57.9	$ 59.9	$ 62.0	$ 64.2	$ 66.4
Retail Rate Revenues	$ 1,402,634	$ 1,449,443	$ 1,506,305	$ 1,565,403	$ 1,626,825	$ 1,690,663	$ 1,757,013	$ 1,825,973	$ 1,897,646	$ 1,972,139
Development Fees	$ 107,600	$ 107,600	$ 107,600	$ 107,600	$ 107,600	$ 107,600	$ 107,600	$ 107,600	$ 107,600	$ 107,600
Interest Earnings	$ 43,722	$ 43,941	$ 44,160	$ 44,381	$ 44,603	$ 44,826	$ 45,050	$ 45,275	$ 45,502	$ 45,729
Other Income (Non-operating)	$ 95,091	$ 95,901	$ 95,901	$ 95,901	$ 95,901	$ 95,901	$ 95,901	$ 95,901	$ 95,901	$ 95,901
Projected Net Debt Proceeds	$ 455,742									
Total other Capital Inflows	$ 455,742	$ 272,600	$ 282,182	$ 292,100	$ 302,368	$ 312,996	$ 323,998	$ 335,386	$ 347,175	$ 359,378
Total Annual Revenue	$ 2,314,118	$ 1,722,043	$ 1,788,486	$ 1,857,503	$ 1,929,193	$ 2,003,659	$ 2,081,010	$ 2,161,359	$ 2,244,821	$ 2,331,517
Additional Revenue Needed (annual)	$ (753,797)	$ (52,468)	$ (96,069)	$ (141,786)	$ (189,710)	$ (234,027)	$ (120,255)	$ (175,382)	$ (233,119)	$ (293,576)
Base Rate Increase Needed per EDU/mo.	$ (32.48)	$ (2.25)	$ (4.10)	$ (6.02)	$ (8.01)	$ (9.84)	$ (5.03)	$ (7.30)	$ (9.65)	$ (12.09)

Financial Analysis Summary

Average EDU Monthly Charge										
EDU Base Rate Used	$ 49	$ 50	$ 52	$ 54	$ 56	$ 58	$ 60	$ 62	$ 64	$ 66
Total Monthly Charge Per EDU needed	$ 16	$ 48	$ 48	$ 48	$ 48	$ 48	$ 55	$ 55	$ 55	$ 54
Percentage of Median Household Income										
% of MHI	0.35%	1.02%	1.02%	1.02%	1.02%	1.02%	1.17%	1.16%	1.16%	1.16%
Total Unallocated Reserves Available	$ 753,797	$ 806,265	$ 902,333	$ 1,044,119	$ 1,233,829	$ 1,467,856	$ 1,588,110	$ 1,763,493	$ 1,996,612	$ 2,290,187

Table 9.4: Funding Scenario Analysis 3: SAWS-JPB with WWDC Grant and SRF Loan

Loan Term (years) 20

Improvement Projects	2019 Cost	Const. Year	Project Cost In Project Year	% SAWS Responsibility	% Grant	% Loan	Rate %	Annual Payment	Orig. Fee %	Orig. Fee
Intake Facilities	$ 950,000	2020	$973,750	20%	67%	33%	2.75%	$3,901	0.5%	$4,869
New Airport Transmission Main	$ 4,020,000	2021	$4,223,513	50%	67%	33%	2.75%	$44,378	0.5%	$21,118
New Upper Road Transmission	$ 6,000,000	2025	$6,958,161	100%	67%	33%	2.75%	$148,510	0.5%	$34,791
Big Horn Tank Aeration	$ 218,400	2024	$247,100	100%	67%	33%	2.75%	$5,274	0.5%	$1,235
			$0			100%		$0	0.5%	$0
			$0			100%		$0	0.5%	$0
			$0			100%		$0	0.5%	$0
			$0			100%		$0	0.5%	$0
			$0			100%		$0	0.5%	$0

Operating Budget

Assumptions and Initial Values

Operations Cost Escalation	2.0%	SAWS EDUs	1,934	SAWS Mo. Rate	$ 48.75
Capital Cost Escalation	2.5%			Water cost $/1000 gal	$ 1.87
Indirect Cost Escalation Rate	3.5%	Ave. Monthly Water Use SAWS (gallons)	6,250		
SAWS EDU Growth Rate	1.0%				
Other Revenue Escalation Rate	0.5%	Median Hhld Income (Sheridan Cty)	$ 56,455		
Monthly fee escalation rate	3.0%				

Annual Water Usage

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Number of Taps SAWS	1,934	1,944	1,953	1,963	1,973	1,983	1,993	2,003	2,013	2,023
Water Usage SAWS (kgal)	145,050	145,775	146,504	147,237	147,973	148,713	149,456	150,204	150,955	151,709

Operating Expenses

Operating Costs	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Operating and Maintenance	$ 1,017,935	$ 1,038,294	$ 1,059,060	$ 1,080,241	$ 1,101,846	$ 1,123,882	$ 1,146,360	$ 1,169,287	$ 1,192,673	$ 1,216,527
	$ -									
Subtotal O&M Expenses	$ 1,017,935	$ 1,038,294	$ 1,059,060	$ 1,080,241	$ 1,101,846	$ 1,123,882	$ 1,146,360	$ 1,169,287	$ 1,192,673	$ 1,216,527
Emergency Fund	$ 101,794	$ 103,829	$ 105,906	$ 108,024	$ 110,185	$ 112,388	$ 114,636	$ 116,929	$ 119,267	$ 121,653
Existing Debt Retirement	$ 440,592	$ 473,358	$ 473,358	$ 473,358	$ 473,358	$ 473,358	$ 473,358	$ 473,358	$ 473,358	$ 473,358
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1	$ 2	$ 3
Total Expenses	$ 1,560,321	$ 1,615,481	$ 1,638,324	$ 1,661,623	$ 1,685,388	$ 1,709,629	$ 1,734,354	$ 1,759,575	$ 1,785,300	$ 1,811,540

Future Debt Service (new projects)	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Intake Facilities	$ -	$3,901	$3,901	$3,901	$3,901	$3,901	$3,901	$3,901	$3,901	$3,901
New Airport Transmission Main	$ -	$44,378	$44,378	$44,378	$44,378	$44,378	$44,378	$44,378	$44,378	$44,378
New Upper Road Transmission	$ -	$ -					$148,510	$148,510	$148,510	$148,510
Big Horn Tank Aeration	$ -	$ -				$5,274	$5,274	$5,274	$5,274	$5,274
	$ -	$ -					$0	$0	$0	$0
	$ -	$ -					$0	$0	$0	$0
	$ -	$ -					$0	$0	$0	$0
	$ -	$ -					$0	$0	$0	$0
	$ -	$ -								
Total New Debt Service Budget	$ -	$ 48,279	$ 48,279	$ 48,279	$ 48,279	$ 53,553	$ 202,063	$ 202,063	$ 202,063	$ 202,063
Annual Revenue Requirement	$ 1,560,321	$ 1,663,760	$ 1,686,603	$ 1,709,902	$ 1,733,667	$ 1,763,182	$ 1,936,418	$ 1,961,638	$ 1,987,364	$ 2,013,604

Projected Revenue

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Water Rate $/1000 gal	$ 1.87	$ 1.87	$ 1.93	$ 1.98	$ 2.04	$ 2.10	$ 2.17	$ 2.23	$ 2.30	$ 2.37
Monthly Rate	$ 48.8	$ 50.5	$ 52.2	$ 54.0	$ 55.9	$ 57.9	$ 59.9	$ 62.0	$ 64.2	$ 66.4
Retail Rate Revenues	$ 1,402,634	$ 1,449,443	$ 1,506,305	$ 1,565,403	$ 1,626,825	$ 1,690,663	$ 1,757,013	$ 1,825,973	$ 1,897,646	$ 1,972,139
Development Fees	$ 107,600	$ 107,600	$ 107,600	$ 107,600	$ 107,600	$ 107,600	$ 107,600	$ 107,600	$ 107,600	$ 107,600
Interest Earnings	$ 43,722	$ 43,941	$ 44,160	$ 44,381	$ 44,603	$ 44,826	$ 45,050	$ 45,275	$ 45,502	$ 45,729
Other Income (Non-operating)	$ 95,091	$ 95,901	$ 95,901	$ 95,901	$ 95,901	$ 95,901	$ 95,901	$ 95,901	$ 95,901	$ 95,901
Projected Net Debt Proceeds	$ 455,742									
Total other Capital Inflows	$ 455,742	$ 272,600	$ 282,182	$ 292,100	$ 302,368	$ 312,996	$ 323,998	$ 335,386	$ 347,175	$ 359,378
Total Annual Revenue	$ 2,314,118	$ 1,722,043	$ 1,788,486	$ 1,857,503	$ 1,929,193	$ 2,003,659	$ 2,081,010	$ 2,161,359	$ 2,244,821	$ 2,331,517
Additional Revenue Needed (annual)	$ (753,797)	$ (58,283)	$ (101,884)	$ (147,601)	$ (195,525)	$ (240,477)	$ (144,593)	$ (199,720)	$ (257,457)	$ (317,914)
Base Rate Increase Needed per EDU/mo.	$ (32.48)	$ (2.50)	$ (4.35)	$ (6.27)	$ (8.26)	$ (10.11)	$ (6.05)	$ (8.31)	$ (10.66)	$ (13.10)

Financial Analysis Summary

Average EDU Monthly Charge										
EDU Base Rate Used	$ 49	$ 50	$ 52	$ 54	$ 56	$ 58	$ 60	$ 62	$ 64	$ 66
Total Monthly Charge Per EDU needed	$ 16	$ 48	$ 48	$ 48	$ 48	$ 48	$ 54	$ 54	$ 54	$ 53
Percentage of Median Household Income										
% of MHI	0.35%	1.02%	1.02%	1.02%	1.01%	1.02%	1.15%	1.14%	1.14%	1.13%
Total Unallocated Reserves Available	$ 753,797	$ 812,080	$ 913,963	$ 1,061,564	$ 1,257,089	$ 1,497,567	$ 1,642,159	$ 1,841,880	$ 2,099,339	$ 2,417,251

Table 9.5: Funding Scenario Analysis 4: SAWS-JPB with WWDC Grant, AML Grant and SRF Loan

Loan Term (years) 20

Improvement Projects	2019 Cost	Const. Year	Project Cost In Project Year	% SAWS Responsibility	% Grant	% Loan	Rate %	Annual Payment	Orig. Fee %	Orig. Fee
Intake Facilities	$ 950,000	2020	$973,750	20%	67%	33%	2.75%	$3,901	0.5%	$4,869
New Airport Transmission Main	$ 4,020,000	2021	$4,223,513	50%	83%	17%	2.75%	$22,189	0.5%	$21,118
New Upper Road Transmission	$ 6,000,000	2025	$6,958,161	100%	67%	33%	2.75%	$148,510	0.5%	$34,791
Big Horn Tank Aeration	$ 218,400	2024	$247,100	100%	67%	33%	2.75%	$5,274	0.5%	$1,235
			$0			100%		$0	0.5%	$0
			$0			100%		$0	0.5%	$0
			$0			100%		$0	0.5%	$0
			$0			100%		$0	0.5%	$0
			$0			100%		$0	0.5%	$0

Operating Budget

Assumptions and Initial Values

Operations Cost Escalation	2.0%	SAWS EDUs	1,934	SAWS Mo. Rate	$ 48.75
Capital Cost Escalation	2.5%			Water cost $/1000 gal	$ 1.87
Indirect Cost Escalation Rate	3.5%	Ave. Monthly Water Use SAWS (gallons)	6,250		
SAWS EDU Growth Rate	1.0%				
Other Revenue Escalation Rate	0.5%	Median Hhld Income (Sheridan Cty)	$ 56,455		
Monthly fee escalation rate	3.0%				

Annual Water Usage

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Number of Taps SAWS	1,934	1,944	1,953	1,963	1,973	1,983	1,993	2,003	2,013	2,023
Water Usage SAWS (kgal)	145,050	145,775	146,504	147,237	147,973	148,713	149,456	150,204	150,955	151,709

Operating Expenses

Operating Costs	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Operating and Maintenance	$ 1,017,935	$ 1,038,294	$ 1,059,060	$ 1,080,241	$ 1,101,846	$ 1,123,882	$ 1,146,360	$ 1,169,287	$ 1,192,673	$ 1,216,527
	$ -									
Subtotal O&M Expenses	$ 1,017,935	$ 1,038,294	$ 1,059,060	$ 1,080,241	$ 1,101,846	$ 1,123,882	$ 1,146,360	$ 1,169,287	$ 1,192,673	$ 1,216,527
Emergency Fund	$ 101,794	$ 103,829	$ 105,906	$ 108,024	$ 110,185	$ 112,388	$ 114,636	$ 116,929	$ 119,267	$ 121,653
Existing Debt Retirement	$ 440,592	$ 473,358	$ 473,358	$ 473,358	$ 473,358	$ 473,358	$ 473,358	$ 473,358	$ 473,358	$ 473,358
	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1	$ 2	$ 3
Total Expenses	$ 1,560,321	$ 1,615,481	$ 1,638,324	$ 1,661,623	$ 1,685,388	$ 1,709,629	$ 1,734,354	$ 1,759,575	$ 1,785,300	$ 1,811,540

Future Debt Service (new projects)	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Intake Facilities	$ -	$3,901	$3,901	$3,901	$3,901	$3,901	$3,901	$3,901	$3,901	$3,901
New Airport Transmission Main	$ -	$22,189	$22,189	$22,189	$22,189	$22,189	$22,189	$22,189	$22,189	$22,189
New Upper Road Transmission	$ -	$ -					$148,510	$148,510	$148,510	$148,510
Big Horn Tank Aeration	$ -	$ -				$5,274	$5,274	$5,274	$5,274	$5,274
	$ -	$ -					$0	$0	$0	$0
	$ -	$ -					$0	$0	$0	$0
	$ -	$ -					$0	$0	$0	$0
	$ -	$ -					$0	$0	$0	$0
	$ -	$ -								
Total New Debt Service Budget	$ -	$ 26,090	$ 26,090	$ 26,090	$ 26,090	$ 31,364	$ 179,874	$ 179,874	$ 179,874	$ 179,874
Annual Revenue Requirement	$ 1,560,321	$ 1,641,571	$ 1,664,414	$ 1,687,713	$ 1,711,478	$ 1,740,993	$ 1,914,228	$ 1,939,449	$ 1,965,175	$ 1,991,414

Projected Revenue

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Water Rate $/1000 gal	$ 1.87	$ 1.87	$ 1.93	$ 1.98	$ 2.04	$ 2.10	$ 2.17	$ 2.23	$ 2.30	$ 2.37
Monthly Rate	$ 48.8	$ 50.5	$ 52.2	$ 54.0	$ 55.9	$ 57.9	$ 59.9	$ 62.0	$ 64.2	$ 66.4
Retail Rate Revenues	$ 1,402,634	$ 1,449,443	$ 1,506,305	$ 1,565,403	$ 1,626,825	$ 1,690,663	$ 1,757,013	$ 1,825,973	$ 1,897,646	$ 1,972,139
Development Fees	$ 107,600	$ 107,600	$ 107,600	$ 107,600	$ 107,600	$ 107,600	$ 107,600	$ 107,600	$ 107,600	$ 107,600
Interest Earnings	$ 43,722	$ 43,941	$ 44,160	$ 44,381	$ 44,603	$ 44,826	$ 45,050	$ 45,275	$ 45,502	$ 45,729
Other Income (Non-operating)	$ 95,091	$ 95,901	$ 95,901	$ 95,901	$ 95,901	$ 95,901	$ 95,901	$ 95,901	$ 95,901	$ 95,901
Projected Net Debt Proceeds	$ 455,742									
Total other Capital Inflows	$ 455,742	$ 272,600	$ 282,182	$ 292,100	$ 302,368	$ 312,996	$ 323,998	$ 335,386	$ 347,175	$ 359,378
Total Annual Revenue	$ 2,314,118	$ 1,722,043	$ 1,788,486	$ 1,857,503	$ 1,929,193	$ 2,003,659	$ 2,081,010	$ 2,161,359	$ 2,244,821	$ 2,331,517
Additional Revenue Needed (annual)	$ (753,797)	$ (80,472)	$ (124,073)	$ (169,790)	$ (217,714)	$ (262,666)	$ (166,782)	$ (221,910)	$ (279,646)	$ (340,103)
Base Rate Increase Needed per EDU/mo.	$ (32.48)	$ (3.45)	$ (5.29)	$ (7.21)	$ (9.20)	$ (11.04)	$ (6.97)	$ (9.23)	$ (11.58)	$ (14.01)

Financial Analysis Summary

Average EDU Monthly Charge										
EDU Base Rate Used	$ 49	$ 50	$ 52	$ 54	$ 56	$ 58	$ 60	$ 62	$ 64	$ 66
Total Monthly Charge Per EDU needed	$ 16	$ 47	$ 47	$ 47	$ 47	$ 47	$ 53	$ 53	$ 53	$ 52
Percentage of Median Household Income										
% of MHI	0.35%	1.00%	1.00%	1.00%	0.99%	1.00%	1.13%	1.12%	1.12%	1.11%
Total Unallocated Reserves Available	$ 753,797	$ 834,269	$ 958,342	$ 1,128,132	$ 1,345,846	$ 1,608,513	$ 1,775,295	$ 1,997,205	$ 2,276,851	$ 2,616,954

10.0 SUMMARY OF RECOMMENDATIONS

10.1 RECOMMENDATIONS

The following is a summary of the recommendations coming out of this study. More detail on the recommendations is presented and discussed elsewhere within this report.

Recommendations include:

1. Continue to maintain and update the GIS and Hydraulic Model as recommended in the sections covering these topics. Follow the protocol presented for the GIS so there is consistency in how data is entered and maintained. Always update both simultaneously.
2. During the final design of projects, use the hydraulic model to confirm the preliminary designs contained in this study of the sizing, location, configuration, and connections to the existing system for the projects.
3. Continue to acquire water shares in Park and Dome Lake Reservoirs as they become available.
4. Recommendations on projects from Section 8.0:
    a. The highest priority project is the Airport Transmission Main. It has been determined that SAWS JPB take the lead on this project and to make applications for WWDC and AML funding this summer.
    b. Other projects that should be funded and proceed to design as soon as possible. While these are ranked in order of priority based on the findings of this study, these differences in priorities are not great, so the order may depend on other local factors. For example, the South and Low Tanks project is WWDC eligible, so it may proceed prior to other projects that may take longer to work into the CIP. If a WWDC Level III application is prepared, it is recommended that the it be considered to combine the 4MG Tank metering with the South and North Low Tanks project.
        i. Big Horn Tank aeration
        ii. 4MG Tank metering
        iii. Intake improvements
        iv. South Low and North Low tank sites
        v. BGWTP improvements
    c. System improvement projects that should be funded as soon as required by growth. These projects should be eligible for Level III funding and to be able to move directly into the Level III program. These are listed in order of priority at this time:
        i. Upper Road transmission main.
        ii. Northeast transmission main.
        iii. Woodland Park School area.
        iv. East-West Cross Valley transmission main.

   d. Older CIP/DIP Transmission Main Projects:
      i. Continue with a long-term program to replace older CIP/DIP transmission mains as these will continue to deteriorate and will need to be replaced at some time in the future. Tentative scheduling is recommended.
      ii. Conduct the additional research into the condition of select CIP/DIP transmission main(s) as discussed in 8.2.12.
   e. If the Airport Transmission Main project proceeds successfully through the funding programs by the spring of 2020, the next Level III project should be selected to follow, with a timeline determined.
   f. Consider the recommendations made to upgrade the hydropower station on the 30-inch RWTM to improve the financial situation with this generator.
5. Continue to use the recently developed financial model and keep it up to date with budgets, debt repayment and projects. Adjust water rates as needed to allow the projects to proceed at the schedule determined by staff and governing entities.
6. Summarize all meter flow and pressure data from throughout this system to be gathered and provided in an annual report. This work is covered in Appendix E. This report is to be standardized with a designated person overseeing this effort, so it is completed and performed consistently. It is recommended that these data be summarized and a report prepared every January/February for the previous calendar year to provide a complete picture of water usage, # of services, water flows and pressures throughout the system, including a summary of water loss, and estimates of unaccounted-for and non-revenue water. Included in this effort of data gathering and reporting is settling on a format for the data, how it is to be assembled and presented. This report must be concise to be valuable. Include the following:
   a. Number of services broken out by entity, size, and category, with calculations on the corresponding number of EDUs.
   b. Intake – diversions by month. Include average, range of flow rates, peak day, and entering the 16-inch main and the 30-inch main.
   c. Releases from each reservoir. Rates, start date, end date, volumes.
   d. Raw water delivered to the two WTPs, the VAMC and Kendrick Golf Course.
      i. Also any locations added such as Wild Rose.
   e. Meter readings available from throughout the two WTPs, including effluent.
   f. User meters from the entire system.
   g. Select data from throughout the systems such as flows and pressures at booster stations and PRV stations, as available through SCADA or the stations.
   h. Dates Big Goose Creek was in placed in regulation by the BOC.
   i. The review of data shall include a review at the end of each month to look for lost readings or readings that appear incorrect. True these up as possible at this time. If it appears some meters are not providing accurate readings, prepare a plan for replacement or calibration.
   j. With the accumulation of a sufficient amount of additional flow and water usage data, review and revise the Design Criteria included in this report.

7. Metering. Accurate metering is important to the management of this system, in particularly at times when water rights are reduced as the BOC regulates Big Goose Creek, which is also the time that water demands peak. A few recommendations on metering:
    a. Upgrade the meters recommended above such as in the 4MG Tank project and the Airport Transmission Main project.
    b. Select a few larger (master) meters to have calibrated to verify their accuracy. There are apparent losses that may be metering issues. Meters for consideration include those in the transmission mains leaving the intake and the influent meters at the WTPs.
    c. Look for opportunities to add master meters at select locations in the system as projects are developed.
    d. Incorporate meter readings into the SCADA system as practical to simplify the tabulation and analysis of these readings.
    e. Compile, compare and analyze meter readings from throughout these system as recommended in #6, above.
8. Utilize (and clarify if needed) a policy where it is encouraged to provide water for new development (such as they provide water (with an acceptable priority date) from Park or Dome, or pay a higher PIF so this water can be acquired by the City or SAWS. Establish the higher PIF rate if needed, for when water supply is provided by the City or SAWS.
9. Proceed with a Level II study for the future water source from Lake DeSmet (and/or Piney Creek and reservoirs that provide water to Lake DeSmet), with the scope as discussed in this report. Proceed with this application in the near future. The deadline for Level II applications is March 1st of each year. The scope of this project is complex and is summarized in 7.3, #3 for the Lake DeSmet source and for transmission main routing such as on McCormick Road, in 8.2.12. The actual scope of this study will take additional consideration at the time it is decided to proceed with this Level II study.
10. As two other WWDC studies are finalized – The Big Goose Watershed Wildfire Hazard Study and the Powder/Tongue River Basin Plan Update – review the information available in these studies and consider any affect they may have on the SWS or the contents of this Level I study. These studies also impact the suggested Level II study for the Lake DeSmet source in #9.
11. If the capacity or redundancy of facilities in the Big Goose Valley are to be improved or increased (such as a redundant raw water transmission main), submit an application for a Level II study for this purpose. This study will not only consider the feasibility and costs associated with such improvements, but how much additional supply can or should be developed out of the Big Goose watershed.

\- End of Report -

11.0 APPENDICES

A – Meetings

B – Existing System Information

C – GIS

D – Model Calibration and Transient Analysis

E – Annual Report Recommendations

F – Additional Figures

G – Financing

Appendix A Table of Contents

Notice of Public Scoping Meeting

Sheridan Water System Master Plan, Level I Study

This water system study is funded through the Wyoming Water Development Commission.

Purpose of Study: Conduct a thorough review of the Sheridan area water system as a whole, with consideration to the two entities involved in its operation. Evaluate the existing infrastructure, water supply and information on this system, and make recommendations for the future. The ultimate product will be a Master Plan that will be a valuable tool to assist the City of Sheridan, SAWS JPB and the WWDC in the future management of this system.

This study includes the following tasks regarding this water system:

- Hold meetings to gather information on the system.
- Gather, compile and review existing information on this water system.
- Inventory and evaluate the existing system. Consider condition and capacity.
- Obtain, review, update and enhance the GIS of the water system.
- Enhance the hydraulic model of the system. Input updated water demands.
- Integrate the revised GIS and hydraulic model into one data base.
- Make recommendations for future standards and procedures for GIS and model upkeep.
- Develop population growth, future demand projections and review the service area.
- Use these future peak water demands and the enhanced model to help identify components that appear to require upgrading or replacement to meet projected demands.
- Assess water quality issues such as water age in the system and make recommendations.
- Evaluate the operation of the water system and make recommendations if appropriate.
- Compile data on the source water quantities available and historical usage, capacities of facilities, limitations, and projected future needs.
- Review previous plans for additional supply and consider alternative water supply sources.
- Summarize improvements recommended to serve existing taps, committed taps and potential growth. Prioritize and prepare cost estimates.
- Summarize a financial plan for funding, review water rates, fees and budget.
- Seek input from stakeholders regarding this water system and study.
- Prepare a Project Report documenting the work completed under the study.

Project Status: The work on this project is underway and will continue over the next 8 months.

Project Sponsors: City of Sheridan; Sheridan Area Water Supply JPB
Wyoming Water Development Commission (WWDC)

Date and time: Tuesday, August 21st, 5:30 p.m.
Location: Sheridan Memorial Hospital Community Conference Room
16 South Gould Street, Sheridan
Enter through the door on Works Street

Contact Person: Dayton Alsaker, P.E.
DOWL
16 W. 8th Street
P.O. Box 7010
Sheridan, WY 82801
Phone: 307-655-7695 email: dalsaker@dowl.com

Input on this important water study is encouraged. Send comments to dalsaker@dowl.com

Notice of the Kickoff Meeting to provide information on a Master Plan for the Sheridan Area Water System.

This Water System Study is funded by the Wyoming Water Development Commission. Local sponsors are the City and SAWS JPB.

Tuesday, August 21th at 5:30 p.m.

Location: Sheridan Memorial Hospital; Community Meeting Room at 61 South Gould Street (use the door on Works Street)

An overview of the scope of work on the study area will be provided, along with the opportunity for questions and discussion. Interested parties may attend and provide input regarding the study's scope.

Any questions regarding this meeting, please call:
Dayton Alsaker, DOWL, 307-655-7695.

Dayton Alsaker, P.E.
DOWL
307.655.7695 | direct
16 W 8th Street
Sheridan, Wyoming 82801

dalsaker@dowl.com

Project Scoping Meeting
Sheridan Water System Master Plan Level I Study
August 21, 2018

Attendance List

SPONSOR: City of Sheridan and SAWS JPB
Wyoming Water Development Commission

ENGINEER: DOWL

Name	Representing (if representing an organization or company)	From (town/city)	email
Dayton Alsaker	DOWL	Sheridan	dalsaker@dowl.com
Ken Hirschman	COS	Sheridan	khirschman@sheridanwy.net
Mike Peacock	COS	Sheridan	MPeacock@sheridanwy.net
Tom Manolis	COS	Sheridan	TMANOLIS@sheridanwy.net
DAN ROBERTS	COS	SHERIDAN	droberts@sheridanwy.net
DAVE MYER	WWDO	CHEY.	dave.myer@wyo.gov
BRUCE EDWARDS		SHERIDAN	BRUCEEDWARDS5933@GMAIL
Suzanne Albright		Sheridan	suzannealbright@hotmail.com
Mark Collins	City of Sheridan	"	mcollins@sheridanwy.net
Thayer Shafer	" " "	"	Tshafer@sheridanwy.net
ROGER MILLER	CITY OF SHERIDAN	SHERIDAN	rmiller@SHERIDANWY.NET
Rich Bridger	City of Sheridan	Sheridan	rbridger@sheridanwy.net
Tod Rosenlund	DOWL		

Project Scoping Meeting

- This Study is overseen by and funded by the Wyoming Water Development Commission (WWDC)
- Local Sponsors are:
  - City of Sheridan
  - Sheridan Area Water Supply Joint Powers Board (SAWS)
- The Sheridan Water System and the WWDC program have a very long and very successful relationship, and this study continues that beneficial association.

DOWL

Level I Master Plan

- Is a study that evaluates the overall water system, considers options and provides recommendations and deliverables for future use.
- Specific scopes vary.
- As evaluations are made, recommendations and cost estimates will be prepared for future projects.
- Opportunities will be provided to move projects into Level III (Design/Construction) for 2020.

DOWL

Project Goal

- Conduct a thorough review of the Sheridan area water system as a whole, with consideration to the two entities involved in its operation. Evaluate the existing infrastructure, water supply and information on this system; update the information on this system, and make recommendations for the future.
- The ultimate product will be a Master Plan to assist the City, SAWS JPB and the WWDC in the future management of this system.

DOWL

Meeting Agenda

- Introductions
- Purpose for the Study
- Purpose for this Meeting
- Review the water system and its major components
- Review the GIS and Hydraulic Model and their proposed upgrading
- Review the water source and possible additional supply
- Updating of estimated water usage and future water needs
- Briefly cover initially identified improvements
- Discuss schedule and deliverables
- Provide opportunity for comment or input

DOWL

Project Scope – for this Level I Study

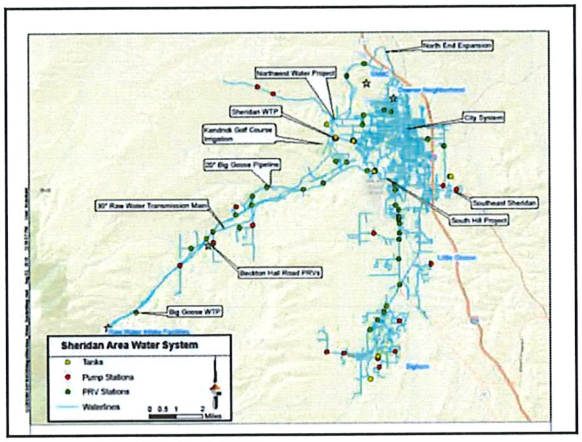
- Conduct Meetings – gather information, provide study updates
- Assemble, review and utilize existing information
  - Past studies, reports, recommendations, designs
  - These are significant with this water system
- Inventory, Evaluate and Update the GIS
- Evaluate, Update and Verify the Hydraulic Model
- Evaluate the Water Source(s) – Consider future needs
- Estimate Future Growth and determine Future Water Demand
- Develop recommendations and cost estimates
- Consider the financing of proposed projects
- Report and Deliverables

DOWL

Purpose of this Meeting

- To inform all stakeholders of this study, its scope, and its goals.
- To provide an overview of this water system.
- To provide an overview of the schedule and the work.
- To provide an opportunity for input on the Sheridan Water System within the scope of this study.

DOWL



Task 1. Meetings
Sheridan Water Master Plan

1	This initial Scoping Meeting
2	A meeting in the spring to present the draft report
3	Local meetings with Water System Managers, Operators and others.
4	Regular updates with WWDO PM and Sponsors.

DOWL

Task 2. Information Review
Sheridan Water Master Plan

1	Considerable information is available on this water system that dates back over 100 years.
2	Gathered previous studies and design reports.
3	Water source and water availability was most recently studied.
4	Have gathered detailed information on most of the components – pipelines, tanks, pump stations, etc.
5	Local planning documents.

DOWL

Task 2. Information Review
Water Quantities and System-wide Demands

1	Reservoir storage and releases.
2	Raw water diversions.
3	Treated water quantities – average and peak day.
4	Flows within system as data is available.
5	User demands from the new metering system.
6	Need Average, Peak, per User usage quantities.

DOWL

Previous Reports, Studies, Designs, Assessments

SOURCE & RAW WATER

- Supplemental Supply Level II, Phase I & II
- Hydrology model of the Big Goose Drainage.
- Diversion and Pretreatment facilities.
- Raw water lines to Big Goose WTP.
- 30" raw water transmission main.
- Delivery to Kendrick GC and the VAMC.
- Water Rights.
- Lake DeSmet.

TREATMENT & STORAGE

- WTPs and site facilities.
- Upgrading of 4MG tank.
- Three tanks on the SAWS system.
- Northwest tank, pressure zone and connections.
- The North Low and South Low Tank sites.
- Water Quality issues within the distribution system.
- Alternative means for filling some of the tanks.
- Review EPA Sanitary Survey

TRANSMISSION

- 15 Booster Stations and Pump Stations
- 50 PRV stations
- 8 pressures zones
- 20-inch Big Goose pipeline
- Beckton Hall area facilities
- Downer Neighborhood
- Little Goose System
- South Hill area
- Southeast Sheridan
- North End expansion
- Several transmission mains throughout the system.

DOWL

Task 3.

Inventory, Evaluation, and GIS

- 3.1 GIS
  - System Connectivity
  - Location of Critical Components
  - GIS/Model Synchronization
  - Recommendations for future upkeep

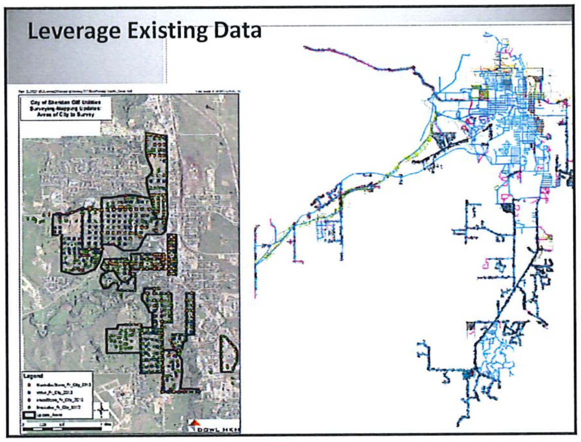
DOWL

GIS - Location of Critical Components

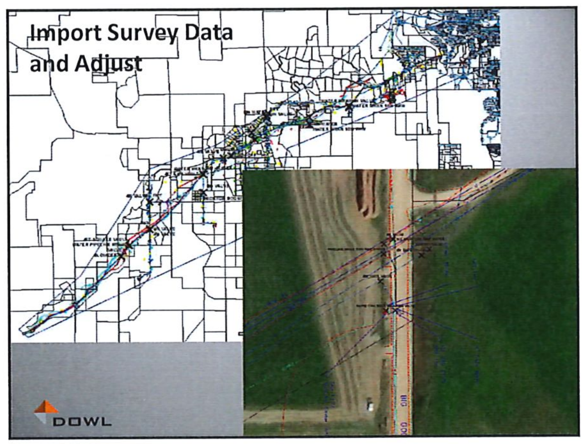
1. Field Survey various features throughout the system
2. Compare and verify existing as-built drawings
3. Assign accuracy level to all data based on collection method
4. Identify critical areas
5. Field survey features in critical areas
6. Update GIS and Model

DOWL

Leverage Existing Data



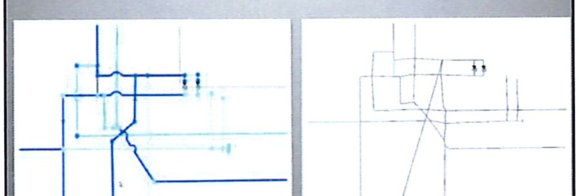
Import Survey Data and Adjust



DOWL

Focus on critical areas

- Water System Staff discussions
- Problem Areas/connectivity issues
- Older Areas



Understanding the system is critical!

DOWL

Task 3.

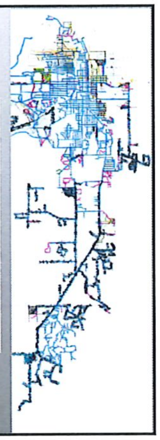
Inventory, Evaluation, and GIS

- 3.2 Inventory
  - Repair and replacement schedule
  - Critical components

DOWL

Task 3.
Inventory, Evaluation, and GIS

- 3.3 Evaluation
  - Existing demand
  - Existing plus current vacant parcels
  - Future demand/growth scenarios
  - Criticality Analysis
  - Model and AMI system used for unaccounted for water.



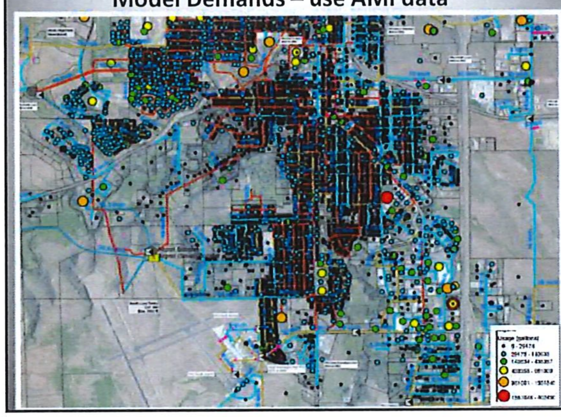
DOWL

Task 4.
Hydraulic Model

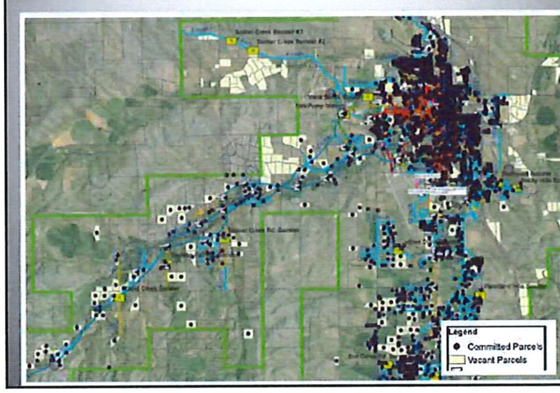
- 4.1 Update GIS and Model together
- 4.2 Develop/Update demand scenarios
- 4.3 Calibrate model
- 4.4 Evaluate System with calibrated model
  - Extended Period Simulation
- 4.5 Water hammer evaluation

DOWL

Model Demands – use AMI data

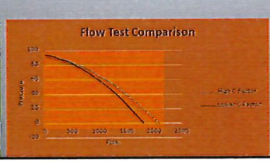


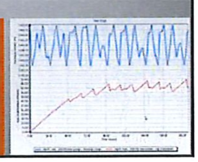
Committed Taps



Model Calibration

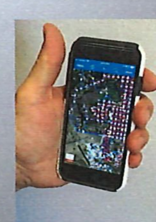
- Critical for a solid model, GIGO
- Calibrate on high flow situations – NOT static pressures
- Retain existing system calibration data
- Validate controls and EPS runs





Overall GIS and Modeling Approach

- Use deliverables (GIS and Hydraulic Model) to perform master plan work.
- This leads to efficient work, valuable deliverables, and a high quality master plan.



DOWL

Scope Alterations

- GIS in ArcGIS online and Collector for ArcGIS
- Review of existing CAD/GIS standards
- Water Hammer Analysis
- Flow Testing and Calibration of Model

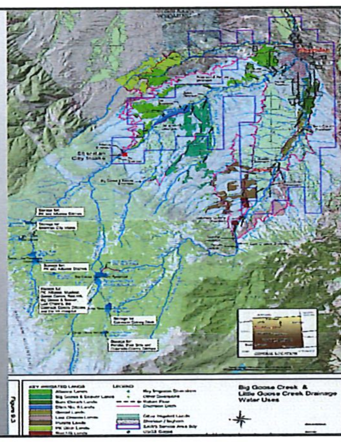
DOWL

Task 5. Water Source

Sheridan Water Master Plan

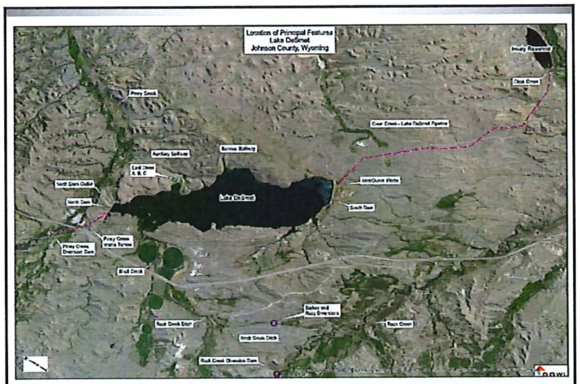
1. Diversions from Big Goose Creek.
2. Mountain Reservoirs – Twin Lakes is primary supply.
3. Acquiring more water in Park.
4. Yellowstone River Compact considerations.
5. Review recent Supplemental Storage Studies.
6. Consider raw water diversion and transmission.
7. Sheridan Watershed Wildfire Hazard Study.
8. Review the Lake DeSmet option.

DOWL

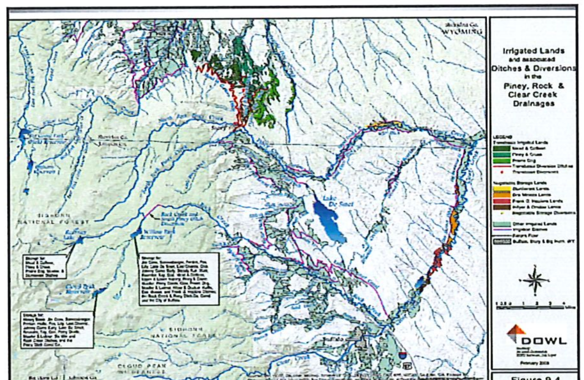


DOWL

DOWL



DOWL

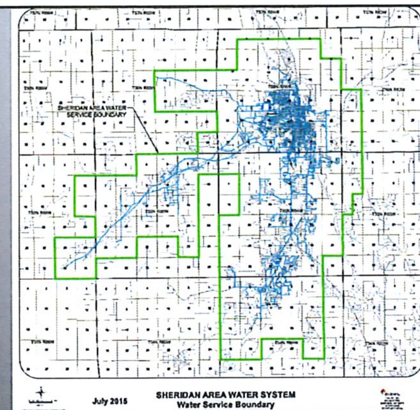


DOWL

Task 6. Growth and Demand Projections
Sheridan Water Master Plan

1. Review existing data on population, number of users, trends, recent projections.
2. Develop recent water usage history.
3. Establish Design Criteria for this system.
4. Consider deliveries to the VAMC, Kendrick golf course and Downer Neighborhood.
5. Review the land use, zoning, growth areas, and Water Service Boundary.

DOWL



DOWL

Task 7. Recommendations and Cost Estimates
Sheridan Water Master Plan

1. Develop and summarize recommendations.
2. Review those from previous studies.
3. Review with Sponsors.
4. Cost estimates and Priorities.
5. Consider and Schedule Level III projects.

DOWL

Tasks 8 – 11. Report and Deliverables
Sheridan Water Master Plan

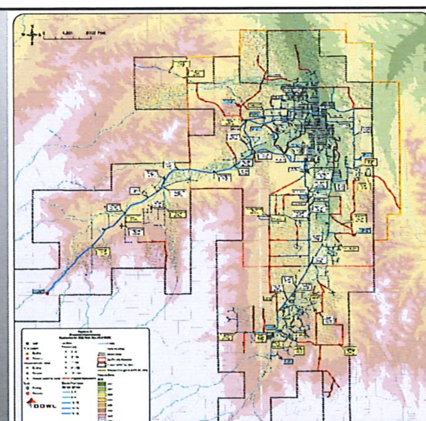
1. Consider funding needs, financing, water rates.
2. Draft Report – April 1, 2019.
   Reviews, Presentation, Revisions.
3. Finalize the Hydraulic Model and GIS.
4. Final Report.
5. Possible application for a Level III project.

DOWL

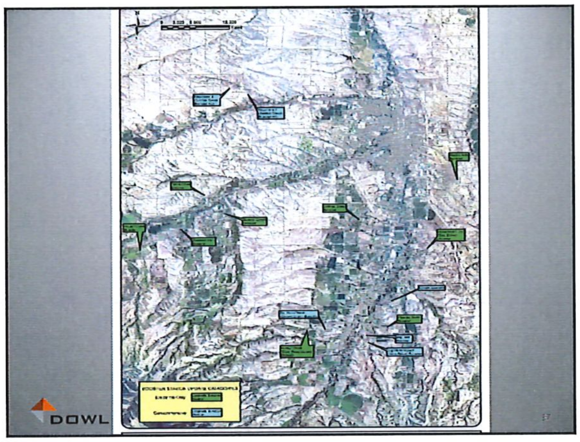
What is being done right now

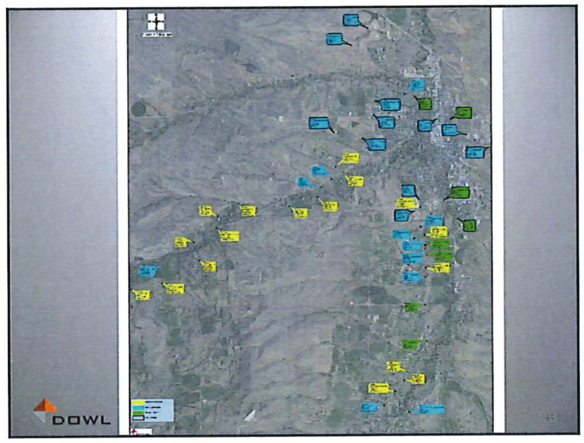
- Gathering and reviewing existing information
- The initial meetings with key local staff
- Reviewing and revising the GIS
- Gathering water quantities, diversion, and flow data
- Tabulating and assessing these data
- Gathering water usage and demands from users throughout the system
- Utilizing the new meters and SCADA system for gathering data.

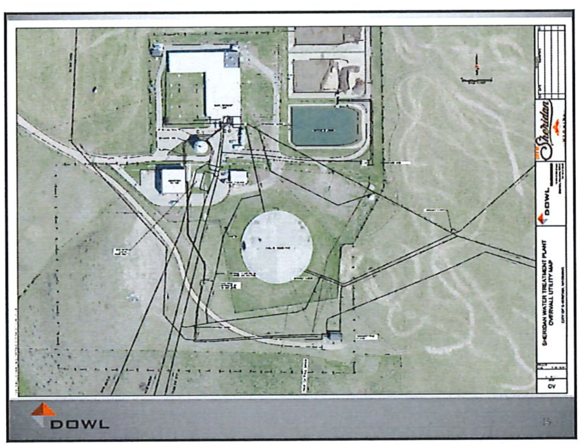
DOWL



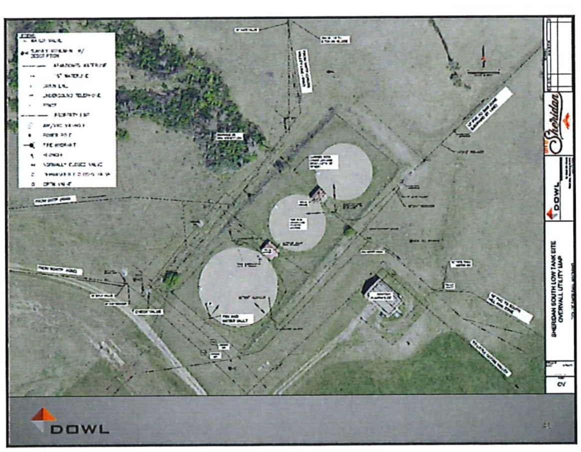
DOWL

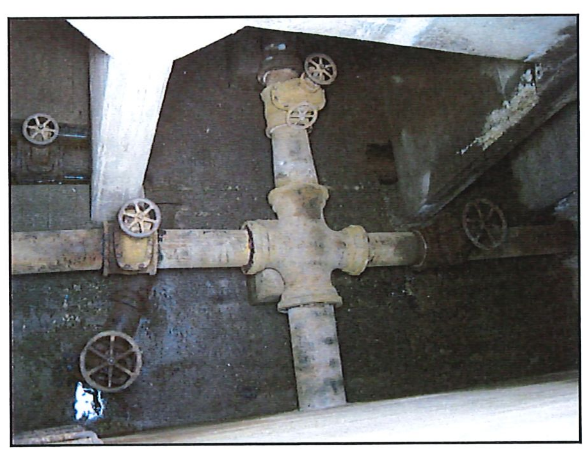

DOWL

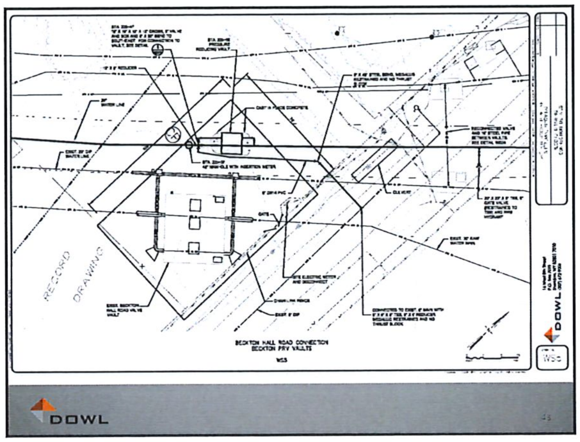

DOWL

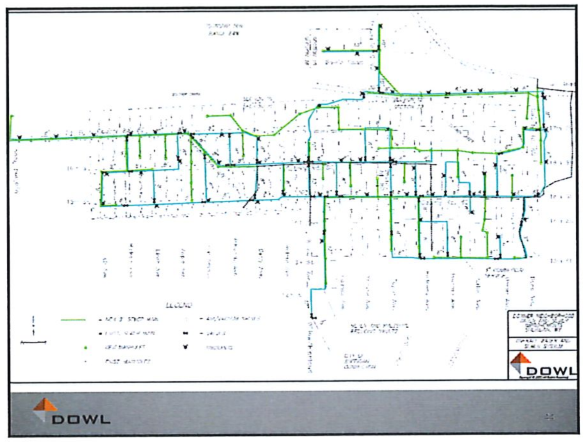

DOWL

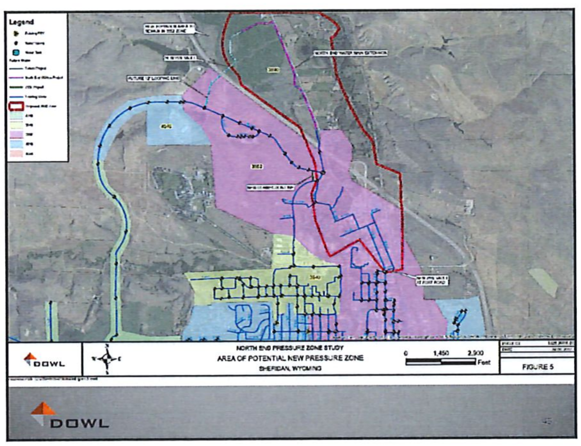

NORTHWEST WATER SYSTEM IMPROVEMENTS
RECORD DRAWINGS
DOWL

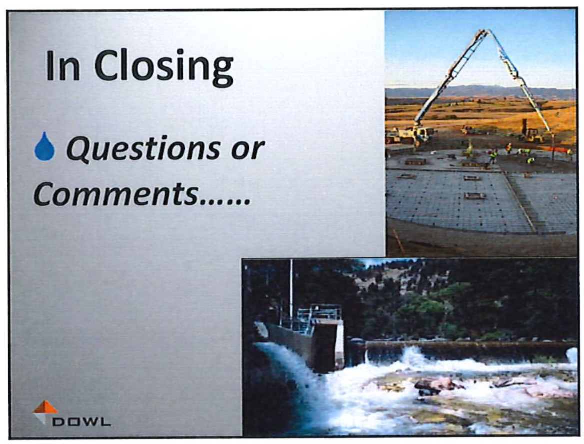

DOWL




DOWL


DOWL


NORTH END PRESSURE ZONE STUDY
AREA OF POTENTIAL NEW PRESSURE ZONE
SHERIDAN, WYOMING
FIGURE 5
DOWL


In Closing
Questions or Comments……
DOWL

Summary of Public Update Meeting

Sheridan Water System Master Plan, Level I Study

This water system study is funded through the Wyoming Water Development Commission.

Purpose of Study: Conduct a thorough review of the Sheridan area water system as a whole, with consideration to the two entities involved in its operation. Evaluate the existing infrastructure, water supply and information on this system, and make recommendations for the future. The ultimate product will be a Master Plan that will be a valuable tool to assist the City of Sheridan, SAWS JPB and the WWDC in the future management of this system.

This study includes the following tasks regarding this water system:

- Hold meetings to gather information on the system.
- Gather, compile and analyze existing information on this system.
- Inventory and evaluate the existing system. Consider condition and capacity of facilities.
- Review, update and enhance the GIS of the water system.
- Enhance the hydraulic model of the system. Input updated water lines and demands.
- Integrate the revised GIS and hydraulic model into one data base.
- Make recommendations for future standards and procedures for GIS and model upkeep.
- Develop population growth and future demand projections; review the service area.
- Use these future projected water demands and the enhanced model to help identify components that appear to require upgrading or replacement to meet demand growth.
- Assess water quality issues such as water age in the system and make recommendations.
- Compile data on the source water rights and water quantities available and historical usage, capacities of facilities, limitations, and projected future needs.
- Review previous plans for additional supply and consider alternative water supply sources.
- Make recommendations on additional long-term water supply.
- Summarize improvements recommended to serve existing users, committed taps and expected growth. Prioritize and prepare cost estimates.
- Summarize a financial plan for funding projects and review water system budgets.
- Seek input from stakeholders regarding this water system and study.
- Prepare a Project Report documenting the work completed under the study.

Project Status: Most of the research, analysis and recommendations have been conducted with the draft report for this study provided for review. Work will be completed by the end of June.

Project Sponsors: City of Sheridan; Sheridan Area Water Supply JPB
Wyoming Water Development Commission (WWDC)

Date and time: Wednesday, April 17th, 5:30 p.m.
Location: Sheridan Memorial Hospital Community Conference Room
16 South Gould Street, Sheridan
Enter through the door on Works Street

Contact Person: Dayton Alsaker, P.E.
DOWL
16 W. 8th Street
P.O. Box 7010
Sheridan, WY 82801
Phone: 307-655-7695 email: dalsaker@dowl.com

Input on this important water study is encouraged. Send comments to dalsaker@dowl.com

Notice of an Informational Meeting to provide an update on the Master Plan for the Sheridan Area Water System.

This Water System Study is funded by the Wyoming Water Development Commission. Local sponsors are the City and SAWS JPB.

Wednesday, April 17th at 5:30 p.m.

Location: Sheridan Memorial Hospital; Community Meeting Room at 61 South Gould Street (use the door on Works Street)

An overview of work completed on the study area will be provided, along with recommendations for future projects and supply. Interested parties may attend and provide input regarding the study's scope.

Any questions regarding this meeting, please call:
Dayton Alsaker, DOWL, 307-655-7695.

Dayton Alsaker, P.E.
DOWL
307.655.7695 | direct
16 W 8th Street
Sheridan, Wyoming 82801

dalsaker@dowl.com

Dayton Alsaker

From: Dan Coughlin <dcoughlin@sheridancounty.com>
Sent: Wednesday, March 27, 2019 3:33 PM
To: Tom Ringley; Christi Haswell; Nick Siddle; 'Roger Miller'; 'Jacob Martin'; 'Aaron Linden'
Cc: Dayton Alsaker; Anny Birkholz; Tad Rosenlund; Jeffrey Rosenlund
Subject: City of Sheridan/SAWS-JPB Informational Public meeting regarding the Sheridan Water System Master Plan Study

SAWS-JPB members,

DOWL engineering has nearly completed the water system master plan being funded by the Wyoming Water Development Commission. DOWL will hold an informational public meeting April 17, 2019 at 5:30 P.M. at the Sheridan Memorial Hospital Community Meeting Room; 61 South Gould Street (door on Works).

Items to be covered at this meeting include:

- An overview of the water system (its infrastructure).
- The existing water supply and acquisition of additional supply in Big Goose.
- Projections for growth and future water needs.
- Recommendations for longer term additional water supply.
- Recommendations for future projects and estimated costs.
- A review of the GIS of this water system, how it was updated under this study and how it will be used.
- A review of the Hydraulic Model of this water system, how it was updated and how it will be used.
- Any other recommendations coming out of this study, such as possible Level II studies.
- Opportunity for questions and input from attendees.

Regards,

Dan Coughlin

Project Manager
Sheridan Area Water Supply Joint Powers Board

Project Update Meeting
Sheridan Water System Master Plan Level I Study
April 17, 2019

Attendance List

SPONSOR: City of Sheridan and SAWS JPB
Wyoming Water Development Commission

ENGINEER: DOWL

Name	Representing (if representing an organization or company)	From (town/city)	email
Keith Clarey	WWDO	Cheyenne	keith.clarey@wyo.gov
Dayton Alsaker	DOWL	Sheridan	dalsaker@dowl.com
DAN COUGHLIN	SAWS - JPB	SHERIDAN	dcoughlin@sheridancounty.com
Tad Rosenlund	DOWL	Sheridan	trosenlund@dowl.com
JEFFREY ROSENLUND	DOWL	SHERIDAN	jrosenlund@dowl.com
Nathan Ryan	COS	Sheridan	NRyan@sheridanwy.net
Tom Manolis	CoS	Sheridan	TMANOLIS@Sheridanwy.net
Suzanne Albright		Sheridan	suzannealbright@hotmail.com
Jenny Birkholz	SAWS -JPB	Sheridan	jbirkholz@sheridancounty.com
Ken Hirschman	COS	Sheridan	khirschman@sheridanwy.net
DAN ROBERTS	CITY OF SHERIDAN		droberts@sheridanwy.net
Carli Kierstead	The Nature Conservancy	Sheridan	carli.kierstead@tnc.org
Mary Auzqui		Sheridan	mauzqui@yahoo.com
Joe Crump	WWC	Sheridan	jcrump@wwcengineering.com
Thayer Shafer	City of Sheridan ~~tshafer@sheridan~~	Sheridan	
Dave Engels	EnTech	"	dte@entechusa.net

Project Update Meeting
Sheridan Water System Master Plan Level I Study
April 17, 2019

Attendance List

SPONSOR: City of Sheridan and SAWS JPB
Wyoming Water Development Commission

ENGINEER: DOWL

Name	Representing (if representing an organization or company)	From (town/city)	email
Catherine Engels	–	Sheridan	engelscatherine@yahoo.com
DREW HOMOLA	DOWL	SHERIDAN	dhomola@dowl.com
Rich Bridger	City of Sheridan	Sheridan	rbridger@sheridanrecreation.com

Sheridan Water Master Plan – Level I Study

April 17, 2019

Study Review (Update) Meeting

- This Study is overseen by and funded by the Wyoming Water Development Commission (WWDC)
- Local Sponsors are:
  - City of Sheridan
  - Sheridan Area Water Supply Joint Powers Board (SAWS)
- The Sheridan Water System and the WWDC program have a very long and very successful relationship, and this study continues that beneficial association.

DOWL

Level I Master Plan

- A study that evaluates the overall water system and source, considers options and provides recommendations and deliverables for future use. Reconnaissance level.
- Specific scopes vary.
- As evaluations are made, recommendations and cost estimates are prepared for future projects.
- Will provide opportunity to move a project(s) forward in the WWDC program.

DOWL

Meeting Agenda

- Introductions
- Overview of the Study
- Purpose for this Meeting
- Review the water system and its major components
- Review the GIS and Hydraulic Model; their upgrading and future use
- Review the water source, water rights and water quantities
- Update projections for future water needs; consider sources
- Review identified improvements
- Discuss schedule and deliverables
- Provide opportunity for comment or input

DOWL

Project Goals

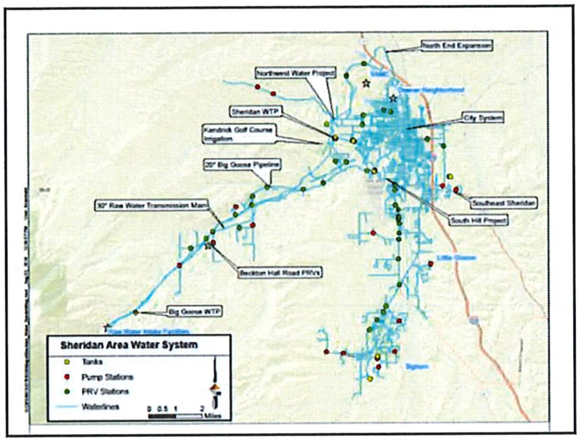
- Conduct a thorough review of the Sheridan area water system as a whole, with consideration to the two entities involved in its operation.
- Evaluate the existing infrastructure, water supply and information on this system; update this information, and make recommendations for future projects and supply.
- Update the Hydraulic Model & GIS for this system.
- The ultimate product will be a Master Plan to assist the City, SAWS JPB and the WWDC in the future management of this system.

DOWL

Purpose of this Meeting

- To inform all stakeholders of work done on this study and the goals for the final report.
- To provide an overview of this water system
  - Condition and capacities.
- Summarize work on the GIS and Hydraulic Model.
- Discuss future water supply & system improvements.
- Provide opportunity for input on the Sheridan Water System within the scope of this study.

DOWL



Tasks 1 and 2 of this Master Plan

- Task 1 – Meetings
- Task 2 – Information review

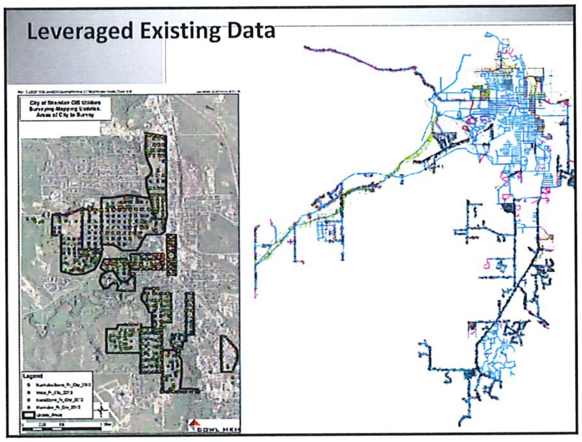
DOWL

GIS (Geographic Information System) – Mapping Update

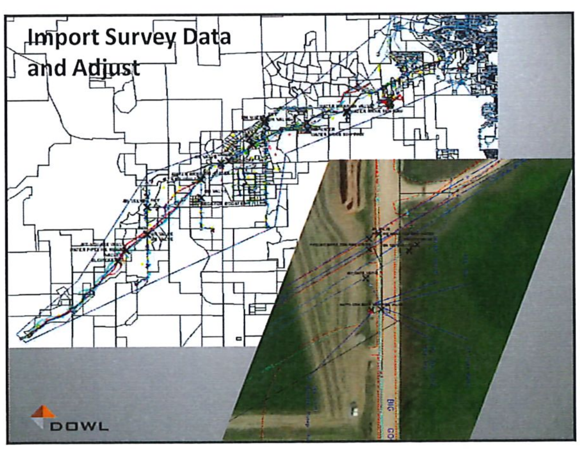
1. Field Surveyed various features throughout the system
2. Compared and verified existing as-built drawings
3. Assigned accuracy level to data based on collection method
4. Identified critical areas
5. Field surveyed features in critical areas
6. Updated GIS and Model

DOWL

Leveraged Existing Data

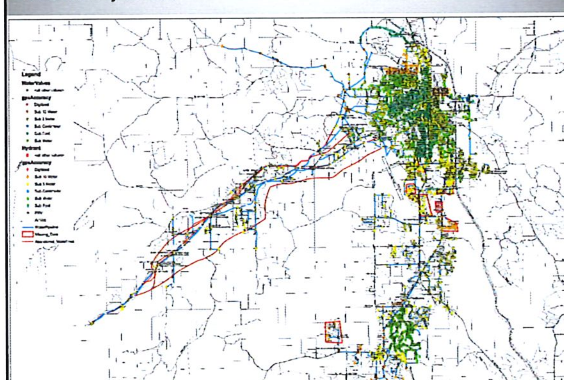


Import Survey Data and Adjust



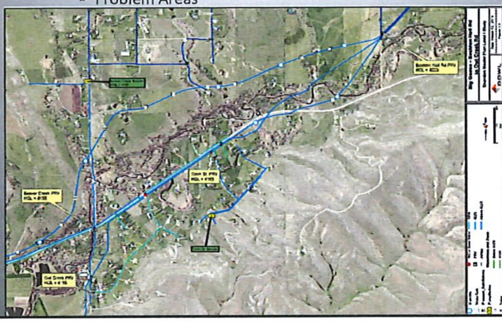
DOWL

Accuracy Field



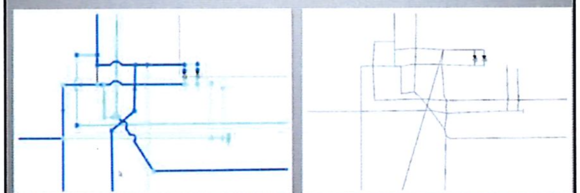
Focus on critical areas

- Utility Maintenance Staff discussions
- Problem Areas
- Older Areas
- Transmission Mains



System Connectivity

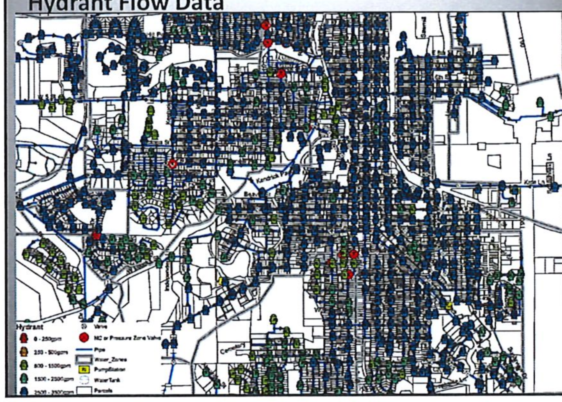
- Water System Staff discussions
- Review Record Drawings
- Hydraulic Water Model
- Created "Junctions" Layer in GIS



Understanding the system was critical

DOWL

Hydrant Flow Data



Collector for ArcGIS

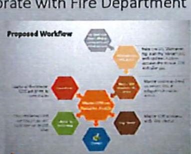
- Mobile GIS App (Free from ESRI)
- Views map published in ArcGIS Online or Portal for ArcGIS
- Download maps and base maps for offline use
- Log data with GPS on mobile device
- Sync edits back to the map stored online
- Option for higher accuracy with additional hardware

App Store Google play

DOWL

GIS Recommendations

- Provide periodic review and update
  - Depending on level of development – Annually, Bi-annually, Quarterly
- Follow GIS Workflow
- Update Hydraulic Water Model simultaneously
- Collector for ArcGIS
- Collaborate with Fire Department

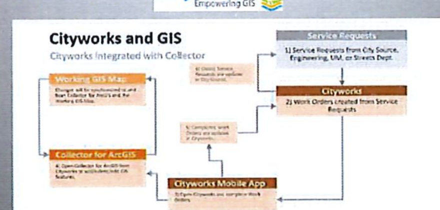


DOWL

CityWorks Workflow and GIS

- Ideally Asset Management and GIS tied together
- Mobile Application still developing
- Continue to monitor and eventually mesh with Collector for ArcGIS and other ESRI Apps.

Cityworks Empowering GIS



DOWL

Task 4 – Hydraulic Model

- Update GIS and Model together
- Develop/Update demand scenarios
- Calibrate model
- Evaluate System with calibrated model
- Extended Period Simulation
- Water hammer evaluation

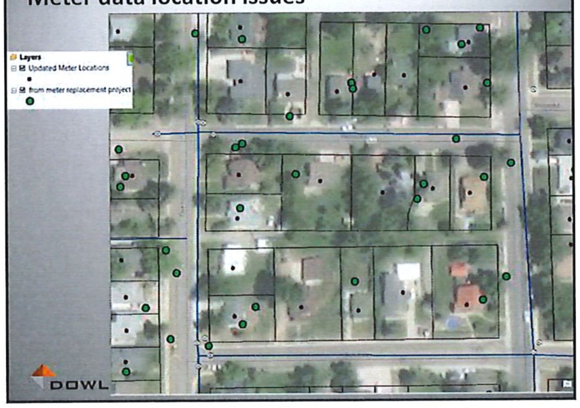
DOWL

Hydraulic Model – Updated with GIS

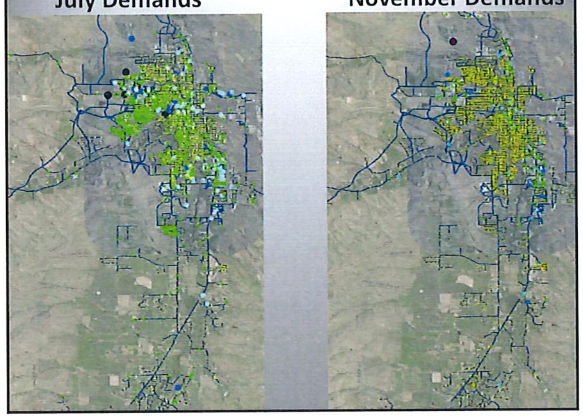
- Physical Components Updated
- Hydrants added to Hydraulic Model
- Model Demands Updated
- Meter Locations Updated and Added to Model
- Data from Pump Station Upgrade Updated
- Data from Control Valve Project Updated
- Model Verified with flow test data

DOWL

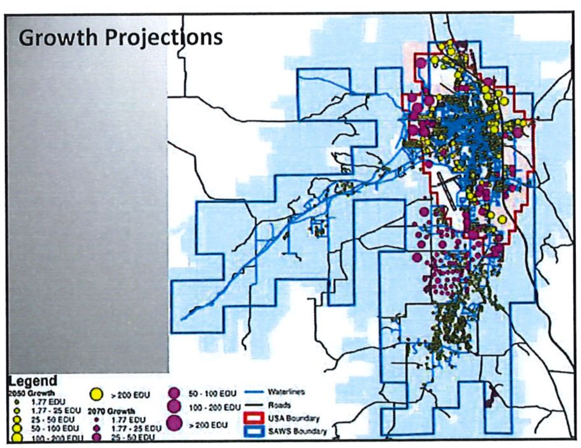
Meter data location issues



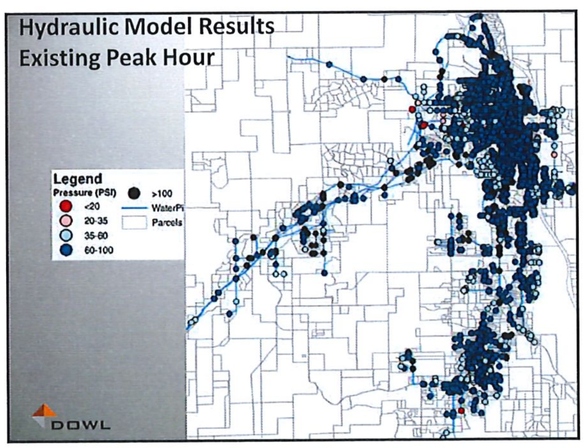
DOWL



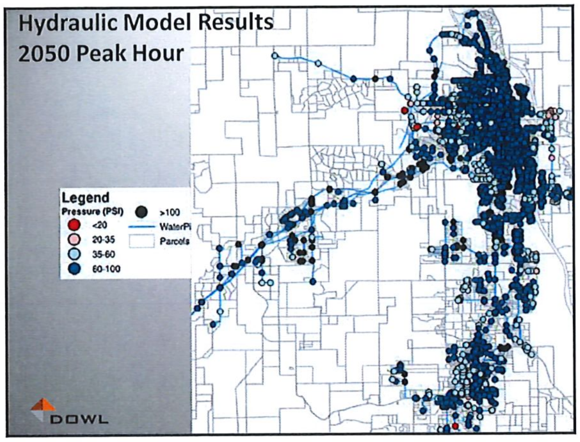
Growth Projections

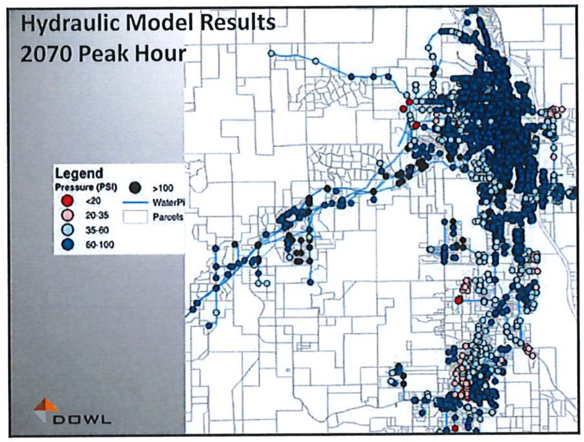


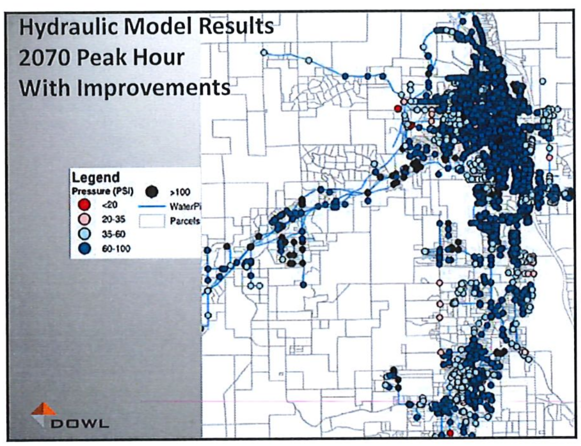
Hydraulic Model Results
Existing Peak Hour

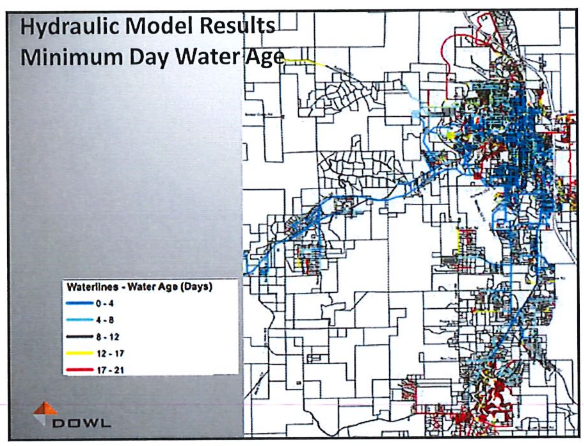


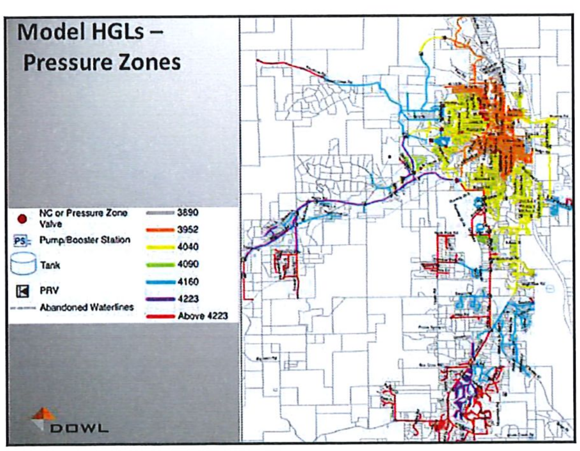
DOWL









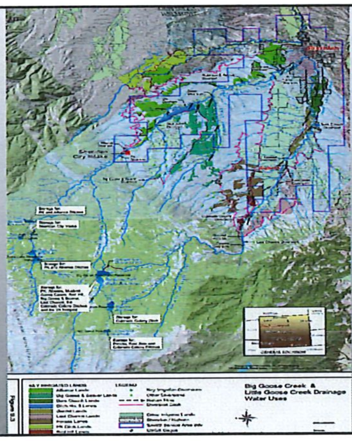


Task 5. Water Source

Sheridan Water Master Plan

1. Diversions from Big Goose Creek. Direct flow rights.
2. Mountain Reservoirs – Twin Lakes is primary supply.
3. Water in Park Reservoir becoming more important.
4. Reviewed recent Supplemental Storage Studies.
6. Consider raw water diversion & transmission capacity.
7. Sheridan Watershed Wildfire Hazard Study.

DOWL



DOWL

DOWL

Table 5.2 - Available Water Supply for the Sheridan Area Water System – Entire Year

WATER RIGHT	City			JPB			
	Cubic ft/sec (cfs)	Comments/ Adjustments	Total ac-ft available	Cubic ft/sec (cfs)	Comments/ Adjustments	Total ac-ft available	
Direct Flow/Big Goose unregulated*	16	With allocation to VA, use 15 cfs available for 275 days. See Note #1 and discussion	8,182.0	7.14	Assumed to be available 275 days/year	3,895.0	
	1.77	Available for 80 days, see Order Record No. 70, page 327	281.0				
Direct Flow/Big Goose in regulation*	13	With allocation to VA, use 11.5 cfs available for 90 days. See Note #1	2053.0	0			
Twin Lakes Storage		2967.7 storage right - 500 conservation pool - 10% conveyance loss	2221.0		408.68 storage right - 69 allocation of conservation pool - 10% conveyance loss	306.0	
Park Reservoir		91.7 ac-ft - with a 10% conveyance loss	82.5		225.1 ac-ft - with a 10% conveyance loss	202.6	
Dome Lake Reservoir		98.9 ac-ft - with a 10% conveyance loss	89.0		69.6 ac-ft - with a 10% conveyance loss	62.6	
I							
Subtotal			12,908.5			4,466.2	17,374.5
Adjustment for Operational Conditions - see Note #2.			142.5			36	178.5
TOTAL AVAILABLE SUPPLY AT INTAKE			12,766			4,430	17,196

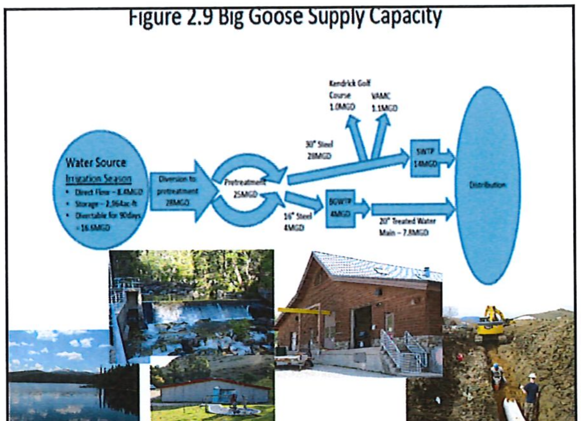
DOWL

Table 5.3 - Available Water Supply for the Sheridan Area Water System – Irrigation Season

WATER RIGHT	City			JPB			
	Cubic ft/sec (cfs)	Comments/ Adjustments	Total ac-ft available	Cubic ft/sec (cfs)	Comments/ Adjustments	Total ac-ft available	
Direct Flow/Big Goose unregulated*	16	With allocation to VA, use 15 cfs available for 275 days. See Note #1 and discussion	0	7.14	Assumed to be available 275 days/year	0	
	1.77	Available for 80 days, see Order Record No. 70, page 327	0				
Direct Flow/Big Goose in regulation*	13	With allocation to VA, use 11.5 cfs available for 90 days. See Note #1	2053.0	0			
Twin Lakes Storage		2967.7 storage right - 500 conservation pool - 10% conveyance loss	2221.0		408.68 storage right - 69 allocation of conservation pool - 10% conveyance loss	306.0	
Park Reservoir		91.7 ac-ft - with a 10% conveyance loss.	82.5		225.1 ac-ft - with a 10% conveyance loss	202.6	
Dome Lake Reservoir		98.9 ac-ft - with a 10% conveyance loss.	89.0		69.6 ac-ft - with a 10% conveyance loss	62.6	
I							
Subtotal			4445.5			571	5016.5
Adjustment for Operational Conditions – - Less loss of 1 cfs as "not divertible". - Less allowance for 10% of Twin Lakes capacity being used 37. outside of the irrigation season.			142.5 222			36 30	178.5 252
TOTAL AVAILABLE SUPPLY AT INTAKE			4081			505	4586

DOWL

Figure 2.9 Big Goose Supply Capacity



Task 6. Population and User Growth Projections

Growth in Water Demands and Total Water Needs

1. Established starting numbers for 2019.
2. Developed projections for 2050 & 2070.
3. Used a growth rate of 1.75%
4. Created estimates of water needs in 2050 & 2070 City, SAWS, VAMC, Kendrick and Total.
5. Compared to water availability.

DOWL

Design Criteria Table – Usage GPD/EDU

	Usage (GPD/EDU) - Metered at User			With share of all Water to WTPs		
	Average Day (year-round)	Peak Day	Average Day Irrigation Season	Average Day (year-round)	Peak Day	Average Day Irrigation Season
City (and DNISD)	250	680	510	325	880	660
SAWS-IPB	200	540	400	260	700	520
City – Residential Only	220		500	280		650
Rural – with secondary irrigation	140		150	180		200

FIRE FLOWS (2 hrs, except industrial = 3)	
Single Family Residence	1000 gpm
Residential areas	1500 gpm
Commercial	2500 gpm
Industrial	3500 gpm

Estimated Water Needs

TOTAL SYSTEM DEMAND (By user, at WTP influent)	2019 GPM	MGD	2050 GPM	MGD	2070 GPM	MGD
Average Day	2,775	4.0	4,800	6.9	6,800	9.8
Peak Day	7,500	10.8	12,900	18.6	18,300	26.4
Peak Hour	11,650	–	20,100	–	28,500	–
Ave Day – Irrigation Season	5,550	8.0	9,600	13.8	13,600	19.6

Tasks 5 & 6. Future Water Source

Additional Water Supply

1. Existing Big Goose Source – Direct Flow & Storage.
2. Additional supply in Big Goose – Park; Weston??
3. Big Goose supply limitations to consider.
4. Additional supply needed by about 2050.
5. Significant source – to carry beyond another 50 years.
6. Other Sources – thoroughly reviewed 2011/2013 studies
7. Significant source, long-term potential, available water, considering a multitude of factors – Lake DeSmet.
8. Complicated – Additional detailed study needed.

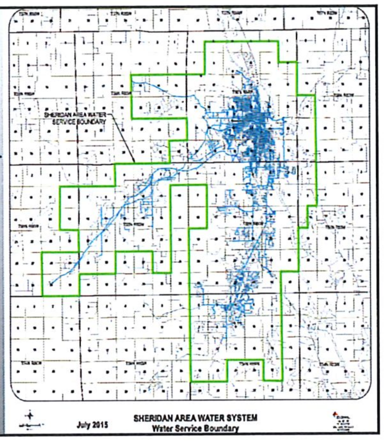
Water Service Boundary for this Water System.

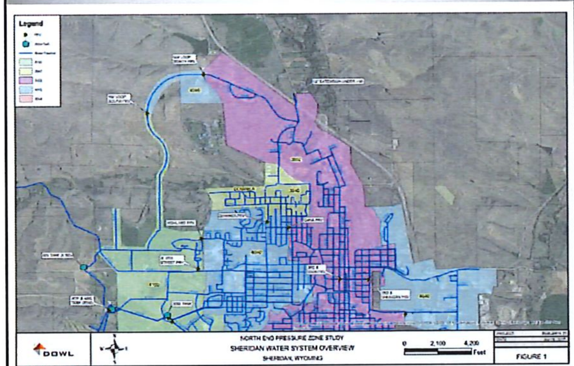
Originally set in about 1990.

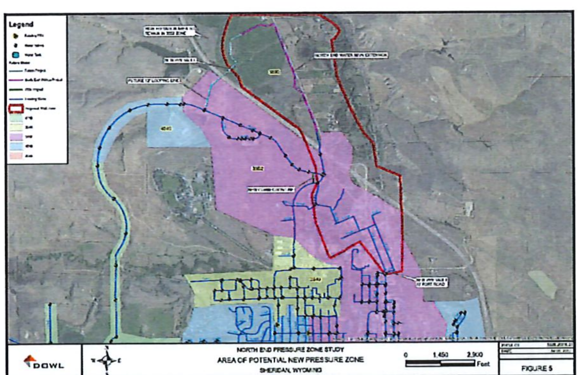
Growth happening to the North and potentially the East.

Recommend to review and revise, and refile with SEO.

Not all areas within the Boundary will be served.



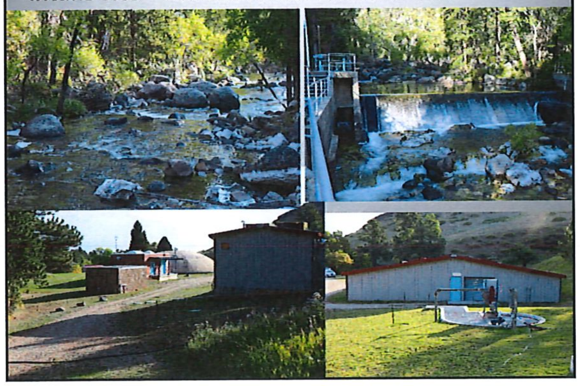


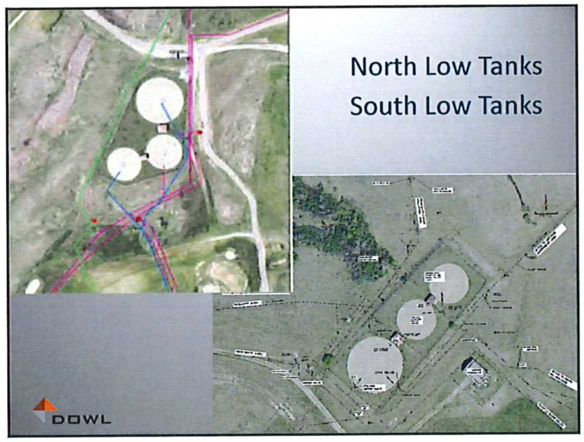


Condition of the Existing System

- Raw Water Diversion and Delivery
- Water Treatment Plants
- Transmission Mains
- Water Tanks
- Pump stations and booster stations
- Pressure Reducing Valve Stations
- Distribution Systems

Intake Site – Diversion and Pretreatment





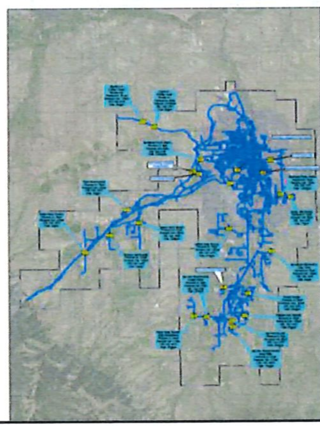
North Low Tanks
South Low Tanks

DOWL

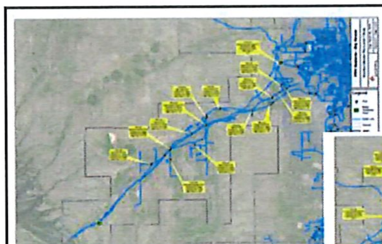
Pump Stations and Booster Stations in the Sheridan water system.

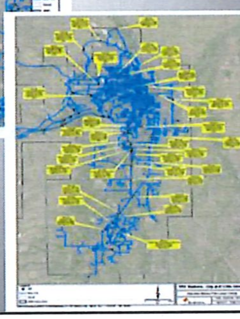
18 stations
(16 recently upgraded)

Inventoried capacities and pressures for the hydraulic model and future designs.



DOWL





Pressure Reducing Valve (PRV) Stations throughout the Sheridan water system.

50 stations.
Older stations recently upgraded.

Inventoried capacities & pressures for the hydraulic model and future designs.

DOWL

Task 7. Recommendations and Cost Estimates
Sheridan Water Master Plan

1. Developed & summarizes recommendations.
2. Reviewed those from previous studies.
3. Reviewed with Staff.
4. Cost estimates and priorities.
5. Consider and Schedule Level III projects.

DOWL

Proposed Improvement Projects

- Top priority – replacement transmission main through the Airport, to the Girls School and over to Sheridan College.
- Upgrading at the Storage Tanks – North Low, South Low, Big Horn.
- Upgrading at the Intake and Big Goose WTP.
- Metering at the Sheridan WTP – effluent flow.
- Upper Road Transmission Main.

DOWL

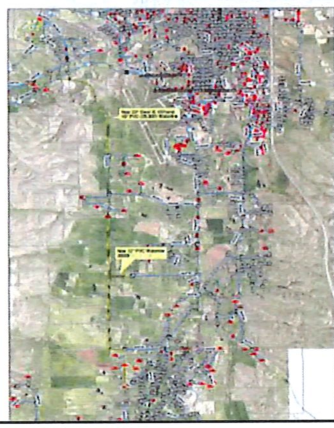
Proposed new Airport Transmission Main

Serves:
- Airport
- Airport Ind Park
- South Hill
- State Girls School
- Sheridan College
- Southeast Sheridan
- Highway 87 area
- All of Little Goose & Big Horn area

DOWL

Proposed new Upper Road Transmission Main

Redundant supply to Little Goose area, which includes serving growth areas.



DOWL

Recommendations to the WWDC for Funding
Sheridan Water Master Plan

1	Level III – Airport Transmission Main
2	Discuss improvements at the Intake and to the North Low and South Low tank sites.
3	Future Level II Study – Lake DeSmet source.
4	Future Level II Study – Raw water transmission in Big Goose – if it is desired to increase capacity.
5	Future Level III projects – i.e., Upper Road Transmission, East-West Transmission Main, etc.

DOWL

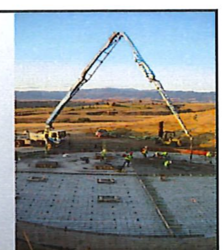
Tasks 8 – 11. Report and Deliverables
Sheridan Water Master Plan

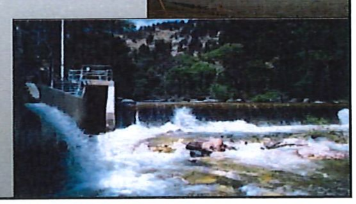
1	Draft Report being reviewed.
2	Obtain comments – this meeting, from reviews of the draft report, other input.
3	Finalize the Hydraulic Model and GIS.
4	Financial section and funding plan for projects.
5	Finalize the report and prepare deliverables (June). Application for a Level III project.

DOWL

In Closing

Questions or Comments......





DOWL

Appendix B Table of Contents

OWNERSHIP AGREEMENT

Among the Sheridan Area Water Supply Joint Powers Board,

The City of Sheridan, Wyoming,

and

Sheridan County, Wyoming,

Concerning the Sheridan Area Water Project

WHEREAS, the Sheridan Area Water Supply Joint Powers Board (hereinafter known as the "JPB"), the City of Sheridan (hereinafter known as the "City"), and Sheridan County, Wyoming (hereinafter known as the "County") have agreed to cooperate in the financing, construction, operation, and maintenance of the Sheridan Area Water Supply Project (hereinafter known as the "Project"); and

WHEREAS, water users represented by the City and by the JPB shall not subsidize the costs of operations, maintenance, or other expenses of system components owned and/or operated for the benefit of the other entity; and

WHEREAS, the JPB, the City and the County intend by this Agreement to establish ownership of Project components, both those components to be financed and newly constructed, and certain City components now in existence; and

WHEREAS, the parties intend to operate and manage their respective interests and facilities with the common goal of insuring that the municipal and rural areas of Sheridan County included in this Project are provided with a safe and reliable supply of water to protect the quality of life within the area, to allow for future growth and development, and to enable economic development.

IT IS THEREFORE AGREED:

I. PROJECT OWNERSHIP

A. Project Components to be Constructed

Project components financed in whole or in part by state loans and/or grants shall be owned by the JPB during construction and during the term of the Project loans. Upon repayment of the Project loans, or upon approval by the legislature, ownership of selected Project components shall be as described below.

1. Enlargement of Twin Lakes Reservoir. The Project provides for the enlargement of Twin Lakes Reservoir to allow for an increase in the firm yield of the reservoir from 1,500 acre feet to 3,700 acre feet, for a net firm yield gain of 2,200 acre feet.

a. Based on a ratio derived from the expected revenues from the Optional Capital Facilities Tax, ownership of the enlargement shall be shared between the JPB and the City on a ratio of 33% to 67%. Based on this ratio, and in water years when the full 2,200 acre feet is in storage and available for use, the City would be entitled to 1,474 acre feet and the JPB would be entitled to 726 acre feet. Should actual firm yields of the enlarged Twin Lakes Reservoir differ from those stated above, any increases or decreases shall vary according to the percentages stated above.

b. The JPB share of the Twin Lakes Enlargement (= 726 acre feet or 33% of actual yield) shall be reduced by approximately 202 acre feet, an amount equal to the water owned by the City and currently stored in Park Reservoir, Sawmill Reservoir, and Dome Lake, at which time, the City shall transfer ownership of its shares in those reservoirs (an amount equal to approximately 202 acre feet) to the JPB for use by the JPB, and subject to the condition that all transferred shares can be used for the JPB's intended purposes. The JPB shall retain a storage account in the enlarged Twin Lakes Reservoir of 524 (= 726 - 202) acre feet to meet its present and future water demands.

If the firm yield actually provided by the enlarged Twin Lakes Reservoir is of such lesser quantity that the transfer of the 202 acre feet no longer provides a 67% - 33% allocation of the enlarged supply, the 202 acre feet amount shall be so adjusted to assure equity in accordance with this agreed-upon ratio.

c. The City shall operate and manage the dam structure, outlet works, and other appurtenances at the Twin Lakes site for the benefit of both parties after the improvements are completed. Ownership of these components shall be transferred to the City upon repayment of the Project loan, or upon approval by the legislature.

2. Big Goose Water Treatment Plant. Upon repayment of the Project loan, or upon approval by the legislature, ownership of the Big Goose Water Treatment Plant shall be shared by the JPB and the City, with the City maintaining 28.7% ownership and the JPB maintaining 71.3% ownership. These percentages are based upon the assumption that the Big Goose Water Treatment Plant will be

constructed to a capacity of 4.6 million gallons per day. Should the plant not be constructed to this size, both parties shall agree to ownership equity based upon usage of the facility by each party. The City shall operate and manage this facility for the benefit of both parties in accordance with the Operating Agreement dated May 15, 1990.

3. Sheridan Water Treatment Plant Improvements and Miscellaneous Improvements to the Water Distribution System Inside the City Limits of Sheridan. Upon repayment of the Project loan, or upon approval by the legislature, the City shall receive entire ownership of all improvements to the City's Water Treatment Plant and miscellaneous improvements to the water distribution system inside the City limits. All improvements shall be constructed to City specifications or with City approval, and all operating benefits, operating obligations and control shall belong to the City upon completion of construction.

4. Big Horn Water Treatment Plant. The Big Horn Water Treatment Plant shall be owned by the JPB. All operating benefits, operating obligations and control shall belong to the JPB.

5. Big Goose Distribution Facilities. The water distribution facilities (i.e., mains, laterals, booster stations, tanks, etc.) serving the Big Goose/Soldier Creek Water District and adjacent areas shall be owned in their entirety by the JPB, except as discussed in Section I(B)(4), and except the West Loucks

Pipeline System, to be constructed as part of the Project and depicted in Exhibit A incorporated herein by reference thereto as if fully set forth. For this pipeline system, upon execution of this agreement, the operating benefits, operating obligations and control of said West Loucks Pipeline System, serving lands within the existing boundary of the Big Goose/Soldier Creek Water District as depicted in Exhibit "A" attached hereto and incorporated herein by reference thereto, shall remain with the JPB. Furthermore, upon execution of this agreement,the operating benefits, operating obligations and control of said West Loucks Pipeline System serving lands outside of the existing boundary of the Big Goose/Soldier Creek Water District as depicted in Exhibit "A", shall belong to the City. Upon repayment of the Project loan, or upon approval by the legislature, the ownership of said West Loucks Pipeline System shall transfer to the City. The West Loucks Pipeline System shall be constructed to City specifications or with City approval.

6. <u>Little Goose Valley Distribution Facilities</u>. The water distribution facilities (i.e., mains, laterals, booster stations, tanks, etc.) constructed as part of the Project to serve the Little Goose Valley Water District, the Southeast Water and Sewer District, the Woodland Hills Improvement and Service District, areas east of the existing City limits, and adjacent areas, shall be owned in their entirety by the JPB, except those pipeline systems to be constructed as part of the Project and depicted in Exhibits B and C. For these pipeline systems, upon execution of this agreement, the operating benefits, operating

obligations and control of said pipeline system serving lands within the existing boundaries of the Little Goose Valley Water District or the Southeast Water and Sewer District, as depicted in Exhibits B and C, shall remain with the JPB. Furthermore, upon execution of this agreement, the operating benefits, operating obligations and control of said pipeline systems serving lands outside of the existing boundaries of the Little Goose Valley Water District or the Southeast Water and Sewer District, as depicted in Exhibits B and C, incorporated herein by reference thereto as if fully set forth herein, shall belong to the City. Upon repayment of the Project loan, or upon approval by the legislature, the ownership of said pipeline systems (depicted in Exhibits B and C attached hereto) shall transfer to the City. These pipeline systems shall be constructed according to City specifications or with City approval.

7. Big Horn Distribution Facilities. The water distribution facilities (i.e., mains, laterals, booster stations, tanks, etc.) serving the Big Horn Water District and adjacent areas shall be owned by the JPB. All operating benefits, operating obligations and control shall belong to the JPB.

8. New Raw Water Transmission Main. During construction, the new raw water transmission main shall be owned by the JPB. Upon repayment of any future Project loan associated with the design and construction of this new transmission main, or upon approval by the legislature, the ownership of the pipeline will be transferred to the City. If no Project loan is required,

the ownership of the pipeline shall revert to the City after construction.

This transmission main shall be constructed to City specifications or with City approval, and all operating benefits, operating obligations and control shall belong to the City upon completion of construction. The City agrees to allow the water owned by the JPB to be transmitted in this main jointly with the City's water, up to its capacity.

9. Future Water Supply. As new water supplies are acquired over and above those specifically mentioned in this Agreement, ownership of those supplies to be purchased using $3,000,000 of the Optional Capital Facilities Tax identified for this purpose shall be shared between the JPB and the City on a ratio of 33% to 67% respectively. Ownership of those water supplies purchased over and above the $3,000,000 allocation shall be proportionate to the ratio of investment in these new water supplies by the City and the JPB.

B. Project Components Now in Existence.

Ownership of any Project component not specifically addressed below by this Agreement shall be retained by the present owner.

1. Twin Lakes Reservoirs. The City shall retain ownership of the existing 1,500 acre feet of storage within the Twin Lakes Reservoirs.

2. Big Goose Direct Flow Rights. The rights for direct flow diversion of water from Big Goose Creek currently owned by the City shall remain the property of the City. However, the City

agrees that water shall be made available to the JPB to meet JPB water delivery obligations when available in excess of the City's needs. If there is insufficient direct flow water available to meet both the needs of the JPB and City, or the State Engineer imposes regulation on the City's direct flow rights, any direct flow water obtained from these rights available will be used by the City, and the JPB will use water from its storage accounts or from other sources. The JPB has applied for an additional direct flow right at the City's existing point of diversion.

3. <u>Big Goose Intake Structure, Pre-Treatment Facilities, and Existing 20" Raw Water Transmission Main</u>. The City shall retain ownership, operating benefits, operating obligations and control of the Big Goose Intake Structure, Pre-treatment Facilities and 20" Raw Water Transmission Main. The City agrees to allow the water owned by the JPB to be diverted, pre-treated and transmitted in these facilities, up to the existing capacity of these facilities.

4. <u>The 16-Inch Raw Water Pipeline in Big Goose Valley</u>. For consideration provided herein and for a period of 99 years, the City shall lease 71.3% of the existing 16-inch raw water line's capacity to the JPB, effective upon completion of the Big Goose Treatment Plant and the Big Goose/Soldier Creek Water District water delivery system. Upon the effective date of the lease, the JPB shall assume 71.3% liability of the 16" line. However, the JPB shall honor no claims for liabilities incurred prior to the

effective date of the lease. In the event that water delivery to the City through the City's present 20-inch or any other raw water transmission main is interrupted, the JPB agrees to impose the necessary water conservation measures on all users served by the 16-inch line in order that emergency supplies of water can be made available to City users.

The 16" line shall be operated and managed for the benefit of both parties.

5. Little Goose Direct Flow Filings, Permits. Direct flow filing (TFN 27 6/5) in Little Goose Creek, now held by the City, shall be transferred to the JPB when final permits are granted.

6. Little Goose Madison #1 Well. The Little Goose Madison #1 Well (TFN 21 2/51) located in the NE1/4, Section 12, T 53 N, R 85 W, shall be owned by the JPB.

II. ANNEXATION

If and when rural areas are annexed into the City, or if the City expands its service area, ownership of system appurtenances affected by such annexation shall be negotiated between the City and the JPB on a case-by-case basis. If a transfer of ownership is proposed, such transfer shall not violate the provisions of any agreement or agreements between the City, the JPB, and/or the State of Wyoming, or the provisions of any state legislation in effect at the time of annexation.

III. LOAN SECURITY

For the purpose of obtaining and securing financial assistance from the State of Wyoming, the City agrees to execute and be bound by the mortgage between the JPB and the State, and to pledge as security for Project loans those Project components and water rights owned or to be acquired by the City and deemed necessary as loan security by the State. As financing arrangements now stand, districts as entities have no direct responsibility for repayment of State loans, as they will not be required to be signatories to any notes, mortgages, or Project agreements.

IV. CHANGES

This Ownership Agreement may be altered upon the written agreement of the JPB, the City and the County, and upon written concurrence by the State of Wyoming.

V. RELATIONSHIP TO OPERATING AGREEMENT

Both this Ownership Agreement and the Operating Agreement dated May 15, 1990 concerning operating of facilities are intended to coordinate and correlate with each other. In areas of difference, however, this Ownership Agreement shall govern.

VI. ASSIGNABILITY

It is understood and agreed that the JPB will assign the benefits of this Agreement to the State of Wyoming as collateral for Project loans. No party to this Agreement shall transfer or assign its responsibilities under this Ownership Agreement without the written consent of the other parties.

VII. SEVERABILITY

If any section, paragraph, clause, or provision of this Agreement shall for any reason be held to be invalid or unenforceable, the invalidity or unenforceability of such section, paragraph, clause, or provision shall not affect any of the remaining provisions of this Agreement, the intention being that the various provisions hereof are severable.

VIII. EFFECTIVE DATE

This Agreement shall become effective upon signature by authorized representatives of the JPB, the City and the County.

Adopted this 15th day of May, 1990.

Sheridan Area Water Supply
Joint Powers Board
Sheridan, Wyoming

ATTEST:

George A. Meredith, Secretary

Max A. DeBolt, Chairman

City of Sheridan, Wyoming

ATTEST:

David D. Oedekoven, City Clerk

Max A. DeBolt, Mayor

Sheridan County, Wyoming
Board of County Commissioners

ATTEST:

Ronald L. Dailey,
Sheridan County Clerk

Kenneth D. Kerns, Chairman

/dc/4/26/90

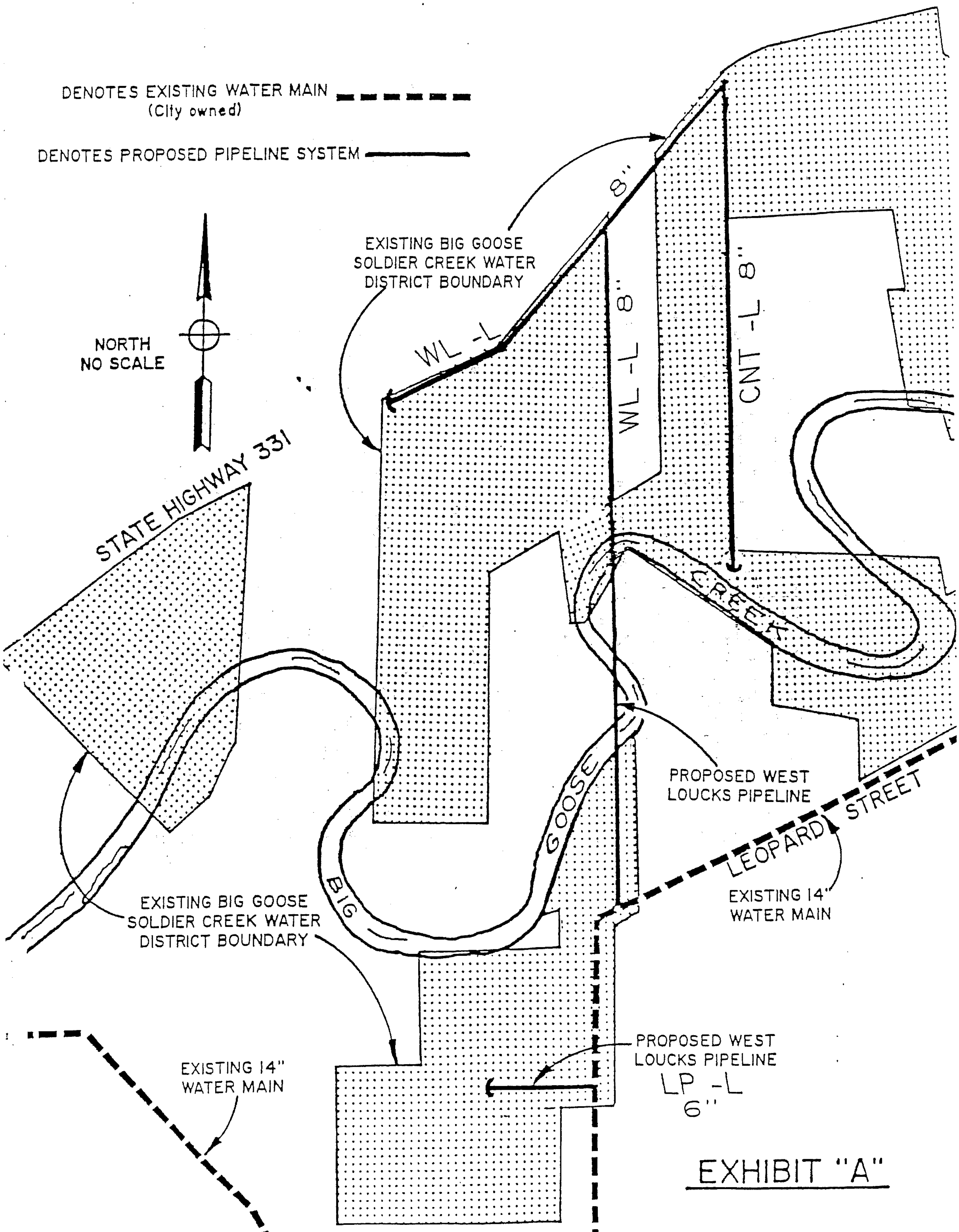

DENOTES EXISTING WATER MAIN (City owned)
DENOTES PROPOSED PIPELINE SYSTEM
NORTH
NO SCALE
EXISTING BIG GOOSE SOLDIER CREEK WATER DISTRICT BOUNDARY
WL -L
8"
WL -L 8"
CNT -L 8"
STATE HIGHWAY 331
CREEK
GOOSE
BIG
PROPOSED WEST LOUCKS PIPELINE
LEOPARD STREET
EXISTING 14" WATER MAIN
EXISTING BIG GOOSE SOLDIER CREEK WATER DISTRICT BOUNDARY
EXISTING 14" WATER MAIN
PROPOSED WEST LOUCKS PIPELINE
LP -L
6"

EXHIBIT "A"

EXHIBIT A SUPPLEMENT

Legal Description of Lands within Existing Big Goose-Soldier Creek Water District, Located in Section 28, T 56 N, R 84 W, and Affected by this Agreement:

Section 28:

All those lands in the S1/2 SE1/4 and the NE1/4 SE1/4 lying outside of the Sheridan City Limits as described in City Ordinance Nos. 1225, 1285, 1340, 1495, and City Resolution Nos. 380, 2211, 2301, also excluding therefrom the lands situate in Section 28 in the following two parcels:

Parcel 1: A tract of land described in Sheridan County Deeds Book 155, Page 273, as follows: A tract of land situated in the SE1/4 SE1/4 of Section 28 and in the NE1/4 NE1/4 of Section 33, Township 56 North, of Range 84 West of the 6th Principal Meridian, in Sheridan County, Wyoming, described as follows: Commencing at a point on the East line of a Roadway, which point is 827.4 feet West and 320 feet South from the Northeast corner of the SE1/4 SE1/4 of said Section 28, thence south along said East line of said Roadway to a point 249.8 feet South of the North line of said Section 33, thence East 275 feet to a point, thence North 87° East 371 feet to a point, thence northerly 25 feet, more or less, to an angle point in the boundaries of that tract of land described in Deed appearing of record in Book X of Deeds at page 468, records of Sheridan County, Wyoming, thence North 86°30' West 265 feet to a point, thence North 44° West 155 feet to a point, thence North 79 feet to a point on the North line of said Section 33, which point is 553.7 feet West of the Northeast corner of said Section, and in the center of Big Goose Creek, thence following the center line of said creek northerly to a point 270 feet North of the South line of said Section 28, thence East to the East line of said Section 28, thence North 300 feet to a point, thence West to the West bank of Big Goose Creek, thence following the West bank of Big Goose Creek in a Northerly direction to a point which is 320 feet South and 214 feet West of the Northeast corner of said SE1/4 SE1/4 of said Section 28, thence West 613.4 feet, more or less to the point of beginning, excluding therefrom the following tract of land described in Sheridan County Deeds Book 264, Page 219, as follows: A tract of land situated in the SE1/4 SE1/4 of Section 28, Township 56 North, Range 84 West of the 6th P.M., more particularly described as follows: From the SE corner of said Section 28, proceed N 0°18'30" E, a distance of 321 feet to the true point of beginning, thence N 0°18'30" E, a distance of 254.38 feet, thence S 89°58'30" W, a distance of 187.98 feet, thence S. 0°54'30" W. a distance of 220.55 feet, thence S. 87°58'55" E, a distance of 82.47 feet, thence S. 76°12'20" E, a distance of 71.97 feet, thence S. 70°03'05" E, a distance of 40.21 feet to the point of beginning.

Parcel 2: A tract of land described in Sheridan County Deeds Book 168, Page 532, as follows: A tract of land located in the South half of the Southeast quarter of Section 28, Township 56 North, Range 84 West of the Sixth Principal Meridian, Sheridan County, Wyoming described as follows: Commencing at a point on the South line of the County road, which point is West 1087.4 feet and South 184 feet from the Northeast corner of the SE1/4 SE1/4 of said Section 28, thence South 0°06' West 966 feet, thence South 63°19' West 272.4 feet, thence North 0°12' West 788.7 feet, thence North 39°36' East 388.9 feet to place of beginning.

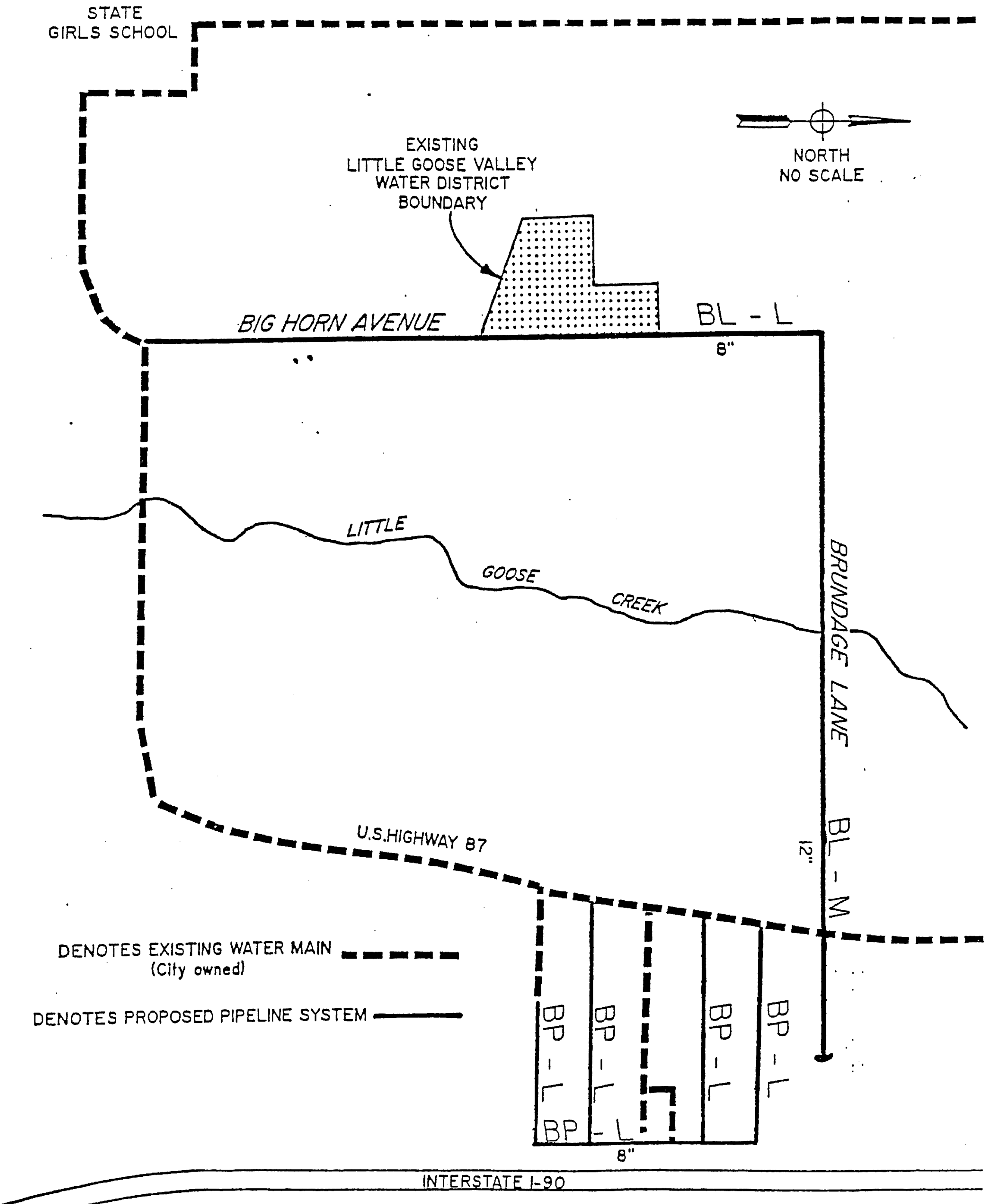

STATE
GIRLS SCHOOL
EXISTING
LITTLE GOOSE VALLEY
WATER DISTRICT
BOUNDARY
NORTH
NO SCALE
BIG HORN AVENUE
BL - L
8"
LITTLE
GOOSE
CREEK
BRUNDAGE LANE
U.S.HIGHWAY 87
12"
BL - M
DENOTES EXISTING WATER MAIN
(City owned)
DENOTES PROPOSED PIPELINE SYSTEM
BP - L
BP - L
BP - L
BP - L
BP - L
8"
INTERSTATE I-90

EXHIBIT "B"

EXHIBIT B SUPPLEMENT

Legal Description of Lands within Existing Little Goose Valley Water District, Located in Section 8, T 55 N, R 84 W, and Affected by this Agreement:

Section 8:

N1/2 NE1/4 NW1/4; S1/2 SE1/4 SW1/4;

A tract of land located in the SE1/4 SE1/4 of Section 8, described as follows: Beginning at a point on the Easterly line of said Section 8, said point being located N 0° 22' 10" W, a distance of 544.68 feet from the Southeast corner of Section 8, said point also being on the centerline of a County Road, thence S 58° 23' 16" W, a distance of 198.84 feet, thence S 53° 06' 40" W, a distance of 346.56 feet, thence N 74° 28' 53" W, a distance of 434.86 feet, thence N 00° 01' 22" E, a distance of 747.93 feet, thence East a distance of 861.66 feet to a point in the center of a County Road, said point being on the Easterly line of said Section 8, thence along said Easterly line and road centerline, S 0° 22' 10" E, a distance of 552.03 feet to the point of beginning.

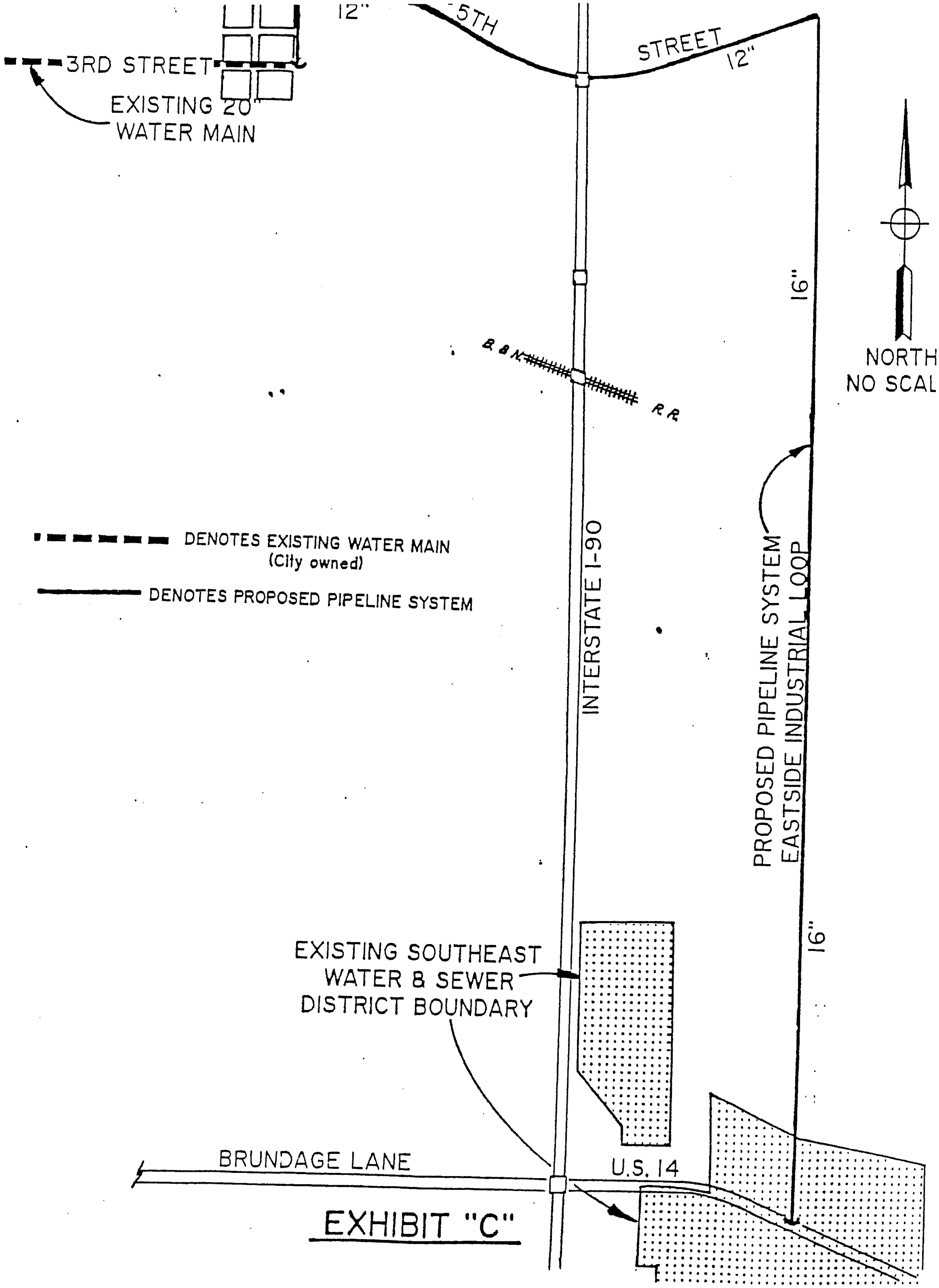

12"
5TH
STREET
12"
3RD STREET
EXISTING 20"
WATER MAIN
16"
NORTH
NO SCAL
B.B.N.
R.R.
DENOTES EXISTING WATER MAIN
(City owned)
DENOTES PROPOSED PIPELINE SYSTEM
INTERSTATE I-90
PROPOSED PIPELINE SYSTEM
EASTSIDE INDUSTRIAL LOOP
16"
EXISTING SOUTHEAST
WATER & SEWER
DISTRICT BOUNDARY
BRUNDAGE LANE
U.S. 14

EXHIBIT "C"

EXHIBIT C SUPPLEMENT

Legal Description of Lands within Existing Southeast Water and Sewer District Affected by this Agreement:

PARCEL NO. 1

A parcel of land located in a portion of Section 1, T. 55 N, R84 W, Sheridan County, Wyoming and more particularly described as follows:

Beginning at a point that is S 33°08' 33" W a distance of 1,619.43 feet from a 1¼' iron pipe that is the NW corner of the NE ¼NW¼, Section 1, said point lying on the north R.O.W. line of U.S. Highway 14, being the SW corner of the Centennial Theatre Property as recorded in Book No. 125 of Deeds, Page No. 195, and being the point of beginning; thence N 0°45'10" E along the west line of said property a distance of 1,002.23 feet to a point that is the SW corner of the Jerry H. Mayo Property as recorded in Book No. 212 of Deeds, Page 305; thence S 58°19'21" E along the south line of said property a distance of 953.00 feet to the SE corner of the Mayo Property as recorded in Book No. 183 of Deeds, Pages 83 and 84; thence S 0°44'13" W a distance of 113.16 feet to a point; thence N 88°44'20" E a distance of 50.00 feetto a point that is the NW corner of the Frank F. Dannels Property as recorded in Book No. 256 of Deeds, Page 513; thence, N 88°44'20"E along the north line of said property a distance of 300.00 feet as recorded, to the NE corner of said property; thence S 77°45'40" E a distance of 41.04 feet to a brass cap that is the NW corner of Country Estates Subdivision as recorded in Book No. 1 of Plats, Page 191; thence S 77°45'40" E along the north line of said subdivision a distance of 1,001.85 feet, as recorded, to a brass cap that is the NE corner of said subdivision; thence, S 1°12'30" E along the east line of the said subdivision, a distance of 765.50 feet as recorded, to a brass cap that is the SE corner of said subdivision; thence S 1°12'30" E along the east line of the Robert Legocki property as recorded in Book 227 of Deeds, Page 613, a distance of 236.73 feet to a point; thence S 61°50'05" E along a line parallel to the centerline of U.S. 14, a distance of 642.25 feet to a point that is 200 feet northerly of said

EXHIBIT C SUPPLEMENT (cont.)

II, monumented by brass caps at the NW and SW corners and recorded as S 1°47'00' W in Book No. 1 of Plats, Page No. 276. All bearings shown have been rotated to conform to this Basis of Bearing.

PARCEL NO. 2

A parcel of land located in portions of Section 1 and the NE¼SE¼ Section 2, T 55N, R 84W, Sheridan County, Wyoming and more particularly described as follows:

Beginning at a point that is S 49°23'43" W a distance of 2,124.70 feet from a 1¼" fron pipe that is the NW corner of the NE¼NW¼, Section 1, said point being a No. 5 rebar, the NW corner of Tract No. 2 of the Brundage Minor Subdivision, and the Point of Beginning; thence S 0°07'29" W along the west line of Tract No. 2, a distance of 798.37 feet, as recorded, in Book No. 1 of Plats, Page No. 171, to the SW corner of said tract; thence, S 89°26'29" E along the south line a distance of 245.48 feet as recorded, to the SE corner of said tract; thence, S 73°48'59" E a distance of 58.34 feet to an aluminum cap at the Intersection of the west line of Country Estates II Subdivision and the north R.O.W. line of Kristi Lane; thence, S 1°47'00" W along the west line of Country Estates II a distance of 467.4 feet, as recorded in Book No. 1 of Plats, Page No. 276, to a brass cap which is the SW corner of said subdivision; thence, N 89°30'17" E along the south line of said subdivision, a distance of 1,070 feet, as recorded, to a brass cap which is the SE corner of Country Estates II; thence N 89°84'12" E, a distance of 192.02 feet to a point that is the NW corner of the reserved parcel of Eastern Hills Subdivision; thence, S 0°21'56" W a distance of 33.00 feet to the NW corner of Lot 7 of said subdivision; thence, S 0°21'56" W along the west line of said subdivision a distance of 1,306.8 feet as recorded in Book No. 1 of Plats, Page No. 106, to an aluminum cap which is the SW corner of Eastern Hills 1st Addition as recorded in Book No. 1 of Plats, Page No. 279; thence S 89°36'34"

E, along the south line of said subdivision a distance of 111.9 feet as recorded, to a point; thence continuing along the south line N 86°02'26" E a distance of 689.45 feet, as recorded to a point thence continuing along said line N 64°57'27" E a distance of 265.9 feet as recorded to a point; thence continuing along said line N 71°28'23" E, a distance of 50 feet as recorded, thence continuing along said line N 88°37'10" E, a distance of 188.75 feet, as recorded, to an aluminum cap which is the SE corner of said subdivision; thence N 5°52'50" W along the east line of said subdivision a distance of 326.15 feet, as recorded, to a point that is the NE corner of Eastern Hills 1st Addition; thence N 5°52'50" W, along the east line of Eastern Hills Subdivision, a distance of 356.2 feet, as recorded, to a point; thence N 9°39'50" W along the east line of said subdivision a distance of 65.7 feet to a point; thence N 3°59'50" W along a chord of a 1,025 foot radius curve a distance of 189.4 feet to a point; thence N 1°29'10" E along the east line of Eastern Hills Subdivision a distance of 32.4 feet, as recorded; thence N 5°01'50" along a chord of 875 foot radius curve a distance of 232.5 feet to a point; thence S 16°03'46" E a distance of 21.2 feet to the SW corner of the Daniel Bilyeu Property; thence N 88°21'55" E along the south line of said property a distance of 253.0 feet as recorde in Book No. 218 of Deeds, Page 609, to the SE corner of said proper thence N 1°16'35" W along the east line of said property a distance of 157.2 feet to a point on the south R.O.W. line of U.S. Highway No. 14 as recorded; thence north westerly following said R.O.W. to the Point of Beginning.

This parcel contains 91.29 acres more or less.

Basis of Bearings:

The basis of bearings for this plat is the west boundary of Country Estates II, monumented by brass caps at the NW and SW corners and recorded as S 1°47'00" W in Book No. 1 of Plats, Page No. 276. All Bearings shown have been rotated to conform to this Basis of Bearing.

PARCEL NO. 3

A tract of land located in the NE¼NE¼ of Section 2, Township 55 North, Range 84 West, and in the SE¼SE¼ of Section 35, Township 56 North, Range 84 West, 6th Principal Meridian, Sheridan County, Wyoming, consisting of those lands recorded in Sheridan County Deed Book 188, Page 459, and Book 188, Page 458. Said tract of land is more particularly described as follows: Beginning at a point of the easterly right-of-way line of Interstate Highway I-90 located S 89°59' E, 4295.5 feet, from a brass cap at the southwest corner of said Section 35; thence along said easterly line, S 00°10' E, 138.2 feet, to brass cap marker 30± 10; thence S 41°29' E, 770.8 feet; thence S 00°12' W, 529.4 feet; thence S 70°35' E, 48 feet: thence S 00°20' E, 7 feet, to the northerly right-of-way line of highway US-14; thence along said northerly line, N 89°41' E, 20 feet; thence leaving said northerly line, N 00°20' W, 420.5 feet thence N 89°30' E, 400 feet; thence N 00°36' E, 2202.0 feet; thence S 89°55' W, 948.5 feet; thence S 89°46' W, 49.9 feet, to brass cap marker 403 ± 87.9 on the easterly line of said I-90; thence along said easterly line, S 00°10' E, 1356.9 feet, to the point of beginning. Said tract contains 45.47 acres, more or less.

OPERATING AGREEMENT

Between the Sheridan Area Water Supply Joint Powers Board

and

the City of Sheridan, Wyoming

Concerning the Sheridan Area Water Project

WHEREAS, the Sheridan Area Water Supply Joint Powers Board (hereinafter known as the "JPB") and the City of Sheridan (hereinafter known as the "City") have agreed to cooperate in the financing, construction, operation and maintenance of the Sheridan Area Water Supply Project (hereinafter known as the "Project"); and

WHEREAS, the JPB and the City have agreed and continue to agree to cooperate in the financing, construction, operation, and maintenance of the Project; and

WHEREAS, the JPB and the City have previously entered into an Ownership Agreement concerning ownership of the Project and dated May 15, 1990; and

WHEREAS, users represented by the City and by the JPB shall not subsidize the costs of operations, maintenance, or other expenses of system components owned and/or operated for the benefit of the other entity; and

WHEREAS, the JPB and the City intend by this Agreement to establish a proper manner for providing efficient operation of the Project as it now and will in the future exist, in order to provide a safe and reliable supply of water to those customers served and to be served, and in accordance with the aforementioned Ownership Agreement.

THE PARTIES TO THIS AGREEMENT DO HEREBY AGREE AS FOLLOWS:

I. SERVICES PERFORMED BY THE CITY

The City shall operate, maintain, and administer those water facilities owned or to be owned, in whole or in part, by the JPB, for the benefit of those system users being provided water service. This operation, maintenance, and administration shall include, but not necessarily be limited to, the following facilities:

A. water treatment plants, appurtenances, and associated water rights and permits;

B. water distribution systems, including tanks, booster stations, mains, valves, meters, and related appurtenances; and

C. the existing Twin Lakes, Sawmill, Dome, and Park Reservoir water supplies, and proposed enlargement of Twin Lakes.

The City shall also read meters, compute, send and collect billings, and perform customer service for the JPB's customers, in a manner usual and customary to that provided by the City to its own retail customers. The City shall act as the JPB's agent in these customer service responsibilities, and shall use its best efforts to collect billings assessed on behalf of the JPB.

The City shall assess user fees on behalf of the JPB as established by the JPB, for those accounts within the JPB's service areas. Monies collected by the City on behalf of the JPB shall be deposited in an account or accounts as so directed by the JPB.

The City shall keep an accurate set of books and records portraying accounts within the JPB's service area. The JPB shall have access to these books and records at any time during regular office hours. Similarly, the JPB shall have access to the City's books and records portraying the City's costs for providing operation, maintenance, and administrative services.

The City shall commence providing these services to the JPB upon receipt of treated water service by the JPB's customers. In the event that the Big Goose/Soldier water distribution system is constructed and available for use prior to the availability of treated water, the City shall be entitled to the use of this distribution system owned by the JPB for service to the City's existing raw water customers, until completion of the Big Goose water treatment plant.

II. COSTS TO THE JOINT POWERS BOARD

A. Administration, Billing and Collection, Source of Supply, Purification, and Transmission Services.

The cost to the JPB to have the City perform operation, maintenance, and administration in these subject areas of service, shall be based upon a percentage of the City's total costs to operate, maintain, and administer (but not replace) its own and the JPB's water facilities, said percentage being the number of active, individual accounts within the JPB's service area as it relates to the total number of active, individual accounts within both the JPB's and City's service area. All costs shall include the necessary materials, equipment, and labor to operate these water facilities. This percentage shall be adjusted annually beginning with the new fiscal year (July 1), using the number of individual accounts active on January 1 of the preceding fiscal year. Additionally, the City and JPB shall jointly prepare an annual audit of costs to assure equity for both parties using this percentage method, and shall maintain the right to adjust the percentages accordingly if there is inequity.

B. Distribution. Meter Reading, and Customer Service Services. The cost to the JPB to have the City perform operation and maintenance in these subject areas of service shall be based upon actual costs to the City. Said costs shall include materials, equipment, and labor costs as determined by the City and approved by the JPB. Whenever possible, hourly rates for equipment and labor shall be established and adjusted from time to time, with hourly rates to include salary, benefits, and training costs incurred by the City, and equipment costs to include operating and depreciation costs incurred by the City. Costs for travel by the City's purification personnel to the JPB's treatment plants shall also be assessed in this manner.

On a quarterly basis, the City shall prepare and submit to the JPB a report sufficient to keep the JPB informed of the activities of the City as they relate to the JPB's water facilities and accounts, as well as any management problems, malfunctions, or pending issues of importance. At that time, the City shall remit billings for its operation, maintenance, and administration services performed for the applicable quarterly period.

III. NEW AND REPLACEMENT EQUIPMENT

The JPB shall construct all treatment plants, tanks, booster stations larger than 75 gpm (or of such size as later agreed to jointly by the JPB and City), and similar facilities in such manner and with such equipment that these facilities can be remotely operated and monitored from the City's water treatment plant or other locations, as determined by the City.

As part of its operation, maintenance, and administration services, the City shall not be responsible for the replacement of components of the JPB's water facilities with a total replacement cost of greater than $500 (said amount to be adjusted from time to time based upon the City's policy of capitalization versus expense for purchases of fixed assets). To that end, the JPB shall establish and maintain a sinking fund to cover the cost of the future replacement of those items over and above said $500 amount. Upon the advice of the City, the JPB shall expend its own funds as necessary for these replacements, with the City administering the use of these funds for an amount to be agreed upon by both the City and JPB. Alternatively, the JPB may let contracts of its own for the purpose of replacing these necessary items.

IV. ADDITIONS AND EXPANSIONS

The City and JPB may, as necessary, purchase or construct additional facilities and/or water supplies to accommodate growth or to improve service to their respective customers. Each entity shall individually pay all costs associated with these facilities and/or water supplies, unless the City and JPB agree that there is mutual benefit in these facilities, in which event both parties shall participate to the extent of their individual benefit as agreed to by both parties.

All facilities to be owned by the JPB within the City's comprehensive planning boundary, as defined in the February, 1983 City of Sheridan Comprehensive Plan Supplement, shall be constructed according to City standards in effect at the time of construction and with City approval. The JPB shall provide plans and specifications to the City, and provide the opportunity for recommendations and comments, for facilities to be owned by the JPB outside of the comprehensive planning boundary.

Equipment items that are highly desirable to be compatible for operational purposes, such as meters, instrumentation, etc., shall be installed both inside and outside of the comprehensive planning boundary in accordance with City standards, and upon approval of the City and JPB.

The JPB shall adopt, and from time to time amend, rules and regulations, connection and extension policies, construction standards, water service master plans, plant investment fee schedules, and other similar items required for the efficient operation and orderly growth of the JPB's system. The City agrees to implement and apply these items as they relate to the City's operation, maintenance and administration of the JPB's water facilities and accounts.

The City, on behalf of the JPB, shall assess and collect plant investment fees for all new installations within the JPB's service area according to an approved JPB fee schedule. The JPB shall immediately report to the City all new connections to its system, after which the City shall provide service in a usual and customary manner.

V. FACILITY USAGE

The Project as proposed at the time of the approval of this agreement contemplates interconnection between both the City's and JPB's facilities. To that end, both parties agree to freely allow the passage of water between and through each other's facilities, and that water treated by one party's treatment facilities may be used within the other's service area.

Additionally, it is not currently known as to the areas where development will occur, and as such, plant investment fees may be obtained by one party although treated water to the areas from where plant investment fees are obtained is being provided by treatment facilities of the other party. Both the City and JPB agree to evaluate this situation on an annual basis, and to require equitable division. Unless mutually agreed, both parties agree that plant investment fees shall not be waived.

Both parties agree to refrain from competing for new connections for water service, and shall cooperate in such manner as to provide the greatest overall benefit to the Sheridan area citizens.

VI. DURATION OF AGREEMENT

This Operating Agreement shall exist in perpetuity, unless either party determines that it is in its best interests to no longer participate. Should either party elect to withdraw from this Operating Agreement, it shall afford the other party the opportunity to make the necessary alterations and adjustments by providing no less than two (2) years' written notice; provided, however, that until the loans described in the Ownership Agreement dated May 15, 1990 to the State of Wyoming are paid in full, no withdrawal by either party shall be allowed without the written concurrence of the State of Wyoming.

VII. CHANGES

This Operating Agreement may be altered upon the written agreement of the JPB and the City, and upon written concurrence by the State of Wyoming.

VIII. RELATIONSHIP TO OWNERSHIP AGREEMENT

Both this Operating Agreement and the Ownership Agreement dated May 15, 1990 are intended to coordinate and correlate with each other. In areas of difference, however, the agreement covering ownership shall govern.

IX. ASSIGNABILITY

It is understood and agreed that the JPB will assign the benefits of this Agreement to the State of Wyoming as collateral for the project loans. Neither party shall transfer or assign its responsibilities under this Operating Agreement without the written consent of the other party.

X. SEVERABILITY

If any section, paragraph, clause, or provision of this Agreement shall for any reason be held to be invalid or unenforceable, the invalidity or unenforceability of such section, paragraph, clause, or provision shall not affect any of the remaining provisions of this Agreement, the intention being that the various provisions hereof are severable.

XI. EFFECTIVE DATE

This Agreement shall become effective upon signature by authorized representatives of the JPB and the City.

Adopted this 15th day of May, 1990.

Sheridan Area Water Supply
Joint Powers Board
Sheridan, Wyoming

ATTEST:

George A. Meredith, Secretary

Max A. DeBolt, Chairman

City of Sheridan, Wyoming

ATTEST:

David D. Oedekoven, City Clerk

Max A. DeBolt, Mayor

/dc/4/25/90

MEMORANDUM OF UNDERSTANDING FOR 2018 WATER SYSTEM MASTER PLAN PROJECT MANAGEMENT

The City of Sheridan, Wyoming ("City") and the Sheridan Area Water Supply Joint Powers Board ("JPB") hereby enter into the following agreement and memorandum of understanding.

RECITALS

WHEREAS, the City of Sheridan has sponsored a Wyoming Water Development Commission (WWDC) Planning Grant application to conduct a Water System Master Plan update of the City's and JPB's interconnected water system to be known and referred to herein as "the Project"; and,

WHEREAS, the Project will be an important document for future growth and management of the City's and JPB's interconnected water system; and,

WHEREAS, by virtue of an existing May 15, 1990 Operating Agreement, as amended, between the City and JPB, the City operates and maintains the JPB's system under contract and in coordination with the City's ongoing operation and maintenance of the City's system; and,

WHEREAS, the City of Sheridan acknowledges that the Project is intended to serve the needs of both the City and JPB where involvement of key staff, the public, and governing bodies representing each must occur and shall occur from inception through to completion and acceptance of the Project; and,

WHEREAS, the City and JPB acknowledge that the Project will be fully funded through the State of Wyoming's WWDC Planning Grant program.

WHEREAS, the City and JPB recognize it will be necessary to commit time and resources to support the Project to a successful completion and hereby agree to commit the necessary resources to support the Project;

THEREFORE, THE CITY AND THE JPB AGREE AS FOLLOWS:

1. While managing the Project for the parties, the City shall act as Project Manager to implement the Project pursuant to this Agreement and the Project Agreement with the WWDC. Specific provisions relating to the City's authority, role and obligations as Project Manager include the following:

A. The City shall have authority to act as agent for the JBP with third-parties regarding the Project, expressly subject to and pursuant to the terms of this Agreement.

B. The City shall endeavor to protect the interests of the JPB in the same manner and to the same extent that it will protect its own at all times.

C. All Project communications between the Project Manager and the JPB with the WWDC shall be made in a timely manner pursuant to this Agreement.

D. The JPB shall designate a qualified Project Representative capable of and authorized to communicate about the Project and to make timely day-to-day decisions and participating in the planning of the Project on behalf of the JPB. The City shall communicate with the JPB's administrative staff and the JPB concerning the Project through this designated JPB representative.

E. A reasonable time prior to approving the final report of the water Master Plan, the City shall submit a complete draft Master Plan to the JBP's Project Representative for review, comment and approval by the JPB Project representative. The City shall not finally approve any report on behalf of the JPB without first obtaining fully informed JPB administrative staff approval.

F. The City Project Manager shall promptly and accurately copy the JPB Project Representative with all written correspondence and any email communications between the City and the WWDC concerning the Project.

G. The City Project Manager shall provide the JPB Project Representative with reasonable advance notice (whenever possible) of all Project meetings with Project engineers and meetings with the WWDC.

H. The Sponsor is not responsible for providing matching funds as a part of this Project. This project is fully funded and administered by the WWDC.

I. It's acknowledged that the City will be the entity allowed to cast the one vote, given to the Sponsor by the WWDC, toward project consultant selection.

2. This Agreement is exclusive of and does not expressly or impliedly amend any of the terms of the Ownership Agreement of May 15, 1990, as amended, and the Operating Agreement of May 15, 1990, as amended.

3. Both the JPB and the City shall, upon reasonable request, provide each other free access to any pertinent books, documents, reports, records, and papers concerning the Project and shall also provide such access to the WWDC, the Wyoming Department of Audit, the Wyoming Attorney General's Office, the Wyoming Department of Labor, the Comptroller General of the United States, the United States Department of Labor, or any of their duly authorized representatives for the purposes of inspection, audit and copying. The City and the JPB shall provide proper facilities for such access and inspection of Project records or documents. The City and the JPB shall keep copies of these records for at least three (3) years after final payment and settlement on the Project.

5. Assignment/Agreement Not Used as Collateral. Neither party shall assign nor otherwise transfer or encumber or cloud title to any of the rights or delegate any of the duties set forth in this Agreement without the prior express written consent of the other party.

6. Indemnification. The JPB shall fully indemnify, defend and hold harmless the City, and their officers, agents, employees, successors and assignees from any and all claims, lawsuits, losses and liability arising out of the JPB's failure to perform any of the JPB's duties and obligations hereunder or in connection with the negligent performance of the JPB's duties or obligations. The City shall fully indemnify, defend and hold harmless the JPB, and their officers, agents, employees, successors and assignees from any and all claims, lawsuits, losses and

liability arising out of the City's failure to perform any of the City's duties and obligations hereunder or in connection with the negligent performance of the City's duties or obligations. Both parties fully reserve and do not waive their sovereign immunity under Wyoming law and any and all rights and defenses otherwise available to them under the Wyoming Governmental Claims Act.

7. No Kickbacks. By executing this Agreement, both parties hereby certify and warrant that no gratuities, kickbacks or contingency fees were paid in connection with this Agreement, nor were any fees, commissions, gifts, or other considerations made contingent upon the award of this Agreement. If either party breaches or violates this warranty, the City may, at its discretion, terminate this Agreement without liability to the non-breaching party, or deduct from the Agreement price or consideration, or otherwise recover, the full amount of any such commission, percentage, brokerage, or contingency fee.

8. Nondiscrimination. Both parties shall fully comply at all times with the Civil Rights Act of 1964, the Wyoming Fair Employment Practices Act (Wyo. Stat. § 27-9-105 et seq.), the Americans with Disabilities Act (ADA), 42 U.S.C. 12101, et seq. and the Age Discrimination Act of 1975. Neither party shall discriminate against any individual on the grounds of age, sex, color, race, religion, national origin or disability in connection with the performance of this Agreement.

9. Notices. All notices arising out of, or from, the provisions of this Agreement shall be in writing and given to the relevant party (ies) at the address provided under this Agreement by certified mail, return receipt requested. Notice shall not be effective unless given in this manner.

10. Severability. Should any portion of this Agreement be finally judicially determined to be illegal or unenforceable, the remainder of this Agreement shall continue in full force and effect, and either party may renegotiate the terms affected by the severance

11. Applicable Law and Venue. The construction, interpretation and enforcement of this Agreement shall be governed by the laws of the State of Wyoming. The Courts of the State of Wyoming shall have jurisdiction over this Agreement and the parties, and the venue shall be in the Fourth Judicial District, Sheridan County, Wyoming.

12. Third Party Beneficiary Rights. The parties do not intend to create in any other individual or entity the status of third party beneficiary, and this Agreement shall not be construed so as to create or to imply such status. The rights, duties and obligations contained in this Agreement shall operate only between the parties to this Agreement and shall inure solely to the benefit of the parties to this Agreement.

13. Ambiguities. The parties agree that any ambiguity in this Agreement shall not be strictly construed, either against or for either party, except that any ambiguity as to sovereign immunity shall be construed in favor of sovereign immunity.

14. Amendments. Any changes, modifications, revisions or amendments to this Agreement which are mutually agreed upon by and between the parties to this Agreement shall be effective and binding only when set forth in a written instrument that is executed and signed by all parties to this Agreement.

15. Binding. The terms of this Agreement, and any proper and valid amendments thereto, shall be binding upon and inure to the parties hereto, their administrators and successors as allowed by applicable law.

16. Entire Integrated Agreement. This Agreement represents the entire and integrated written Agreement between the parties and supersedes all prior negotiations, representations and agreements, whether written or oral.

In witness whereof, the parties to this Agreement, either personally or through their duly authorized representatives, have executed this Agreement on the days and dates set out below and certify that they have read, understood, and agreed to the terms and conditions of this Agreement. The effective date of this Agreement is the day and date last signed and executed by the duly authorized representatives of the parties to this Agreement below.

ATTEST:

Secretary

SHERIDAN AREA WATER SUPPLY
JOINT POWERS BOARD

Chairman

Date: 12/12/17

ATTEST:

City Clerk

CITY OF SHERIDAN, WYOMING

Mayor

Date: 120517

CITY OF SHERIDAN
Resolution 73-07

POLICY RESOLUTION - WATER SUPPLY AVAILABILITY, OUTSIDE CITY WATER AND SEWER EXTENSIONS, PLANT INVESMENT FEE REDUCTIONS, AND WATER RIGHTS CONSIDERATIONS

A RESOLUTION establishing the water capacity and outside water and sewer policy of the City Council of the City of Sheridan, Wyoming superseding all previous resolutions on the provision of water sewer service outside of the corporate limits.

WHEREAS, the 2001 Sheridan County Growth Management Plan – Vision 2020 designated and defined a Planning Area surrounding the City into which the City is expected to expand and grow, and within which it would be in the best interest of the City to promote and encourage quality growth and development that will meet and conform with existing standards and policies of the City, and

WHEREAS, the efforts of updating the City of Sheridan Comprehensive Plan has reexamined and revised the Comprehensive Plan Area boundary especially as it relates to subdivisions, zoning, and the construction of improvements, and

WHEREAS, in a September 15, 1995 memorandum to Bill Bensel, then Attorney General William U. Hill gave the formal opinion that requiring annexation agreements in exchange for municipal water and sewer services was both legal and constitutional.

WHEREAS, the Sheridan Area Water System was designed to meet the following goals: Provide treated water for rural residents surrounding City of Sheridan, resolve raw water tap problem in Big Goose Creek Valley, provide public water supply for Town of Big Horn, provide additional water treatment plant capacity, resolve low pressure problems in areas of the City, Increase raw water transmission conveyance capacity, resolve Twin Lakes spillway deficiencies, increase raw water supply for City and rural residents, provide increased opportunities for economic development.

WHEREAS, it is critical for the City Council to espouse the goals and objectives of the 2001 Sheridan County Growth Management Plan, The City of Sheridan Comprehensive Plan, and any other planning document or study adopted by reference, and

WHEREAS, Sheridan City Council Resolutions 04-71, 08-88, 03-95 all addressed the provision of water and sewer service to customers outside of the corporate limits.

WHEREAS, the nature and quality of the development of lands within the defined Planning Area depends largely upon the availability of basic urban services, such as provided by municipal water and sewer systems, and,

WHEREAS, it is in the best interest of the City, and would promote and encourage quality growth and development of both contiguous and non-contiguous lands within the Comprehensive Plan Area, and utilize affirmative covenant agreements with the owners of to extend the City water and sewer systems to such lands when economically feasible, in return for covenants running with the land by such owners that they will comply with required standards and policies of the City in the developing of their lands and constructing improvements thereon, and that their land will be annexed to the City as soon as such lands become eligible for annexation, and

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF SHERIDAN:

Section 1. City Water Supply Availability :

a. It shall the policy of the City of Sheridan Wyoming that all development within the Comprehensive Plan Area shall be evaluated for impact to the municipal water supply.

b. Any evaluation of the municipal water supply shall use the following base assumptions.
   i. The availability of water during a 5 year drought event (20% base annual chance of occurrence).
   ii. That 500 acre feet will be left in Twin Reservoir to avoid environmental restoration costs.
   iii. That no watering restrictions will be required of municipal residents.
   iv. That Sheridan's "territorial" stream flow appropriation of 16 cfs during the non-irrigation season, and 13 cfs during the irrigation season is never "called" out of priority. If this right is called out, City will defer to "Drought Response Plan" adopted in March of 2003.
   v. That Twin will fully recharge each winter.
   vi. Capacity will be measured in 5/8-inch meter equivalents per AWWA Manual M-1.

c. Based on these assumptions a current capacity measure was developed which is attached as Exhibit A.

d. The City will consider providing available water supplies to other entities outside of the Comprehensive Plan Area experiencing drought conditions. These outside water agreements will be on a contract agreement for one-time annual provision of services.

Section 2. Extension of Water and Sewer Service

a. The Council hereby adopts the Contiguous and Non-Contiguous Property Annexation Agreements, attached hereto as Exhibits B and C, as the template for annexation agreements required in conjunction for the extension of City services outside of the corporate limits.

b. It shall be the policy of the City Council of the City of Sheridan that there shall be no extension or further extension of the municipal water or sewer systems beyond the corporate limits of the City except as hereinafter provided to land lying within the Comprehensive Plan Area surrounding the City as defined in the map attached as Exhibit D.

c. The municipal water or sewer systems may be extended to lands within the Planning Area only if the landowner signs an annexation agreement as established in Section 2.A.

d. The landowner must extend water and sewer main to and within the property to be served entirely at the expense of the landowner. All work shall meet current City Standards, and shall be constructed in accordance with plans and specifications to be approved by the City Engineer.

e. Before the City Council shall enter into any agreement to provide water and sewer outside of the corporate limits, it shall find:

1. That the City has an adequate water supply and sufficient water and sewer plant capacity to furnish outside service without adversely effecting service within the corporate limits.
2. The extension of water and sewer service is economically feasible and can be accomplished within a reasonable time to be fixed by the City Council.
3. The property to be served is readily adaptable to and can be made to conform, within a reasonable time to be fixed by the governing body, to the then existing ordinances, which relate to subdivision, platting, zoning, building and fire codes, and construction of improvements;
4. The area, within which the property to be served lies, can be reasonably expected to be annexed to the municipality within the foreseeable future, and could reasonably be furnished with the other basic services available to residents of the City.
5. Such extension would help promote the orderly growth and development of the municipality.
6. Such extension would help promote the health, safety and welfare of the citizens of the municipality.
7. Such extension is generally in the best interest of the citizens of the municipality.
8. That the landowner has obtained or caused to be obtained the applicable City Permits and Licenses.
9. That all property to be served by City water shall likewise be served by City sewer unless a hardship permit has been granted under the auspices of the 201 Agreement between the City of Sheridan, Sheridan County, and the Wyoming

Department of Environmental Quality. All properties served by City sewer shall be served by City water.

10. If the property is currently served by a water or sewer district or other provider with infrastructure compatible to current City standards, said infrastructure assets may be dedicated to the City at the discretion of the City Council.

Section 3. Plant Investment Fees

a. Plant investment fees for water and sewer fees shall be established annually per resolution in accordance with Sheridan City Code Chapter 28 Article I Sections 1 and 4.4.

b. As defined in, and in in conjunction with, Sheridan City Code Chapter 28 Article III Section 41(f), water and sewer service lines shall be considered abandoned in cases where the water and sewer account has been inactive for a period of one year or more. Reactivation of the water and sewer account shall require the payment of Plant Investment Fees and among other connection charges. Said fees and charges shall be the amount required by resolution at the time the account is reactivated.

c. The City Council may considering reducing Plant Investment Fees in the following cases:
   i. An individual or entity performs an offsite extension of water or sewer mains in excess of 400 feet to serve an area.
   ii. At the request of the City, an individual or entity enlarges the capacity of proposed mains to accommodate a larger service area.

d. The reduction amount of Plant Investment Fees shall be of similar value of the associated costs to the individual or entity for the offsite extension or enlargement of water and sewer mains.

e. In cases where the City Council authorizes the reduction of Plant Investment fees for offsite extension or enlargement, the individual or entity responsible for the improvements shall waive the right to enter into an agreement with the City to recapture enlargement or extension costs. The City shall reserve the right to recapture offsite enlargement and extension investment by assessing other nonparticipating individuals or entities benefiting from the improvements.

Section 4. Water Rights

a. Individuals or entities possessing water rights for a given property may opt to transfer the water rights to the City in exchange for a Plant Investment Fee Reduction equal to the value of the water rights when considering cost and effort necessary to transfer ownership, point of diversion, means of conveyance and change of use State Board of Control rules and regulations and State of Wyoming statutory requirements.

b. The individual or entity requesting plant investment fee reduction in exchange for water rights shall provide the appropriate "Authorization to Detach" instrument or appropriate water right deed acceptable to the State Board of Control. The individual or entity shall also provide all other necessary documentation and supporting information necessary to effectuate the transfer.

c. The sole discretion to accept or reject offers for water rights shall lie with the City Council based on the ability to utilize the water rights for municipal purposes.

Passed, approved and adopted this 17th day of September, 2007

Dave Kinskey, Mayor

Attest:

Arthur Elkins, City Clerk

EXHIBIT ______

WATER TAP "CAPACITY COUNTDOWN" FOR CITY OF SHERIDAN

AWWA EQUIVLNT. 5/8" TAPS (EACH)	ESTIMATED ANNUAL DEMANDS (ACRE-FEET)			ESTIMATED ANNUAL SUPPLIES (ACRE-FEET)			DIFFERENCE (ACRE-FEET)		
	265 DAY NON-IRR SEASON	100 DAY IRRIGATION SEASON	365 DAY ANNUAL AVERAGE	265 DAY NON-IRR SEASON	100 DAY IRRIGATION SEASON	365 DAY ANNUAL AVERAGE	265 DAY NON-IRRIGATION SEASON	100 DAY IRRIGATION SEASON	365 DAY ANNUAL AVERAGE
7,800	1,866.5	2,101.1	3,967.6	7,345.8	4,161.3	11,507.1	5,479.3	2,060.3	7,539.6
8,000	2,075.0	2,150.8	4,069.3	7,345.8	4,161.3	11,507.1	5,270.8	2,010.5	7,437.8
8,200	2,126.9	2,200.6	4,171.0	7,345.8	4,161.3	11,507.1	5,218.9	1,960.7	7,336.1
8,400	2,178.7	2,250.4	4,272.8	7,345.8	4,161.3	11,507.1	5,167.1	1,911.0	7,234.4
8,600	2,230.6	2,300.1	4,374.5	7,345.8	4,161.3	11,507.1	5,115.2	1,861.2	7,132.6
8,800	2,282.5	2,349.9	4,476.2	7,345.8	4,161.3	11,507.1	5,063.3	1,811.4	7,030.9
9,000	2,334.4	2,399.7	4,578.0	7,345.8	4,161.3	11,507.1	5,011.4	1,761.6	6,929.2
9,200	2,386.2	2,449.5	4,679.7	7,345.8	4,161.3	11,507.1	4,959.6	1,711.9	6,827.4
9,400	2,438.1	2,499.2	4,781.4	7,345.8	4,161.3	11,507.1	4,907.7	1,662.1	6,725.7
9,600	2,490.0	2,549.0	4,883.2	7,345.8	4,161.3	11,507.1	4,855.8	1,612.3	6,624.0
9,800	2,541.9	2,598.8	4,984.9	7,345.8	4,161.3	11,507.1	4,803.9	1,562.6	6,522.2
10,000	2,593.7	2,648.5	5,086.6	7,345.8	4,161.3	11,507.1	4,752.1	1,512.8	6,420.5
10,200	2,645.6	2,698.3	5,188.4	7,345.8	4,161.3	11,507.1	4,700.2	1,463.0	6,318.8
10,400	2,697.5	2,748.1	5,290.1	7,345.8	4,161.3	11,507.1	4,648.3	1,413.2	6,217.0
10,600	2,749.4	2,797.9	5,391.8	7,345.8	4,161.3	11,507.1	4,596.4	1,363.5	6,115.3
10,800	2,801.2	2,847.6	5,493.6	7,345.8	4,161.3	11,507.1	4,544.6	1,313.7	6,013.6
11,000	2,853.1	2,897.4	5,595.3	7,345.8	4,161.3	11,507.1	4,492.7	1,263.9	5,911.8
11,200	2,905.0	2,947.2	5,697.0	7,345.8	4,161.3	11,507.1	4,440.8	1,214.2	5,810.1
11,400	2,956.9	2,996.9	5,798.8	7,345.8	4,161.3	11,507.1	4,388.9	1,164.4	5,708.4
11,600	3,008.7	3,046.7	5,900.5	7,345.8	4,161.3	11,507.1	4,337.1	1,114.6	5,606.6
11,800	3,060.6	3,096.5	6,002.2	7,345.8	4,161.3	11,507.1	4,285.2	1,064.9	5,504.9
12,000	3,112.5	3,146.3	6,104.0	7,345.8	4,161.3	11,507.1	4,233.3	1,015.1	5,403.2
12,200	3,164.4	3,196.0	6,205.7	7,345.8	4,161.3	11,507.1	4,181.4	965.3	5,301.4
12,400	3,216.2	3,245.8	6,307.4	7,345.8	4,161.3	11,507.1	4,129.6	915.5	5,199.7
12,600	3,268.1	3,295.6	6,409.2	7,345.8	4,161.3	11,507.1	4,077.7	865.8	5,098.0
12,800	3,320.0	3,345.3	6,510.9	7,345.8	4,161.3	11,507.1	4,025.8	816.0	4,996.2
13,000	3,371.8	3,395.1	6,612.6	7,345.8	4,161.3	11,507.1	3,974.0	766.2	4,894.5
13,200	3,423.7	3,444.9	6,714.3	7,345.8	4,161.3	11,507.1	3,922.1	716.5	4,792.8
13,400	3,475.6	3,494.6	6,816.1	7,345.8	4,161.3	11,507.1	3,870.2	666.7	4,691.0
13,600	3,527.5	3,544.4	6,917.8	7,345.8	4,161.3	11,507.1	3,818.3	616.9	4,589.3
13,800	3,579.3	3,594.2	7,019.5	7,345.8	4,161.3	11,507.1	3,766.5	567.1	4,487.6
14,000	3,631.2	3,644.0	7,121.3	7,345.8	4,161.3	11,507.1	3,714.6	517.4	4,385.9
14,200	3,683.1	3,693.7	7,223.0	7,345.8	4,161.3	11,507.1	3,662.7	467.6	4,284.1
14,400	3,735.0	3,743.5	7,324.7	7,345.8	4,161.3	11,507.1	3,610.8	417.8	4,182.4
14,600	3,786.8	3,793.3	7,426.5	7,345.8	4,161.3	11,507.1	3,559.0	368.1	4,080.7
14,800	3,838.7	3,843.0	7,528.2	7,345.8	4,161.3	11,507.1	3,507.1	318.3	3,978.9
15,000	3,890.6	3,892.8	7,629.9	7,345.8	4,161.3	11,507.1	3,455.2	268.5	3,877.2
15,200	3,942.5	3,942.6	7,731.7	7,345.8	4,161.3	11,507.1	3,403.3	218.7	3,775.5
15,400	3,994.3	3,992.4	7,833.4	7,345.8	4,161.3	11,507.1	3,351.5	169.0	3,673.7
15,600	4,046.2	4,042.1	7,935.1	7,345.8	4,161.3	11,507.1	3,299.6	119.2	3,572.0
15,800	4,098.1	4,091.9	8,036.9	7,345.8	4,161.3	11,507.1	3,247.7	69.4	3,470.3
16,000	4,150.0	4,141.7	8,138.6	7,345.8	4,161.3	11,507.1	3,195.8	19.7	3,368.5
16,200	4,201.8	4,191.4	8,240.3	7,345.8	4,161.3	11,507.1	3,144.0	(30.1)	3,266.8
16,400	4,253.7	4,241.2	8,342.1	7,345.8	4,161.3	11,507.1	3,092.1	(79.9)	3,165.1
16,600	4,305.6	4,291.0	8,443.8	7,345.8	4,161.3	11,507.1	3,040.2	(129.6)	3,063.3
16,800	4,357.5	4,340.8	8,545.5	7,345.8	4,161.3	11,507.1	2,988.3	(179.4)	2,961.6
17,000	4,409.3	4,390.5	8,647.3	7,345.8	4,161.3	11,507.1	2,936.5	(229.2)	2,859.9
17,200	4,461.2	4,440.3	8,749.0	7,345.8	4,161.3	11,507.1	2,884.6	(279.0)	2,758.1
17,400	4,513.1	4,490.1	8,850.7	7,345.8	4,161.3	11,507.1	2,832.7	(328.7)	2,656.4
17,600	4,565.0	4,539.8	8,952.5	7,345.8	4,161.3	11,507.1	2,780.8	(378.5)	2,554.7
17,800	4,616.8	4,589.6	9,054.2	7,345.8	4,161.3	11,507.1	2,729.0	(428.3)	2,452.9

REFERENCES

Population, Water Supply and Water Demand Estimates from: *"WWDC Level I Study -- Draft Documents" Buffalo/Sheridan Area Water System/Lake DeSmet*, May 22, 2007, HKM Engineering Inc., Dayton Alsaker.

ANNEXATION AGREEMENT AND PETITION
CONTIGUOUS PROPERTY

THIS ANNEXATION AGREEMENT, made this ____ day of ______________, 20__, by and between ______________________, and their heirs, successors in interests and assigns (hereinafter "LANDOWNER") and the City of Sheridan, Wyoming, a municipal corporation and City of the First Class (hereinafter "CITY").

WHEREAS, the LANDOWNER is the record owner of a certain tract of land, described as follows: ____

This tract of land, or any smaller part or parcel which may be conveyed as a separate tract, whether or not subdivided, shall hereinafter be referred to as the LAND.

WHEREAS, the LAND is currently contiguous to the CITY; and

WHEREAS, the LANDOWNER desires to receive certain CITY services in exchange for a commitment to annex, at the direction of the CITY; and

NOW, THEREFORE, the parties above named have decided to set forth all of their agreements concerning the annexation of the property as follows:

1. The parties acknowledge that the LAND is currently contiguous to the City limits of the CITY and is within the natural growth area of the CITY. The LANDOWNER agrees and covenants for himself and his heirs, assigns and successors in interest to take all remaining actions at any time, and at the sole discretion of the CITY, to comply with State annexation law and to complete the annexation of the LAND into the CITY. The LANDOWNER, or any successor in interest, shall incorporate this requirement to annex into the CITY on each and every deed for any parcel of land existing or created within the LAND. The LANDOWNER shall adhere to the **City Comprehensive Plan**, appropriate restrictions pertaining thereto, and the **City of Sheridan Traffic Study,** and all amendments thereto. All lands existent at the time of this AGREEMENT, if subdivided and approved by Sheridan County, along with any agreements, covenants, restrictions or zones, shall be submitted to the City Council for approval prior to the recording of the subdivision plat or a sale of any parcel. A commitment or restriction shall be included in every deed or land sale contract executed by the LANDOWNER, whether or not presently platted or subdivided, subsequent to the date of approval of this AGREEMENT, noting that the parcel "shall annex to the CITY without protest, at the discretion and direction of the Sheridan City Council". The commitment to annex shall be recorded as part of each deed and is a covenant running with the property known as the LAND, enforceable by the CITY.

2. This AGREEMENT does not relieve the LANDOWNER, or any successor in interest, from any requirements of the City of Sheridan Subdivision Regulations, when the LAND is further subdivided, and that the subdivision shall be in accordance with all relevant CITY ordinances and other regulations in effect at this time.

3. The LANDOWNER shall construct any and all new buildings or structures on the property in complete conformity with the current building codes and all other codes, as adopted by the City of Sheridan, and the LANDOWNER shall certify such compliance to the Building Official of the City of Sheridan.

4. Upon annexation to the CITY, the CITY shall provide municipal services on the same level as provided to other areas of the CITY, according to state statutes and local ordinances, subject to LANDOWNERS' obligations herein.

5. The parties acknowledge that all CITY utilities and services are required to service lands annexed to the CITY. The parties further acknowledge that this AGREEMENT is a petition to create a local improvement district, as specified in §15-6-203 W.S., 1977, and therefore, constitutes a waiver of the LANDOWNER's right to file protests and remonstrances, as provided by Wyo. Stat. Ann. §15-6-202(d) and §15-6-203. It is expressly understood that this AGREEMENT obligates the inclusion of the LAND, after annexation, in a district or districts which provide for the installation and construction of the following listed improvements, until all the improvements are constructed in compliance with City ordinances then in effect and accepted by the City Council. The improvements required are as follows:

> LANDOWNER shall be required to install, at LANDOWNER'S sole cost, all water infrastructure and sewer infrastructure for the LAND required under City ordinances in effect at the time of such installation for the benefit of the LAND so annexed. LANDOWNER further agrees to pay all costs and fees associated with the annexation and installation (eg., costs of producing required drawings, exhibits, maps, etc.; filing and review fees; and other typical fees charged in similar processes. If a district(s) is formed which includes annexation of lands in addition to LANDOWNER'S LAND, then LANDOWNER shall pay their proportionate fair share costs of the district(s), in accord with applicable City Code.

6. The parties further agree to the following specific items: ______________

____

____

____

7. The LANDOWNER hereby petitions the Sheridan City Council to accept this AGREEMENT as a petition to annex all of the LAND previously described above into the CITY limits of the City of Sheridan. LANDOWNER is the owner of all LAND described above. LANDOWNER and CITY agree that this petition may be filed with the City and/or County Clerk at any time, and at the sole discretion of the CITY.

8. LANDOWNER agrees to sign any other petition or petitions or to take any other action whatsoever to comply with State annexation law as they may be required by the CITY to facilitate the annexation. LANDOWNER further waives any irregularities in the annexation process and specifically waives his right to protest the said annexation. The parties acknowledge that the CITY may choose not to complete the annexation of LANDOWNER's land until other logical contiguous areas can be annexed to the CITY, at the CITY'S direction. LANDOWNER agrees to provide an annexation plat, prepared by a Wyoming registered land surveyor, at his sole cost and expense, upon the request of the CITY. The LANDOWNER specifically agrees and acknowledges that the timing of the annexation is within the sole discretion of the CITY. The CITY may initiate the annexation of the LAND described above at any time and without notice to LANDOWNER.

9. This AGREEMENT, and every part thereof, shall constitute a covenant running with the LAND described above and may be enforced by the CITY by an action at law or equity.

10. This AGREEMENT shall inure to the benefit of, and be binding upon the parties hereto, their respective heirs, successors in interest and assigns. This AGREEMENT shall bind each and every successor in interest to the LAND or any portion or parcel thereof.

11. This AGREEMENT shall be governed by the laws of the State of Wyoming. The District Court of the Fourth Judicial District in Sheridan County, Wyoming, shall have venue and jurisdiction exclusively for any action in law or equity which may be instituted to enforce the terms of this AGREEMENT.

12. If any legal action is instituted to enforce any of the terms of this AGREEMENT, the unsuccessful party shall pay the successful party's reasonable attorneys' fees and all costs of the action including court costs, expert witness fees and all other actual expenses incurred in the prosecution of the action.

13. If any section, subsection, sentence, clause, phrase or portion of this AGREEMENT is for any reason held invalid or unconstitutional by any Court or other authority of competent jurisdiction, such portion shall be deemed a separate, distinct and independent provision and shall not affect the validity of the remaining portions hereof, which shall remain in full force and effect.

DATED This ____ day of ____________________, 20__.

LANDOWNER:

____

____

CITY OF SHERIDAN:

____
Dave Kinskey, Mayor

ATTEST:

____
Art Elkins, City Clerk

STATE OF WYOMING)
)ss.
COUNTY OF SHERIDAN)

On __________, 20__, personally appeared before me __________________, whom I know personally, to be the signer of the above and he acknowledged that he signed it.

____
Notary Public
My Commission Expires:

STATE OF WYOMING)
)ss.
COUNTY OF SHERIDAN)

On __________, 20__, personally appeared before me Dave Kinskey, Mayor of the City of Sheridan, Wyoming, whom I know personally, to be the signer of the above and he acknowledged that he signed it.

____
Notary Public
My Commission Expires:

ANNEXATION AGREEMENT AND PETITION
NON-CONTIGUOUS PROPERTY

THIS ANNEXATION AGREEMENT, made this ____ day of ________________, 20__, by and between ________________, and their heirs, successors in interests and assigns, hereinafter referred to as LANDOWNER, and the City of Sheridan, Wyoming, a municipal corporation and City of the First Class, hereinafter referred to as CITY.

WHEREAS, the LANDOWNER is the record owner of a certain tract of land, described as follows: ________________________________

This tract of land, or any smaller part or parcel which may be conveyed as a separate tract, whether or not subdivided, shall hereinafter be referred to as the LAND.

WHEREAS, the LAND is currently not contiguous to the CITY; and

WHEREAS, the LANDOWNER desires to receive certain CITY services in exchange for a commitment to annex, at the direction of the CITY; and

NOW, THEREFORE, the parties above named have decided to set forth all of their agreements concerning the annexation of the property as follows:

1. The parties acknowledge that the LAND is currently not contiguous to the City limits of the CITY but is within the natural growth area of the CITY. The LANDOWNER agrees and covenants for himself and his heirs, assigns and successors in interest to take all remaining actions at any time, and at the sole discretion of the CITY, to comply with State annexation law and to complete the annexation of the LAND into the CITY. The LANDOWNER, or any successor in interest, shall incorporate this requirement to annex into the CITY on each and every deed for any parcel of land existing or created within the LAND. The LANDOWNER shall adhere to the **City Comprehensive Plan**, appropriate restrictions pertaining thereto, and the **City of Sheridan Traffic Study,** and all amendments thereto. All lands existent at the time of this AGREEMENT, if subdivided and approved by Sheridan County, along with any agreements, covenants, restrictions or zones, shall be submitted to the City Council for approval prior to the recording of the subdivision plat or a sale of any parcel. A commitment or restriction shall be included in every deed or land sale contract executed by the LANDOWNER, whether or not presently platted or subdivided, subsequent to the date of approval of this AGREEMENT, noting that the parcel "shall annex to the CITY without protest, at the discretion and direction of the Sheridan City Council". The commitment to annex shall be recorded as part of each deed and is a covenant running with the property known as the LAND, enforceable by the CITY.

2. This AGREEMENT does not relieve the LANDOWNER, or any successor in interest, from any requirements of the City of Sheridan Subdivision Regulations, when the LAND is further subdivided, and that the subdivision shall be in accordance with all relevant CITY ordinances and other regulations in effect at this time.

3. The LANDOWNER shall construct any and all new buildings or structures on the property in complete conformity with the current building codes and all other codes, as adopted by the City of Sheridan, and the LANDOWNER shall certify such compliance to the Building Official of the City of Sheridan.

4. Upon annexation to the CITY, the CITY shall provide municipal services on the same level as provided to other areas of the CITY, according to state statutes and local ordinances.

5. The parties acknowledge that all CITY utilities and services are required to service lands annexed to the CITY. The parties further acknowledge that this AGREEMENT is a petition to create a local improvement district, as specified in §15-6-203 W.S., 1977, and therefore, constitutes a waiver of the LANDOWNER's right to file protests and remonstrances, as provided by Wyo. Stat. Ann. §15-6-202(d) and §15-6-203. It is expressly understood that this AGREEMENT obligates the inclusion of the LAND, after annexation, in a district or districts which provide for the installation and construction of the following listed improvements, until all the improvements are constructed in compliance with City ordinances then in effect and accepted by the City Council. The improvements required are as follows:

> LANDOWNER shall be required to install, at LANDOWNER'S sole cost, all water infrastructure and sewer infrastructure for the LAND required under City ordinances in effect at the time of such installation for the benefit of the LAND so annexed. LANDOWNER further agrees to pay all costs and fees associated with the annexation and installation (eg., costs of producing required drawings, exhibits, maps, etc.; filing and review fees; and other typical fees charged in similar processes. If a district(s) is formed which includes lands in addition to LANDOWNER'S LAND, then the LANDOWNER shall pay the cost of any infrastructure assessed to the property as part of the local improvement district in addition to any costs described above.

6. The parties further agree to the following specific items: ______________

7. The LANDOWNER hereby petitions the Sheridan City Council to accept this AGREEMENT as a petition to annex all of the LAND previously described above into the CITY limits of the City of Sheridan. LANDOWNER is the owner of all LAND described above. LANDOWNER and CITY agree that this petition may be filed with the City and/or County Clerk at any time, and at the sole discretion of the CITY.

8. LANDOWNER agrees to sign any other petition or petitions or to take any other action whatsoever to comply with State annexation law as they may be required by the CITY to facilitate the annexation. LANDOWNER further waives any irregularities in the annexation process and specifically waives his right to protest the said annexation. The parties acknowledge that the CITY may choose not to complete the annexation of LANDOWNER's LAND until additional logical and adjacent properties may be annexed simultaneously. LANDOWNER agrees to provide an annexation plat, prepared by a Wyoming registered land surveyor, at his sole cost and expense, upon the request of the CITY. The LANDOWNER specifically agrees and acknowledges that the timing of the annexation is within the sole discretion of the CITY. The CITY may initiate the annexation of the LAND described above at any time and without notice to LANDOWNER.

9. This AGREEMENT, and every part thereof, shall constitute a covenant running with the LAND described above and may be enforced by the CITY by an action at law or equity.

10. This AGREEMENT shall inure to the benefit of, and be binding upon the parties hereto, their respective heirs, successors in interest and assigns. This AGREEMENT shall bind each and every successor in interest to the LAND or any portion or parcel thereof.

11. This AGREEMENT shall be governed by the laws of the State of Wyoming. The District Court of the Fourth Judicial District in Sheridan County, Wyoming, shall have venue and jurisdiction exclusively for any action in law or equity which may be instituted to enforce the terms of this AGREEMENT.

12. If any legal action is instituted to enforce any of the terms of this AGREEMENT, the unsuccessful party shall pay the successful party's reasonable attorneys' fees and all costs of the action including court costs, expert witness fees and all other actual expenses incurred in the prosecution of the action.

13. If any section, subsection, sentence, clause, phrase or portion of this AGREEMENT is for any reason held invalid or unconstitutional by any Court or other authority of competent jurisdiction, such portion shall be deemed a separate, distinct and independent provision and shall not affect the validity of the remaining portions hereof, which shall remain in full force and effect.

DATED This ____ day of ____________________, 20__.

CITY OF SHERIDAN: LANDOWNER:

________________________ ________________________

Dave Kinskey, Mayor

ATTEST: ________________________

____

Art Elkins, City Clerk

STATE OF WYOMING)
)ss.
COUNTY OF SHERIDAN)

On ___________, 20__, personally appeared before me ____________________, whom I know personally, to be the signer of the above and he acknowledged that he signed it.

____

Notary Public

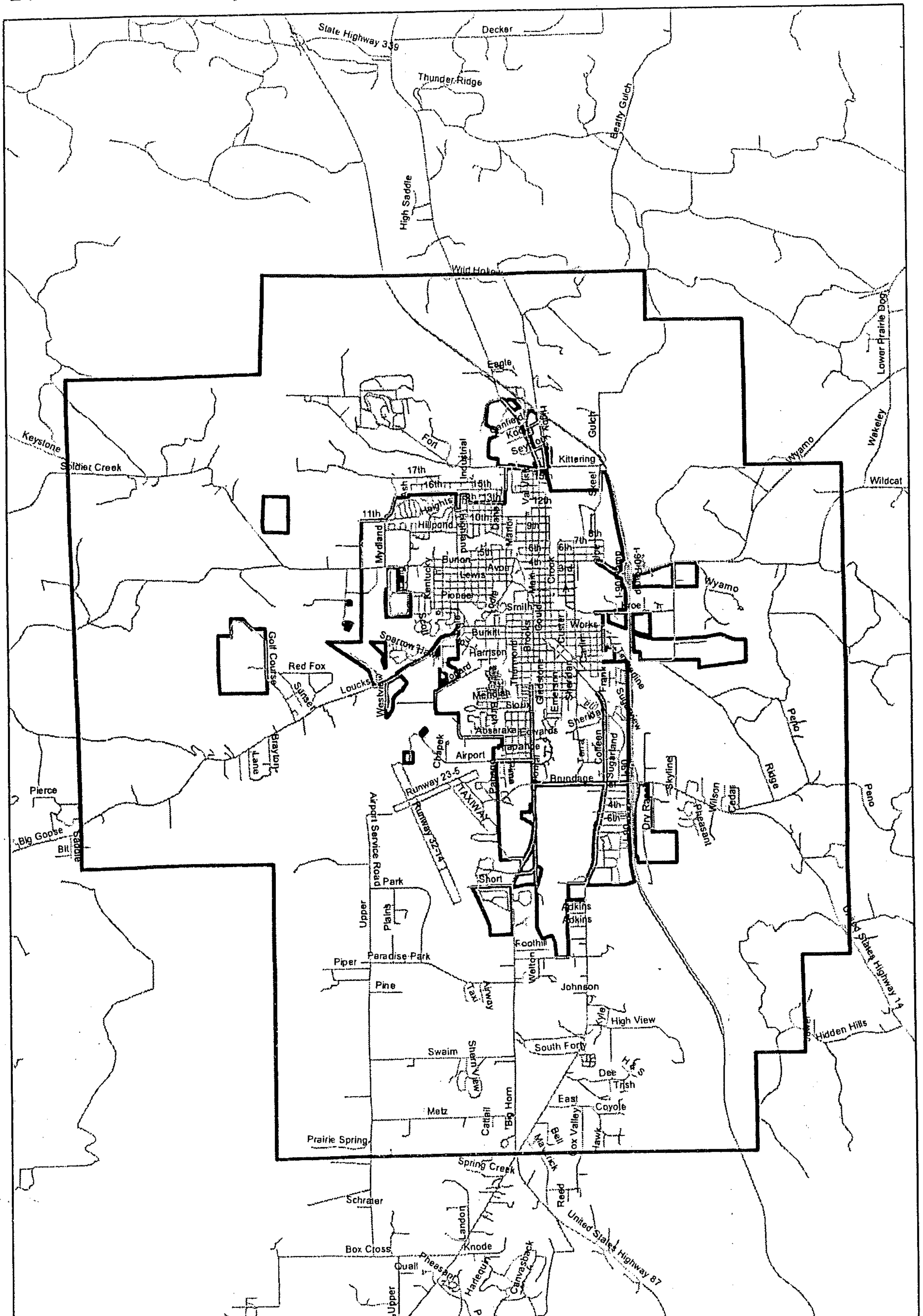
My Commission Expires:

STATE OF WYOMING)
)ss.
COUNTY OF SHERIDAN)

On ___________, 20__, personally appeared before me Dave Kinskey, Mayor of the City of Sheridan, Wyoming, whom I know personally, to be the signer of the above and he acknowledged that he signed it.

____
Notary Public
My Commission Expires:

Exhibit D - City of Sheridan Comprehensive Planning Area



Legend

City Limits — Planning Area — Roads

0 2,500 5,000 10,000 15,000 20,000 Feet

DISCLAIMER:
This map was produced by the City of Sheridan Planning Office for informational purposes only. Although data represented on this map is believed to be accurate at the time of printing, the City of Sheridan provides this map on an "as is" basis without warranties of any kind, either expressed or implied, and shall not be liable for any direct, indirect, incidentle, special, or consequential damages arising out of use of such map. The user acknowledges and agrees that the use of such data is at the sole risk of the user. General questions about this map including errors, omissions, and/or updates should be directed to the City of Sheridan Planning Office.

CITY OF Sheridan

WYOMING

Public Infrastructure Design Standards

2017 Edition

City of Sheridan
Public Works Department
Engineering and Utilities Division
55 Grinnell Plaza
P.O. Box 848
Sheridan, WY 82801
www.sheridanwy.net

TABLE OF CONTENTS

Section 301
Design of Water Distribution Systems

301.00 The City of Sheridan adopts the most current version of Chapter XII of the Wyoming Department of Environmental Quality, Water Quality Rules and Regulations, as the design standards for water distribution systems, well pumps, water storage structures and pumping facilities, to include the following which amend, supplement, or revise the above referenced standards as noted.

DEQ Engineering Design Report – Chapter 12 Section 6 (Modifications)

Add the following language at the end of Subsection 6-b-ii:

The per capita usage rates (gpcd) shall be incorporated into the design:

**TABLE 301-1 DESIGN CRITERIA*

Per Capita Usage Rates (gpcd) for City of Sheridan, DNISD and SAWS-JPB

	Average Day (year-round)	Peak Day	Average Day (During irrigation season)
City and DNISD	210	555	375
SAWS-JPB	180	475	290
Other Design Criteria:			
Irrigation Season – domestic (in-house) usage only:			120 gpcd
Average Day to Peak Day conversion factor:			2.65
Average Day to Peak Hour:			4.20
Persons per Account:			2.50

*Reference: Section 4.9 of the "Final Report for the City of Buffalo – Sheridan Area Water System – Lake DeSmet," Level I Study, June 2008, prepared for the Wyoming Water Development Commission, prepared by: HKM Engineering, Sheridan, Wyoming.

The system shall provide static pressure ranging from forty (40) psi to one hundred ten (110) psi during average day conditions. The system shall maintain a twenty (20) psi minimum residual pressure at the finish floor elevation of the highest unit proposed during peak day plus fire flow demand or peak hour demand, whichever demand is greater, and a thirty-five (35) psi minimum residual pressure during the peak hour demand. The maximum pressure fluctuation at any location in the distribution system between peak hour demand and minimum hour demand should not exceed thirty (30) psi.

Add the following language at the end of Subsection 6-b-iii:

Subject to the following minimums, fire flow will be calculated according to the latest adopted edition of the "International Fire Code," published by the International Code Council, as amended by Sheridan City Code, and will be added to the maximum day hourly flow to adequately size the system for fire flow conditions. Unless in conflict with the "International Fire Code" as determined by the City Fire Code Official, fire flows shall meet the following minimum requirements:

Zoning Type	Fire Flow	Duration
Single Family Residential *(for units less than 3,500 sf)*	1000 gpm	2 hr
All Other Residential	1500 gpm	2 hr
Commercial	2500 gpm	2 hr
Industrial	3500 gpm	3 hr

DEQ Distribution Systems – Chapter 12 Section 14 (Modifications)

Add the following language at the end of Subsection 14-b-iii:

The design must be in substantial conformance with the latest Master Water Plan(s) for the City of Sheridan, Downer Neighborhood Improvement and Service District, and the Sheridan Area Water Supply Joint Powers Board. Twelve inch mains shall be grid spaced at approximately one mile intervals. Eight inch mains shall be grid spaced at approximately ¼ mile intervals, subject to the approval of the Public Utilities Director. Pipes will be designed so the maximum velocity obtained will be less than five (5) ft./sec, excluding fire flow.

Fire sprinkler lines shall be installed at right angles to the distribution main or lateral and be extended directly to the property line. No horizontal bends or offsets are to be installed in these lines. The size of the fire sprinkler lines shall be determined by the needed fire flow required for the building sprinkler system. A post-indicator valve, if required, must be installed in the City right-of-way or easement.

Add the following language at the end of Subsection 14-b-v:

Fire hydrants shall be spaced per Appendix C in the latest edition of the International Fire Code, subject to the approval of the City Fire Code Official.

Delete subsection 14-b-vi in its entirety and insert the following:

All waterlines shall be looped. Permanent dead-end lines are prohibited with the exception of lines extending into cul-de-sacs serving no more than twenty (20) single-family residential units or equivalent demand. For those dead-end lines that are allowed as describe above shall be terminated with a fire hydrant or other flushing device. Dead-end lines may be allowed within the SAWSJPB distribution system provided it is justified by hydraulic analysis, meets demand requirements, to include fire flows when required and terminates with a flushing hydrant or device.

Add a new subsection immediately after Subsection 14-b-vii:
(viii) Services. The International Plumbing Code, latest adopted edition shall be generally used as the basis of design for water service lines. There shall be only one tap and water service line from the main to the property line for each lot. Multiple services on one lot may be divided at the property line with each individual service having a meter and a curb stop. Where multiple structures are on one lot which could be subdivided in the future, one tap and water service line from the main to the property line for each main structure will be allowed only upon approval by the Public Utilities Director. Services larger than 2" must be approved by the Public Utilities Director and will require a "Permit to Construct." That portion of the service line between the main and the property line shall be one continuous length of Type K copper pipe or HDPE pipe, installed perpendicular from the main to a meter pit or curb stop and box at the property line.

Service lines shall be installed at least ten (10) feet laterally, from any foreign non-potable conduit and a minimum of five (5) feet from the side property line of the lot being served. In accordance with the International Plumbing Code, water and sewer services can be installed within the same trench provided the sewer service piping system is constructed using Sch. 40 PVC.

When serving lots at the end of a cul-de-sac, the length of the service line between the main and the property line shall not exceed seventy (70) feet.

Under no circumstances shall any tap be made on a fire hydrant lateral line.

Service lines shall be adequate to supply the requirements of the property being served. The minimum size allowed for a water service line is 1 inch with a 3/4-inch meter. The corporation stop, the meter, and that portion of the service pipe between the meter and the corporation stop on the main, shall all be of the same size for services larger than one (1) inch in the City of Sheridan. For individual service lines, larger than one (1) inch, used for (a) domestic flows and (b) fire suppression system supply, the meter(s) used to record domestic and irrigation flows (non-fire suppression supply) may be of a different size than the shared service pipe as long as the meter is sized appropriately for the anticipated flows. The size for a service line from the City water main to any unit being served shall be selected such that the following design criteria are not exceeded during total peak demand flow:

A. Eighty (80) percent of the manufacturer's maximum meter capacity

B. Service line pipe flow velocity does not exceed fifteen (15) feet per second (fps).

C. The pressure drop from the City water main to any unit being served shall not be greater than thirty (30) psi and the minimum residual pressure at the finish floor elevation to any unit shall not be less than twenty (20) psi.

The water requirements of the property being served shall be defined as "total peak demand flow." Peak domestic water requirements shall be calculated in accordance with the latest edition of the International Plumbing Code and the American Water Works Association M22 Standard. The irrigation demand flow and continuous load demands (when applicable) shall be added to the peak designed flow to get the total peak demand flow.

Meter pits are required on all water service connections in areas served by the SAWS-JPB and DNISD. For areas served by the City of Sheridan, meters will be installed accordingly:

1. All meters shall be installed within a full-depth basement, or in a location within 3 feet of the access if in a crawl space.
2. The service line between the curb-stop and the meter shall be a single, continuous (un-spliced) section and will be buried to prevent future connections prior to the meter.
3. If the aforementioned requirements of 1. and 2. cannot be met, a meter pit to be located immediately after the curb stop will be allowed, provided the meter pit conforms to other requirements within adopted City Standard Specifications.
4. Depending on the hazard classification of the building, an appropriate backflow prevention device may be installed in the meter pit; however, for high-hazard installations, the required backflow prevention device might need to be installed within the mechanical room of the new building provided appropriate floor drains exist to dispense water discharged from the device during a back-pressure situation.

Add a new subsection 14-b-ix:

(ix) Easements and Right-of-Ways

The minimum width right-of-way or easements for City use in which a water main will be installed is twenty (20) feet. If the final depth as measured from finished grade to the top of the water main exceeds 6.0 feet, the following table shall be used to determine the minimum width of right-of-way or easement required:

Depth of water main measured from finished grade to top of pipe (feet).	Minimum distance (feet) from center of proposed water main to edge of building or established R-O-W.

6.0 and less	10.0 (20.0 feet total width)
6.0 to 10.0	15.0 (30.0 feet total width)
Greater than 10.0 feet	At least 20.0 feet (40.0 ft total), and function of soil type.

Add a new subsection 14-b-x:

(x) Fittings. Water main shall be designed to minimize the number of fittings. All fittings shall be in conformance with the City Standard Specifications.

Delete Subsection 14-c in its entirety and insert the following:

(c) Valves. Valves shall be provided on water mains so inconvenience and sanitary hazards will be minimized during repairs. Valves shall be located at not more than five hundred (500) foot intervals on distribution and lateral mains and one thousand (1000) foot intervals on transmission mains. Valves will be placed at all pipe junctions so that the total number of valves at the junction is one less than the number of branches, except as otherwise approved by the Public Utilities Director. Line valves shall also be placed:

- Such that no more than one (1) fire hydrant is isolated at any one time.
- At each end of a line running through an easement on private property.
- On each side of a creek, channel crossing, or Arterial Street/Highway crossing.
- On fire hydrant laterals.

Delete Subsections 14-f-i and 14-f-ii in their entirety and insert the following in their place:

(i) Excavation. Shall be in conformance with the City Standard Specifications and O.S.H.A. Regulations.

(ii) Bedding. Shall be in conformance with the City Standard Specifications.

Add the following language at the end of Subsection 14-f-v:

Water mains shall have a minimum cover of six (6) feet and a maximum cover of seven (7) feet to top of pipe, except as otherwise approved by the Public Utilities Director.

Delete Subsections 14-i in its entirety and insert the following:

i. Cross Connection Control. All water services connected to the public water system shall comply with the City's "Cross Connection Control Program" as described within City of Sheridan Ordinance No. 1946. (A full copy of Ordinance No. 1946 has been provided at the end of Section 301.)

301.10 Transmission Lines 16-Inch and Larger

1. No person shall in any manner tap or make any connections for the purpose of providing water to serve areas outside current service boundaries.
2. No person shall tap or connect to any 16-inch and larger water transmission pipeline unless the applicant has been granted written permission by the Public Utilities Director for doing such.
3. No installation of a utility transmission line, conduit, or underground structure should be nearer than twenty (20) feet clear separation from the outside surface of all 16-inch and larger transmission pipelines when it is required to run parallel to said pipeline(s). No installation of a utility transmission line, conduit, or underground structure should be nearer than two (2) feet clear separation above or below the outside surface of all 16-inch and larger transmission pipelines when it should be required to cross said pipeline(s).

301.20 DEQ Requirements for Service Connections

Any potable water supply service connection from any public water supply to the building shall require a "Permit to Construct" from the City of Sheridan if any of the following conditions exist:

1. A tee must be installed in order to make the connection, or
2. Fire hydrants will be installed, or
3. The service pipe is larger than two (2) inches, or
4. Any appurtenance will be connected to the service pipe that will have an adverse impact on the quality or quantity of the supply.
5. The service connection is tied to the City of Sheridan's water system and is outside the City Limits.

The information to be submitted as an application for "Permit to Construct" shall include plan sketches, valve arrangements, material information, hazard classification for cross-connection control (back-flow) prevention, mechanical room schematics, and hydraulic calculations.

301.30 Pump Stations

Pump stations shall be designed to the current standards of the Wyoming Department of Environmental Quality, Water Quality Division. Pump stations shall include necessary control and telemetry equipment, compatible with the City's existing system, for remote operations of the facility.

SAWSJPB DEVELOPMENT REVIEW AND PERMITTING PROCEDURE

APPROVED BY SHERIDAN WATER SUPPLY JOINT POWERS BOARD

May 9, 2018

Definitions:

City of Sheridan Utility Services Staff: Utility Department staff of the City of Sheridan.

Design and Construction Standards: The design and construction standards of the latest version of the City of Sheridan Standard Specifications and Details for Street and Utility Construction, Sheridan City Codes and applicable State of Wyoming DEQ Rules and Regulations.

Development: Any subdivision of land subject to Sheridan County Planning and Zoning requirements or any extension of water mains or other infrastructure construction to serve a property the SAWSJPB deems a Contingent Water Service Agreement is required.

Developer: The owner of the property seeking water service

Developer's Engineer: Professional engineer licensed to practice in the State of Wyoming providing design and or construction management services to developer

Developer's Contractor: Contractor licensed by City of Sheridan to construct water infrastructure connecting to the joint City of Sheridan/SAWSJPB water system.

SAWSJPB: The Sheridan Area Water Supply Joint Powers Board

SAWJPB Administrator: Administrator, Project Manager or another person appointed by the SAWSJPB.

SAWSJPB's Engineer: **Professional** Engineer engaged by SAWSJPB to provide SAWSJPB with professional services.

Capacity to Serve: The sufficiency of water supply, treatment, transmission, storage, distribution, pressure and volume to meet standards for domestic water service to a property or customer.

Maximum Service Elevation: The elevation above which water volume and or pressure meeting WDEQ standards cannot be provided with the existing water system.

Master Plan: The overall water system plan to manage, record, map, improve, extend, loop, operate and maintain the joint City of Sheridan/SAWSJPB water system.

Contingent Water Service Agreement: Agreement between SAWSJPB and Developer identifying the lands to be served, infrastructure to be constructed by developer and terms of service from SAWSJPB to the development. Acceptance of the infrastructure by SAWSJPB is CONTINGENT upon developer meeting the terms of the agreement.

Separate Irrigation System: A raw water supply and delivery system not connected to the SAWSJPB potable water system used to irrigate the development.

Design and Hydraulic Demand Report: This report explains the improvements proposed, number and type of lots, estimated water usage under all conditions (average day, peak day, peak hour, fire flows), elevation of houses and HGL(s) of the water system, pressures, and other pertinent information that explains and documents the project. This report shall contain an acceptable hydraulic analysis and discussion of the results of that analysis, for both the SAWSJPB system and the new development. A geotechnical investigation and report is recommended.

Permits: Any permit or approval required for construction of the improvements, including but not limited to WYDOT, WYDEQ, Sheridan County or private property owner.

Service Lines: All new development shall include service lines meeting Design and Construction Standards and include corp stop, curb stop, meter pit and tracer wire.

The following path will be followed except where the SAWSJPB Administrator grants an exception:

1. Developer arranges a pre-application meeting with Sheridan County Public Works Department, SAWSJPB staff, City of Sheridan Utility Services staff and any other agency and consulting staff who will review and discuss proposed development. The developer must provide SAWSJPB an exhibit showing the location and description of the proposed connections to and extension of water infrastructure to service the proposed development.

2. SAWS Administrator determines whether development area falls within the water service area. This is accomplished by reviewing the location of the proposed development related to water service boundary, elevation and existing water system infrastructure.

3. The developer requests a letter from SAWSJPB stating the conditions of service to the proposed development.

4. Sheridan County Planning and Zoning prepares letter for developer in consultation with other agency staff detailing initial findings of pre-application meeting.

5. As a part of the preliminary plat process a water system layout shall be provided.

6. As part of the Sheridan County's subdivision improvement guarantee requirement, the developer shall enter into a subdivision improvement agreement that includes assurance for the installation of all permitted water infrastructure.

7. Developer's engineer shall prepare and submit to SAWSJPB Administrator and the City of Sheridan Utility Services Department a hydraulic system review and service simulation modeling report for the specific development and service that the Developer proposes to construct using the SAWSJPB system Electronic and hard copies shall be provided.

8. City of Sheridan Utility Services staff reviews the hydraulic system review and service simulation modeling report, determines capacity to serve and provides a letter to SAWSJPB Administrator, the Developer and Developer's engineer.

9. SAWSJPB Administrator prepares a Contingent Water Service Agreement (CWSA) for the Developer to review and sign. The CWSA will be presented to the SAWSJPB at a regular or special meeting after the Developer has signed the CWSA.

10. Upon approval and execution of the CWSA by the SAWSJPB, the Developers Engineer prepares and applies for a permit to construct from Wyoming Department of Environmental Quality. Any application for a permit to construct shall be reviewed by SAWSJPB administrator and the City of Sheridan Utility staff prior to submission to WDEQ.

11. Following receipt of the permit to construct from Wyoming Department of Environmental Quality, the Developer shall provide a copy of the permit to the City of Sheridan Utility staff and to SAWSJPB Administrator PRIOR to construction beginning.

12. Following review of the permit to construct by the City of Sheridan and SAWSJPB Administrator and prior to any construction of water infrastructure, the Developer shall arrange a preconstruction meeting with the City of Sheridan assigned project manager and the SAWSJPB Administrator, Developer, Developer's Engineer and Developer's Contractor.

13. Following the pre-construction meeting, SAWSJPB's Administrator shall issue a written notice to proceed to the Developer.

14. Construction shall be coordinated in the same manner as a city subdivision process. The Developer's Engineer shall coordinate with the assigned City project manager for all installation, testing and approval procedures and policies for the water system.

15. Any communication between the Developer, Developer's Engineer or Contractor with the City of Sheridan staff shall be recorded in writing and copies provided to the SAWSJPB Administrator on a weekly basis.

16. When the City of Sheridan staff determines the construction has met the City's requirements for Preliminary Acceptance, the City of Sheridan will notify the SAWSJPB Administrator, in writing.

17. Before preliminary acceptance of the water infrastructure constructed by the Developer's Contractor can happen, the following inspections and tests shall be made and approved by the Developer's Engineer and the City of Sheridan staff:

    - Pressure test/leakage test
    - Disinfection and bacteriological tests
    - Operational check of all valves, hydrants, service connections, cathodic test stations and other water infrastructure specific to the Development.
    - Accessibility and alignment of valve boxes and curb stop boxes

18. If applicable, a separate irrigation system shall be installed prior to preliminary acceptance.

19. The following items must be provided to SAWSJB prior to final acceptance of the improvements. Final acceptance is required for water service. The one-year warranty period shall not start until final acceptance is obtained in writing from SAWSJPB:

A. Acceptable lien waivers or other documentation from all contractors, suppliers, subcontractors, vendors, etc. associated with the public improvements that demonstrate to the satisfaction of the SAWSJPB that no liens have been or will be filed upon the facilities which have been installed that are to become the property of the SAWSJPB.

B. A letter of certification from the Developer's Engineer indicating the work was completed in accordance with the Plans and specifications. This shall include verification that all punch list items identified during inspection of the construction of the improvements or the final walk-through, have been satisfactorily addressed.

C. The letter of certification shall accompany a completion report prepared by the engineer, summarizing the construction history and other significant project milestones. A final set of daily observation reports (copies to be submitted weekly to SAWSJPB and the City of Sheridan engineering staff in accordance with Appendix B of Sheridan City Code); compaction test results; approved shop drawings; and water system test results (see#4); shall be included within the appendices of the completion report. Electronic and hardcopies shall be provided

D. The following inspection test shall be made and approved by the City Project Manager for each section of water line. Records of satisfactory test results shall be provided.
   a. Pressure test/leakage test
   b. Disinfection and bacteriological tests.
   c. Operational check of all valves, hydrants, service connections and cathodic test stations.
   d. Accessibility and alignment of valve boxes and curb boxes.

E. Fully complied with all other applicable terms and requirements for the provision of domestic water service by SAWS-JPB pursuant to the CWSA and all applicable SAWS-JPB rules and regulations and other applicable law;

F. Provided or committed to timely provide record drawings for all domestic water facilities constructed to SAWS-JPB staff and/or City of Sheridan staff. This information shall be in hardcopy form, CAD file and in GIS shape file satisfactory to Sheridan County GIS Coordinator and City of Sheridan staff;

G. Fully paid and/or reimbursed all fees, assessments, or costs required to be paid prior to commencement of SAWS-JPB domestic water service or thereafter.

H. All necessary easements and/or plats prepared and filed and recorded with the Sheridan County Clerk. The required utility easement shall be restricted for water mains and/or service lines only.

I. Transfer of ownership of appropriate DEQ and other regulatory permits to the SAWSJPB.

J. Final approval and execution of a written acceptance of the water system by the SAWSJPB.

K. Final Plat/Construction/Acceptance - Upon final acceptance, the SAWSJPB Administrator shall notify the Public Works Department of such to assure that the subdivision Improvement Agreement has been satisfied.

Contingent Water Service Agreement – SAWS-JPB

THIS AGREEMENT made, dated, and signed this ________ day of _________, 2007, by and between, __________________ hereinafter referred to as "Developer"), and the Sheridan Area Water Supply Joint Powers Board (hereinafter referred to as "SAWS-JPB").

WITNESSETH:

WHEREAS, Developer is the owner of the following land, to wit:

> CCC acres, more or less, located in the InSERT of Section XX, Township 55 North, Range 84 West of the Sixth P.M., Sheridan County, Wyoming. Road, access location text HERE.

WHEREAS, Developer desires to obtain domestic water service from Board for said property to supply a proposed a proposed # lot residential subdivision, for a total of no more than XX SAWS-JPB individual residential domestic service taps. The execution of this Contingent Water Service Agreement ("Agreement") shall hereafter be expressly conditional upon certain specific requirements.

WHEREAS, following the execution of this Agreement, the Board shall not be obligated to actually provide water service to the Developer unless and until the Developer is in full compliance with all of the terms, obligations and conditions of this Agreement, has completed construction of the water service facilities approved herein, and said facilities have been approved for use in the SAWS-JPB system by SAWS-JPB or its agents or representatives.

NOW, THEREFORE, IT IS HEREBY AGREED AMONG THE PARTIES AS FOLLOWS:

1. The parties expressly acknowledge and agree that this Agreement is expressly conditioned as follows:

A. First, the parties affirm that at the time of execution of this Agreement by an authorized representative or agent of SAWS-JPB the Developer has fully complied with and met the following mandatory requirements:

i. The proposed service area within the lands is located within SAWS-JPB service boundary;

ii. Specific identification and description of the location of the actual connection(s) to the SAWS-JPB system that the Developer proposes and identification and description of which specific water supply line(s) the Developer proposes to use to connect to SAWS-JPB service to the Developer's lands;

iii. The Developer has provided SAWS-JPB staff, City of Sheridan staff and Sheridan County Utilities staff with sufficiently detailed preliminary engineering plans and construction specifications to allow staff and the SAWS-JPB Board to determine and conclude that the SAWS-JPB system has adequate available water, taps and pressure to provide the water service requested by the Developer so long as all other requirements of this Agreement are met;

iv. The Developer expressly agrees to be bound by and to perform all of the additional specific terms and conditions set forth in the attached Appendix A (which Appendix A is expressly adopted by the parties and incorporated herein by reference).

B. Second, It shall be a further and distinct express condition precedent to the provision of SAWS-JPB will supply domestic water service to any of the Developer's lands that the Developer must verify in writing, and SAWS-JPB must approve and agree in writing that the Developer has:

i. Completed and provided to SAWS-JPB a detailed, accurate, and complete hydraulic system review and service simulation modeling report has been completed by the Developer or the Developer's qualified consultant(s) for the specific development(s) and service(s) that the

Developer proposes to construct using the SAWS-JPB system and such review and modeling has been fully reviewed and accepted by SAWS-JPB staff and City of Sheridan staff;

ii. Finally obtained an appropriate and final Wyoming DEQ "Permit to Construct" domestic water service facilities consistent with the specific plans and specifications provided to SAWS-JPB to induce execution of this Agreement. The Developer and/or its successors and assigns shall be solely responsible to defend any appeal of any such final DEQ permit and to pay or reimburse any and all costs or attorneys fees incurred by SAWS-JPB that are in any way associated with any formal or informal challenge or litigation concerning any such DEQ permit;

iii. Complete and appropriate engineering construction management is in place and documentation evidencing the establishment and activities under said management is followed and provided as per DEQ and SAWS-JPB rules and regulations and/or City of Sheridan construction and operation specifications;

iv. System fitness related performance for pressure, bacteria and other engineering issues and water quality related issues are deemed fully acceptable by the City of Sheridan and SAWS-JPB;

v. Finally obtained, conveyed and recorded, as necessary, all permits, variances, plats, covenants, other similar zoning and planning approvals necessary to legally construct subdivision improvements and to sell or convey any lands to any third-parties consistent with the requirements of Wyoming law and applicable Sheridan County or City of Sheridan regulations, ordinances, and/or laws;

vi. Finally obtained, conveyed and recorded, as necessary, all easements and rights-of-way required by SAWS-JPB, Sheridan County, the City of Sheridan or any other agency with jurisdiction over the Developer's development;

vii. Actually completed construction of the domestic water service facilities as specifically described in the Developer's application plan and permit materials that were provided to SAWS-JPB to induce execution of this Agreement and that such finally completed facilities have been appropriately tested and finally approved for domestic water service use within five hundred forty-five (545) consecutive calendar days immediately following execution of this Agreement;

viii. Fully complied with all other applicable terms and requirements for the provision of domestic water service by SAWS-JPB pursuant to this Agreement and all applicable SAWS-JPB rules and regulations and other applicable law;

ix. Provided or committed to timely provide as-built drawings for all domestic water facilities constructed pursuant to this Agreement to SAWS-JPB staff and/or City of Sheridan staff; and,

x. Fully paid and/or reimbursed all fees, assessments, or costs required to be paid prior to commencement of SAWS-JPB domestic water service or thereafter.

2. Developer shall install necessary water mains and related appurtenances extending from the XXXXXXXXXXXXXXXXXXXXXXXXXXXXx property corner. Specific improvements (line size, location, and other city and county planning issues) shall be determined, evaluated and approved through City of Sheridan and Sheridan County subdivision design and review permitting process.

Installation shall be in accordance with the City of Sheridan Standard Construction/Operation Specifications and any additional requirements resulting from the subdivision, PUD or other applicable planning, zoning or development review and approval process. In addition to the subdivision review and approval process, the plans and specifications must be approved by SAWS-JPB, or its duly authorized agent or successor in interest, and the Wyoming Department of Environmental Quality prior to commencing construction of the domestic water system. Prior to acceptance of the work by the Board, its duly authorized agent or successor in interest, a professional engineer registered to practice in the State of Wyoming shall certify that the work was performed in accordance with the approved construction and operation plans and specifications described herein. Developer shall provide full-time inspection of all underground facilities to assure that the work was in fact performed in accordance with the approved construction and operation plans and specifications described herein.

Upon final acceptance of the work by SAWS-JPB, all water mains and related appurtenances shall become the property and responsibility of SAWS-JPB, or its successor in interest. Similarly, all water meters shall become the property and responsibility of the SAWS-JPB, or its successor in interest. All service lines and related appurtenances shall become the property and responsibility of the owners of the respective lots receiving domestic water service, in accordance with all applicable SAWS-JPB rules and regulations.

3. Developer shall provide and finally convey to SAWS-JPB, its successor in interest, or another appropriate public entity expressly approved by SAWS-JPB in writing, any and all utility, access, construction and/or maintenance easements necessary for the provision of domestic water service to the Developer's lands at no cost to SAWS-JPB or its successor in interest. Such easements shall be prepared in accordance with the minimum horizontal distances shown in the following table or, if necessary, shall be of an appropriate size and character to meet and fully comply with any and all existing and applicable City of Sheridan and/or Sheridan County zoning and planning standards for such utility easements, including but not necessarily limited to:

Depth of water main measured from finished grade to top of pipe (feet).	**Minimum distance (feet) from center of proposed water main to edge of building, edge of easement, or edge of dedicated public right-of-way.**
6.0 and less	15.0
6.0 to 10.0	20.0
Greater than 10.0 feet	At least 20.0 feet, and function of soil type

4. Developer or any successor owners of the respective lots receiving domestic water service from SAWS-JPB pursuant to this Agreement, shall make application for service and pay to SAWS-JPB, or its successor in interest, the then-current water tap installation/service activation fees for each lot or property to be served at the time of receipt of a building permit from Sheridan County, or upon commencement of construction of the residential dwelling unit upon the individual lot to be served, whichever occurs first . Billing for domestic water service shall commence at the time of connection to SAWS-JPB's domestic water system (at the time of installation of corporation stop and meter by the City of Sheridan). Once connection has been made to the SAWS-JPB domestic water system and SAWS-JPB has actually begun providing domestic water to a connection as otherwise required herein, the owner(s) of the property to be served by such connection shall be obligated thereafter to pay all fees and charges in full compliance with the applicable rate schedule as established by SAWS-JPB.

5. SAWS-JPB, its duly-authorized agent, or successor(s) in interest, shall have the ongoing unfettered right to inspect all water main and water service line construction. Construction of any residential dwelling unit on any part of the lands described in this Agreement shall not begin unless and until the domestic water system facilities serving each respective lot or dwelling unit established on the lands described in this Agreement has been finally completed, tested if necessary, and accepted by SAWS-JPB, its duly authorized agent, or successor(s) in interest. Occupancy of any residential dwelling unit shall not begin unless and until the domestic water system facilities serving each respective lot or dwelling unit established on the lands described in this Agreement has been finally completed, tested if necessary, and accepted by SAWS-JPB, its duly authorized agent, or successor(s) in interest. All water meters for SAWS-JPB domestic water service shall be obtained from SAWS-JPB, its duly authorized agent, or successor(s) in interest, and installed according to the regulations of SAWS-JPB or its successor(s) in interest.

6. Developer hereby fully warrants to SAWS-JPB all of the materials, and construction and installation work, associated with its water system (expressly exclusive of any water

connections or facilities installed by Developer or subsequent landowners from the actual water supply system line or vale to a home or other improvement) for one (1) calendar year from the date of actual activation of domestic water service to any logical portion or unit of the domestic water system installed by the Developer or the Developer's successors or assigns that SAWS-JPB or its successors or assigns shall obtain ownership of pursuant to this Agreement and/or SAWS-JPB rules or regulations. Said warranty shall include the Developer's responsibility to repair, maintain and service said facilities at the Developer's sole cost and expense. The Developer shall further fully defend and indemnify SAWS-JPB against any and all claims or liabilities associated with such facilities during the relevant warranty period.

7. Developer expressly agrees that all applicable SAWS-JPB rules and regulations (as they exist now or as they are amended in the future) governing domestic water provided by SAWS-JPB to the Developer's lands pursuant to this Agreement are incorporated herein as binding and enforceable terms of this Agreement. Developer and its successor agree to abide by all applicable SAWS-JPB rules and regulations at all times.

8. The parties to this Agreement expressly acknowledge and agree that given current growth and projected in the development of land in the SAWS-JPB service area, the capacity of the SAWS-JPB domestic water system in the area of the Subdivision is or may be limited. Therefore, in recognition of that circumstance, Developer expressly agrees to perform the following in order to reduce the demands placed upon SAWS-JPB's domestic water system as a result of the development of this subdivision.

A. Developer shall not exceed thirteen (13) individual 3/4" residential domestic connections, or the equivalent for the Lands described in this Agreement.

B. Developer shall include within the covenants of any subdivision of the lands governed by this Agreement sufficient language controlling, regulating and defining the use of domestic water supplied by SAWS-JPB for the purpose of irrigating or applying any and all exterior lawns, gardens, and landscaping consistent with SAWS-JPB rules, regulations and system operation policies and procedures. Developer agrees that domestic water from the SAWS-JPB system should not be used for the purpose of supplying irrigation water for any and all exterior lawns, gardens, and/or landscaping within the Subdivision except as authorized by SAWS-JPB. It shall be an express condition precedent to the provision of domestic water service to the Developer or Developer's lands or to the Developer's successors or assigns or their lands hereunder that the Developer or the Developer's successors or assigns shall provide SAWS-JPB with a final copy of its covenants, bearing evidence that they have been properly recorded and are applicable to all lands described in this Agreement.

C. Developer shall verify in writing that it has submitted and/or filed all petitions or other documentation necessary to bring the Developer into full compliance with all laws and regulations of the State of Wyoming, the Wyoming State Engineer's Office or the State of Wyoming Board of Control concerning the use, conveyance and/or abandonment of any water rights associated with the Developer's lands and that Developer shall implement all orders therefrom fully and promptly.

9. In the event that the Developer or any of the Developer's successors and/or assigns fail to fulfill one or more of the conditions precedent set forth herein or otherwise defaults under the terms of this Agreement, SAWS-JPB shall have the immediate right pursuant to its governing rules and regulations, to declare this Agreement terminated, null and void in all respects. In such circumstance, SAWS-JPB shall have no obligation to perform hereunder and SAWS-JPB shall have no other obligation or liability to the Developer or the Developer's successors or assigns whatsoever.

10. This Agreement shall be governed in all respects by the laws of the State of Wyoming. SAWS-JPB fully reserves, and does not expressly or impliedly waive any governmental and/or sovereign immunity available to it under applicable law.

11. This Agreement shall be binding upon all of the parties heirs, successors in interest, and assigns at all times.

12. In the event that a Court of competent jurisdiction finally determines that any part of this Agreement is unenforceable, such unenforceable provision shall be severable from the remainder of this Agreement and the Agreement shall otherwise remain in full force and effect between the parties to the maximum extent allowed by applicable law.

13. All parties executing this Agreement expressly represent to all other parties that they are fully authorized, without legal disability of any kind, to enter into this Agreement and be bound by it in all respects. All parties hereto enter into this Agreement expressly relying upon such representations.

14. All parties executing this Agreement do so voluntarily and only after availing themselves of the advice of their respective legal counsel.

IN WITNESS WHEREOF, the parties to this agreement execute it as of the date first above written.

Attest by:

SHERIDAN AREA WATER SUPPLY
JOINT POWERS BOARD:

__________________________ Secretary

_____________________________ Chairman

DEVELOPER:

____
Developer or Developer's Agent

STATE OF WYOMING)
: ss.
COUNTY OF SHERIDAN)

The foregoing instrument was acknowledged before me this __________ day of _____, 2007, by ____________________, Chairman of the Sheridan Area Water Supply Joint Powers Board.

Witness my hand and official seal.

Notary Public

My Commission Expires:_______________

STATE OF WYOMING)
: ss.
COUNTY OF SHERIDAN)

The foregoing instrument was acknowledged before me this ____________ day of ______, 2007, by ____, personally known to me as the authorized agent for XXXXXXXXXXXX.

Witness my hand and official seal.

Notary Public

My Commission Expires:_______________

APPENDIX A – Additional Requirements and Conditions

Developer shall install, at its own cost, a properly designed and functional irrigation system within the Subdivision that utilizes a source of water separate and distinct from the domestic water supply to be provided by SAWS-JPB hereunder. This irrigation system shall be utilized by the Developer and the Developer's successors and assigns for the purpose of supplying irrigation water for any and all exterior lawns, gardens, and landscaping for the lands described in this Agreement. Said irrigation system shall not be physically connected in any manner to the SAWS-JPB system. Said irrigation system serving each property or lot within the lands described in this Agreement shall be fully operational to any lots or other portion of the Developer's lands for which actual SAWS-JPB service is to be provided prior to the actual provision of domestic water service for each such respective lot or property by SAWS-JPB. The Developer and/or its successors and assigns hereby agrees to and shall fully indemnify and defend SAWS-JPB and its successors and assigns against any and all casualty, property damage, personal injury or other actual or contingent liability associated with the existence, operation or maintenance of said irrigation system.

In the event that said irrigation system is not constructed as required herein within five hundred forty-five (545) consecutive calendar days from the date of execution of this agreement, SAWS-JPB reserves, and Developer expressly assents, to SAWS-JPB's ongoing right and authority to require Developer to provide other non-domestic irrigation water or to require payment in lieu of provision of non-domestic irrigation water pursuant to SAWS-JPB rules and regulations.

Party Initials

____
Developer

____
SAWS-JPB

DATE: ____________

Rules and Regulations

SHERIDAN AREA WATER SUPPLY JOINT POWERS BOARD

County of Sheridan, Wyoming

I certify that the attached is a true and correct copy of the rules of the Sheridan Area Water Supply Joint Powers Board relating to the provision of domestic water to Sheridan County residents and adopted in accordance with W.S. § 16-1-108 (LexisNexis 2009) and the Wyoming Administrative Procedures Act.

- This is an amendment amending the Rules and Regulations and specifically amending the following chapters and sections; Rules 1 through 26 inclusive, as shown below.

Prior to adoption this rule was made available for public inspection for forty-five (45) days or more beginning on December 7, 2009 and notices of intended adoption were mailed to all persons requesting notice of proposed rules. The attached rule amendments and revisions were adopted by the Board at its regular monthly Board meeting on February 9, 2010 in Sheridan, Wyoming.

The attached rules are effective immediately upon filing with the County Clerk as the Registrar of Rules.

Signed this 10th day of February, 2010.

Administrator
Sheridan Area Water Supply Joint Power Board

662755 RULES & REGULATIONS
BOOK 33 PAGE 0186
RECORDED 02/22/2010 AT 04:35 PM
AUDREY KOLTISKA, SHERIDAN COUNTY CLERK

SHERIDAN AREA WATER SUPPLY JOINT POWERS BOARD

WATER SYSTEM

AMENDED RULES AND REGULATIONS

Adopted pursuant to the Wyoming Administrative Procedures Act and to the authority of the Sheridan Area Water Supply Joint Powers Board established by agreement of the City of Sheridan, Wyoming and the County of Sheridan, Wyoming, by Agreement dated April 5, 1988, and as amended on September 6, 1988 and October 18, 1988.

I certify that the attached is a true and correct copy of the Rules and Regulations as adopted by the Sheridan Area Water Supply Joint Powers Board on February 9, 2010, amending and superseding previous Rules and Regulations. These Rules and Regulations supersede those Rules and Regulations, which were adopted on June 21, 1989 and amended on September 11, 1990, March 10, 1992, November 10, 1992, August 4, 2004, October 16, 2007 and July 16, 2009.

Signed this 10th day of February, 2010.

Interim Administrator
Sheridan Area Water Supply Joint Powers Board

TABLE OF CONTENTS

1. **Ownership and Control**

The rural system of water works that is funded by the Sheridan Area Water Supply Joint Powers Board shall be so owned by the said Joint Powers Board. The system shall be maintained, controlled and managed exclusively by the Joint Powers Board, with the exception of that portion within the corporate limits of the City of Sheridan and that portion outside the corporate limits that is owned exclusively by the City of Sheridan as specifically set forth in the Sheridan Area Water Supply Joint Powers Board Ownership Agreement, as amended. It is the express intent of the Board that the Administrator is responsible for and direct the day-to-day operational and administrative aspects of the SAWSJPB system and that the Board serves a supervisory and policy-making role.

2. **Purpose**

The objective and purpose of the water works system shall be to supply rural water Customers and the City of Sheridan with potable water.

3. **Definitions**

For the purpose of these regulations, certain words and terms used herein are defined as follows:

a. "Applicant" means one who makes any formal application to obtain and/or use any water service(s) from SAWSJPB at any time.

b. "Board" or "SAWSJPB" means the Sheridan Area Water Supply Joint Powers Board.

c. "Administrator" means the water system Administrator who has been duly appointed by the Board.

d. "Customer" or "User" means any person or entity that possesses the contractual and/or legal right to obtain one or more Taps or any other water service from SAWSJPB at any time.

e. "Tap" or "Tap Connection" means the contractual or legal right held by any Customer or User to demand and receive one (1) physical service line connection to the SAWSJPB water supply system capable of providing water service from SAWSJPB. A Tap or Tap Connection is not a water main extension.

4. **Extension of Water System**

a. Each Customer or User who owns or holds any Tap shall pay and shall remain solely responsible for the entire cost of extending water mains and services lines (including the costs of all necessary permitting) to his property, over and above those costs borne by the Board, in accordance with these Rules. Every proposed Subdivision, Planned Unit Development ("PUD"), or water main extension applicants shall apply for and secure a final written Water Service Agreement acceptable to the Administrator and approved by the Board before any taps may be committed to any Customer or User whose lands are located within such developments. The Board may, but is not obligated to, include in Water Service Agreement terms governing developer recapture of actual costs to extend mains. Upon issuance of all necessary permits for such facilities from the State of Wyoming Department of Environmental Quality, upon satisfaction of all applicable Water Service Agreement terms and requirements, and upon final acceptance by the City of Sheridan and the Administrator, then all newly-constructed mains and associated facilities and easements shall, upon such acceptances, become the property of SAWSJPB.

5. **Customer Rates**

The following Customer rates are established and shall be charged and paid on a bimonthly basis.

Minimum Base Rate For All Customers

Minimum Base Rate/2 month billing cycle	
Meter Size	Rate
¾"	$84.00
1"	$127.00
1 ½"	$154.00
2" and larger	$161.00

Tiered Water Usage Rate For All Customers And All Meter Sizes

Usage Rate	
0 – 15,000 gallons	$1.60/1,000 gallons
15,001 gallons and greater	$3.40/1,000 gallons

Billing

a. Billing for all Taps shall commence at the time of connection to the Board's water works system, except for those service applicants applying on or before June 21, 1989, whose billing shall be in accordance with Section 21 of these Rules.

b. SAWSJPB expressly establishes and fully reserves the right to adjust these rates and any other fees or charges described in these Rules from time to time by Board Resolution and as it sees fit.

c. The Administrator shall be primarily responsible to manage all billing and collection issues and disputes for the SAWSJPB.

6. **Contract for Service Required**

No person or entity shall be permitted to use any water from the SAWSJPB system except pursuant to an authorized Application for a Tap or pursuant to an authorized Water Service Agreement and only in accordance with these Rules.

7. **Application for Tap Connection(s)**

a. Every person or entity desiring to acquire one or more Tap Connections from SAWSJPB must make Application to SAWSJPB for a tap or taps on forms to be furnished for that purpose. Subdivision and PUD Customer or User Applicants shall enter into a Water Service Agreement using a form prescribed by the SAWSJPB Administrator. Individual Customers shall apply for any Tap Connection service using an Application Form prescribed by the SAWSJPB Administrator and approved by the Board. Any Applicant for a Tap Connection shall be either the legal owner of the property to be served by the relevant Tap Connection or his/her/its disclosed and duly authorized agent. Every Applicant for a Tap Connection must disclose fully and truly for what purpose and all uses to which the water from the Tap Connection is to be applied. No different or additional use will be allowed except by prior express and specific written authorization of the Administrator.

b. At the time of original application for any Tap, the Applicant shall pay to SAWSJPB the amount of the fees and charges required for the service connection as provided in Section 11 of these Rules.

c. No Applicant for any Tap Connection shall receive service from SAWSJPB unless and until all applicable federal, state, county, and/or city laws, resolutions or ordinances relating to land use and building code standards are fully met to the Administrator's satisfaction.

d. Every Tap shall be allocated and issued only to a specifically described property and in the name of the actual property owner where actual use is planned. Taps and Tap Connections shall not be transferable in any manner to a different property without prior written authorization of the Board after review and approval in the first instance by the Administrator and consistent with the requirements of Section 10 *infra*.

e. When service to a Tap has previously been rendered and subsequently turned off, any request for reinstitution of that specific service may be made either by the owner of the property, his duly authorized agent, or by the tenant or occupant jointly with the owner or agent of the premises. A turn-on charge of one hundred dollars ($100.00) will be assessed.

8. **Permission Required for Connection**

Water will not be turned into any house or private service pipe except upon the written order of the Administrator or his duly authorized agent. Plumbers are strictly prohibited from turning the water into any service pipe except by written order from the Manager or his duly authorized agent. This rule shall not be construed to prevent any licensed plumber from admitting water to test pipes and for that purpose only.

9. **Rate Schedule Constitutes Part of Contract**

The water rates established by the Board shall be considered a part of the contract with every customer supplied with water through the water works system of the Board. Every person taking water shall be considered and held to be bound thereby. Whenever any rule or regulation is violated, the Administrator may exercise his discretion to suspend or shut off service as necessary. After the cause of the suspension has been removed, and upon any other terms the Administrator shall determine, the water service shall be restored pursuant to these Rules.

10. **Service to Non-property Owners - Transfers**

Any Customer who does not own the property to receive service from a Tap, may receive service in his name; provided, however, that the actual record property owner first executes an agreement with SAWSJPB guaranteeing payment for all water service furnished such property, including any required water service fees, minimum fees, or monthly debt service payments fully pursuant to these Rules. In the event that a property owner executes a guarantor's agreement, bills shall be addressed to the property owner in care of the tenant at the address to which service is furnished.

11. **Tap Connection/Plant Investment Fees**

a. Every person or entity applying for any Tap Connection to connect to the SAWSJPB system, or to increase the size or number of Tap Connections thereto, shall pay SAWSJPB a water Tap Connection and Plant Investment Fee ("PIF"). The PIF shall cover the following (including material and labor costs where applicable):

i. plant investment fee;

ii. main line tap (i.e., corporation stop);

iii. meter;

iv. radio read fee; and,

v. any other applicable fees as determined by the Board.

These fees shall be based on the size and number of taps and water meters to be installed upon the premises to be served, in accordance with the amount or amounts set forth.

Rates and Actual Charges					
Size	One-Time Connection and Plant Investment Fee	*Corp Stop	*Meter	*Radio Read	Illustrative Total
¾"	$ 5,380	$ 216	$ 192	$ 300	$ 6,088
1"	$ 12,440	$ 234	$ 288	$ 300	$ 13,262
1 ½"	$ 24,880	$ 336	$ 576	$ 300	$ 26, 092
2"	$ 39,810	$ 372	$ 798	$ 300	$ 41,280
3"	$ 79,630	*	*	*	*
4"	$ 124,410	*	*	*	*
6"	$ 248,830	*	*	*	*

b. Corp Stop, Meter and Radio Read charges shall be actual costs and shall be increased or decreased in the future to reflect and correspond with actual costs for those items. Costs shown for those items in this table are illustrative and are subject to change as actual costs change.

c. The location or relocation of each meter and/or meter pit for each tap shall be determined by the Administrator or his authorized agent or operator before any tap connection is made. No water service to any Tap Connection shall be authorized by the Administrator unless and until the meter and meter pit location has been finally approved by the Administrator.

d. Water service lines and meters shall be the same size unless specific written permission is received from the Board or its Administrator.

e. SAWSJPB will not charge a PIF Fee for any Tap used exclusively for fire protection purposes and will assess PIF fees based upon sizing for needs other than fire protection; however, approved connections, piping, and fittings must be installed. Each Customer shall be responsible for all expenses and any damages which may result from the installation of any fire protection Tap.

f. All materials and labor costs for each Tap incurred to install the service line from the corporation stop to the curb stop, the meter vault, and all associated appurtenances, and the excavation, backfill, and repair of surface damage, (i.e. streets, curbs, etc.,) for each Tap Connection, shall be installed by a utility contractor or other qualified person licensed for such work by the City of Sheridan and shall be the sole responsibility of the Applicant or customer. Any applicable non-SAWSJPB permits required for connection by a Tap holder to the SAWSJPB system shall be obtained prior to the actual installation of the water tap fixtures and facilities beyond the corporation stop.

12. **Delinquent Accounts**

a. All bills for any User's use of any water furnished and for minimum charges are due and fully payable within 30 days after such bills are sent. If any User neglects, refuses or fails to pay his water bill or any other fee or charge within 30 days after the same becomes due, SAWSJPB reserves the right to: (a) charge including a penalty on the balance due consistent with SAWSJPB Resolution No. 06-0911 five (5) day grace period past written due date and then a late fee of one and one-half percent (11/2%) on the unpaid balance per billing cycle or as otherwise determined by the Administrator; and/or (b) terminate service to the premises as determined by the Administrator. Before terminated water service is resumed, the total delinquent amount, together with a reconnection charge of $100.00, shall be paid to SAWSJPB. In the event the Administrator elects to sue in a civil court of competent jurisdiction for the recovery for any delinquent water fees, all court costs, sheriff's fees, and reasonable attorney's fees and expenses and interest at the rate of ten percent (10%) per annum on the full amount of principal, any attorneys fees and costs due on the delinquent account may be assessed to the defendant User and shall be part of the claim of SAWSJPB.

b. SAWSJPB may decline to serve an Applicant for water who is indebted to the Board for service previously rendered to such Applicant, until the applicant pays in full the amount due for the service previously rendered, or until satisfactory arrangement is made with the Board for the payment thereof. SAWSJPB shall not be required to furnish water service to an Applicant, if the Administrator investigates and determines that such Applicant is attempting to obtain water service for a party who is indebted to the Board for service previously rendered; and if such fraud in obtaining service shall be detected after service has been connected, the Administrator may discontinue such service; provided, however, that in the event the indebtedness for service rendered at a former location is in dispute, the applicant shall be served upon complying with the deposit requirement in an amount equal to the net balance in dispute.

13. **Discontinuance of Service**

a. SAWSJPB maintains and reserves the right to terminate water service to any Tap upon violation of these Rules, or where any fraudulent use has been detected. In the event water service has been shut off for a violation of these Rules, water service shall be restored only upon the consent of the Administrator after full payment of any delinquent User accounts.

b. SAWSJPB reserves the absolute right to shut off the water from its mains for the purpose of making repairs or extension, or to prevent waste or loss of water or damage to equipment or property, in an emergency, or for any other purpose, without incurring liability for any damages that might result therefrom.

c. Every User who determines to vacate any premises supplied with service by SAWSJPB, or who for any reason wishes to have such service discontinued, shall give at least three (3) business days notice in advance of specified date of discontinuance of service. The User shall be held responsible for all service rendered at this location until service is discontinued. SAWSJPB assumes no responsibility for any damages arising out of any events and/or circumstances that occur as a result of the continuance or discontinuance of water service.

d. When water service is temporarily shut off, and later turned on at the request of any Customer, the actual cost of such disconnection and reconnection, but not less than ($100.00), shall be paid by the Customer.

14. **Permit to Alter System**

No person or entity shall make any connection to, or in any manner perform any work upon, any of the mains, connections or appurtenances pertaining to any part of the SAWSJPB system without the express prior written permission of the Administrator.

15. **Service to Property**

Each lot, tract, or individual property shall have a separate water service line, meter, and shut-off valve for the Tap Connection that serves it.

16. **Sanitary Regulations**

a. It shall be each Customer's individual responsibility to insure that his existing water service lines and/or plumbing facilities can safely and efficiently accommodate the pressures exerted by the SAWSJPB water system. It shall be unlawful for any person to pollute or contaminate the SAWSJPB water system. There shall be no physical connection between the SAWSJPB water system and any alternate water supply unless and until suitable backflow prevention devices are installed and perform in a manner acceptable to the Administrator. Upon discovery by any SAWSJPB official or inspector of any connection, or practice, which could cause contamination of the system in any degree, the Administrator, or other authorized SAWSJPB personnel shall shut off the connection until the practice or condition is corrected.

b. All newly constructed mains shall be a minimum diameter of 4-inches and shall otherwise conform to these Rules and shall conform to the applicable requirements of the City of Sheridan, the State of Wyoming Department of Environmental Quality – Water Quality Division, Sheridan County and the Administrator. In the event that SAWSJPB requires an Applicant or User to install a water main larger than 8-inch diameter, and the larger-sized water main is not required for said development, SAWSJPB may choose, in its discretion, to reimburse the Applicant or User for the actual materials cost difference between the "oversized" main and an 8-inch main.

c. All service lines or pipes through which water supplied by SAWSJPB shall be installed in accordance with all: (1) relevant Plumbing Codes adopted by the City of Sheridan; (2) relevant City of Sheridan Standard Specifications for Street and Utility Construction; (3) relevant State of Wyoming Department of Environmental Quality - Water Quality Rules and Regulations; and, (4) relevant Sheridan County, Wyoming, building and plumbing standards. All pipe work that will connect to the SAWSJPB water system that is located within public and/or private property shall be available for inspection by the Administrator or his authorized representative during construction and thereafter by exposing such works at the applicant or user's expense. Any unsatisfactory work or exceptions shall be corrected by the Applicant or User. An appropriate cross-connection control device shall be installed on each service line consistent with current City of Sheridan Ordinance No. 1946, as amended, or any equivalent City of Sheridan Ordinance or requirement.

d. Within sixty (60) days immediately following the provision of water service in such lines and facilities, all Applicants who install any service pipes and/or facilities which connect to the SAWSJPB system shall provide the Administrator with complete and accurate "AS-BUILT" accurate drawings showing the installed location of all service line and facility installations.

17. **Tampering, Etc. with Property of the Board**

It is unlawful for any person to in any manner molest, modify, or tamper with any water meter or connection thereto, water main, supply pipe, fire hydrant, or any property of the water works system, unless such person be a duly authorized representative of the Board, or have permission from a duly authorized representative of the Board. Such unlawful conduct shall be considered as property destruction and defacement and offenders shall be prosecuted in accordance with all applicable State of Wyoming statutes or regulations and/or local laws and ordinances.

18. **Customers to Maintain Service Pipes, Etc.**

a. All SAWSJPB system Users and/or Tap holders shall be responsible for providing and paying for the corporation stop, service pipes, curb stop, and all other appurtenances which allow for water service to be provided to their property, and shall properly maintain these facilities and prevent all unnecessary waste of water. All such service lines and appurtenances must be sufficiently strong to bear the pressure and run of the water in the SAWSJPB system main. No reduction in User charges will be made for the time any service pipe or main frozen or out of use for any cause. Every User shall maintain the curb box allowing access to the curb stop in a plumb and operable condition, flush with ground level. SAWSJPB reserves the right, within the exercise of the Administrator's discretion to terminate water services to an individual property if, after five (5) business days' express prior written notice, the property owner has not made the necessary repairs to these appurtenances.

b. Every Customer shall allow access by the SAWSJPB personnel to the curb box and stop for the purpose of regulating water service to any User service location. SAWSJPB shall not be responsible for any damage sustained as a result of operating the service stop in usual and customary manner.

c. SAWSJPB will install and maintain all water meters necessary to enable it to render bills for each class of service furnished. All meters furnished by SAWSJPB will be maintained by SAWSJPB and will remain its property. All pressure-reducing valves, backflow preventers, valves, yokes, pits, or vaults associated with the metering equipment, shall be the responsibility of the Customer or Tap Holder.

d. Should damage result to metering equipment from molestation or willful neglect by any User, the service may be discontinued. In addition to other costs of discontinuing the service, SAWSJPB will repair or replace such equipment and bill consumer for all costs incurred.

e. If a meter is damaged due to freezing, all actual costs for meter repair or replacement shall be paid by the User responsible for that Tap.

f. The Administrator shall be primarily responsible to manage all service installation and maintenance issues.

19. **Hydrants**

All SAWSJPB flushing hydrants or other SAWSJPB hydrants erected in the service area are hereby declared to be the property of SAWSJPB. It shall be unlawful for any person or entity, to open any of the hydrants, or attempt to draw water from the same or at any time uncover or remove any protection from any of such hydrants, or in any manner interfere with the same unless a permit for this purpose is first received from the Administrator. No person authorized to open hydrants shall delegate his authority to another, except for purposes strictly connected with the authorized use.

20. **Water Use Limitation**

Upon the direction of and in a manner set forth by the Board, the Administrator shall limit the use of water both as to quantity and/or time of use.

21. **Special Conditions for Service Applicants Applying on or Before June 21, 1989**

The following special conditions and requirements apply to those Applicants requesting water service from the Board on or before June 21, 1989.

a. The following charges and fees have been waived in favor of the Applicants who requested service on or before June 21, 1989:

i. the plant investment fee for the size of service requested in the Applicant's request for water service received on or before June 21, 1989;

ii. all materials and labor costs associated with the main line tap (corporation stop), extension of service line to applicant's property line, and setting of a service stop, meter, and meter vault, including necessary excavation, backfill, and surface restoration costs.

b. By applying for water as a pre-June 21, 1989 Applicant, each such Applicant and his or its successors and assigns are obligated to pay the relevant property's proportionate share of SAWSJPB's indebtedness, as determined by the Board, at such time that water was made available to the property, and regardless of whether or not each such Tap is in service. Availability of water shall be when water is supplied by the SAWSJPB water system adjacent to the Applicant's property and within 2,000 feet of the point of use, and at a minimum static pressure of 30 psi at the ground level of the point of use. SAWSJPB shall not be obligated to make water available to the Applicant.

c. An Applicant may remove his obligation to the Board at any time by making payment to the Board an amount that is equal to the present worth value of his proportionate share of the Board's outstanding indebtedness, as determined by the Board, at an interest rate of 4 percent per annum. At which time this obligation is removed, the then existing rates for water usage shall be correspondingly reduced by the Board. He also may request that the water service be terminated, and no further user charges will be assessed. A turn-on fee of twenty-five dollars $25.00 will be charged for reinstitution of service.

d. If water does not become available to the Applicant's property by September 1, 1994, neither the Board nor Applicant shall be obligated to the other; however, this obligation may extended in time by mutual agreement.

22. **Request to Return Tap**

Any Applicant or Tap holder may request that water service be permanently terminated, and no further user charges will be assessed. The Board shall have no obligation to grant such request(s) and shall consider them on a case-by-case basis in its sole discretion. When such a request is granted by the Board in its sole discretion, every tap associated with such terminated service shall be returned to the SAWSJPB tap inventory and shall thereafter be made available to new tap Applicants pursuant to these Rules. When such a request is granted by the Board, SAWSJPB shall not owe or pay any refund, reimbursement or other consideration whatsoever to such an applicant.

23. **Amendments**

These Rules and Regulations may be amended only by the affirmative vote of a majority of all members of the Board.

24. **Exemptions to Rules and Regulations**

The Board has the power and the sole discretion on a case-by-case basis to hear and decide exemptions to these Rules. The Board may allow an exemptions only if:

a. For reasons fully set forth by the Board, the circumstances or conditions are such that strict application of these Rules would place an unfair, unnecessary, or undue hardship upon the consumer as determined by the Board;

b. The granting of any exemption is consistent with the general purposes and intent of these Rules, and will not be injurious or unfair to other Customers or Users provided with SAWSJPB service or otherwise detrimental to the public welfare; and

c. Any exemption granted is the reasonable minimum adjustment that will accomplish this purpose as determined by the Board.

25. **Hearings**

SAWSJPB does not expressly or impliedly provide or intend to provide any right to any contested case hearings under the Wyoming Administrative Procedures Act or otherwise to any Applicant, Customer, Tap Holder or User or any reason under these Rules. SAWSJPB will only convene and conduct a contested case hearing under the Wyoming Administrative Procedures Act when a valid statute requires it to do so or pursuant to valid Court Order.

200.

26. **Severability**

If any provisions of these Rules and Regulations are declared invalid by any tribunal, the Attorney General, or supervising state agency, the remaining provisions of these Rules and Regulations shall not be affected thereby.

Approved and adopted this 10th day of February, 2010.

Tom Ringley

Tom Ringley, Chairman

Attest:

T. Cram

Terry Cram, Secretary

STATE OF WYOMING)
) ss
COUNTY OF SHERIDAN)

Subscribed to in my presence and sworn to before me by Tom Ringley, Chairman of the Sheridan Area Water Supply Joint Powers Board, on the 10th day of February, 2010.

CHERYL CROOK NOTARY PUBLIC
SHERIDAN COUNTY, WYOMING
My Commission Expires September 19, 2013

Cheryl Crook
Notary Public

My Commission Expires: 09.19.2013

**SHERIDAN AREA WATER SUPPLY JOINT POWERS BOARD
RULES AND REGULATIONS
FOR
NEW WATER MAIN EXTENSIONS TO SERVE NEW DEVELOPMENT**

4. **Extension of Water System**

...Every proposed Subdivision, Planned Unit Development ("PUD"), or water main extension applicants shall apply for and secure a final written Water Service Agreement acceptable to the Administrator and approved by the Board before any taps may be committed to any Customer or User whose lands are located within such developments.

16. Sanitary Regulations

b. All newly constructed mains shall be a minimum diameter of 4-inches and shall otherwise conform to these Rules and shall conform to the applicable requirements of the City of Sheridan, the State of Wyoming Department of Environmental Quality – Water Quality Division, Sheridan County and the Administrator. In the event that SAWSJPB requires an Applicant or User to install a water main larger than 8-inch diameter, and the larger-sized water main is not required for said development, SAWSJPB may choose, in its discretion, to reimburse the Applicant or User for the actual materials cost difference between the "oversized" main and an 8-inch main.

c. All service lines or pipes through which water supplied by SAWSJPB shall be installed in accordance with all: (1) relevant Plumbing Codes adopted by the City of Sheridan; (2) relevant City of Sheridan Standard Specifications for Street and Utility Construction; (3) relevant State of Wyoming Department of Environmental Quality - Water Quality Rules and Regulations; and, (4) relevant Sheridan County, Wyoming, building and plumbing standards. All pipe work that will connect to the SAWSJPB water system that is located within public and/or private property shall be available for inspection by the Administrator or his authorized representative during construction and thereafter by exposing such works at the applicant or user's expense. Any unsatisfactory work or exceptions shall be corrected by the Applicant or User. An appropriate cross-connection control device shall be installed on each service line consistent with current City of Sheridan Ordinance No. 1946, as amended, or any equivalent City of Sheridan Ordinance or requirement.

Within sixty (60) days immediately following the provision of water service in such lines and facilities, all Applicants who install any service pipes and/or facilities which connect to the SAWSJPB system shall provide the Administrator with complete and accurate "AS-BUILT" accurate drawings showing the installed location of all service line and facility installations.

At its May 9, 2018 Regular Meeting, the SAWSJPB adopted the "SAWSJPB Development and Permitting Procedure" which will govern the development of all new proposed developments to the SAWSJPB water system.

SHERIDAN COUNTY WYOMING EST 1888

CITY OF Sheridan WYOMING

Sheridan Area Water Supply Joint Powers Board
APPLICATION FOR WATER SERVICE PERMIT
(Application shall be made for each tap requested)

ADDRESS OF PROPERTY TO BE SERVED:

Number Street City , WY ZIP

APPLICANT(s) (must be the legal owners of the property to be served or the duly-authorized agent):
First Name(s) Last Name(s)

____

____

MAILING ADDRESS: (If different than the address of the property served)

____

Number Street City State ZIP

Telephone: ________________ **Fax:** ______________ **Mobile:** ________________

E-mail address: ________________________________

LEGAL DESCRIPTION OF PROPERTY TO BE SERVED (attach exhibit as necessary):
Section [ ] Township [ ] Range [ ]

Subdivision ________________________ Block ________ Lot ________

CIRCLE SIZE OF TAP REQUESTED: ¾ inch 1 inch 1 ½ inch 2 inch 3 inch 4 inch 6 inch

CIRCLE THE PROPOSED USE: Residential Commercial Other ________

CIRCLE THE NUMBER OF DWELLING UNITS TO BE SERVED: 1 2 3 Other ________

WILL THE SERVICE LINE CROSS ANY PROPERTY LINES? CIRCLE YES NO

The Applicant hereby applies for a water service permit for the above described real property upon the following terms and conditions:

1. Domestic water service shall be provided only to the property described above.
2. The Applicant agrees to abide by all of the applicable rules; regulations and policies of the Joint Powers Board, The formally promulgated rules and regulation of the Joint Powers Board are expressly incorporated herein as part of this agreement by this reference.
3. The Applicant agrees to fully pay the entire cost of extending water mains and/or service lines to his property, over and above those costs borne by the Joint Powers Board, and in accordance with the Joint Powers Board's rules and regulations and pursuant to the policies, specifications and standards set forth therein. Upon acceptance of the work by the Joint Powers Board, the newly-constructed mains shall become the property of the Joint Powers Board with the responsibility for the water service line remaining with the Applicant.
4. This application is valid for a period of up to two (2) years from date of submittal. If the tap is not in place and the water is not in use by that time, any water service permit issued shall become null and void. This permit may be extended in time at the request of the owner and after the approval of the Sheridan Area Water Supply Joint Powers Board.
5. If a permit is issued the Applicant understands and agrees that the above-stated terms and conditions shall be fully binding upon all water users and upon all owners and successors in interest of the described real property at all relevant times.

SIGNATURE(S):________________________________

DATE: ______________ **WITNESS:** ________________________

OFFICIAL USE ONLY

Date Received: ______________ Approved [ ] Denied [ ]

____________________________ __________________

Sheridan Area Water Supply Joint Powers Board Administrator Date Approved

Water Service Agreement Name: ____________________________

Irrigation system separate from SAWSJPB water supply required: Yes ☐ No ☐

IN THE MATTER OF THE PETITION FOR CLARIFICATION, DESCRIPTION OF ALTERNATE POINTS OF DIVERSION AND FOR CHANGE OF POINTS OF DIVERSION OF THE SHERIDAN TOWN DITCH AND PIPELINE, TERRITORIAL APPROPRIATION, DIVERTING FROM BIG GOOSE CREEK, TRIBUTARY TONGUE RIVER, TRIBUTARY YELLOWSTONE RIVER, WITH PRIORITY OF NOVEMBER 1882. (O.R. 1, P. 244; C.R. 3, P. 477; PROOF NO. 788)	)	DOCKET NUMBER II-96-1-2 IN WATER DIVISION NUMBER TWO

PETITIONER: CITY OF SHERIDAN, ACTING THROUGH ITS MAYOR, DELLA HERBST, P.O. BOX 848, SHERIDAN, COUNTY OF SHERIDAN, STATE OF WYOMING 82801.

This matter was considered by the State Board of Control at its regular meeting on August 21, 1996, with the following results:

FINDINGS OF FACT

1. THAT the petitioner is the owner of the appropriation for which clarification, description of alternate points of diversion and for change of points of diversion are sought.

2. THAT the appropriation involved is the Town of Sheridan Appropriation, Territorial Appropriation, adjudicated under Proof No. 788, in the amount of 16.0 c.f.s. for municipal purposes, diverting from Big Goose Creek, tributary Tongue River, tributary Yellowstone River, through the Sheridan Town Ditch and Pipeline, with priority of November 1882, and of record in Order Record 1, Page 244; Certificate Record 3, Page 477.

3. THAT subsequent to the original Certificate of Appropriation dated May 5, 1892, the State Board of Control entered the following Orders:

a. An Order recorded in Minute Record 3, Pages 275 through 276, to divert 2.0 c.f.s., at a new point of diversion from Big Goose Creek several miles west of the City of Sheridan, at a point located 2538 feet east of the West ¼ Corner of Section 19, Township 55 North, Range 85 West, and to reduce the amount diverted at the Sheridan Town Ditch and Pipeline to 14 c.f.s;

b. An Order recorded in Minute Record 3, Pages 473 through 474, authorizing the diversion of water under the original Certificate from a point from Big Goose Creek for use at Fort McKenzie (now known as United States of America - Department of Veteran's Affairs Medical Center) to supply the military post, and authorizing the City to make an additional diversion at a suitable point for use in supplying 1.0 c.f.s. of flow to the shops and plant of the C. B. and Q. Railroad, and for fire protection and authorized the city to use water under its appropriation at any point or points within the corporate limits of the City as then established or as may thereafter be extended by additions thereto for supplying its inhabitants with water for domestic, manufacturing, sanitary and other uses and the extinguishment of fires. The State Board of Control canceled the original Certificate of Appropriation, and directed that a new amendatory certificate be issued. An Amendatory Certificate of Appropriation dated June 21, 1904, was issued and recorded in Certificate Record 3, Page 477;

c. An Order recorded in Minute Record 4, Pages 272 through 273, granting a petition on April 16, 1909, allowing the City of Sheridan to change the location of its intake to a point described as North 22° 13' 30" West, 2776 feet distant from the South Quarter Corner of Section 35, Township 55 North, Range 86 West, and situated in the NE¼SW¼ of Section 35. This Order also allowed the City to use the old point of intake in case of an emergency;

d. An Order recorded in Order Record 43, Page 358, granting a petition from the Veteran's Administration to change its point of diversion and means of conveyance of 3.0 c.f.s. of the Town of Sheridan Appropriation from the SE¼NW¼ of Section 35, Township 55 North, Range 86 West, to a point approximately 900 feet upstream described as North 22° 13' 30" West, 2776 feet distant from the South Quarter Corner of Section 35, Township 55 North, Range 86 West, and situated in the NE¼SW¼ of Section 35.

4. THAT by and through its petition, the petitioner requested the following:

a. The Big Goose Creek Canyon primary point of diversion will continue to divert 16.0 c.f.s. of the Town of Sheridan Appropriation, Territorial Appropriation, Proof No. 788, at a point located South 51° 27' 27" West, 4233.04 feet distant from the Northeast Corner of Section 35, Township 55 North, Range 86 West, and situated in the SE¼NW¼ of Section 35, provided however that:

i. Up to, but not to exceed 3.0 c.f.s. of the Town of Sheridan Appropriation from the natural flow of Big Goose Creek shall be attributable to the Veteran's Administration by virtue of City Ordinance No. 94 (1903) and the Order of the State Board of Control recorded in Minute Record 3, Pages 473 through 474, or so much thereof as may be necessary to supply its works will be used by the Veteran's Administration. To the extent any portion of said 3.0 c.f.s. is not utilized by the Veteran's Administration, the City may use the same in accordance with City Ordinance No. 94;

ii. During the period of May 1 to October 1 of each year, if Roberts or the P K Ranch are not receiving their full direct flow appropriation from Big Goose Creek under the appropriations listed on Exhibit A that accompanied the petition, the City and the Veteran's Administration shall limit their combined direct flow diversions from Big Goose Creek under the Town of Sheridan Appropriation at their point of diversion in Section 35, Township 55 North, Range 86 West, to 13.5 c.f.s. and may take the remainder of the appropriation (2.5 c.f.s.) at their alternate points of diversion.

b. The petitioner requests that the State Board of Control records reflect a change of point of diversion for the following:

i. A change of point of diversion and means of conveyance of 2.0 c.f.s. from a point 2538 feet East of the West Quarter Corner of Section 19, Township 55 North, Range 85 West, to the primary point of diversion of the Sheridan Town Ditch and Pipeline located at a point described as South 51° 27' 27" West, 4233.04 feet distant from the Northeast Corner of Section 35, Township 55 North, Range 86 West, and situated in the SE¼NW¼ of Section 35;

ii. A change of point of diversion and means of conveyance of 1.0 c.f.s. from the C. B. and Q. Railroad point of diversion in Section 33, Township 56 North, Range 84 West, to the primary point of diversion of the Sheridan Town Ditch and Pipeline located at a point described as South 51° 27' 27" West, 4233.04 feet distant from the Northeast Corner of Section 35, Township 55 North, Range 86 West, and situated in the SE¼NW¼ of Section 35;

c. The petitioner be allowed to maintain an alternate point of diversion from Big Goose Creek at a point upstream of its primary point of diversion described as North 22° 13' 30" West, 2776 feet distant from the South Quarter Corner of Section 35, Township 55 North, Range 86 West, and situated in the NE¼SW¼ of Section 35. This alternate point of diversion is to be used when the primary point of diversion is closed for maintenance or is closed from ice or for on-site purposes at the intake location.

d. The petitioner be allowed during the period from May 1 to October 1 of each year to divert 2.5 c.f.s. of flow at alternate points of diversion downstream from the primary point of diversion located at a point described as South 51° 27' 27" West, 4233.04 feet distant from the Northeast Corner of Section 35, Township 55 North, Range 86 West, and situated in the SE¼NW¼ of Section 35. These alternate points of diversion are described as follows:

i. 0.5 c.f.s. at the Big Goose Creek Beckton alternate point of diversion located at a point described as 2538 feet east of the West Quarter Corner of Section 19, Township 55 North, Range 85 West;

ii. 0.67 c.f.s. at the Big Goose Creek Municipal Golf Course alternate point of diversion located at a point described as South 51° 33' 48" West, 1189.68 feet distant from the Northeast Corner of Section 1, Township 55 North, Range 85 West, and situated in Lot 1 of Section 1;

iii. 1.0 c.f.s. at the Big Goose Creek Cemetery alternate point of diversion located at a point described as North 4° 19' 38" East, 2585.27 feet distant from the West Quarter Corner of Section 34, Township 56 North, Range 84 West, and situated in the $NW\frac{1}{4}NW\frac{1}{4}$ of Section 34;

iv. 0.33 c.f.s. at the Big Goose Kendrick Park alternate point of diversion located at a point described as South 53° 55' 45" East, 3143.34 feet distant from the Northwest Corner of Section 27, Township 56 North, Range 84 West, and situated in the $SE\frac{1}{4}NW\frac{1}{4}$ of Section 27.

5. THAT the reason for the requested changes is to clarify the Town of Sheridan Appropriation as a result of a Compromise and Settlement Agreement in the matter of the petition for declaration of partial abandonment assigned Docket No. II-94-4-3.

6. THAT there are sixty three (63) intervening points of diversion between the present primary point of diversion located in Section 35, Township 55 North, Range 84 West, and the proposed Big Goose Kendrick Park alternate point of diversion located in Section 27, Township 56 North, Range 84 West. The consents of the owners of these intervening points of diversion were not obtained.

7. THAT this petition was referred to a public hearing in accordance with Sections 41-3-114, W.S. 1977, at Sheridan, Wyoming, on June 13, 1996, conducted by the Superintendent of Water Division Number Two.

8. THAT due and legal notice of time and place of the hearing was given in all respects as required by law.

9. THAT at the public hearing or subsequent to the public hearing, the following objections to this petition were received by the Superintendent of Water Division Number Two and the State Board of Control:

a. An objection was received from William C. Forbes, Waldo E. Forbes, Julia Forbes, Charlotte F. Wunderlich, Sarah P. Forbes, Douglas K. Bingham, Hillside Street Trust, and the Beckton Ranch Trust doing business as the Beckton Stock Farm, through their attorney, Robert G. Berger. These contestants own water rights that are junior to the appropriation to be affected by this petition. The water rights owned by the contestants are diverted through the Beck No. 1 Ditch as changed to the Alliance Ditch, Territorial Appropriation, with priority of June 1884, the Boulder Ditch as changed to the Alliance Ditch, Territorial Appropriation, with priority of October 1886, the Alliance Ditch, Permit No. 83, with priority of June 29, 1891; and the Big Goose and Beaver Ditch, Territorial Appropriations, with priority of August 29, 1885. The contestants do state in their objection that they will be injured by the granting of this petition;

b. An objection was received from Urmson Sloniger, and the Anna M. Boswell Trust, through their attorney, Charles Hart. These contestants own water rights that are junior to the appropriation to be affected by this petition. The water rights owned by the contestants are diverted through the Alliance Ditch, Permit No. 83, with priority of June 29, 1891. The contestants do state in their objection that they will be injured by the granting of this petition;

c. An objection was received from Donald Townsend who owns water rights diverted through the Alliance Ditch. The contestant does state in his objection that he will be injured by the granting of this petition;

d. An objection was received from Robert C. Tate, Mimi S. Tate and Hardy H. Tate, through their attorney, Hardy H. Tate. These contestants own water rights that are junior to the appropriation to be affected by this petition. The water rights owned by the contestants are diverted through the Alliance Ditch, Permit No. 83, with priority of June 29, 1891. The contestants do state in their objection that they will be injured by the granting of this petition.

10. THAT after examination of all of the evidence presented at the hearing and subsequent thereto, the State Board of Control concluded that a preponderance of evidence showed that the contestants carried their burden of showing that there might be injury during the period of May 1 through September 30, and that any diversion greater than 13.0 c.f.s. at the Sheridan Town Ditch and Pipeline during the period of May 1 through September 30, would be injurious to the Alliance Ditch. During the historic irrigation season, May 1 through September 30, the 3.0 c.f.s. of the senior Town of Sheridan Appropriation that was traditionally at downstream points of diversion, were satisfied from localized return flow sources of supply. This water was not historically passed down Big Goose Creek from the upstream areas to downstream areas. The Board believes that this type of upstream move raised a clear issue of injury. During the public hearing, the petitioner objected to this concern arguing that the full 16.0 c.f.s. was at the primary point of diversion and that the petitioner was only seeking a clarification as a result of their Compromise and Settlement Agreement in the matter of the petition for declaration of partial abandonment assigned Docket No. II-94-4-3 and that additional restrictions during the irrigation season should be applied. The State Board of Control did not concern itself with the private arrangements of this agreement, but relied upon the transcript of the public hearing and the hearing record for potential injury to the Alliance Ditch or Big Goose and Beaver Ditch.

11. THAT properly prepared maps accompanied the petition.

12. THAT the granting of this petition with conditions and limitations will not cause injury to any other appropriators.

CONCLUSIONS OF LAW

The State Board of Control has jurisdiction both to consider the petitioner's request for clarification, description of alternate points of diversion and for change of points of diversion and to prepare and promulgate the Order hereinafter set forth disposing of said petition.

The Findings of Fact contain the elements necessary to comply with Sections 41-3-114, W.S. 1977, pertaining to change of point of diversion and the petition should be granted with certain limitations.

ORDER

IT IS HEREBY ORDERED THAT this petition be and the same is **GRANTED** without loss of priority and subject to the condition that the changes shall not affect the rights of other appropriators in good standing at the time the changes are made.

IT IS FURTHER ORDERED THAT the petitioner be allowed a change of point of diversion and means of conveyance of 2.0 c.f.s. from a point 2538 feet East of the West Quarter Corner of Section 19, Township 55 North, Range 85 West; to the primary point of diversion of the Sheridan Town Ditch and Pipeline located at a point described as South 51° 27' 27" West, 4233.04 feet distant from the Northeast Corner of Section 35, Township 55 North, Range 86 West, and situated in the SE¼NW¼ of Section 35.

IT IS FURTHER ORDERED THAT the petitioner be allowed a change of point of diversion and means of conveyance of 1.0 c.f.s. from the C. B. and Q. Railroad point of diversion in Section 33, Township 56 North, Range 84 West; to the primary point of diversion of the Sheridan Town Ditch and Pipeline located at a point described as South 51° 27' 27" West, 4233.04 feet distant from the Northeast Corner of Section 35, Township 55 North, Range 86 West, and situated in the SE¼NW¼ of Section 35.

IT IS FURTHER ORDERED THAT the petitioner be allowed to maintain an alternate point of diversion from Big Goose Creek at a point upstream of its primary point of diversion described as North 22° 13' 30" West, 2776 feet distant from the South Quarter Corner of Section 35, Township 55 North, Range 86 West, and situated in the NE¼SW¼ of Section 35. This alternate point of diversion is to be used when the primary point of diversion is closed for maintenance or is closed from ice or for on-site purposes at the intake location.

IT IS FURTHER ORDERED THAT for the period of October 1 to April 30 of each year, the City of Sheridan be allowed to divert the entire 16.0 c.f.s. of the Town of Sheridan Appropriation, Territorial Appropriation, Proof No. 788, from Big Goose Creek, at the primary point of diversion located South 51° 27' 27" West, 4233.04 feet distant from the Northeast Corner of Section 35, Township 55 North, Range 86 West, and situated in the SE¼NW¼ of Section 35, provided however that up to, but not to exceed 3.0 c.f.s. of the Town of Sheridan Appropriation from the natural flow of Big Goose Creek shall be attributable to the Veteran's Administration by virtue of City Ordinance No. 94 (1903) and the Order of the State Board of Control recorded in Minute Record 3, Pages 473 through 474, or so much thereof as may be necessary to supply its works, will be used by the Veteran's Administration. To the extent any portion of said 3.0 c.f.s. is not utilized by the Veteran's Administration, the City may use the same in accordance with City Ordinance No. 94.

IT IS FURTHER ORDERED THAT during the period of May 1 to September 30 of each year, under non-surplus conditions, if a call for regulation has been placed on Big Goose Creek and its tributaries or if storage water is being released into Big Goose Creek, the petitioner and the Veteran's Administration shall limit their combined direct flow diversions from Big Goose Creek under the Town of Sheridan Appropriation at their point of diversion in Section 35, Township 55 North, Range 86 West, to 13.0 c.f.s. and may take the remainder of the appropriation (3.0 c.f.s.) at their alternate points of diversion.

IT IS FURTHER ORDERED THAT the petitioner be allowed during the period from May 1 to September 30 of each year, to divert 3.0 c.f.s. of flow at alternate points of diversion downstream from the primary point of diversion located at a point described as South 51° 27' 27" West, 4233.04 feet distant from the Northeast Corner of Section 35, Township 55 North, Range 86 West, and situated in the SE¼NW¼ of Section 35. These alternate points of diversion are described as follows:

a. 0.50 c.f.s. at the Big Goose Creek Beckton alternate point of diversion, located at a point described as 2538 feet east of the West Quarter Corner of Section 19, Township 55 North, Range 85 West;

b. 1.17 c.f.s. at the Big Goose Creek Municipal Golf Course alternate point of diversion located at a point described as South 51° 33' 48" West, 1189.68 feet distant from the Northeast Corner of Section 1, Township 55 North, Range 85 West, and situated in Lot 1 of Section 1;

c. 1.33 c.f.s. at the Big Goose Creek Cemetery alternate point of diversion located at a point described as North 4° 19' 38" East, 2585.27 feet distant from the West Quarter Corner of Section 34, Township 56 North, Range 84 West, and situated in the NW¼NW¼ of Section 34.

IT IS FURTHER ORDERED THAT the petitioner will notify the Superintendent of Water Division Number Two at least 72 hours in advance of use of the alternate points of diversion.

DONE AT TORRINGTON, COUNTY OF GOSHEN, STATE OF WYOMING, THIS 21ST DAY OF AUGUST 1996.

STATE BOARD OF CONTROL

Gordon W. Fassett
GORDON W. FASSETT, PRESIDENT

ATTEST:

Allan Cunningham
ALLAN CUNNINGHAM, EX-OFFICIO SECRETARY

ENTERED: FEBRUARY 28, 1997

IN THE MATTER OF THE PETITION FOR CHANGE OF POINT OF DIVERSION AND MEANS OF CONVEYANCE OF PORTIONS OF THE TOWN OF SHERIDAN APPROPRIATION, TERRITORIAL APPROPRIATION, DIVERTING FROM BIG GOOSE CREEK, TRIBUTARY TONGUE RIVER, TRIBUTARY YELLOWSTONE RIVER, THROUGH THE SHERIDAN TOWN DITCH AND PIPELINE AS PREVIOUSLY CHANGED IN PART TO THE BIG GOOSE CREEK BECKTON ALTERNATE DIVERSION AND THE BIG GOOSE CREEK MUNICIPAL GOLF COURSE ALTERNATE DIVERION, WITH PRIORITY OF NOVEMBER 1882, TO THE BIG GOOSE CREEK CEMETERY ALTERNATE DIVERSION. (O.R. 1, P. 244; C.R. 3, P. 477; PROOF NO. 788)	DOCKET NUMBER II-99-4-4 IN WATER DIVISION NUMBER TWO

PETITIONER: CITY OF SHERIDAN, ACTING THROUGH ITS MAYOR, JIM WILSON, OF P.O. BOX 848, SHERIDAN, COUNTY OF SHERIDAN, STATE OF WYOMING.

This matter was considered by the State Board of Control at its regular meeting on February 24, 2000, with the following results:

FINDINGS OF FACT

1. THAT the petitioner is the owner the appropriation involved as evidenced by the records of the State Board of Control.

2. THAT the appropriation involved is the Town of Sheridan Appropriation, Territorial Appropriation, adjudicated under Proof No. 788, in the amount of 16.0 c.f.s., for municipal purposes, diverting from Big Goose Creek, tributary Tongue River, tributary Yellowstone River, through the Sheridan Town Ditch and Pipeline as previously changed in part to the Big Goose Creek Beckton Alternate Diversion, the Big Goose Creek Municipal Golf Course Alternate Diversion, and the Big Goose Creek Cemetery Alternate Diversion, with priority of November 1882, and of record in Order Record 1, page 244; Certificate Record 3, page 477.

3. THAT by and through its petition, the petitioner requested a change of point of diversion and means of conveyance of the Big Goose Creek Beckton Alternate Diversion and the Big Goose Creek Municipal Golf Course Alternate Diversion portions of the Town of Sheridan Appropriation, Territorial Appropriation, Proof No. 788, at the following described points of diversion:

a. 0.50 c.f.s. at the Big Goose Creek Beckton Alternate Diversion located at a point described as 2538 feet east of the West Quarter Corner of Section 19, Township 55 North, Range 85 West;

b. 1.17 c.f.s. at the Big Goose Creek Municipal Golf Course Alternate Diversion located at a point described as South 51° 33′ 48″ West, 1189.68 feet distant from the Northeast Corner of Section 1, Township 55 North, Range 85 West, and situated in Lot 1 of Section 1;

to the Big Goose Creek Cemetery Alternate Diversion located at a point described as North 4° 19′ 38″ East, 2585.27 feet distant from the West Quarter Corner of Section 34, Township 56 North, Range 84 West, and situated in the NW¼NW¼ of Section 34.

4. THAT the reason for the requested changes is to relieve treated water supply problems in and near the Sheridan City Cemetery and to improve operational flexibility for the cemetery irrigation system and the conservation of treated water as required by the United States Army Corps of Engineer's 404 Permit for the Twin Lakes Project.

5. THAT there are fifty (50) intervening points of diversion between the point of diversion of the Big Goose Creek Beckton Alternate Diversion and the point of diversion of the Big Goose Creek Cemetery Alternate Diversion. The consents of the owners of these fifty (50) intervening facilities were not obtained.

6. THAT this petition was referred to a public hearing in accordance with Section 41-3-114, W.S. 1977, at Sheridan, Wyoming, on January 14, 2000, and was conducted by the Superintendent of Water Division Number Two.

7. THAT due and legal notice of the time and place of the public hearing was given in all respects as required by law. No protests were received at the public hearing or subsequent thereto.

8. THAT a properly prepared map accompanied the petition.

9. THAT the granting of this petition will not injure any other appropriators.

CONCLUSIONS OF LAW

The State Board of Control has jurisdiction both to consider the petitioner's request for change of point of diversion and means of conveyance and to prepare and promulgate the Order hereinafter set forth disposing of said petition.

The Findings of Fact contain the elements necessary to comply with Section 41-3-114, W.S. 1977, pertaining to change of point of diversion and means of conveyance and the petition should be granted.

ORDER

IT IS HEREBY ORDERED THAT this petition be and the same is **GRANTED** without loss of priority and subject to the condition that the changes shall not affect the rights of other appropriators in good standing at the time the changes are made.

IT IS FURTHER ORDERED THAT the petitioner be allowed a change of point of diversion and means of conveyance of the Big Goose Creek Beckton Alternate Diversion and the Big Goose Creek Municipal Golf Course Alternate Diversion portions of the Town of Sheridan Appropriation, Territorial Appropriation, Proof No. 788, at the following described points of diversion:

a. 0.50 c.f.s. at the Big Goose Creek Beckton Alternate Diversion located at a point described as 2538 feet east of the West Quarter Corner of Section 19, Township 55 North, Range 85 West;

b. 1.17 c.f.s. at the Big Goose Creek Municipal Golf Course Alternate Diversion located at a point described as South 51° 33′ 48″ West, 1189.68 feet distant from the Northeast Corner of Section 1, Township 55 North, Range 85 West, and situated in Lot 1 of Section 1;

to the Big Goose Creek Cemetery Alternate Diversion located at a point described as North 4° 19′ 38″ East, 2585.27 feet distant from the West Quarter Corner of Section 34, Township 56 North, Range 84 West, and situated in the NW¼NW¼ of Section 34.

IT IS FURTHER ORDERED THAT the petitioner be allowed during the period from May 1 to September 30 of each year to divert 3.0 c.f.s. of flow at the Big Goose Creek Cemetery Alternate Diversion downstream from the primary point of diversion of the Sheridan Town Ditch and Pipeline.

IT IS FURTHER ORDERED THAT the petitioner will notify the Superintendent of Water Division Number Two at least 72 hours in advance of use of the Big Goose Creek Cemetery Alternate Diversion.

DONE AT CHEYENNE, COUNTY OF LARAMIE, STATE OF WYOMING THIS 24TH DAY OF FEBRUARY 24, 2000.

PATRICK T. TYRRELL, PRESIDENT

ATTEST:

ALLAN CUNNINGHAM, EX-OFFICIO SECRETARY

ENTERED: JANUARY 10, 2003

FILE: NEW FILE: WATER RIGHTS

Ken 7-13-07

THE STATE OF WYOMING

DAVE FREUDENTHAL
GOVERNOR

PATRICK T. TYRRELL
STATE ENGINEER

HARRY C. LABONDE, JR
DEPUTY STATE ENGINEER

Board of Control

4E, HERSCHLER BUILDING
CHEYENNE, WYOMING 82002

TELEPHONE NO. (307) 777-6178
FAX NO. (307) 777-5451

ALLAN CUNNINGHAM
ADJUDICATION OFFICER

RANDY TULLIS, SUPERINTENDENT
WATER DIVISION NO. 1
MICHAEL WHITAKER, SUPERINTENDENT
WATER DIVISION NO. 2
LOREN SMITH, SUPERINTENDENT
WATER DIVISION NO. 3
JADE HENDERSON, SUPERINTENDENT
WATER DIVISION NO. 4

July 9, 2007

City of Sheridan
P.O. Box 848
Sheridan, WY 82801

Priority 11-23-06

Re: Certificate Record Book No. 85, Page 139

Dear Appropriator(s):
Today we are sending to the County Clerk for recording purposes the following listed final Certificate(s) of Appropriation of Water or Ground Water and/or Certificate(s) of Construction of Reservoir as follows:

Permit No.	**Facility**	**Amount Appropriated**
1678 E	Enl. Alliance (& Alliance Lateral) Ditch	1.61 c.f.s.

Final Certificates of Appropriation are valuable insofar as your water rights are concerned and they should, therefore, be carefully preserved. If you need copies of them, they may be obtained either from the County Clerk or from this office.

When the County Clerk has recorded your certificate(s) he/she will forward the same to you.

Yours truly,

Allan Cunningham

ALLAN CUNNINGHAM
Adjudication Officer
AC/NCC

RECEIVED
JUL 17 2007
HKM ENGINEERING INC
SHERIDAN OFFICE

THE STATE OF WYOMING
Certificate of Appropriation of Water

Proof No. 39352
Certificate Record No. 85 Page 139
Water Division No. 2 , District No. 4

WHEREAS, City of Sheridan has presented to the Board of Control of the State of Wyoming proof of the appropriation of water from Big Goose Creek, tributary Tongue River, tributary Yellowstone River through the Enlarged Alliance (& Alliance Lateral) Ditch under Permit No. 1678 E ; irrigation of lands-- herein described, lying and being in Sheridan County, Wyoming.

NOW KNOW YE, That the State Board of Control, under the provisions of the Statutes of Wyoming, has, by an order duly made on August 18, 2006 and entered on February 19, 2007 , in Order Record 62 Page 73 , determined and established the priority and amount of such appropriation as follows:

Name and Address of Appropriator(s) City of Sheridan, P.O. Box 848, Sheridan, WY 82801

; Date of Appropriation (Priority) November 23, 1906 ; Amount of Appropriation -----------1.61---------- cu. ft. per sec.;

Total Acreage One hundred twelve and five tenths (112.5) acres------------------------------------- ; Head Gate NE¼NE¼, Section 35, T.55N., R.86W.

DESCRIPTION OF LAND TO BE IRRIGATED AND FOR WHICH THIS APPROPRIATION IS DETERMINED AND ESTABLISHED

TWP	RANGE	SEC	NE ¼				NW ¼				SW ¼				SE ¼				TOTAL
			NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	NE¼	NW¼	SW¼	SE¼	
			Original supply to the following lands:																
56N	84W	28							37.50		37.50	37.50							112.50

The right to water hereby confirmed and established is limited to irrigation of lands--------------------------- and the use is restricted to the place where acquired and to the purpose for which acquired; right for irrigation not to exceed one cubic foot of water per second for each seventy acres of land for which the appropriation is herein determined and established; except when there is surplus water available under provisions of Sections 41-4-317 thru 41-4-325, W.S. 1977, and where there is excess water available under provisions of Section 41-4-329 thru 41-4-331, W.S. 1985.

IN TESTIMONY WHEREOF, I, Patrick T. Tyrrell President of the State Board of Control, have hereunto set my hand this 19th day of February A.D. 2007 , and caused the Seal of said Board to be hereunto affixed.

Attest: Albert Cunningham Ex-officio Secretary

Patrick T. Tyrrell President.

RECEIVED
JUL 27 2007
HKM ENGINEERING INC
SHERIDAN OFFICE

WATER AGREEMENT

This agreement is entered into between Whitney Benefits, a Wyoming nonprofit corporation ("Whitney") whose address is P.O. Box 5085, Sheridan, Wyoming 82801 and the City of Sheridan ("City") whose address is P.O. Box 848, Sheridan, WY 82801.

RECITALS

A. Whitney owns 141.0 shares of stock in Park Reservoir Company which represents 169.20 acre feet of storage in Park Reservoir.

B. The City and Whitney have previously entered into a "Water Agreement" dated May 3, 2004, as amended on August 22, 2006.

C. City and Whitney desire to see the storage represented by this amended agreement increased to 91 shares of the stock in Park Reservoir Company (109.2 acre feet of storage) to be used by the City for irrigation of certain lands operated by the City, Sheridan County Fair Association Board, and Recreation District in Sheridan, Wyoming when watering restrictions might otherwise be imposed and that the storage represented by 30.0 shares of the stock in Park Reservoir Company owned by Whitney (36.0 acres feet of storage) is available for use on certain areas within the City of Sheridan on which Whitney conducts its charitable activities and its other business activities, such as Whitney-YMCA soccer fields, Whitney Plaza PUD, Sheridan Ice LLC., Whitney Commons, various pathway extensions and for use on certain areas where activities supported by Whitney are conducted.

D. The parties acknowledge that as a public service Whitney is willing to allow the City to use water without any payment from the City.

It is, therefore, revised and agreed to as follows:

1. **Lease.** Whitney leases to City the right to take on an annual basis 91/141 of Whitney's share of water available in Park Reservoir. The parties expect that this share will be 109.2 acre feet of water, but may vary according to the water available to be stored in Park Reservoir.

2. **Term.** This revised agreement shall begin on the 1st day of May, 2008 and shall terminate on the 3rd day of May, 2011.

3. **No Payment Required.** City shall not be required to pay Whitney any money for the use of this water.

4. **Use on Whitney Properties.** Because the amount of water which City is entitled to take and use under this agreement greatly exceeds the quantity of water that would be necessary for the irrigation or use on certain properties where Whitney conducts it charitable activities within the City of Sheridan, City will supply at no cost to Whitney Property through the City's water distribution system up to 36.0 acre feet of water each year. This water may be used by Whitney on properties within the City of Sheridan on which Whitney conducts its charitable activities, including, without limitation of use of the water at the following locations:

Whitney Commons for irrigation, including the water feature and the water fountain;

YMCA Whitney Benefits Soccer Fields for irrigation;

Sheridan Ice LLC for recreation purposes; and

Whitney Plaza PUD for irrigation, including water for irrigation of the Whitney pathway between Sheridan Ice LLC and Alger Street, among other Whitney pathway extensions.

The aforementioned properties are hereafter referred to as the "Whitney Properties."

The use of this water shall be generally applied as identified in Table 1; however, for annual report and billing purposes, Whitney and the City agree that these shares will be evaluated and adjusted on an annual basis as usage may change from location to location in the future.

TABLE 1: WHITNEY PROPERTIES

Location	Meter ID	Annual Metered Quantity to be applied for Irrigation (Proposed Annual Water Bill Adjustment)				Remarks
		Park Res. Shares	acre-feet	cubic-feet	gallons	
Whitney- YMCA Soccer Fields	6679618	5.118	6.141	267,502	2,001,048	
Sheridan Ice LLC	14039942	3.000	3.600	156,816	1,173,062	Future irrigation for Whitney Plaza PUD Greenway along Little Goose Creek applied to this meter. Additional meters might be necessary.
Whitney Commons	14249858	21.883	26.259	1,143,842	8,556,510	
	TOTAL =	30.000	36.000	1,568,160	11,730,620	

So long as the quantity of water consumed on the Whitney Properties does not exceed 36.0 acre feet on an annual basis, Whitney shall not be subject to water use restrictions imposed by the City of Sheridan on other water users and shall not be required to pay for any water used on any Whitney Properties.

5. Use of Water. The City will use this water prudently and will not waste the water. The City will use this water to irrigate and keep green the following community recreational properties.

City Operated Lands:

Kendrick Park
Henry Burgess Bridge location
Morrill Street area between Whitney Commons and Kendrick Park
Washington Park
Emerson Park (Sheltered Acres)
Lions Club Park
Marshall Park
Mill Park
Crooks Campaign Park
Rotary Park
North Heights Park
Dow Street Greenway
Sheridan Avenue/Coffeen Avenue Greenway
Gould Street/Coffeen Avenue Greenway

Recreation District Operated Lands:
Thorne-Rider Park
Oatts Field

Sheridan County Fair Assoc. Board Operated Lands:
[1]Open Space Area between grandstand & West 5th St. (E. of Rotary Park)

The City shall take and use this water according to all applicable rules and regulations of Park Reservoir Company and according to all applicable laws and regulations of the State of Wyoming and will withdraw from storage and use in each year all of the water leased by Whitney to the City under this agreement. If required for the delivery of the water, Whitney and City shall notify the water commissioner that Whitney has authorized the City to use the 109.2 acre feet of water and shall authorize the water commissioner to deliver the water upon City order. It shall be the City's responsibility and obligation to transport the water from Park Reservoir to City's point of diversion. Whitney is not guaranteeing or warranting that any particular quantity of water will be available for use by the City.

6. **Public Benefit.** Because Whitney is allowing City to use this water at no cost to the City and as a public service, City' sole and exclusive remedy for any breach of this agreement by Whitney shall be to terminate this agreement, and Whitney shall not be liable to City for monetary damages in any event.

7. **Termination of Right to Use Water.** After the date set for termination of this agreement in paragraph 2, City shall have no right to use any of the water which is the subject of this agreement, and City waives any right to use this water in later years without the express written consent of Lessor.

8. **Time.** Time is of the essence in this agreement.

9. **Report.** In January of each year, City shall provide Whitney with a written report describing the quantity of water used by the City each year from Whitney's share of water in Park Reservoir. The report shall describe the quantity of water used to irrigate each of the City Operated Lands and Recreation Department Operated Land described in paragraph 4 and the quantity of water used to irrigate Whitney Properties.

10. **Signs.** At each park irrigated using water from Whitney's share of water in Park Reservoir, the City shall place or caused to be placed a sign in a prominent location stating that irrigation water to keep the park green is provided by Whitney. Whitney will provide the signs at Whitney's expense and may request that additional signs be placed as warranted and requested by Whitney.

11. **2007 Irrigation Season.** In consideration of this agreement, the City agrees to waive water charges for consumption in excess of 20.4 acre-feet, up to 36.0 acre-feet, applied to the Whitney Properties in 2007.

---

[1] Up to 2.0 acre-feet (87,120 cubic feet) of potable water shall be provided to the Sheridan County Fair Association Board through the Meter ID 4150838 "free of charge" as part of this agreement. Water use charges shall be adjusted in January of each year based on the actual consumption recorded through this meter during the previous year for the irrigation months of April through October. The Sheridan County Fair Association Board shall be responsible for water use charges for annual consumption above 2.0 acre feet.

12. **Previous Agreements.** This amended agreement replaces previous water agreements executed between the City and Whitney dated May 3, 2004 and August 22, 2006.

Dated this 21 day of April, 2008.

Whitney Benefits

By: ______________________
President

City of Sheridan

By: ______________________
Mayor

Attest: ______________________
Clerk

STATE OF WYOMING)
) ss.
COUNTY OF SHERIDAN)

The forgoing instrument was acknowledged before me this 22nd day of April, 2008, by Dave Kinskey, the Mayor of the City of Sheridan.

Witness my hand and official seal.

KRISTEN BUNNING - NOTARY PUBLIC
County of Sheridan
State of Wyoming
My Commission Expires July 27, 2011

____
Notary Public

My Commission Expires: July 27, 2011

STATE OF WYOMING)
) ss.
COUNTY OF SHERIDAN)

The forgoing instrument was acknowledged before me this 25 day of April, 2008, by Tom Kinnison, the President of Whitney Benefits.

Witness my hand and official seal.

GEORGIA FOSNIGHT - NOTARY PUBLIC
County of Sheridan
State of Wyoming
My Commission Expires ________

____
Notary Public

My Commission Expires: 12/30/2010

Minute Record Book 30, Page 277

Map Filed: G-4, Page 51 A-D

IN THE MATTER OF THE AMENDED PETITION FOR CHANGE OF USE FROM IRRIGATION TO MUNICIPAL PURPOSES AND CHANGE OF POINT OF DIVERSION AND MEANS OF CONVEYANCE OF THE FOLLOWING APPROPRIATIONS, DIVERTING FROM BIG GOOSE CREEK, TRIBUTARY TONGUE RIVER, TRIBUTARY YELLOWSTONE RIVER:

A. A PORTION OF THE FRED McDONOUGH APPROPRIATION, PERMIT NO. 83, THROUGH THE ALLIANCE DITCH AS PREVIOUSLY CHANGED TO THE PK DITCH, WITH PRIORITY OF JUNE 29, 1891.

B. A PORTION OF THE FRANK MAY APPROPRIATION, PERMIT NO. 1678 ENL., THROUGH THE ENLARGED ALLIANCE (AND ALLIANCE LATERAL) DITCH AS PREVIOUSLY CHANGED IN PART TO THE PK DITCH, WITH PRIORITY OF NOVEMBER 23, 1906.

C. A PORTION OF PERMIT NO. 1678 ENL., THROUGH THE ENLARGED ALLIANCE (AND ALLIANCE LATERAL) DITCH, WITH PRIORITY OF NOVEMBER 23, 1906;

TO BE CHANGED IN PART TO THE TOWN OF SHERIDAN MUNICIPAL INTAKE (TOWN DITCH AND PIPELINE).

(O.R. 2, P. 305; NO C.R. OF RECORD; PROOF NO. 2478
O.R. 4, P. 364; C.R. 30, P. 330; PROOF NO. 10424
UNADJUDICATED)

DOCKET NUMBER II-2005-2-7
IN WATER DIVISION NUMBER ONE

PETITIONER: CITY OF SHERIDAN, ACTING THROUGH ITS MAYOR, DAVE KINSKEY, OF P.O. BOX 848, SHERIDAN, COUNTY OF SHERIDAN, STATE OF WYOMING.

This matter was considered by the State Board of Control at its regular meeting on August 15, 2006, with the following results:

known to have an interest in the Petition. Notice was given by advertisement (legal notice) on May 23, 2006, in The Sheridan Press.

15. THAT the hearing was held in Sheridan, Wyoming, on June 28, 2006, and conducted by the Superintendent of Water Division Number Two. No protests were received at the hearing or subsequent thereto.

16. THAT the granting of this amended petition with limitations will not injure any other appropriators.

CONCLUSIONS OF LAW

The State Board of Control has jurisdiction both to consider the petitioner's request for change of use and change of point of diversion and means of conveyance and to prepare and promulgate the Order hereinafter set forth disposing of said amended petition.

The Findings of Fact contain the elements necessary to comply with Sections 41-3-104 and 41-3-114, W.S. 1977, pertaining to change of use and change of point of diversion and means of conveyance and the amended petition should be granted.

ORDER

IT IS HEREBY ORDERED THAT this amended petition be and the same are **GRANTED** without loss of priority and subject to the condition that the changes shall not affect the rights of other appropriators in good standing at the time the changes are made.

THAT the portions of the appropriations and permit described below be changed from irrigation to municipal purposes and that the water, as changed, may be diverted a period of 80 days not to exceed 281.0 acre-feet of consumptive use in any one year and at a maximum rate not to exceed 1.77 c.f.s.

THAT this water is obtained by detaching and changing the use of the water from the following lands:

a. A portion of the Fred McDonough Appropriation, Permit No. 83, Proof No. 2478:

b. A portion of the Frank May Appropriation, Permit No. 1678 Enl., Proof No. 10424:

BIG GOOSE CREEK, TRIBUTARY TONGUE RIVER, TRIBUTARY YELLOWSTONE RIVER

Certificate Record Book	Certificate Record Page	Proof No.	Permit No.	Name of Facility	Name of Appropriator	Address	Date Of Appro.	Use For Which Appro.	Amt. of Appro. C.F.S.	No. of Acres
88	199	10424	1678 Enl.	Enlarged Alliance (and Alliance Lateral) Ditch as changed to the PK Ditch as changed to the Town of Sheridan Municipal Intake (Town Ditch and Pipeline) H.G: NE¼SW¼ Section 35-55-86	City of Sheridan (successor in part to Frank May, original appropriator)	P.O. Box 848 Sheridan, WY 82801	November 23, 1906	Mun.	0.58	NONE

Description of lands: Water is used for municipal purposes within the City of Sheridan municipal service area at the following points of use:

Township 56 North, Range 84 West
Section 9: All
Section 10: All
Section 14: All
Section 15: All
Section 16: All
Section 18: All
Section 19: All
Section 20: All
Section 21: All

IT IS FURTHER ORDERED THAT certificate of appropriation and amended certificate of appropriation be issued in part to the petitioner for the appropriations involved as follows:

a. A portion of the Fred McDonough Appropriation, Permit No. 83, Proof No. 2478:

BIG GOOSE CREEK, TRIBUTARY TONGUE RIVER, TRIBUTARY YELLOWSTONE RIVER

Certificate Record Book	Certificate Record Page	Proof No.	Permit No.	Name of Facility	Name of Appropriator	Address	Date Of Appro.	Use For Which Appro.	Amt. of Appro. C.F.S.	No. of Acres
88	198	2478	83	Alliance Ditch as changed to the PK Ditch as changed to the Town of Sheridan Municipal Intake (Town Ditch and Pipeline) H.G: NE¼SW¼ Section 35-55-86	City of Sheridan (successor in part to Fred McDonough, original appropriator)	P.O. Box 848 Sheridan, WY 82801	June 29, 1891	Mun.	0.29	NONE

Description of lands: Water is used for municipal purposes within the City of Sheridan municipal service area at the following points of use:

Township 56 North, Range 84 West
Section 9: All
Section 10: All
Section 14: All
Section 15: All
Section 16: All
Section 18: All
Section 19: All
Section 20: All

Township 55 North, Range 85 West (cont'd)
Section 20: All
Section 21: All
Section 22: All
Section 23: All
Section 26: All
Section 29: All
Section 30: All

Township 55 North, Range 86 West
Section 12: All
Section 13: All
Section 25: All
Section 26: All
Section 35: All
Section 36: All

This appropriation is not to exceed 140.92 acre-feet in any one year and is to be diverted, when in priority, during an 80 day period each year at a rate not to exceed 0.90 c.f.s.

IT IS FURTHER ORDERED THAT the petitioner be allowed a change of point of diversion and means of conveyance of a portion of the Fred McDonough Appropriation, Permit No. 83, Proof No. 2478, and a portion of the Frank May Appropriation, Permit No. 1678 Enl., Proof No. 10424, as changed to municipal purposes, from the Alliance Ditch (and Alliance Lateral) Ditch as previously changed to the PK Ditch, diverting at its record point of diversion described as South 55° West, 4700.0 feet distant from the northeast corner of Section 35, Township 55 North, Range 86 West, and situated in the SE¼NW¼ of Section 35, to be changed to the Town of Sheridan Municipal Intake (Town Ditch and Pipeline), diverting from the same source of supply, at its record point of diversion described as North 22° 13' 30" West, 2776.0 feet distant from the south quarter corner of Section 35, Township 55 North, Range 86 West, and situated in the NE¼SW¼ of Section 35.

IT IS FURTHER ORDERED THAT the petitioner be allowed a change of point of diversion and means of conveyance of a portion of Permit No. 1678 Enl., unadjudicated, as changed to municipal purposes, from the Enlarged Alliance (and Alliance Lateral) Ditch, diverting at its record point of diversion described as South 66° 45' West, 1260.0 feet distant from the northeast corner of Section 35, Township 55 North, Range 86 West, and situated in the NE¼NE¼ of Section 35, to be changed to the Town of Sheridan Municipal Intake (Town Ditch and Pipeline), diverting from the same source of supply, at its record point of diversion described as North 22° 13' 30" West, 2776.0 feet distant from the south quarter corner of Section 35, Township 55 North, Range 86 West, and situated in the NE¼SW¼ of Section 35.

THAT the remainder of the Fred McDonough Appropriation, Permit No. 83, Proof No. 2478, is unaffected by the granting of this petition, and is described as follows:

Township 56 North, Range 84 West	
Section 21: S½NW¼	50.00 acres
Total	50.00 acres (0.72 c.f.s.)

THAT the remainder of the Frank May Appropriation, Permit No. 1678 Enl., Proof No. 10424, for 863.5 acres (12.30 c.f.s.), is unaffected by the granting of this petition.

THAT the remainder of Permit No. 1678 Enl., unadjudicated, is unaffected by the granting of this petition.

IT IS **FURTHER ORDERED THAT** a copy of this Order be given to the Surface Water Division of the State Engineer's Office so that Permit No. 1678 Enl. can be noted of this change of use.

BIG GOOSE CREEK

Big Goose and Beaver

#12	Big Goose and Beaver	88.7 cfs	8/29/1885

Sheridan City Intakes

#7	Terr. Sheridan Town Ditch and Pipeline	13.0 cfs	11/ /1882

Goose Canon Ditch

#16	Terr. Goose Canon	0.50 cfs	04/14/1888

Rocky Ditch

#11	Terr. Rocky	1.43 cfs	11/ /1884

No. 9 Ditch

#6	Terr. No. 9	5.01 cfs	Fall 1882

RAPID CREEK

Elk Horn Ditch

#9	Terr. Elkhorn	1.71 cfs	11/01/1883

Nelson Pump

#6	Terr. No. 9	2.00 cfs	Fall 1882

(Northside Ditch)

#22	Zimmerman Pump	0.50 cfs	4/23/1894

BEAVER CREEK

Daisy Ditch

#3	Terr. Daisy	5.03 cfs	10/19/1882
#13	Terr. Daisy 2nd	1.28 cfs	10/15/1885

Murray Pump

#3	Terr. Daisy	0.16 cfs	10/19/1882

Youth Incorporated Pump

#3	Terr. Daisy	0.23 cfs	10/19/1882

Cresswell Pump Site No. 1

#13	Terr. Daisy 2nd	0.65 cfs	10/15/1885

Bow and Arrow Pump Station

#13	Terr. Daisy 2nd	0.64 cfs	10/15/1885

Trembath Pump Stations 1, 2, & 3

#55	P18786 Trembath	0.14 cfs	8/21/1936

Flume Ditch

#1	Terr. Flume	6.79 cfs	10/12/1882

Mudder Pump Station

#1	Terr. Flume	0.13 cfs	10/12/1882
#5	Terr. N. B. Held		10/12/1882

City 3.00 Cfs Cemetary 11/ /1882

LITTLE GOOSE CREEK

BIG Goose Ck. Above the P. K. Ditch Gage

PK Ditch

Terr. PK	26.5 cfs	08/17/1887	#15
Permit 83 Alliance	4.38 cfs	06/29/1891	#19

Alliance Ditch

Terr. Beck No. 1	9.16 cfs	06/ /1884	#10
Terr. Beck No. 1 (SS)	1.26 cfs	06/ /1884	#10
Terr. Boulder	1.42 cfs	10/ /1886	#14
Permit 83 Alliance	24.01 cfs	06/29/1891	#19
Permit 83 Alliance (SS)	0.57	06/29/1891	#19

Bedford Ditch (does not divert)

Beckton Mill Ditch (does not divert)

Beckton Mill	37.5 cfs	06/09/1883	

(This was a nonconsumptive use for milling at a saw mill.)

BECKTON

Northside Ditch does divert ~~(does not divert)~~ #22

Owl Ditch

Terr. Owl	1.84 cfs	10/20/1882	#4
Northside Ditch	0.57 cfs	4/23/1894	#22

Owl Pumps (15 pump points scattered above and below the Daisy Ditch headgate) 1.45 cfs 10/20/1882 #4

Kirsch Ditch (34 ac. in ditch) (does not divert) #23

10 pumps for 1.47cfs (103 ac.) 10/30/1894

Robinson Hardee Ditch

Terr. Robinson & Hardee Ditch	2.25 cfs	10/15/1882	#2

Pump does 4.00 cfs

Weaver Sprinkler

Terr. Daisy 2nd	0.57 cfs	10/15/1885	#13

Bates Sprinkler

Terr. Robinson & Hardee Ditch	0.21 cfs	10/15/1882	#2

Fillmore Pump Station

Terr. Robinson & Hardee Ditch	0.23 cfs	10/15/1882	#2

N. B. Held Ditch

Terr. Flume	1.2 cfs	10/12/1882	#1
Terr. N. B. Held	1.9 cfs	11/01/1882	#5

Rhodes Ditch (does not divert) #20

SHERIDAN

Sheridan Mill #15 (does not divert)

Grinnell Livestock Ditch

Terr. Grinnell Livestock Co.	7.50 cfs	09/17/1890	#18

TONGUE RIVER

Appendix C Table of Contents

2019 City of Sheridan GIS Master Water Geodatabase Schema

Feature/Attribute	Data Type	Domain Name	Domain Range	Example	Notes
AbandonPipelines					
Id	Long Integer			1	
Diameter	Text	WaterPipelineDiameter	1, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 24, 30, 36	8	
Material	Text			CI	
Type	Text			Water	
YrAbnded	Text			2017	
AirVac					
AirVacNmbr	Text			1	
Size	Text			1 Inch	
Manufacturer	Text			A.R.I.	
Ownership	Text	Ownership	City of Sheridan, SAWS, Joint, Other	SAWS	
YearInstalled	Text			2019	
Notes	Text			Offset Vent Pipe. Etc	
gpsAccuracy	Text	gpsAccuracy	Sub Centimeter, Sub Foot, Sub Meter, Sub 3 Meter, Sub 10 Meter, Digitized	Sub Centimeter	GPS Accuracy depends on the device.
Source	Text			Wenck Associates	
RecDraw	Text			Leopard_Waterline_As-Builts.pdf	
Hyperlink	Text			File/Path/URL	
Elevation	Double			4000	
Northing	Double			1883876.038	
Easting	Double			1407174.603	
Latitude	Text			43° 50' 42.33" N	
Longitude	Text			105° 31' 00.52" W	
Blowoff					
Id	Long Integer			1	
Size_	Short Integer			2"	
Type_	Text			Hydrant	
Notes	Text			Blowoff	
Label	Text				
PRVID	Text				
Location	Text				
UpstreamPressureSetting	Text				
DownstreamPressureSetting	Text				
LargeSize	Text				
MediumSize	Text				
MediumSizeSetting	Text				
SmallSize	Text				
SmallSizeSetting	Text				
PipeSizeIn	Text	PRVPipeSizeIn	2 Inch, 4 Inch, 6 Inch, 8 Inch, 10 Inch, 12 Inch, 16 Inch	2 Inch	
PipeSizeOut	Text	PRVPipeSizeOut	2 Inch, 4 Inch, 6 Inch, 8 Inch, 10 Inch, 12 Inch, 16 Inch	2 Inch	
ValveTypeBrand	Text				
FlowMeter	Text	YesNo	Yes, No	Yes	
Enabled	Short Integer	Enabled Domain	0, 1 (True, False)	True	

2019 City of Sheridan GIS Master Water Geodatabase Schema

YearInstalled	Text			2019	
gpsAccuracy	Text	gpsAccuracy	Sub Centimeter, Sub Foot, Sub Meter, Sub 3 Meter, Sub 10 Meter, Digitized	Sub Centimeter	GPS Accuracy depends on the device.
Source	Text			DOWL GPS	
RecDraw	Text			FileName.pdf	
Hyperlink	Text			File/Path/URL	
Elevation	Text			4000	
Northing	Double			1883876.038	
Easting	Double			1407174.603	
Latitude	Text			43° 50' 42.33" N	
Longitude	Text			105° 31' 00.52" W	
Hydrant					
HydrantID	Text			1201	
LocationAddress	Text			Intersection of Brundage Lane/Coffeen Avenue	Intersection or Address - Use fully spelled out directional signage
FlushingHydrant	Text	YesNo	Yes, No	No	
DeadEndHydrant	Text	YesNo	Yes, No	Yes	
Type	Text	HydrantType	Mueller, Ludlow, Other	Mueller	
Weepless	Text			Yes	
MaintBy	Text	Ownership	City of Sheridan, SAWS, Joint, Other	City of Sheridan	Others - VA, Memorial Hospital, Sheridan College
YearInstalled	Text			2014	
LABEL	Text				
ZONE	Text				
Predicted_FF	Double			100 GPM	
HW_Model_FF	Double			120 GPM	
Static	Text			82 PSI	
Residual	Text			70 PSI	
Notes	Text			See record drawing for special notes	Could be left blank - used for atypical situations
gpsAccuracy	Text	gpsAccuracy	Sub Centimeter, Sub Foot, Sub Meter, Sub 3 Meter, Sub 10 Meter, Digitized	Sub Centimeter	
Source	Text			DOWL	
RecDraw	Text			FileName.pdf	Exact name as listed on title sheet
Elevation	Text			4000.0	
Northing	Double			1883876.038	
Easting	Double			1407174.603	
Latitude	Text			43° 50' 42.33" N	
Longitude	Text			105° 31' 00.52" W	
Juntion					
ElementTypeId	Long Integer			55	
ElementId	Long Integer			6300	
ID	Long Integer			6300	
Label	Text			J-26	
Zone	Long Integer			246	
Demand	Double			11.27	
Hydraulic_Grade	Double			3948.28	
Pressure	Double			89.29	
Is_Active	Short Integer			1	
Notes	Text				

2019 City of Sheridan GIS Master Water Geodatabase Schema

gpsAccuracy	Text	gpsAccuracy	Sub Centimeter, Sub Foot, Sub Meter, Sub 3 Meter, Sub 10 Meter, Digitized	Digitized	
Source	Text			DOWL Model	
Elevation	Double			4000.0	
Northing	Double			1883876.038	
Easting	Double			1407174.603	
Latitude	Text			43° 50' 42.33" N	
Longitude	Text			105° 31' 00.52" W	
MiscServiceLine					
Type	Text	MiscPointType	House Corner, Property Corner, Edge of Sidewalk, Back of Curb, Other	Back Of Curb	
Address	Text			4025 Bighorn Avenue	
Date	Date			40288	
PermitNum	Text			Permit Number	
Notes	Text			See Record Drawing Notes	
MIscServicePoint					
Point_ID	Long Integer			8	
Type	Text	MiscPointType	House Corner, Property Corner, Edge of Sidewalk, Back of Curb, Other	Water Line	
Address	Text			409 Park Street	Include spelled out direction sign (i.e. Place, Drive, Lane)
Date	Date			43559	
PermitNum	Text			Permit Number?	
Notes	Text				
gpsAccuracy	Text	gpsAccuracy	Sub Centimeter, Sub Foot, Sub Meter, Sub 3 Meter, Sub 10 Meter, Digitized	Sum 10 Meter	
Source	Text			DOWL GPS	
Elevation	Double			4000	
Northing	Double			1883876.038	
Easting	Double			1407174.603	
Latitude	Text			43° 50' 42.33" N	
Longitude	Text			105° 31' 00.52" W	
PressureReliefValve					
Id	Long Integer			1	
Size_	Short Integer			2	
Type_	Text			Hydrant	
Label	Text			Paradise Park Rd	
PRVID	Text				
Location	Text				
UpstreamPressureSetting	Text				
DownstreamPressureSetting	Text				
PipeSizeIn	Text	PRVPipeSizeIn	2 Inch, 4 Inch, 6 Inch, 8 Inch, 10 Inch, 12 Inch, 16 Inch	2 Inch	
PipeSizeOut	Text	PRVPipeSizeOut	2 Inch, 4 Inch, 6 Inch, 8 Inch, 10 Inch, 12 Inch, 16 Inch	2 Inch	
ValveTypeBrand	Text				
FlowMeter	Text	YesNo	Yes, No	Yes	
Enabled	Short Integer	Enabled Domain	0, 1 (True, False)	True	

2019 City of Sheridan GIS Master Water Geodatabase Schema

YearInstalled	Text			2010	
Notes	Text			Blowoff	
gpsAccuracy	Text	gpsAccuracy	Sub Centimeter, Sub Foot, Sub Meter, Sub 3 Meter, Sub 10 Meter, Digitized	Sum 10 Meter	
Source	Text			DOWL	
RecDraw	Text			FileName.pdf	
Hyperlink	Text			File/Path/URL	
Elevation	Text			4000	
Northing	Double			1883876.038	
Easting	Double			1407174.603	
Latitude	Text			43° 50' 42.33" N	
Longitude	Text			105° 31' 00.52" W	
PressureZones					
Id	Long Integer			1	
Zone	Short Integer			4040	
Name	Text			South Hill	
PRV					
PRVID	Text			PRV18	
Location	Text			NW Loop	Title Sheet/PP Sheet/Station
UpstreamPressureSetting	Text			85 PSI	
DownstreamPressureSetting	Text			72 PSI	
NumOfPRV	Text	PRVNumberOfValves	2, 3, 4	3	
LargeSize	Text			8 Inches	
LargeSizeSetting	Text			85 PSI	
MediumSize	Text			6 Inches	
MediumSizeSetting	Text			80 PSI	
SmallSize	Text			2 Character Integer	
SmallSizeSetting	Text			2 Character Integer	
PipeSizeIn	Text	PRVPipeSizeIn	2 Inch, 4 Inch, 6 Inch, 8 Inch, 10 Inch, 12 Inch, 16 Inch	2 Inch	
PipeSizeOut	Text	PRVPipeSizeOut	2 Inch, 4 Inch, 6 Inch, 8 Inch, 10 Inch, 12 Inch, 16 Inch	6 Inch	
ValveTypeBrand	Text			Cla-Val	
FlowMeter	Text	YesNo	Yes, No	Yes	
YearInstalled	Text			2000	
Notes	Text			See record drawing for special notes	Could be left blank - used for atypical situations
gpsAccuracy	Text	gpsAccuracy	Sub Centimeter, Sub Foot, Sub Meter, Sub 3 Meter, Sub 10 Meter, Digitized	Sum Centimeter	
Source	Text			DOWL	
RecDraw	Text			FileName.pdf	
Hyperlink	Text			File/Path/URL	Title Sheet/PP Sheet/Station
Elevation	Double			4000	
Northing	Double			1883876.038	
Easting	Double			1407174.603	
Latitude	Text			43° 50' 42.33" N	
Longitude	Text			105° 31' 00.52" W	

2019 City of Sheridan GIS Master Water Geodatabase Schema

PumpStation					
Id	Text			PS02	
Name	Text			Beckton Hall	
Address	Text			67 Beckton Hall Road	Include spelled out direction sign (i.e. Place, Drive, Lane)
Type	Text			Pump Station (Vault)	
SizeOfValves	Text			8 Inch	
SizeOfPipes	Text			8 Inch	
SuctionPressure	Text			62 PSI	
DischargePressure	Text			85 PSI	
YearInstalled	Text			1970	
Notes	Text			See record drawing for special notes	Could be left blank - used for atypical situations
gpsAccuracy	Text	gpsAccuracy	Sub Centimeter, Sub Foot, Sub Meter, Sub 3 Meter, Sub 10 Meter, Digitized	Sub Centimeter	
Source	Text			DOWL	
RecDraw	Text			FileName.pdf	Exact name as listed on title sheet
Hyperlink	Text			File/Path/URL	
Elevation	Double			4000	
Northing	Double			1883876.038	
Easting	Double			1407174.603	
Latitude	Text			43° 50' 42.33" N	
Longitude	Text			105° 31' 00.52" W	
SAWSMeters					
MeterNumber	Text			2461	
Address	Text			56 Pierce Rd	
LocationOfPit	Text			Rear?	
Code	Text			WM	
WM_Manufacturer	Text			Ford	
WM_Condition	Text			Good	
PRV	Text			No	
PRV_Manufacturer	Text			Sensus SR II	
WM_Size	Text			5/8"	
Notes	Text			See record drawing for special notes	
gpsAccuracy	Text	gpsAccuracy	Sub Centimeter, Sub Foot, Sub Meter, Sub 3 Meter, Sub 10 Meter, Digitized	Sum Centimeter	
Source	Text			DOWL	
RecDraw	Text			FileName.pdf	
Drawing	Text			File/Path?	
Elevation	Double			4125.56	
Northing	Double			1883876.038	
Easting	Double			1407174.603	
Latitude	Text			43° 50' 42.33" N	
Longitude	Text			105° 31' 00.52" W	
SAWSServiceArea					
Name	Text			SAWS Service Area Boundary	
YearUpdated	Text				
Notes	Text			Original SAWS Service Area Boundary(Current)	

2019 City of Sheridan GIS Master Water Geodatabase Schema

WaterLineLeaks					
Address	Text			1415 North Heights Drive	Include spelled out direction sign (i.e. Place, Drive, Lane)
MainDiameter	Double	WaterPipelineDiameter	1, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 24, 30, 36	8	
MainMaterial	Text	WaterPipelineMaterial_1	RCP, CMP, PVC, DIP, CIP, HDPE, Steel, PCCP	PVC	
Cause	Text	WaterLineLeakCause	Beam Break, Corrosion, Joint, Hole, Faulty Installation, Freeze, Drilling Machine, Other(Describe in Notes)	Beam Break	
LeakLocation	Text	WaterLineLeakLocation	Pipe, Hydrant, Valve, Service Line, Corp Stop, Other(Describe in Notes)	Pipe	
CorrosionY_N	Text	YesNo	Yes, No	Yes	
RepairDate	Text			37176	
RepairYear	Text			2001	
Score	Short Integer			75	
Notes	Text			Settlement issues	Could be left blank - used for atypical situations
gpsAccuracy	Text	gpsAccuracy	Sub Centimeter, Sub Foot, Sub Meter, Sub 3 Meter, Sub 10 Meter, Digitized	Sub Meter	
Source	Text			DOWL	Individual/Firm that shot in the elevation
Hyperlink	Text			File/Path/URL	
Elevation	Double			6.5 Feet	Top of surface to top of pipe
Northing	Double			1883876.038	
Easting	Double			1407174.603	
Latitude	Text			43° 50' 42.33" N	
Longitude	Text			105° 31' 00.52" W	
WaterPipeline					
Number	Long Integer			1	
Size	Double	WaterPipelineDiameter	1, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 24, 30, 36	6	
Material	Text	WaterPipelineMaterial_1	RCP, CMP, PVC, DIP, CIP, HDPE, Steel, PCCP	PVC	
PressureZone	Double	PressureZones	3890, 3952, 4040, 4090, 4160, 4276, 4390, 4506, 4622	4040	
Ownership	Text	Ownership	City of Sheridan, SAWS, Joint, Other	City of Sheridan	
YearInstalled	Text			2019	
FireHydrantLine	Text	YesNo	Yes, No	No	
Lined	Text	YesNo	Yes, No	No	
EasementRec	Text			FileName.pdf	
Notes	Text			Project Name	
Source	Text			See record drawing for special notes	Could be left blank - used for atypical situations
RecDraw	Text			DOWL	
WaterServiceLine					
Address	Text			981 PINYON PLACE	Include spelled out direction sign (i.e. Place, Drive, Lane)
PermitNumber	Text			Permit Number	
YearInstalled	Text			2003	
Size	Text	WaterServiceLineSize	1/2 Inch, 1 Inch, 1-1/2 Inch, 2 Inch, 3/4 Inch, 4 Inch, 6 Inch, 8 Inch	6 Inches	
Material	Text	WaterServiceLineMaterial_1	HDPE, Copper, PVC, DIP, CIP	HDPE	
DepthAtTap	Text			8.25 Feet	
DepthAtCurbstop	Text			5.9 Feet	

2019 City of Sheridan GIS Master Water Geodatabase Schema

TapSize	Text	WaterServiceLineTapSize	5/8 Inch, 3/4 Inch, 1 Inch, 1-1/4 Inch, 1-1/2 Inch, 2 Inch	5/8 Inches	
MainSize	Text	WaterServiceLineMainSize	2 Inch, 4 Inch, 6 Inch, 8 Inch, 10 Inch, 12 Inch, 16 Inch, 20 Inch, 24 Inch, 30 Inch	4 Inch	
Notes	Text			See record drawing for special notes	Could be left blank - used for atypical situations
Source	Text			DOWL	
RecDraw	Text			FileName.pdf	Title Sheet/PP Sheet/Station
WaterServicePoint					
Type	Text	WaterType	Water Line, Curbstop, Coupling, Meter Pit, Tap, Water Enters House, Tie to Existing, Tee, Frost Free Hydrant, Other	Water Line	
Address	Text			409 Park Street	Include spelled out direction sign (i.e. Place, Drive, Lane)
LineType	Text	WaterServiceLineMaterial_1	HDPE, Copper, PVC, DIP, CIP, Other	HDPE	
LineSize	Text	WaterServiceLineSize	1/2 Inch, 1 Inch, 1-1/2 Inch, 2 Inch, 3/4 Inch, 4 Inch, 6 Inch, 8 Inch	3/4"	
DepthAtCurbstop	Text			6 Feet	
TapDepthFT	Text			8.25 Feet	
YearInstalled	Text			2002	
PermitNumber	Text			Permit Number?	
Notes	Text			Water main tapping saddle	Could be left blank - used for atypical situations
gpsAccuracy	Text	gpsAccuracy	Sub Centimeter, Sub Foot, Sub Meter, Sub 3 Meter, Sub 10 Meter, Digitized	Sum Meter	
Source	Text			DOWL	
RecDraw	Text			FileName.pdf	Title Sheet/PP Sheet/Station
Hyperlink	Text			File/Path/URL	
Elevation	Text			4125.56	
Northing	Double			1883876.038	
Easting	Double			1407174.603	
Latitude	Text			43° 50' 42.33" N	
Longitude	Text			105° 31' 00.52" W	
WaterSystemPressures					
Demand	Double			41	
HGL	Double			4040	
Label	Text			3rd and Val Vista	
Pressure	Text			80 PSI	
Notes	Text				
gpsAccuracy	Text	gpsAccuracy	Sub Centimeter, Sub Foot, Sub Meter, Sub 3 Meter, Sub 10 Meter, Digitized	Sub Meter	
Source	Text			DOWL Model	
Elevation	Double			4125.56	
Northing	Double			1883876.038	
Easting	Double			1407174.603	
Latitude	Text			43° 50' 42.33" N	
Longitude	Text			105° 31' 00.52" W	

2019 City of Sheridan GIS Master Water Geodatabase Schema

WaterTank					
Name	Text			North High	
Type	Text			Fiberglass, Cylindrical	
Volume	Text			0.5	
OverflowElevation	Text			3972	
MaxElevation	Text			3974	
LowElevation	Text			3960	
YearInstalled	Text			1977	
Diameter	Text			110 Feet	
Underground	Text	WaterTankUnderground	Yes, No, Partial	Yes	
Notes	Text			See record drawing for special notes	Could be left blank - used for atypical situations
gpsAccuracy	Text	gpsAccuracy	Sub Centimeter, Sub Foot, Sub Meter, Sub 3 Meter, Sub 10 Meter, Digitized	Digitized	
Source	Text			DOWL	
RecDraw	Text			FileName.pdf	Exact name as listed on title sheet
Hyperlink	Text			File/Path/URL	
Northing	Double			1883876.038	
Easting	Double			1407174.603	
Latitude	Text			43° 50' 42.33" N	
Longitude	Text			105° 31' 00.52" W	
WaterTreatmentPlant					
Name	Text			SWTP	
Notes	Text			SWTP	
gpsAccuracy	Text	gpsAccuracy	Sub Centimeter, Sub Foot, Sub Meter, Sub 3 Meter, Sub 10 Meter, Digitized	Digitized	
Source	Text			DOWL	
RecDraw	Text			FileName.pdf	
Hyperlink	Text			File/Path/URL	
Northing	Double			1883876.038	
Easting	Double			1407174.603	
Latitude	Text			43° 50' 42.33" N	
Longitude	Text			105° 31' 00.52" W	
WaterValves					
ValveID	Text			BG4_PP34_1+10	
Size	Text	WaterValveSize	2 Inch, 4 Inch, 6 Inch, 8 Inch, 10 Inch, 12 Inch, 16 Inch, 20 Inch, 24 Inch, 30 Inch	8 Inch	
Type	Text	WaterValveType	Butterfly, Gate	Gate	
PressZoneValve	Text	YesNo	Yes, No	No	
DepthToNut	Text			6.0 Feet	
Ownership	Text	Ownership	City of Sheridan, SAWS, Joint, Other	SAWS	
YearInstalled	Text			1999	
Manufacturer	Text			MUELLER	
Notes	Text			MUELLER GATE VALVE A-2360	
gpsAccuracy	Text	gpsAccuracy	Sub Centimeter, Sub Foot, Sub Meter, Sub 3 Meter, Sub 10 Meter, Digitized	Sum Centimeter	
Source	Text			DOWL	
RecDraw	Text			FileName.pdf	Title Sheet/PP Sheet/Station

Elevation	Text			4125.56	
Northing	Double			1883876.038	
Easting	Double			1407174.603	
Latitude	Text			43° 50' 42.33" N	
Longitude	Text			105° 31' 00.52" W	
WTPBuildings					
Name	Text			Sheridan Plan 4MG Tank	
FacID	Text			SPT	
OTHER LAYERS IN GDB					
RecordDrawingSheetLink					
RecordDrawingZones					
TwinLakesInundation					
ValveBookPages					
WTPBuildings					
WTPBuildings_HAS_WTPProcess					

GIS AND ASSET MANAGEMENT RECOMMENDATIONS

Prepared by:

DOWL

Overview

The City of Sheridan currently has a Geographic Information System (GIS) of their infrastructure. Implementing a mobile GIS would be a great asset to the City. The purpose of the mobile GIS is to assist the City staff with locating, updating, maintaining, and creating new features. The City currently has an ArcGIS Enterprise license which allows the use of Collector for ArcGIS Mobile App using the Portal for ArcGIS licenses that come with ArcGIS Enterprise.

Figure 1 below shows a diagram of how Portal for ArcGIS woks with the ESRI Apps (Collector for ArcGIS).

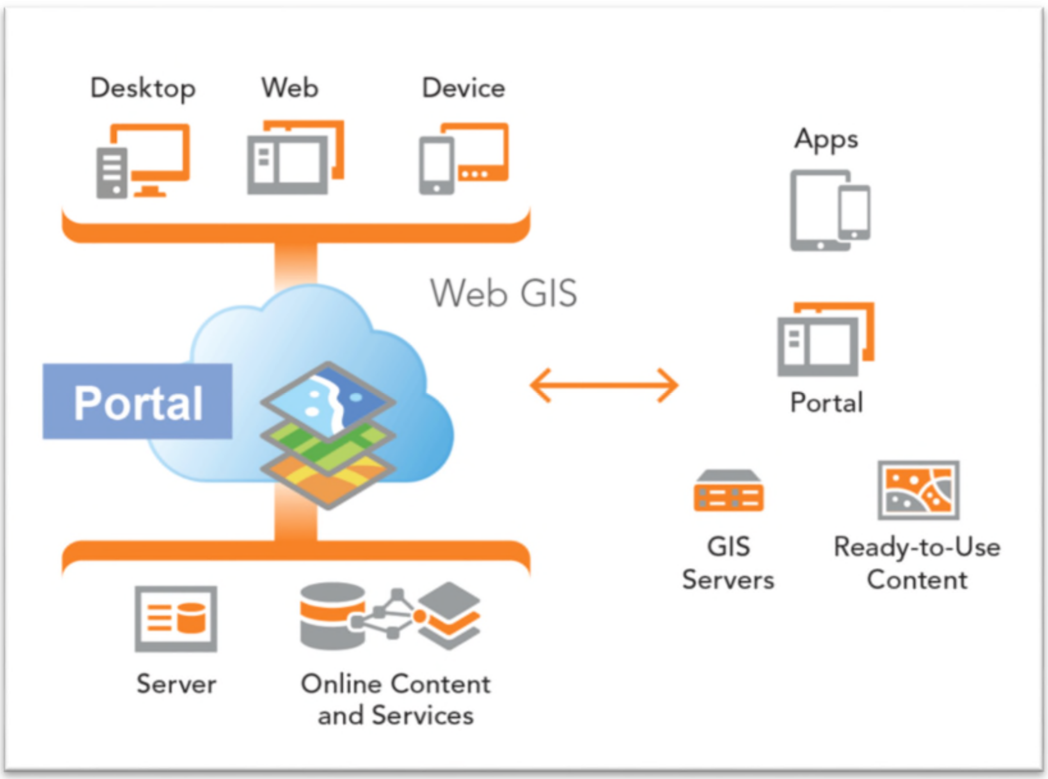


Figure 1: Portal for ArcGIS diagram

Below is the process for creating an online GIS map for Collector for ArcGIS.

1. Prepare Data – The data is prepared on ArcGIS Desktop. This data is stored on a cloud-based server
2. Publish Map – The data is published to a map on Portal for ArcGIS, this allows the users to access the map through Collector for ArcGIS
3. Download map to device – In Collector for ArcGIS, the map is downloaded onto the device from Portal for ArcGIS
4. View, Query, and Edit – In Collector for ArcGIS, the user can view, query, and edit the data within the map
5. Synchronize changes – The changes to the data are synchronized back to Portal for ArcGIS where the data is stored

Collector for ArcGIS and Portal for ArcGIS

Collector for ArcGIS is an application for mobile devices that works with the online web mapping created on Portal for ArcGIS, to provide mapping and location services as well as editing and maintaining the GIS data.

Setting up a Map

Setting up a map for Collector will be performed on Desktop for ArcGIS or Portal for ArcGIS. The data for the map is stored on the cloud-based server and accessed through Portal for ArcGIS or Desktop for ArcGIS. A web map is authored from this data. The map and data can be edited, exported, deleted and more. ESRI base maps can be added to the map as well as custom base maps. The maps can then be shared to other ArcGIS organizations and users.

Using Collector

Once the map is created it can be accessed through Collector for ArcGIS. Through the Collector app, the user must login to the ArcGIS Organizational account which gives access to the maps that were authored. The user can view and edit data in the map. After changes are made to the map, the Sync function allows the map to be updated back to the online server.

Some key features of Collector for ArcGIS are:

- Field Data Collection Workflows
- Collect asset locations and status
- Capture and Update both tabular and spatial information
- Update Attributes
- Make observations and conduct surveys
- Measure distances and areas
- Capture photos and videos of assets

Offline Use

Collector for ArcGIS can be operated from an offline status outside of cellular service areas. The maps must be downloaded onto the device with Collector to use them offline. While offline, users still have all the functions of Collector, but changes that are made must be synchronized with the source map once back online. These changes will be made to the online map and will be reflected to the maps of other users if they are also connected to the online map.

Device Requirements

Collector for ArcGIS works on most iOS, Android, and Windows 10 devices. Verify the device can run Collector for ArcGIS before purchasing. The device must have a GPS location chip. Most WiFi only tablets do not come with the GPS location chip so a device with cellular network capabilities is recommended. A cellular data plan is not required. Device costs vary greatly so are not included in this report, but a recommendation can be made.

ArcGIS Account Requirements

To use maps in Collector an ArcGIS organizational account (ArcGIS Online or ArcGIS Enterprise) is required. If using ArcGIS Enterprise, a level 2 membership is required. Portal for ArcGIS 10.3.1 and 10.4.1 are also supported. The City of Sheridan ArcGIS Enterprise account currently contains 5 Level 2 membership licenses.

High-Accuracy data collection with Collector

When collecting data using the device's location, the accuracy can depend on a variety of sources. To increase the accuracy, a high-accuracy receiver that connects to the device using a Bluetooth connection can be used. These receivers are available from several suppliers with varying accuracies. Table 2 shows of some of the options for the Trimble R2 receiver, which is compatible with Collector for ArcGIS (These costs may vary depending on supplier):

Table 2. Trimble R2 Receiver Options

Setup	Accuracy	Annual Cost	Initial Cost
Default Device GPS	3-5 m (12-16 ft)	$ 0.00	$ 0.00
Trimble R2	30 cm (1 ft)	$ 0.00	$ 5,129.00
Trimble R2 + Trimble RTX Subscription	10-20 cm (4-8")	$ 800.00	$ 5,129.00
Trimble R2 w/High Accuracy Capabilities and Trimble RTX Subscription	2 cm (<1")	$ 2,750.00	$ 5,129.00
***Accessories**	N/A	N/A	$ 412.66

Also recommended for going to high-accuracy data collection are the following accessories:

- SECO brand survey rod (recommended) $120.50
- Power Supply and Power Cord for Dual Battery Charger $85.00
- X-Grip 3 10" Tablet Holder $119.95
- Range Pole Ball Socket $68.36
- Double Ball and Socket Link $18.85

Options for Asset Management and GIS – Cityworks
Several options for Asset Management and GIS are discussed below.

Cityworks Office and Cityworks App
The City currently uses Cityworks Office but does not use Cityworks in the field. There are several options for accessing the Cityworks platform in the field. Pricing for these options are not discussed as pricing varies based on need and the size of the asset management system. There are several options for this setup:

- Cityworks Office and Cityworks Mobile App
- Cityworks Office and Cityworks Respond
- Cityworks Office and Cityworks Mobile App with Collector for ArcGIS

Asset Management and GIS Recommendations

DOWL recommends a more streamlined process for issuing, completing, and recording service requests and work orders using Cityworks, the asset management system the City currently uses.

Currently the City uses Cityworks to create work orders and send hard copies of the work orders with the field staff. The information from these hard copies then must be entered back into Cityworks to retain the information and close the work order. See Figure 2 below for the current Cityworks Workflow.

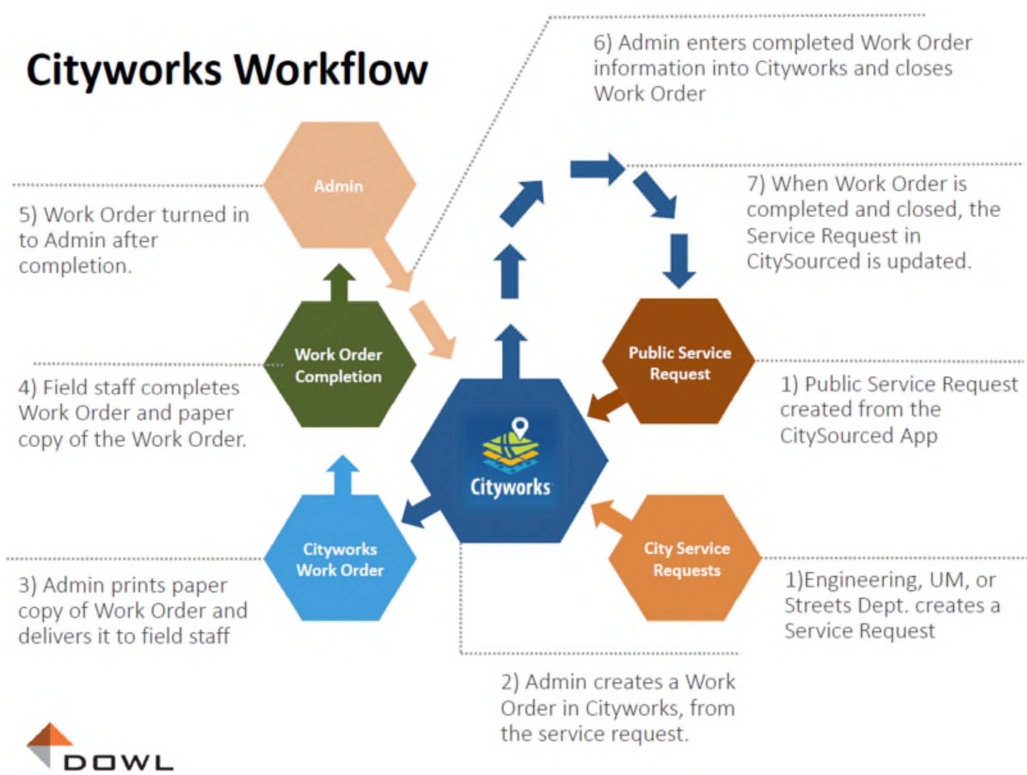


Figure 2: Current Cityworks Workflow

DOWL recommends that the City uses Cityworks Respond for completion of the work orders. Cityworks Respond is an HTML 5 customizable app accessed via a web page. Using Cityworks Respond, the work orders would be completed electronically out in the field while online. This would ensure that more of the information about the specific work order is retained. This would reduce the amount of work transferring the data from hard copies back into Cityworks. Figure 3 below shows the workflow using Cityworks Respond.

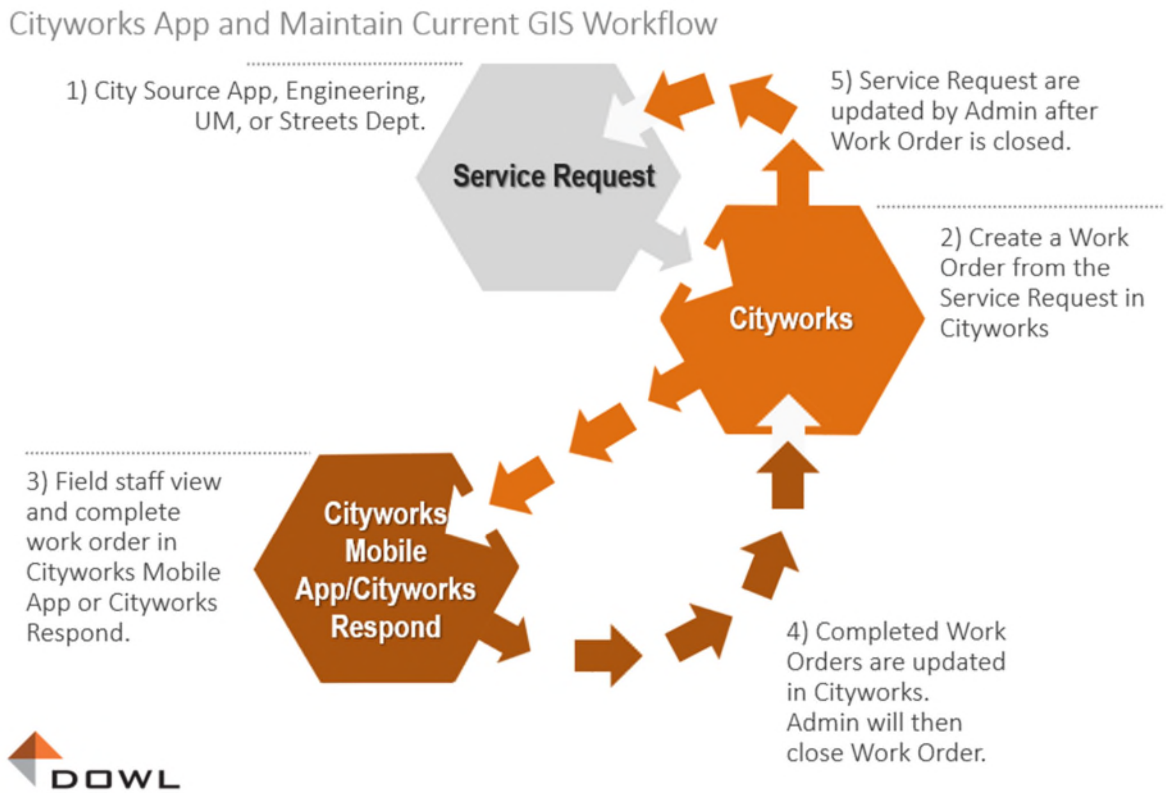


Figure 3: Cityworks Respond Workflow

The Cityworks Mobile app does not allow customization like Cityworks Respond but it does allow work orders to be completed offline. This would allow field staff to download work orders, complete them offline, and synchronize the completed work orders to Cityworks once online. Though conversations with the City Engineering Department, UM, and IT, the Mobile app does not include all of the functionality and customization that they would like. This may change as Cityworks updates the app and further develops their software. DOWL recommends that the City stay in contact with Cityworks, and periodically checks to see if the Mobile App has been upgraded or if a new app from Cityworks is produced. DOWL recommends that the City move towards the Cityworks Mobile app if the functionalities they desire are incorporated so they go offline with Cityworks and complete field orders in areas without internet connectivity. The Cityworks Mobile app can be integrated with Collector for ArcGIS for maintenance and updating the GIS. Figure 4 below is the workflow integrating CityWorks with the Collector App.

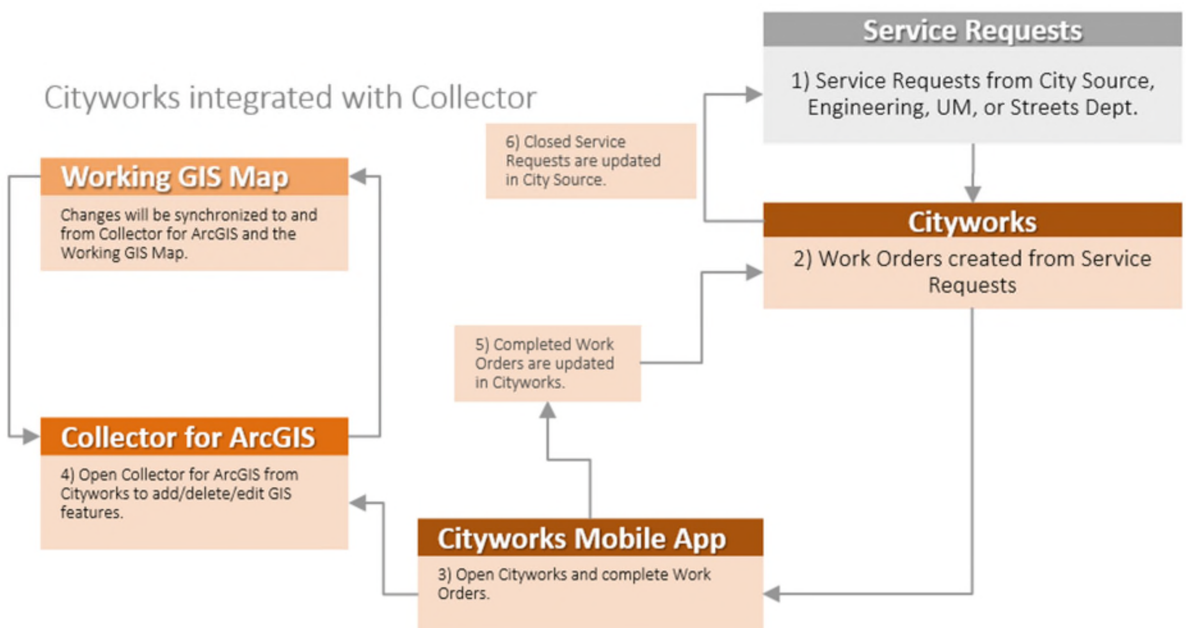


Figure 4: Cityworks integrated with Collector for ArcGIS

Summary and Recommendations

Collector for ArcGIS coupled with the City's current ArcGIS Enterprise license would be a great asset for the City. With Collector, the City could locate, update, maintain, and create new features. A field tablet coupled with a high accuracy GPS receiver is recommended for gathering data, as well as locating features in the field (not to be confused with or used in place of line locating for one-call operations). iPad tablets are the recommended devices to use, as they are more user friendly and less technical difficulties are experienced during the set up and daily operations. To improve the asset management, DOWL recommends implementing Cityworks Respond to reduce the amount of duplicated information and effort in recording work orders and information.

Sources

ArcGIS Desktop
http://desktop.arcgis.com/en/arcmap/ Collector for ArcGIS
http://doc.arcgis.com/en/collector/

Collector Requirements
https://doc.arcgis.com/en/collector/faq/requirements.htm

ArcGIS Online
http://www.esri.com/software/arcgis/arcgisonline
http://doc.arcgis.com/en/arcgis-online/reference/faq.htm#anchor1
http://doc.arcgis.com/en/arcgis-online/reference/roles.htm
https://doc.arcgis.com/en/arcgis-online/share-maps/share-maps.htm
http://www.esri.com/software/arcgis/arcgisonline/purchase

ArcGIS Desktop
http://desktop.arcgis.com/en/arcmap/

Portal for ArcGIS
http://server.arcgis.com/en/portal/latest/administer/linux/what-is-portal-for-arcgis-.htm
http://server.arcgis.com/en/portal/latest/administer/linux/portal-clients.htm
https://www.slideshare.net/sspinnovations/ssp-core-competencies?next_slideshow=1

Appendix D – Hydraulic Model Calibration and Transient Analysis

Hydraulic Model Calibration

Model History

The hydraulic water model that DOWL began this study with has been a very valuable tool for the City of Sheridan used for design and system analysis, and review of developments. DOWL developed this model in the early 1990's for the planning of the SAWS water system. Since then DOWL has updated the model as changes to the system were made. This study allowed DOWL to update the model once again and also verify the accuracy of the model.

Piping Update and Connectivity

Updating the model was completed in conjunction with the update of the GIS, as discussed in Section 4.0 of the Report. This was done in WaterGems for ArcGIS and the steps as outlined in Section 4.0 were followed. These included surveying, reviewing record drawings, discussions with UM Staff, and field checking. From this information connectivity and or mapping misrepresentations were fixed in the hydraulic model and GIS.

PRV and Booster Station Set Points

The Sheridan water system is mostly gravity fed and there are over 50 PRVs which regulate pressure. The set-points of these PRVs are critical to how the system operates. At the beginning of this study DOWL was finishing up the SAWS Control Valve project, in which 18 of these PRVs were updated. From this, and meetings with City UM, the set-points of the PRVs were reviewed and recorded, then updated in the model.

DOWL also just recently finished up a project installing meters nine of the booster stations. Flow data and pressures were recorded and updated for all stations and verified in the model.

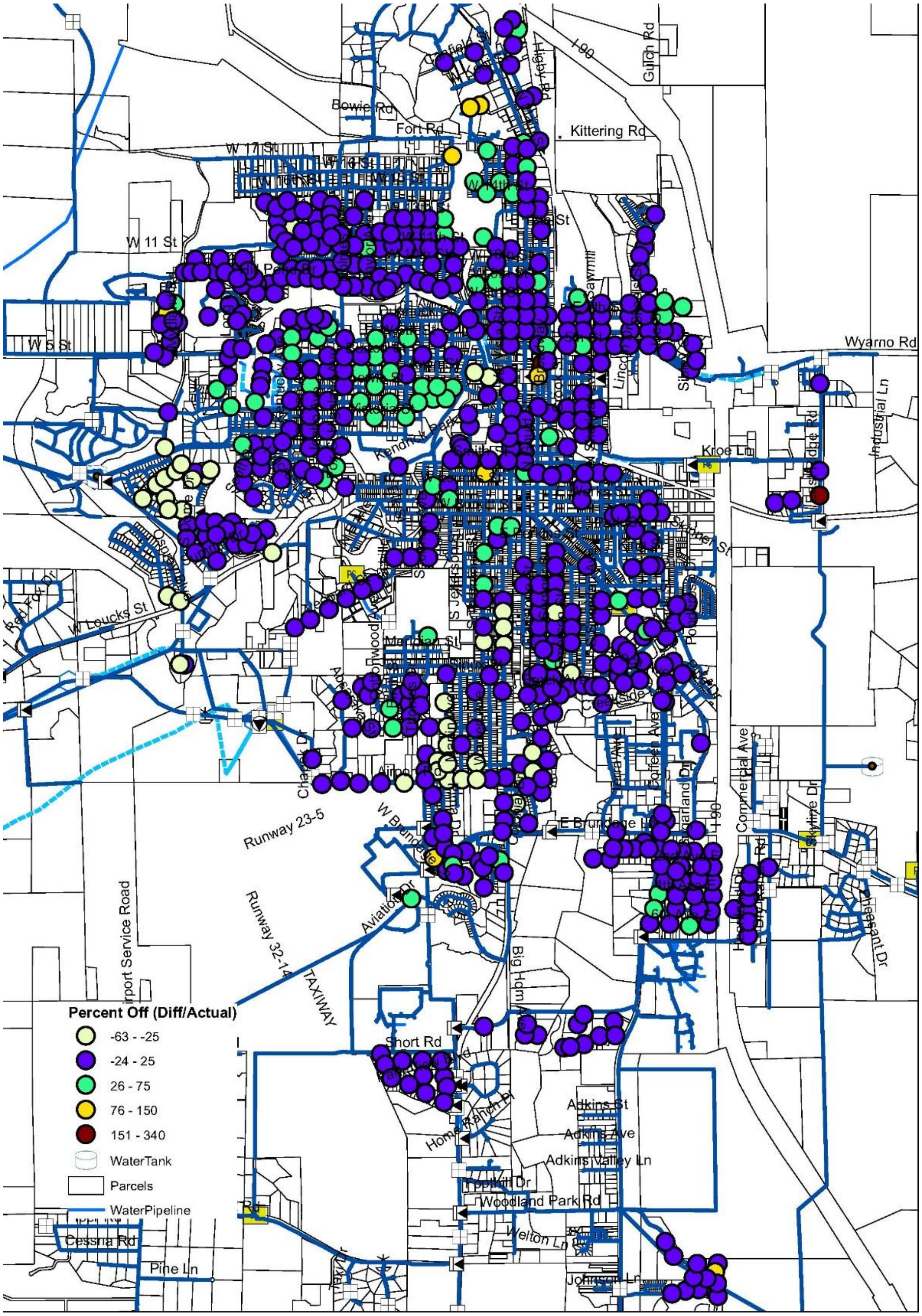
Hydrant Flow Calibrations

As discussed in Section 4.0, the Sheridan Area Fire Department has been recording flow information when they flow test hydrants. DOWL used this information to check and update the model. The accuracy of this data caused its value to be somewhat limited however. The main limitation is the lack of detailed information as to whether a fire hose was used in the flow test. The fire department said they use a hose on about half of their tests. Without this information, the actual flow from the hydrant could still be off by a couple hundred gallons per minute, depending on the pressure available. By averaging the flow data and comparing it to the model, DOWL was able to use this data to get a good "feel" for how well certain areas were being represented in the model.

Prior to this study, hydrants were not in the model, but were represented by a nearby node. When a fire flow analysis was done the modeled flow was the available capacity of the mainlines and didn't consider losses through the hydrant. This was documented in each report and usually a note was added that multiple hydrants would be needed to realize the available flow. This is accurate and still valuable information to have but the actual flow that a hydrant would give was not reported.

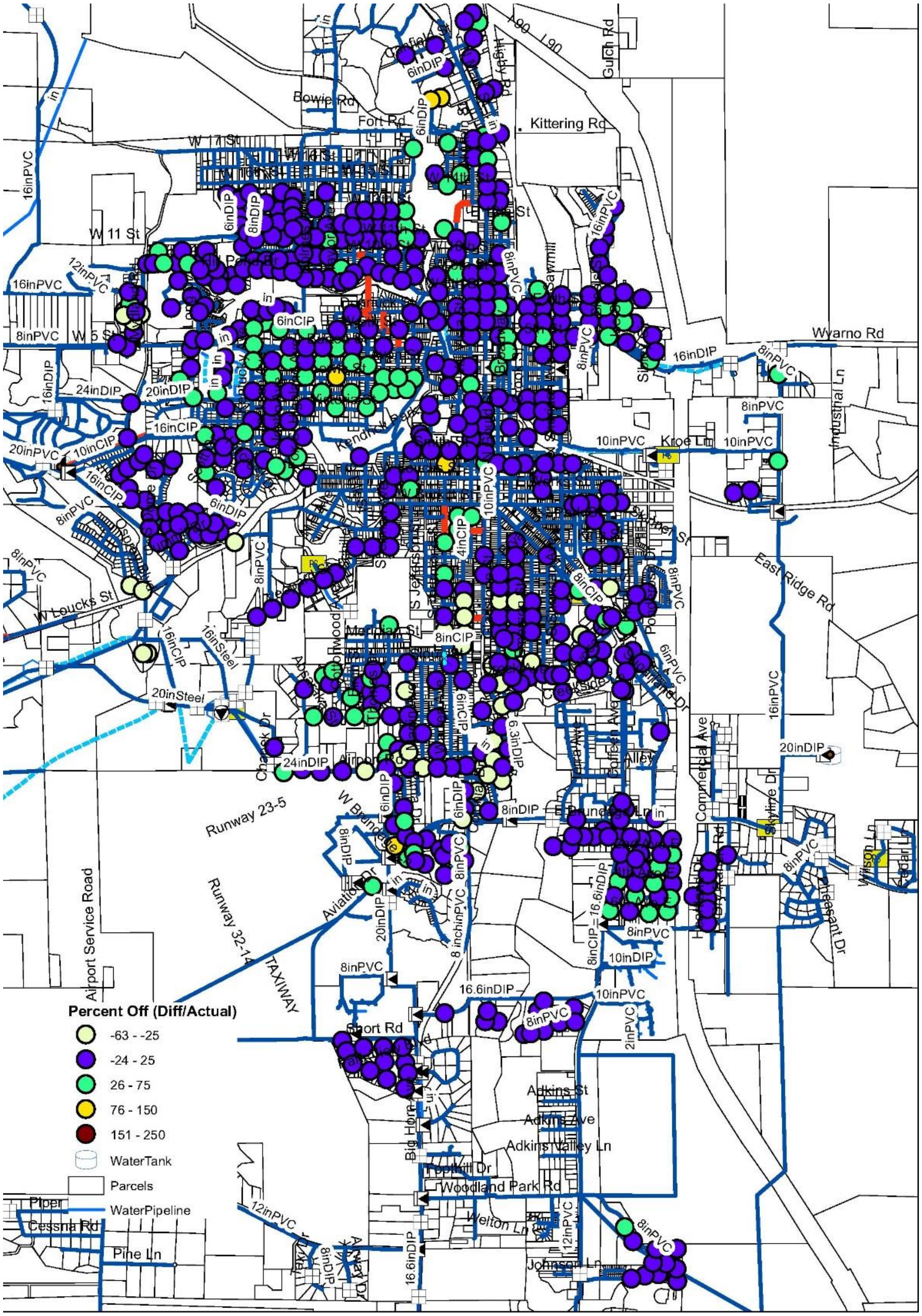
DOWL added hydrant nodes to the model from GIS data and assigned emitter coefficients to the hydrants so the averaged flows throughout the system were close to that modeled. Figure D1.1 shows the actual flows compared to modeled flows prior to calibration. The actual flow was subtracted from the modeled flow which was then divided by the actual flow for a percent difference. Therefore, hydrants that show a negative difference are hydrants in which the actual flow was greater than the modeled flow.

Figure D1.1 – Pre-Calibration Hydrant Flow Comparison



As shown, certain areas of the system showed a greater variation in the modeled vs. actual hydrant flows. DOWL investigated these areas in more detail and updated the model. Figure D1.2 shows the difference comparison after calibration.

Figure D1.2 – Post-Calibration Hydrant Flow Comparison



Even after calibration there are still some hydrant flows that do not match the model very well. These areas were further critiqued and will continue to be analyzed as more information comes in. As discussed above, without the information on the equipment used during the actual flow testing, it is difficult to come to any further conclusions on why the data do not align better with the model. On the hydrants in which the actual flows are shown greater than the modeled flows and no issues were found in the model, it is suspected that the method used to obtain the flow test greatly inhibited the hydrant flow but was not documented. In other words, the flow that could have been realized from the hydrant was greater than that recorded, due to losses in the flushing hose, a partially closed valve in the system, or some other undocumented or unknown occurrence during the flow test.

Additional specific flow testing was also performed at key locations.

Transient Analysis

Introduction

The purpose of this report is to document the transient (surge) analysis of the transmission mains in the Sheridan Area Water Supply (SAWS) system.

Background

Transient effects can be introduced into pipelines by sudden changes in the flow rate, such as valves opening or closing quickly, sudden pump starts, or more commonly, pump stoppage due to power failures. Transients caused by automatic valve opening and closing can be remedied by adjusting opening and closing speed controls. Similarly, transients caused by pump starts and normal pump stops can be minimized by the variable speed/frequency drives, soft start, delayed restarts, and pump control valves. Since these sources of transients are typically not an issue due to valve and pump features and most of the stations in SAWS are VFD controlled, the scenarios evaluated in this transient analysis focus on loss of power at the pump stations.

As discussed above, transient events could still take place in other areas due to valve or hydrant operation. However, these types of surges can be avoided by operator training, opening and closing speed control on automatic valve, and proper system operation. A power failure at a pump station cannot be totally avoided. Therefore, the systems with pump stations must be designed to accommodate or protect against transients. The total system was included in the model, but results were only considered for the areas indicated.

Refer to Section 2.3 for information on the pump stations and transmission mains in SAWS.

Transient Modeling

As discussed in Section 4 of this report, a *WaterGEMS* computer-based hydraulic model of the SAWS system was built and calibrated. Using this hydraulic model as a foundation, DOWL developed the transient analysis model to analyze the transmission mains described above. Transient analysis software, *Hammer* (by *Bentley*), was used for this analysis. *Hammer* enables engineers to simulate transient events, evaluate the magnitude of surges and design surge protection for water systems. It uses the physical layout, demand scenarios, and steady-state hydraulic analyses created in *WaterGEMS* for the surge analysis.

In addition to the physical information from the *WaterGEMS* model, information necessary for performing the transient analysis was input to the Hammer model. This information includes wave celerity, local vapor pressure, and pump rotational inertia. These items are discussed in more detail as follows:

- Wave Celerity - Wave celerity is the speed at which a surge wave propagates within a pipeline. Higher wave celerity typically means higher surge pressures will be generated. Wave celerity is dependent on a number of variables, but principally on the pipe material and wall thickness. Table D1 illustrates celerity values for various pipes in the SAWS system.

Table D1 – Celerity Values

Pipe	Celerity (ft/s)	Pipe	Celerity (ft/s)
24" C900 DR 18	1545	4" Ductile Iron	3990
20" C900 DR 18	1544	6" Ductile Iron	4287
16" C900 DR 18	1557	8" Ductile Iron	4138
12" C900 DR 18	1747	10" Ductile Iron	4029
10" C900 DR 18	1754	12" Ductile Iron	3959
8" C900 DR 18	1767	16" Ductile Iron	3853
6" C900 DR 18	1781	20" Ductile Iron	3733
4" C900 DR 18	1807	24" Ductile Iron	3718
16" Cast Iron	3851	30" Ductile Iron	3636
12" Cast Iron	3990	36" Ductile Iron	3574
10" Cast	4047	16" Steel	4086
8" Cast Iron	4120	20" Steel	3945
6" Cast Iron	4272		
4" Cast Iron	4370		

- Local Vapor Pressure - When the pressure of water is reduced under constant temperature, bubbles or cavities begin to form in the liquid. This process is known as cavitation. The collapsing of the cavities can have high impact, in some cases resulting in damage to a water system. Damage such as pitting and degradation of the inside pipe surface can occur when small vapor bubbles collapse and very high transient pressures can be formed as a result of large vapor pockets collapsing. When a large vapor pocket forms in a pipeline, this is known as water column separation and must be protected against. The Sheridan Area Water System varies in elevation from 3,700ft to 4400ft. At these elevations vapor forms if the pressure in the pipe drops below -12.9psi (lowest elevation) and -12.5psi (highest elevation). In some instances, such as with large diameter, thin-walled pipe in poor soil bedding, pipe collapse could be a concern. For the pipe and pressures in the SAWS system, collapse is not a big concern, because pressures under which vapor forms will not collapse a typical pipe, however negative pressures should be avoided, as there is a possibility that ground water could be drawn into the pipe, contaminating the system.

- Pump Rotational Inertia - When a power failure causes water system pumps to stop, rotational inertia is the major factor in establishing how quickly the pump impeller will stop. Larger impellers (with higher rotational inertia) tend to stop more slowly, which helps to reduce pressure surges. Pump rotational inertia was calculated based on the brake horsepower and rotational speed of each pump. The following table shows the pump stations considered with this transient analysis and their computed inertia values.

Pump	RPM	HP (bhp)	HP (kw)	I_{pmp}	I_{motor}	I_{total} (lbft^2)
Beaver Creek	3600	5	3.7	0.003	0.005	0.187
Beckton Hall	3600	1.5	1.1	0.001	0.001	0.043
Big Horn Ranch	3600	3	2.2	0.002	0.002	0.099
Big Horn West	3600	7.5	5.6	0.005	0.008	0.313
Jeffries Draw	3600	10	7.5	0.007	0.013	0.454
Keystone #1	3600	3	2.2	0.002	0.002	0.099
Keystone #2	3600	2	1.5	0.001	0.001	0.061
Knode	3600	7.5	5.6	0.005	0.008	0.313
Parker Draw	3600	5	3.7	0.003	0.005	0.187
Powder Horn	3600	15	11.2	0.010	0.023	0.773
Rapid Creek	3600	1	0.7	0.001	0.000	0.027
Rocky Hills	3600	1.5	1.1	0.001	0.001	0.043
Timm Drive	3600	1	0.7	0.001	0.000	0.027
Woodland Hills	3600	2	1.5	0.001	0.001	0.061
Southeast	3600	25	18.7	0.016	0.049	1.532
Northwest	3600	75	56.0	0.045	0.248	6.959
Big Horn	3600	20	14.9	0.013	0.035	1.134
Boxcross Road	3600	5	3.7	0.003	0.005	0.187

For the SAWS system, the most likely transient event resulting in extreme surge pressures is from the sudden loss of power to pumps throughout the system. For this transient analysis the system was modeled under the “Peak Hour Demand (PHD)” scenario. Further scenario description is provided in the water modeling section of this report.

A scenario was run for each booster station simulating power failure. Results are shown below. There are 14 small booster stations and 4 larger pump stations. The booster stations have smaller pumps – usually less than 15hp and serve directly into distribution systems. The “transmission main” analyzed for these was the main trunk line carrying water from the pump station to the distribution system. The pump stations have larger pumps feeding a transmission line to a tank. The line from the station to the tank was analyzed.

The SAWS system also has a hydropower generator installed on the 30-inch raw water transmission line. If a power failure occurs on this hydropower generator it could trigger a transient event. When the power fails there is no load on the generator causing it to go into a “free spin” which effectively shuts down the waterline, causing pressure surges upstream and downstream. The water model built by DOWL only considered the treated water portion of this system, so a transient analysis was not performed on the generator. However, the generator has been having issues operating lately due to insufficient flows and has had many abrupt shutdowns which have not triggered any alarms for the City Utility Maintenance. They also have not noticed any pressure relief valves operating, so it is assumed there are no transient issues with this generator.

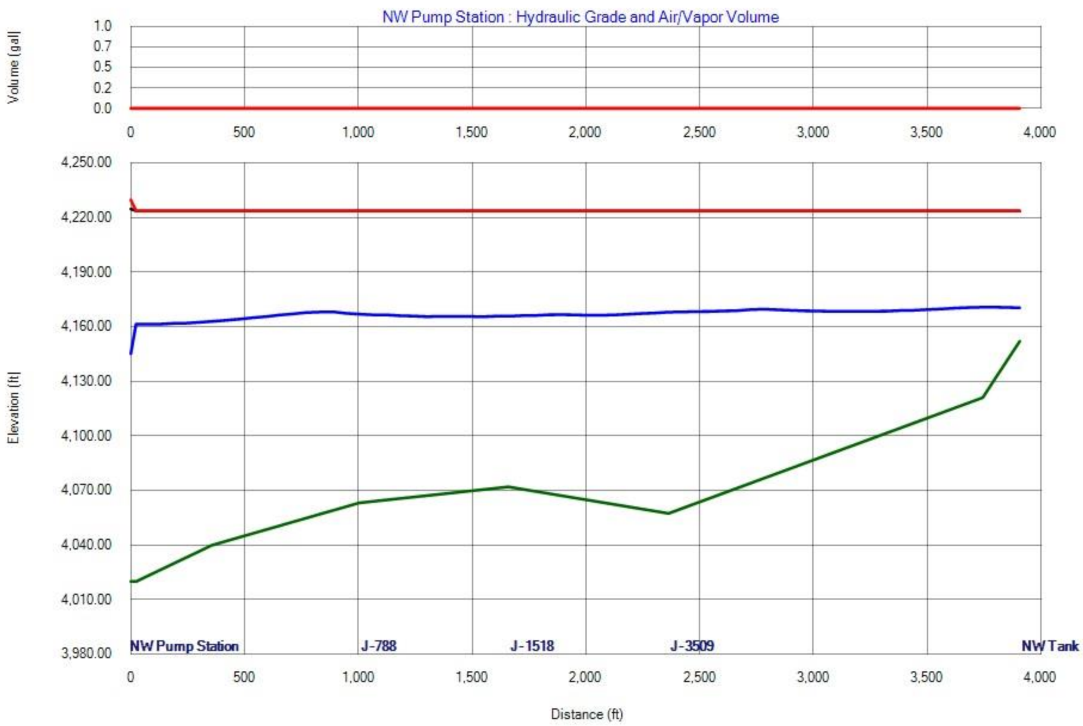
Results

The following discussions present the results of a power failure during peak hour demand operating conditions, with no surge protection in place. Each of the following figures contains two separate graphs: The top section shows the volume of vapor pockets (if any) formed resulting from low pressure created by the transient event. The bottom section shows the profile of the pipeline segment. With respect to the bottom section of the graph, the ground surface elevation (green line) and steady state or normal operation with no surge protection hydraulic grade line (HGL) (black line) are shown. A red line represents the highest HGL experienced and a blue line represents the lowest HGL resulting from the transient event. Stationing for the profiles is shown on the x axis; it begins near the pump station and ends at the tank or distribution system served.

The figures are a sample in time of the transient event simulation. The pressure wave caused by the transient event is shown in the figure by the "jump" in the line on the Steady State HGL profile. This wave travels down the pipeline as time progresses then bounces back and eventually settles out to the static HGL.

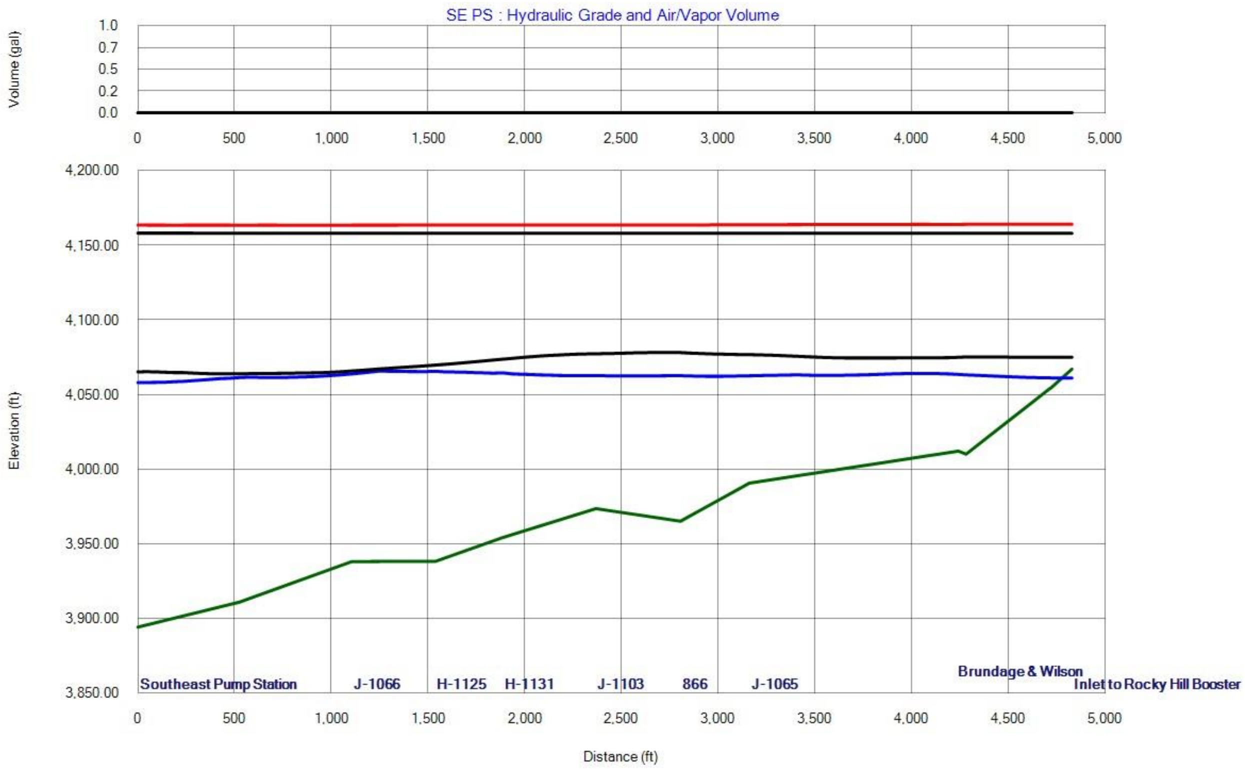
Northwest Pump Station

This is the largest pump station in the system. This pump station does not run very often since its purpose is to feed the NW tank and an automatic valve was installed a few years ago to serve this tank off the 4160 zone. High demands in the system would make this PS turn on though. Below are the results for this transient analysis. As shown, there are no issues, which was expected when pumping to a tank.



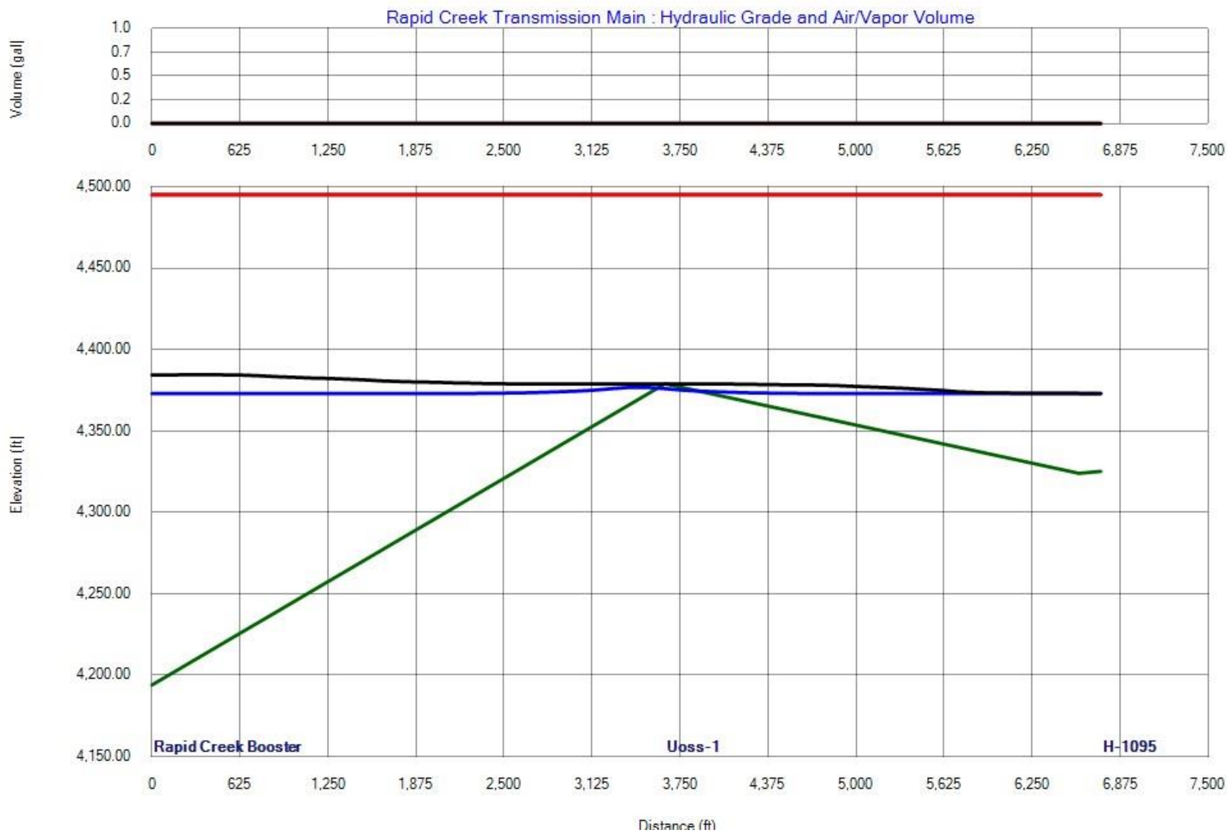
Southeast Pump Station

This pump station is the largest normally operating station in the system. The following figure shows the results of the transient analysis. No issues were recorded.



Rapid Creek

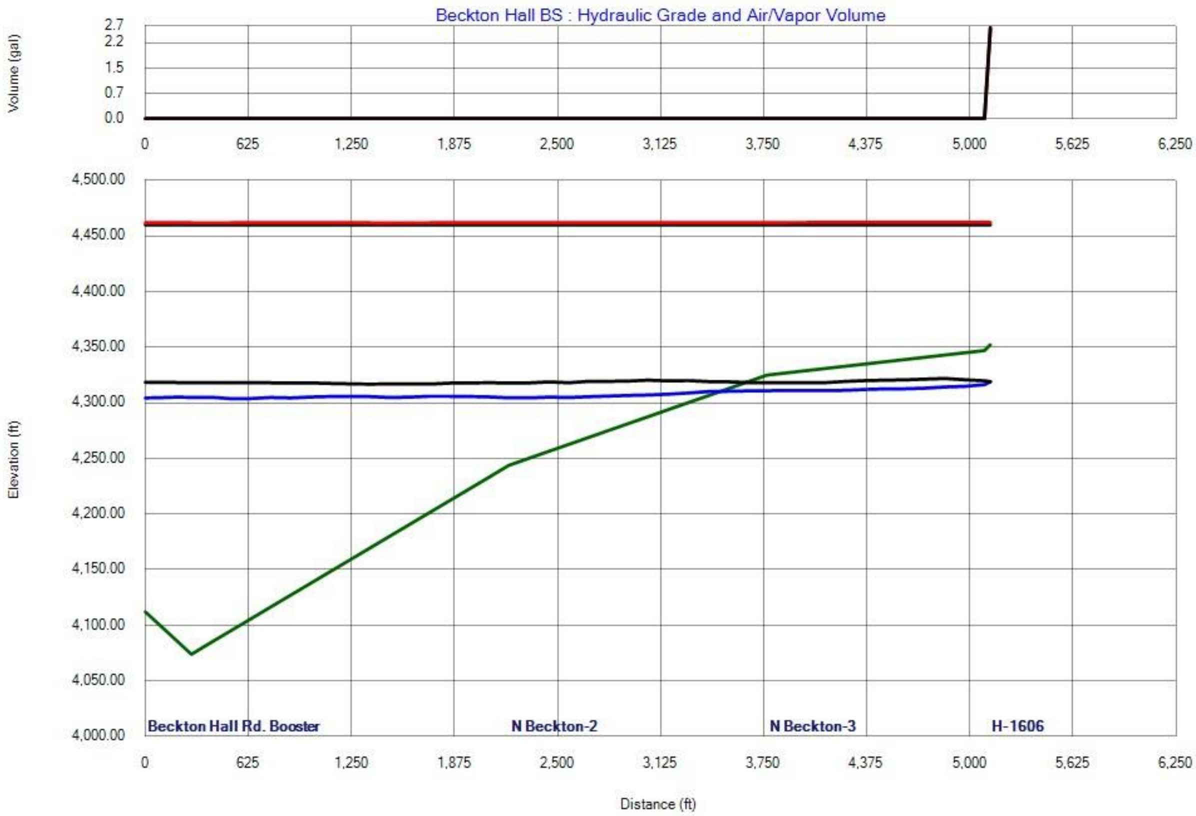
The Rapid Creek booster station is a typical small booster station in the SAWS system and shows no issues during the transient event. The following figure shows the results.



As shown in the figure where the green line comes above the blue line briefly, a short area of the waterline experiences some negative pressure for a short instant but, as shown by the top graph, no vapor develops.

Beckton Hall Rd Booster

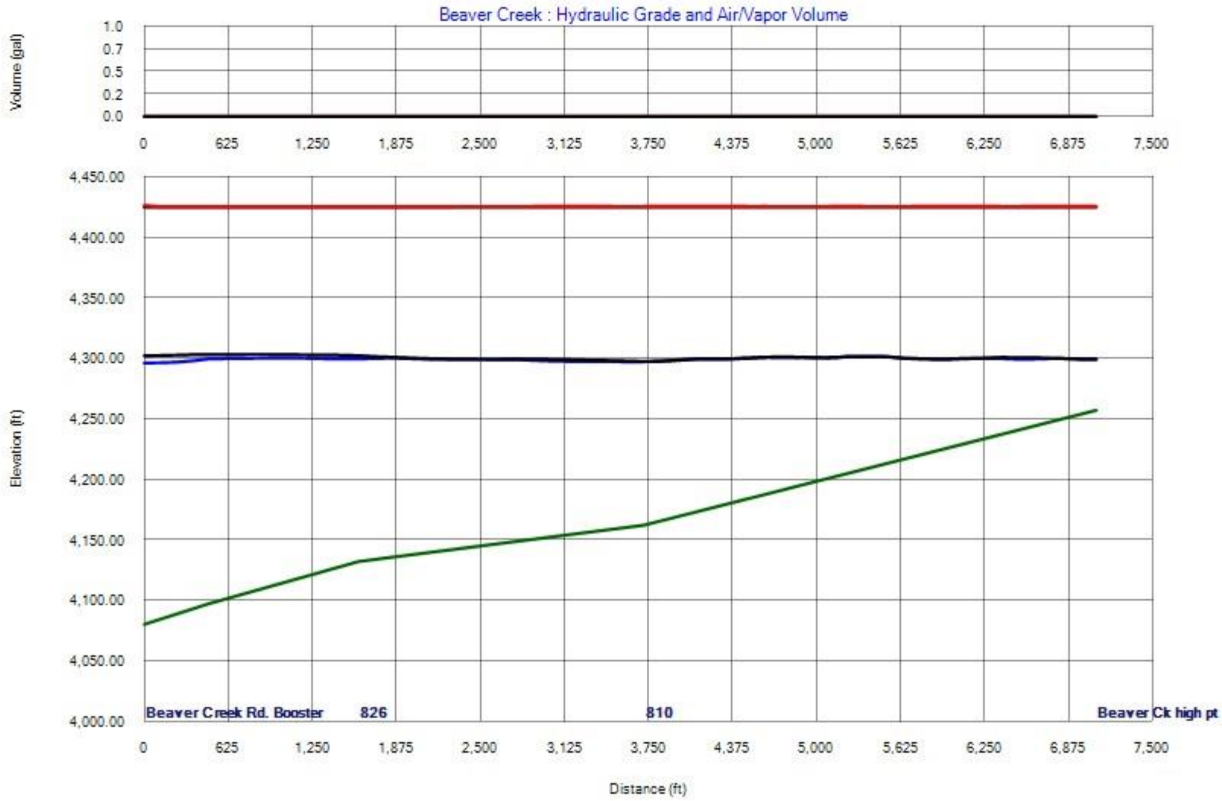
The next location analyzed was the Beckton Hall Rd transmission line from the booster station to the high point at the end of Beckton Hall Road. The following figure shows the results.



The modeling of this transmission line showed that some negative pressures develop in the system at the high point after power failure. No surges take place though and an ARV would alleviate the negative pressures. According to the record drawings there is an ARV near this high-point.

Beaver Creek

The next location analyzed was the Beaver Creek transmission line from the pump station to the high point on Beaver Creek Road. The following figure shows the results of this analysi.



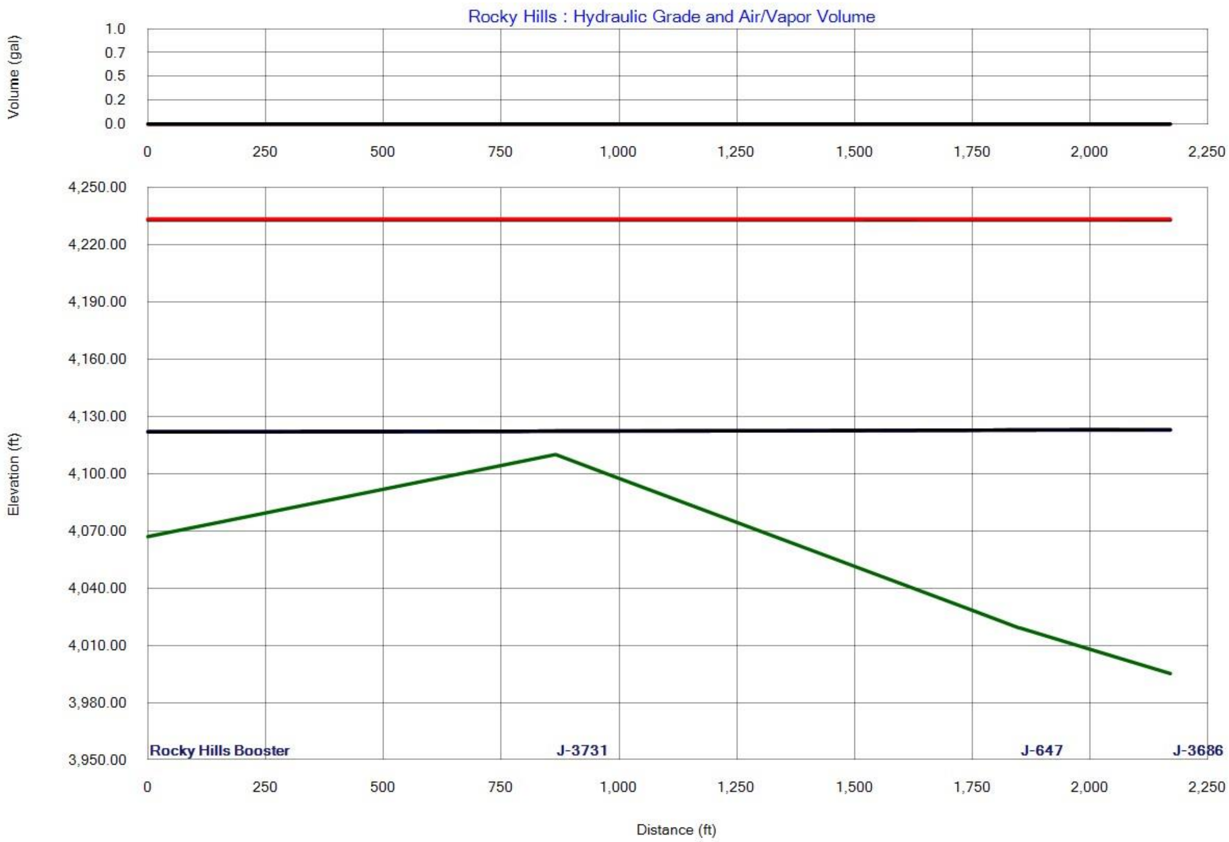
The modeling of this transmission line showed no issues in the system after power failure. No negative or extremely high pressures developed.

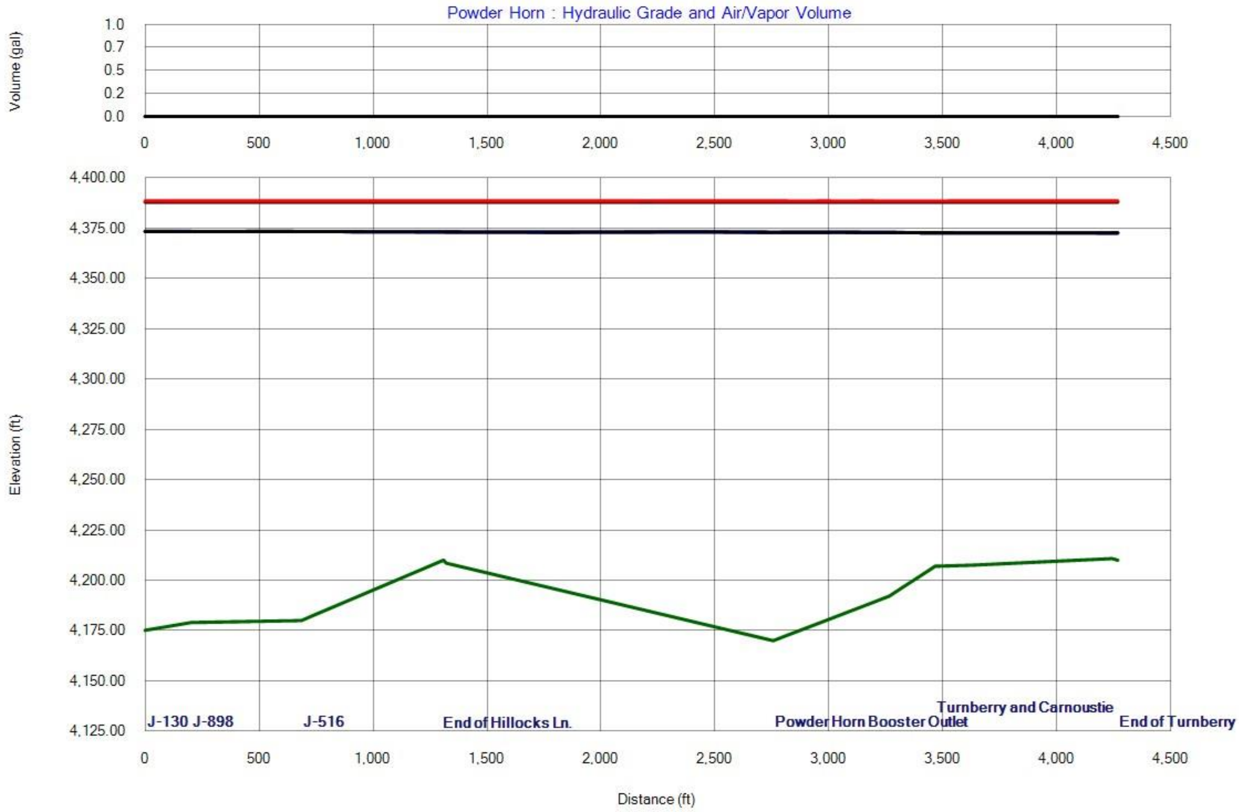
Other Similar small booster stations

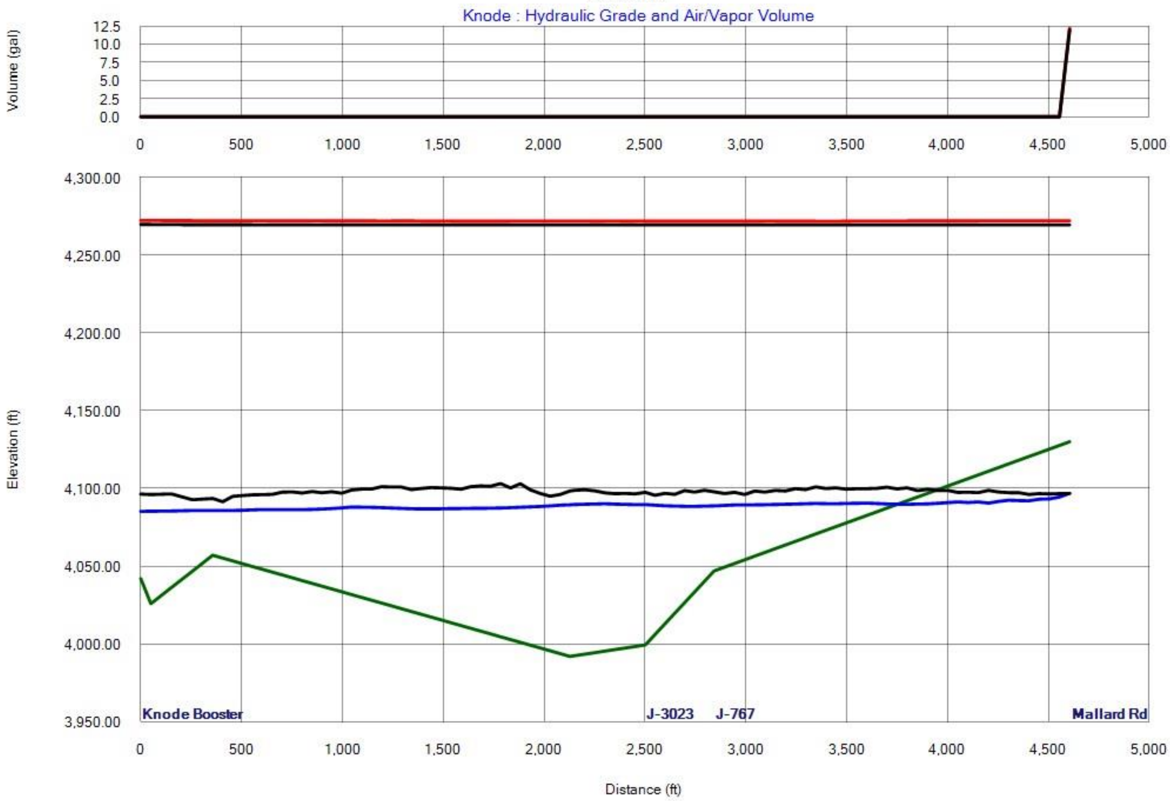
The remaining booster stations were analyzed, with similar results. The following figures show the results and are summarized below:

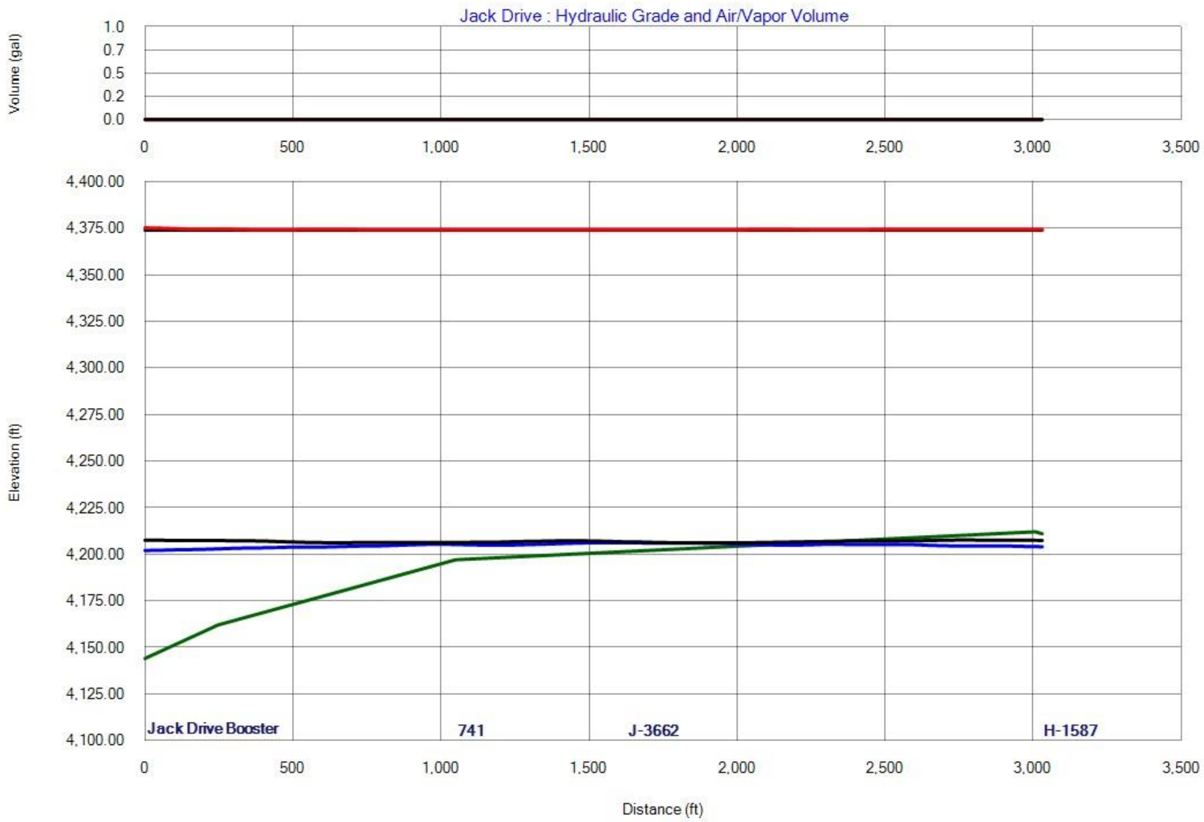
- Rocky Hills – No transient issues. This station is fed by the Southeast PS. If power failed at both stations the steady state HGL (black line) would drop down to around 4050. This would create a vacuum in most of the Rocky Hills transmission line. However, there are air/vacs along the line that would alleviate these negative pressures.
- Powder Horn – No transient issues. If the analyses were run for a longer duration the steady state HGL (black line) would be much lower. But the demands on the system are not enough to drop the pressures significantly in the 60second duration that was run.
- Knode – Some negative pressures develop at the end of the transmission line, causing some air to be introduced. There is an air/vac at the end of this transmission line.

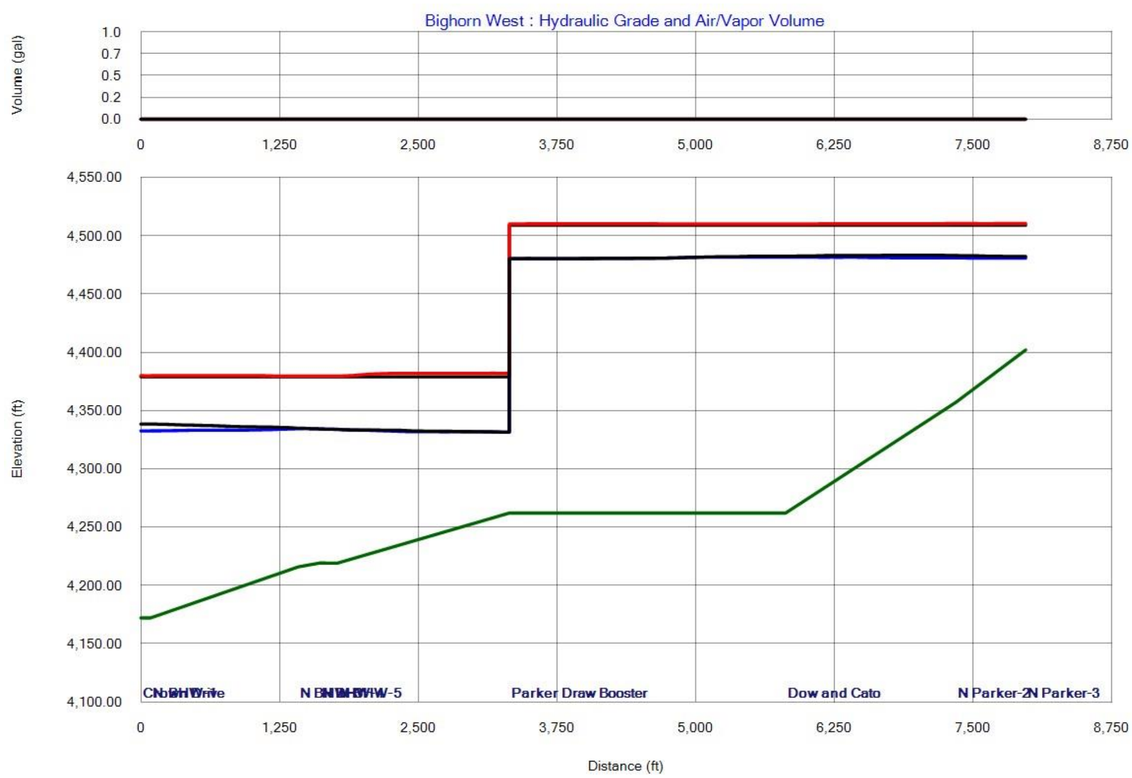
- Jack Drive – Slightly negative pressures develop at the end of the transmission that may introduce some air into the line. There is an air/vac at the end of this transmission line.
- Bighorn West and Dow – Both booster stations were considered in this scenario and are shown on the profile. If the analyses were run for a longer duration the steady state HGL (black line) would drop to about 4340 which would cause a vacuum at the end of the line. There is an air/vac at this location so any negative pressures would be alleviated.




Powder Horn : Hydraulic Grade and Air/Vapor Volume
Volume (gal)
Elevation (ft)
J-130 J-898
J-516
End of Hillocks Ln.
Powder Horn Booster Outlet
Turnberry and Carnoustie
End of Turnberry
Distance (ft)


Knode : Hydraulic Grade and Air/Vapor Volume
Volume (gal)
Elevation (ft)
Knode Booster
J-3023
J-767
Mallard Rd
Distance (ft)





-End of Appendix D-

Appendix E – Annual Report Recommendations

Sheridan Water System – Recordkeeping Recommendations
Sheridan Water System Level I Study
June 2019

Introduction – Goals & Purpose

The following is a discussion of certain records that are recommended to be compiled annually on this water system. These records mostly relate to flow quantities, but for some locations pressures are to be included. Also, user numbers are to be tracked. In many cases, these records are already kept, what is recommended is the compiling, standardizing and condensing of the records for easier and expanded use.

The goals of the recommended approach to this recordkeeping include:

- To produce a complete yet concise annual report on the use of water throughout this large water system.
- To help with the management of this water system.
- To help identify ways water quantities or usage can be reduced, aiding conservation efforts.
- Over time, to refine and revise the Design Criteria in this Level I Master Plan.
- To develop a more accurate understanding of water losses throughout the system, apparent losses, and non-revenue water uses. And then provide opportunities to reduce these quantities. (The recent Level I Master Plan estimated that a multiplier of 1.3 times the readings from the user meters is needed to match WTP influent. This multiplier can be verified with more data, and then hopefully reduced with this process.)
- To identify meters that are suspect and may need to be calibrated or replaced.
- To continue the calibration of the hydraulic model of this water system.
- To help identify places where losses may be occurring that are not otherwise being identified.
- To help identify trends over time. This includes assessing the effectiveness of implemented conservation measures.
    - In many cases the data should be graphed to better illustrate the results. For example, the differences between the irrigation season when demand is up and flow in the creek is down, and the non-irrigation season.
- To provide records of water demand in dry years, wet years and average years.
- To help identify capacity issues within the system.
- To identify projects for the Capital Improvements Plan.
- To be used for considering the capacity of a certain system component, such as a booster station to continue to supply its existing users and to possibly take on more users.
    - Develop design standards for VFD booster stations that must meet peak momentary demand, and the gpm demand rate needed for each user (based on the circumstances).
- To be used during the design of an extension to the system, the rehabilitation of components or to assess the ability of the system to accommodate a proposed development.
- Since the Big Goose watershed produces a certain amount of water for this water system and the capacities of the infrastructure connected to this Big Goose source have their limitations, to better estimate when the supply capability of this watershed and facilities will be reached.

The primary purpose for the compiling of these records and the production of an annual report is in the management of and engineering for this water system, and to provide data needed to make the most informed decisions possible.

Summary of Locations

The records are to include the following facilities and locations. These are discussed later in more detail.

- Storage reservoirs in the Big Horn Mountains.
- Diversions at the Intake Facilities
- Raw water deliveries to the two WTPs, Kendrick Golf Course, the VAMC and any other points that are added such as Wild Rose.
- Flows returned to Big Goose Creek regarding the maintaining of flow through the turbine at Beckton Hall Road.
- WTP influent, internal uses, internal return flows, and WTP effluent.
  - The WTP effluent is clearwell effluent.
- Meters within the system such as through the Airport pump station.
- Flows through all pump stations and booster stations.
- Pressures entering and leaving all pump stations and booster stations.
- Pressures entering and leaving PRV stations.
- Records from all user meters (point of use) from the Mi.Net system.

Notes

A key to the success of these reports is to have certain individuals responsible for gathering the specific data at the specific locations, and then a certain individual responsible for compiling the annual report.

Some key points regarding the compiling and reporting of these data include:

- The initial recording of quantities should be done as soon as possible after the day where the flow took place. This will help provide an accurate review of the data and opportunity for corrections.
- Occasionally a flow reading or quantity is obviously incorrect. The data should be reviewed frequently, as a minimum at the end of each month. Obviously incorrect data should either be deleted or corrected to best estimate of the person closest to the data (preferably the latter).
- In some cases flow readings may not be collected, or equipment is not working properly. At the end of each month, review the number of days readings are gathered and note this in the report. If there are missing days:
  - Divide by the number of days there is data to get the average, not the number of days in the month.
  - If the daily readings are added to get a monthly total, first get the average for the number of days there is data and multiply this average by the number of days in the month to get the estimated total flow for the month.
- Similarly, it has been seen that in a series of pressure readings, such as daily pressures at a location, pressure readings are reported that are clearly incorrect. These need to be deleted and not included in averages or ranges.
- Verify that the units being reported are correct.

- Use graphs to better illustrate the data and to help identify data that may be suspect in its accuracy.
- Compile the monthly reports as soon as possible after the end of the month, and the annual report no later than the end of the following February.

Operators may wish to gather additional data or comments, which is fine. The template for this report may be periodically modified.

For the individual water meters from the utility billing system, review and clarify the user categories and make any corrections or clarifications needed. For example, the list of types of users includes "No Service" yet there is flow recorded. There are also sewer accounts within this spreadsheet so any "sewer only" accounts need to be removed.

Timeframe

As noted, much of these data are already being gathered, but they are not summarized and compiled in one report as is being recommended. It is recommended that 2019 be used to put this process together and prepare a draft report for review and revision. This complete report should be prepared in January or February 2020.

Then prepare annual reports for three years – 2020, 2021 and 2022.

Then the data from these years should be used to compare and update the design criteria and future water usage/water need projections that were contained in the 2019 Level I.

If at that time, the Level II study for the second water source coming from Lake DeSmet (and/or the creeks that supply Lake DeSmet) is being commenced, the data from these reports will be used to update all water demands for the system and the preliminary design quantities for this second supply.

The annual reports will continue. At about 5-year intervals, the design criteria and future water usage/needs projections should be reviewed and updated.

Discussion of Locations and Data

Mountain Reservoirs.

Release rates and total released per month for each reservoir (Twin, Park, Dome) are already gathered. In the annual summary of data include:

- Total volume released each month from each reservoir and total released (AF).
- When releases take place (starting dates and ending dates).
- Release rates and changes in release rates (CFS).
- The allocation of released flows to the entities such as City, SAWS, VAMC.
- Documentation required by the BOC.
- For Twin Lakes, note if at the start of the time of usage (such as June 20th or July 1st) it is at anything other than full.

Intake Facilities.

At this location the amount diverted from Big Goose Creek is measured. The flow rate is measured by the meters in the pipelines leaving the site. These are currently the 16-inch and 30-inch meters. If the 20-inch line is ever returned to service, it too needs to be measured.

Flows are already recorded in both CFS and MGD for each day for each meter and then totaled.

Also track the allocation of diversions to the City, SAWS, VAMC to verify water rights. These of course are more critical during the time when Big Goose is under regulation by the BOC and the direct flow rights reduce considerably.

For the annual summary a 1-page table of:

- List each month with the average diversion rate per day for the month (in both CFS and MGD).
- The max daily diversion rate within each month in both CFS and MGD.
- The total diverted for the month in MGD.
- Then an annual summary with of these quantities or flow rates.
- The date Big Goose went into regulation by the BOC.

Water Treatment Plants.

Considerable data is already recorded on a daily basis for each of the WTPs. As is already being done, continue a spreadsheet for each day with Influent, to Lagoons, Return Washwater, Filter Backwash Water, Utility Water, and Effluent. At the SWTP effluent is the metered flow in the two lines leaving the 4MG tank. Also at the SWTP, note any flow from the BGWTP that enters the 4MG tank or the filter backwash tank (this amount may need to be estimated).

The above needs to be carefully considered so there is no double accounting such as if return washwater is also included in the Influent, when this water has already been included in the influent flow. Also, that any flow from the BGWTP into the 4MG tank for example, is considered in the WTP effluent flow quantity.

With much of these data already recorded, the main additional effort is the annual summary. Include rows for each month and then a row for the year. Include total for each month, average day and peak day. Categories to include: Influent (from the RWTM), to lagoons, return washwater, filter backwash water, utility water, and effluent.

Then a separate simple table with sections for each WTP. For each month include Influent and Effluent, average day and peak day.

At the BGWTP, compare the flow in the 16-inch main at the intake to the influent meter at the WTP.

Raw Water Delivery Points.

Prepare a 1-page summary for the year:

- 16-inch RWTM. Compare Leaving the Intake to Influent at the BGWTP.
- 30-inch RWTM. Compare Leaving the Intake to: Influent at the SWTP, to Kendrick, to the VAMC, dumped back into Big Goose for the turbine, to Wild Rose, any other delivery point (such as if any water is delivered to the BGWTP).
- For each receiving point include total flow, average daily flow and peak day flow for each month.

- Then include a total annual water delivered (this would not include any water dumped back into the creek for the turbine.

Compare total deliveries over the years. For example, it is believed the amount delivered to Kendrick and the VAMC will not increase over time. Is this correct? Do the WTP influent amounts increase over time, or due to conservation, reduction in losses or management practices, are these quantities held fairly constant even with an increasing population?

Booster Stations.

For booster stations monthly data includes total flow, average flow, peak momentary flow (for stations with VFDs), incoming and outgoing pressures, and other notes. Refer to the attached example of a report for the Booster Stations and PRV Stations.

PRV Stations.

For PRV stations that report through SCADA, include monthly summaries of incoming and outgoing pressures, including the range of pressures. For stations without SCADA, the operators should make notes at least once per year on what they see for incoming and outgoing pressures. Also refer to the attached example of a report for the Booster Stations and PRV Stations.

Other Master Meters.

Such as the meters measuring flows through the Airport pump station, into the South Hill area, or into the Downer Addition.

Prepare a 1-page summary (for each meter) with total, average and peak day flow rates for each meter for each month, along with an annual summary line.

User Meters.

Review and make corrections in the user categories. Also simplify this list if possible. Prepare a summary of the number of users in each category based on the meter size. Do this multiple times a year as there are some seasonal accounts. Maybe prepare this one-page summary sheet at the end of each quarter.

Using the number of users and their meter sizes, create a table with EDU numbers and separate City users and SAWS users.

As is already being done, separate the total of City users and SAWS users at the start of each year to calculate cost sharing.

Comparing User meters to WTP production.

Prepare a summary sheet for the year with each month represented by a row that lists BGWTP – Influent and Effluent; SWTP – Influent and Effluent; two WTPs – total Influent and Effluent; and water through the user meters. Compare the quantities through the user meters to both Influent and Effluent. Calculate % “loss”. Calculate totals for the year, including the % “loss”. Consider how the % loss varies with the time of year (total quantity of water) and then over time. Is the loss amount being reduced? Is this “loss” a fixed amount (approximately), so the percentage is lower during higher demand times than lower demand times?

<u>Other Uses and Comparisons</u>

The following are other ideas for the use of these data that may provide valuable information.

- From all the user's consumption data (flow through the individual user meters), prepare a diurnal flow curve for July (a peak demand month with considerable outside watering), and a winter month (such as November or December). Understand when the peak demand times are occurring and review the multiplier of average demand to both peak day and peak hour demand.
- Compare the flow through a booster station to the sum of the flows through the user meters the station serves. Verify dates of the readings are the same, or cover a longer period such as 6 months or a year so the affect of discrepancies in the dates the readings are taken are minimized. If there is a significant difference, might there be a leak somewhere that should be sought out?
- Break out the City and SAWS user data and develop per user and per EDU demand summaries for each. Do this for both irrigation season (when water rights for Big Goose Creek are reduced) and the average for the year.
- Compare the per user or per EDU usage in different types of residential development based on: In city vs rural; lot size – larger vs smaller; and having an alternative yard watering source vs using treated water for outside watering.
- Over time a simple "conservation" table or graph can be prepared, summarizing the affect of conservation measures of reduced losses and a reduction in per user (or per EDU) total and peak water demand.
- If possible, with help from UM, the Fire Department, the Street Department, and the Parks Department, try to estimate water losses and non-revenue water. This includes "losses" due to breaks or leaks, flushing hydrants for water quality, flushing hydrants for fire protection verification, hydrant water for street cleaning or other purposes, and any other uses or losses that fit this category.
- Once the data is compiled and analyzed, it would be interesting to see if a better estimate can be prepared of "water released and not diverted" at the intake facilities; and water available for diversion (at least during the time of regulation when water rights reduce) and the amount actually diverted.

2019 SHERIDAN AREA WATER SYSTEM BOOSTER AND PRV STATIONS ANNUAL REPORT

Prepared for:

Sheridan Area Water Supply Joint Powers Board
And
City of Sheridan

Sheridan, Wyoming

Prepared by:

DOWL

16 W. 8th Street
Sheridan, WY

June 2019

1.0 CONTENTS

1.1 Overview of Report

Introduction

Over the past four years the SAWS' Booster Stations and pressure reducing valve (PRV) Stations were significantly upgraded. This upgrading involved installing a SCADA system on the Booster Stations and some of the PRV Stations. The base station computer for the SCADA system has separate screens for the Booster Stations and the PRV Stations, which report certain data such as pressures in and out and alarms. The information on these screens is very helpful for the operators so they can quickly inventory the status of each station and trouble shoot a problem somewhere in the system. There are also alarms that report certain specific problems to the operators. This system with its alarms and data reports reduces the need to make onsite inspections, therefore increasing the efficiency of operations.

The purpose of this document is to present a summary report of key data gathered in a concise and useful format for analysis and tracking, from the considerable amount of flow and pressure data reported. If more data is needed such as the flows or pressures throughout a peak usage day, it may be possible to access such data in the system.

It is recommended that this approach be used to compile an annual summary report for these stations in January, covering the data for the prior calendar year. Data will be summarized for each station, for each month (to illustrate seasonal differences) and then a brief annual summary. The goals for this annual report include:

- To utilize the value of the data being accumulated by the SCADA system, and for flows through the Mi.Net system.
- To create historical records of pressure data for all stations, and flow data for the booster stations that can be used for periodically verifying or updating the hydraulic model.
- Over time, these annual reports can be used to monitor changes within the system due to increased demand, drifting of pressure settings, usage of station capacity, etc.
- To create data that can be checked against the design of these upgraded stations and help establish their capacity used and remaining capacity. The remaining capacity question relates to the capability of the booster station to accommodate additional users.

The purpose for this particular document is to present a draft of what may be included in these reports. The ideas presented need to be:

- Reviewed and revised as may be needed.
- Verified as to who will oversee the production and distribution of these reports.

Data Gathered for the Booster Stations:

- Through SCADA: Pressures in & out; average, max, min; for each day.
- Through Mi.Net: Total flows for each day or the time-period selected. Include a total for the month, and then an average day and the total flow during the peak day.
- Downloaded at the station: Instantaneous flows for each 15-minute time-period so peak instantaneous flows can be determined. Include:

- The peak instantaneous flow recorded for that month.
  - If there are one or two very high flows that do not seem to be correct, list the greatest flow that appears to be correct based on an overall review of the data.
  - The average of the peak instantaneous flows for each day during the month.
- For flows for each month we will have:
  - Total flow for the month – gallons.
  - Average flow for each day – gallons.
  - Total flow on the peak day – gallons.
  - Peak instantaneous flow for the month – gpm.
  - Average of the peak daily flow – gpm.
  - Average of the minimum flows for each day, for the month – gpm.
  - The overall average flow for the entire month – gpm.
- Summarize alarms for the month.

Data Gathered for the PRV Stations

- Through SCADA: Pressures in & out; average, max, min; for each day.
- A brief summary of alarms.

Stations Monitored:

Booster Stations

- Beaver Creek
- Beckton Hall
- Big Horn
- Big Horn Ranch (Jack Drive)
- Big Horn West (Crown)
- Jeffries Draw (Paradise)
- Keystone #2
- Keystone #1
- Knode
- Parker Draw (Dow)
- Powder Horn
- Rapid Creek
- Rocky Hills
- Southeast
- Timm Drive
- Woodland Hills (Dee Drive)

PRV Stations

- Beaver Creek
- Beckton Hall Road
- Big Horn Wye
- West Brundage Lane
- Upper Don Ena
- Girls School Gate
- Knode

Recommended composition of each annual report

For the Booster Stations

Prepare at most a two-page report for each station. Use a row in the table of data for each month and then a summary row for the year. Also possibly include a summary of alarms and any comments regarding problems or special notes that should be documented. Columns will be as indicated above under Data Gathered for Pressures and Flows. After the data is tabulated, use graphs to illustrate the flow data, as they will better show trends or concerns.

For the PRV Stations

Prepare one-page reports for each station, with rows in the table for each month and then a summary row for the year. Also include a summary of alarms and any comments regarding problems or special notes that should be documented.

Notes:

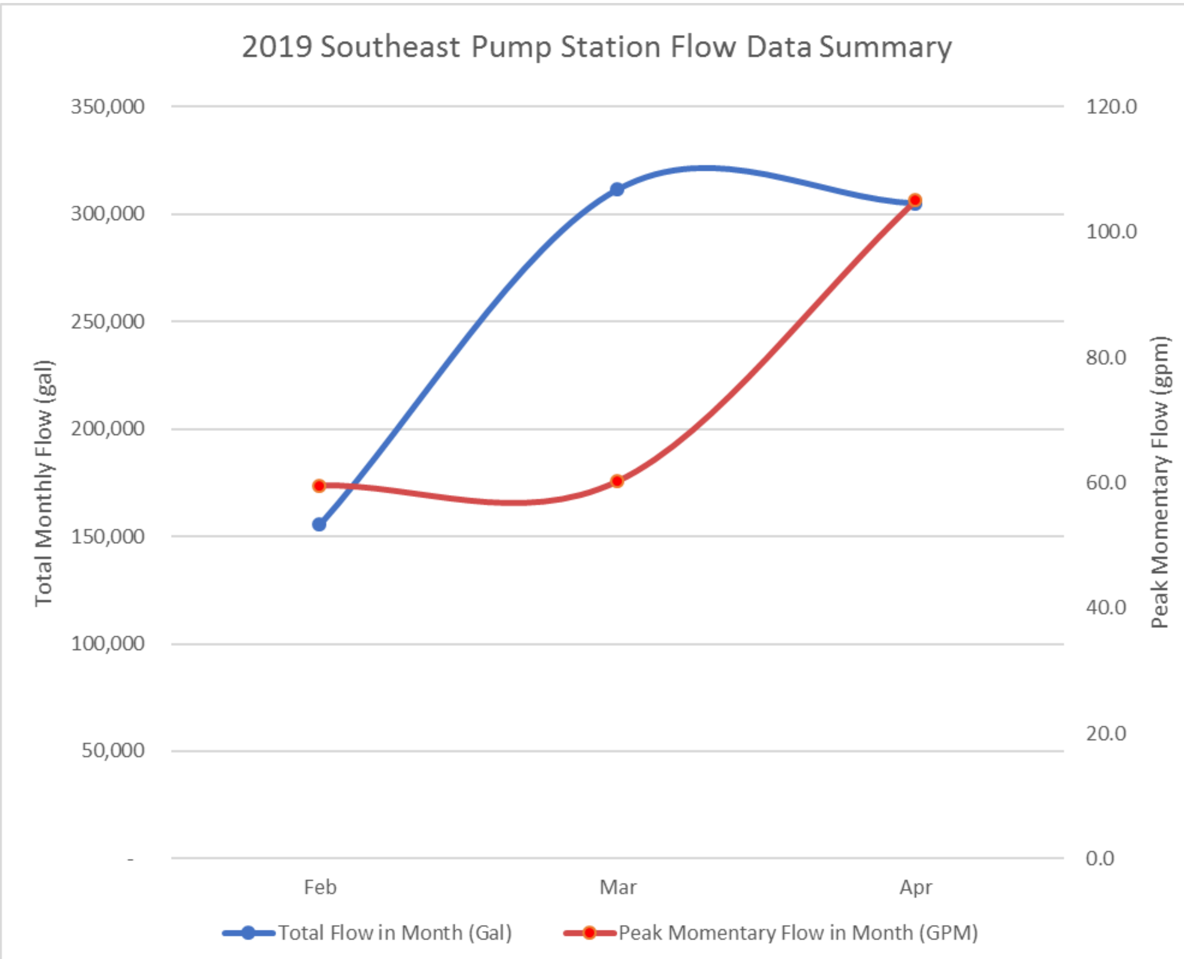
- It is important to review the data to verify it is correct, to minimize the incorporation of incorrect data into these reports. Examples:
    - In reviewing sample data, sometimes there is a flow or pressure that is clearly not correct – a very high flow reading when the second high is only a fraction of the higher number. Or a pressure reading that is similarly out of line, or even negative. These must be eliminated and not included in summaries or averages.
    - Verify the number of days of data there are and use that number in calculating the averages. If there are only 26 days of data and there are 31 days in the month, be sure to divide by 26 for the average day, not 31.
- Use no decimals for readings in gallons or psi, and only one decimal place for gpm.
- With July and August being the peak demand months, the flow and pressure data from these months are particularly important.
- Other information that could be added to this report includes pump run hours, maintenance performed, power outages, alarms, etc.
- The data gathered at each station that must be downloaded on site is held for just over 30 days, so a routine must be developed to gather this data each month and place it into a central folder. Downloading is done on a laptop with Sensus UniPro software.
- Ideas for additional graphs or data analyses:
    - A “typical” diurnal curve for booster stations that show how the instantaneous flow rate varies throughout a 24-hour period.
    - Do the above exercise for July or August, and then a winter month.
    - Do the above exercise for a station that serves homes with significant outside watering and a station that serves homes with a separate irrigation system.
    - Compare total flow through a station for a time-period (at least a 3-month period) to the volumes through the individual meters that this station serves.
    - Eventually prepare a Design Criteria table for per user water requirements for these booster stations.

2.0 BOOSER/PUMP STATION DATA

2.1 Pump Stations

Pump stations are above ground buildings housing larger pumps. The pump stations which had data gathered this year included Southeast and Bighorn.

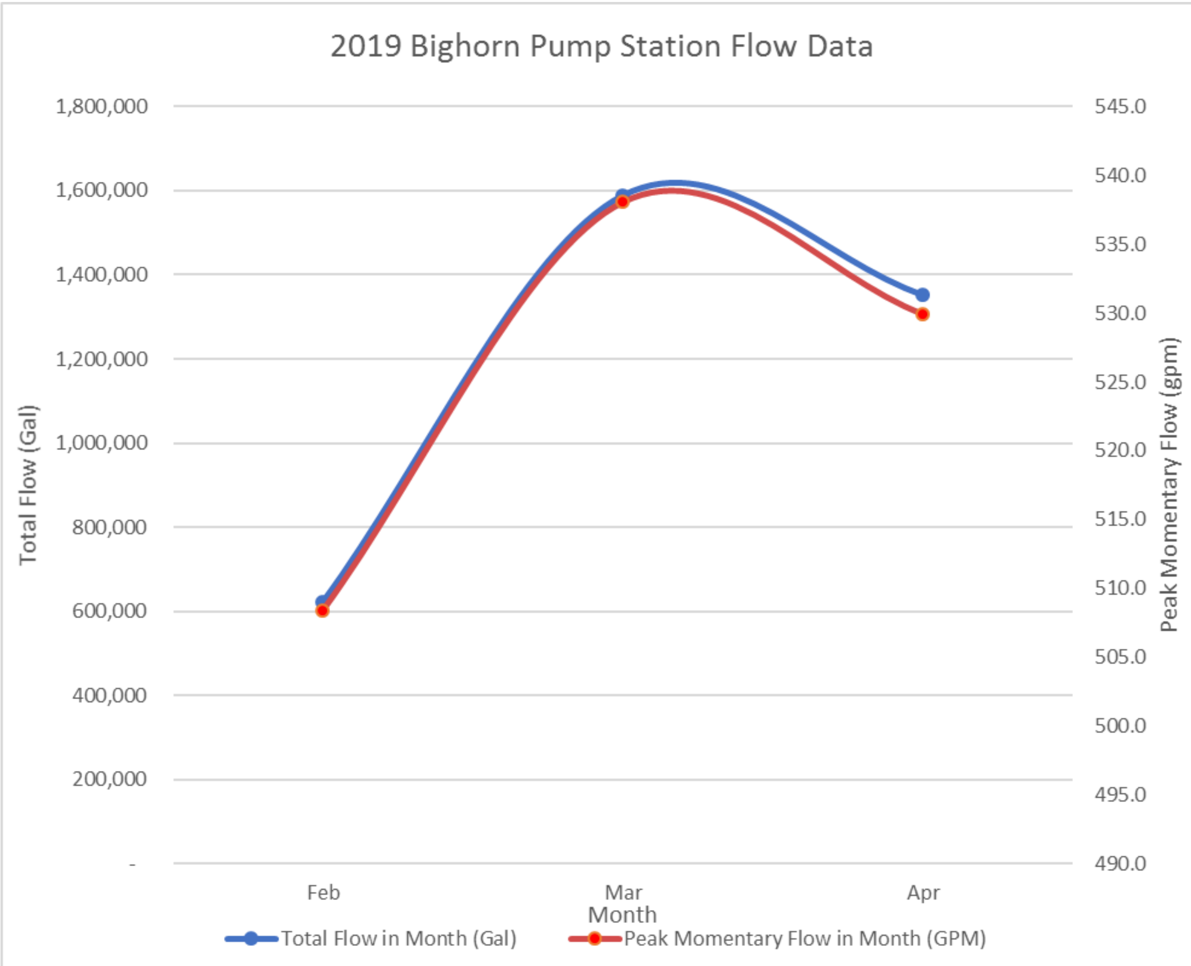
2.1.1 Southeast Pump Station



2019 Southeast Pump Station Flow Data Summary					
Month	Minimum Flow in Month (GPM)	Peak Momentary Flow in Month (GPM)	Total Flow in Month (Gal)	Peak Day of Month	Total Flow in Peak Day of Month (Gallons)
Feb	0.0	59.6	272,370	2/28/2019	12,010
Mar	0.0	60.2	311,460	3/20/2019	13,500
Apr	0.0	105.1	304,970	4/1/2019	14,240
May	0.0	59.6	315,589	5/5/2019	11,910

There was no pressure data available for this station at the time of this report.

2.1.2 *Bighorn Pump Station*

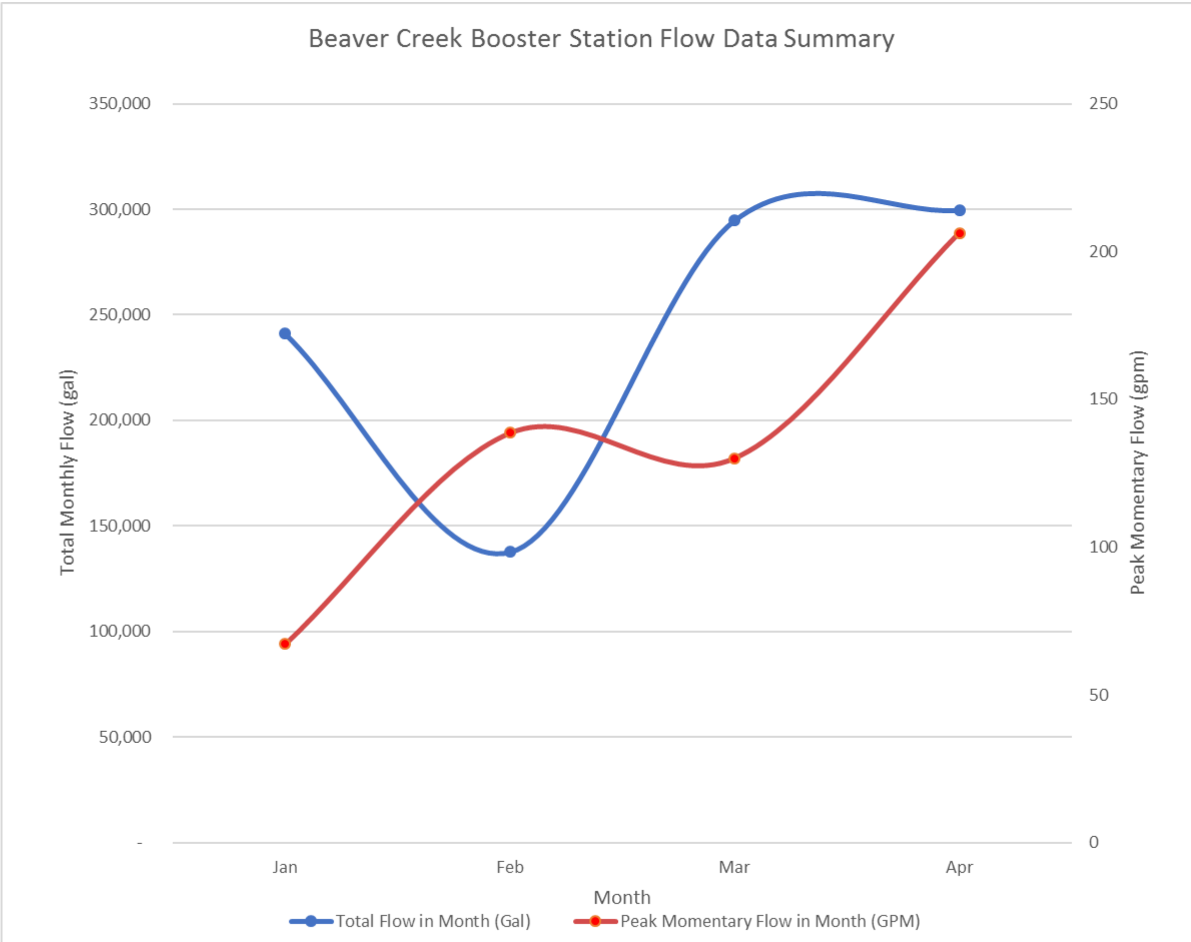


2019 Bighorn Pump Station Flow Data Summary					
Month	Minimum Flow in Month (GPM)	Peak Momentary Flow in Month (GPM)	Total Flow in Month (Gal)	Peak Day of Month	Total Flow in Peak Day of Month (Gallons)
Feb	0	508.4	1,341,372	2/25/2019	108,210
Mar	0.0	538.1	1,589,150	3/18/2019	130,400
Apr	0.0	529.9	1,470,464	4/9/2019	120,800
May	0.0	516.5	1,315,675	5/7/2019	108,630

There was no pressure data available for this station at the time of this report.

2.2 Booster Stations

2.2.1 Beaver Creek

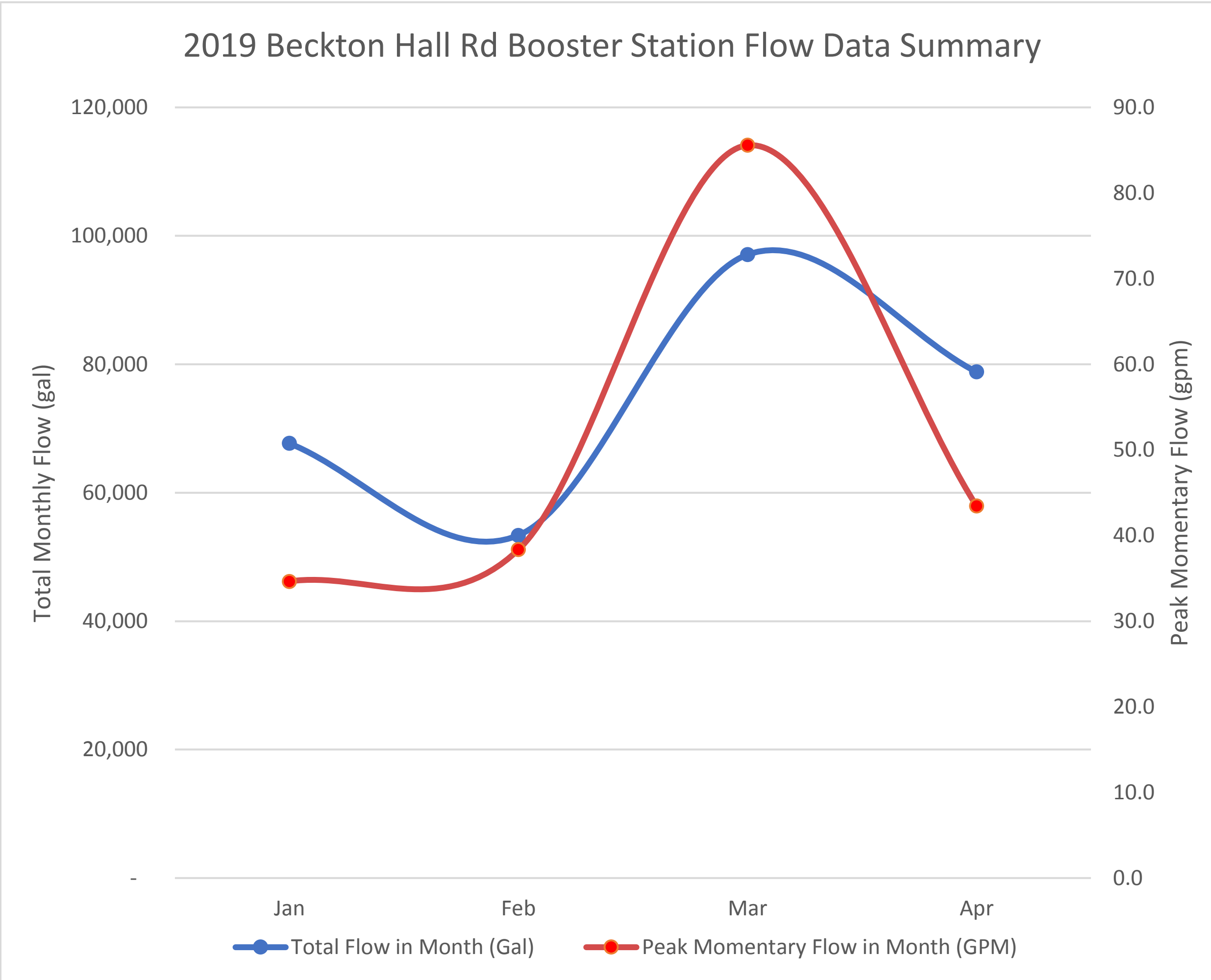


2019 Beaver Creek Booster Station Flow Data Summary					
Month	Minimum Flow in Month (GPM)	Peak Momentary Flow in Month (GPM)	Total Flow in Month (Gal)	Peak Day of Month	Total Flow in Peak Day of Month (Gallons)
Jan	0.1	67.2	287,477	1/10	13,780
Feb	-0.1	138.6	248,821	2/24	9,900
Mar	0.0	130.1	294,850	3/15	13,990
Apr	0.1	206.3	305,521	4/19	15,290
May	0.0	85.7	339,060	5/2	12,690

Pressure Data:

2019	Inlet Pressure (psi)			Outlet Pressure (psi)		
Month	Ave Inlet	Max Inlet	Min Inlet	Ave Outlet	Max Outlet	Min Outlet
Mar	50	119	32	133	140	50
Apr	50	57	40	133	142	122

2.2.2 *Beckton Hall Rd Booster Station*

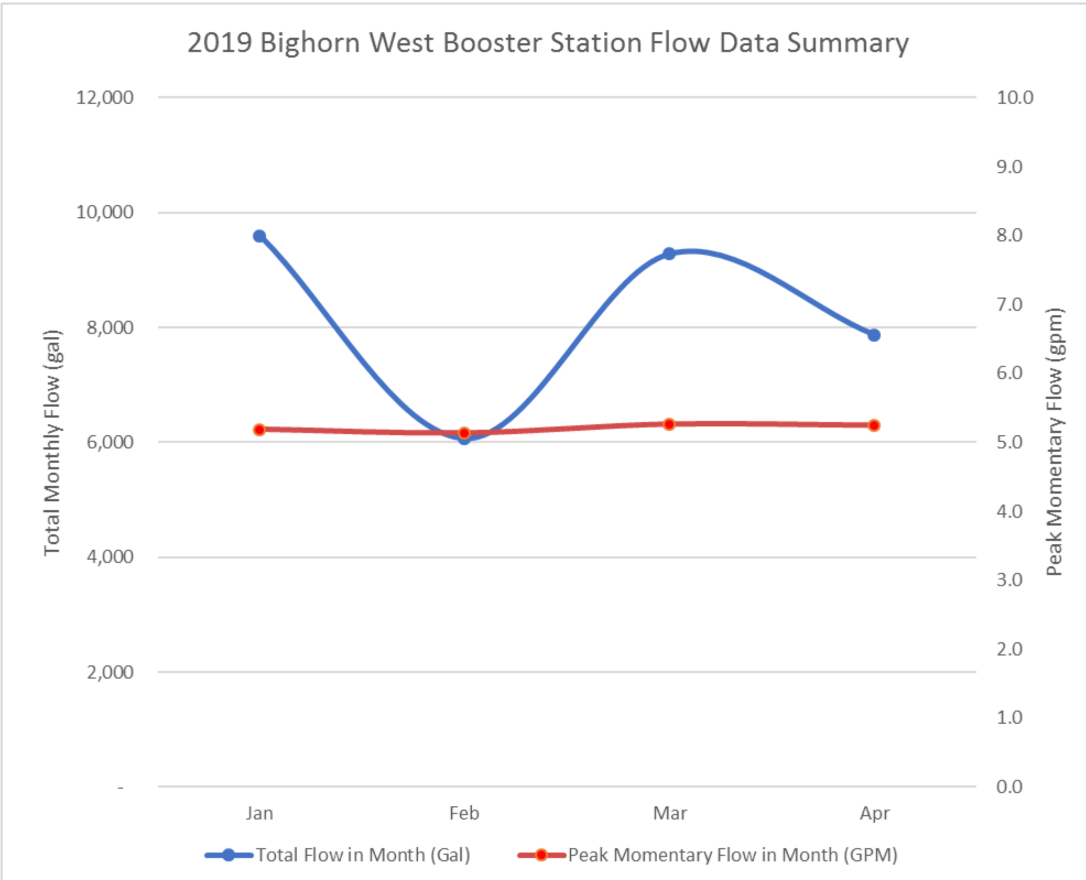


2019 Beckton Hall Rd Booster Station Flow Data Summary					
Month	Minimum Flow in Month (GPM)	Peak Momentary Flow in Month (GPM)	Total Flow in Month (Gal)	Peak Day of Month	Total Flow in Peak Day of Month (Gallons)
Jan	0.0	34.7	80,698	1/31/2019	3,277
Feb	0.0	38.4	96,423	2/24/2019	4,259
Mar	0.0	85.6	97,074	3/17/2019	4,019
Apr	0.0	43.5	80,259	4/21/2019	3,306
May	0.0	30.0	78,779	5/4/2019	3,170

Pressure Data:

2019	Inlet Pressure (psi)			Outlet Pressure (psi)		
Month	Ave Inlet	Max Inlet	Min Inlet	Ave Outlet	Max Outlet	Min Outlet
Mar	116	126	78	145	164	67
Apr	118	125	101	146	160	135

2.2.3 *Bighorn West (Crown Drive)*



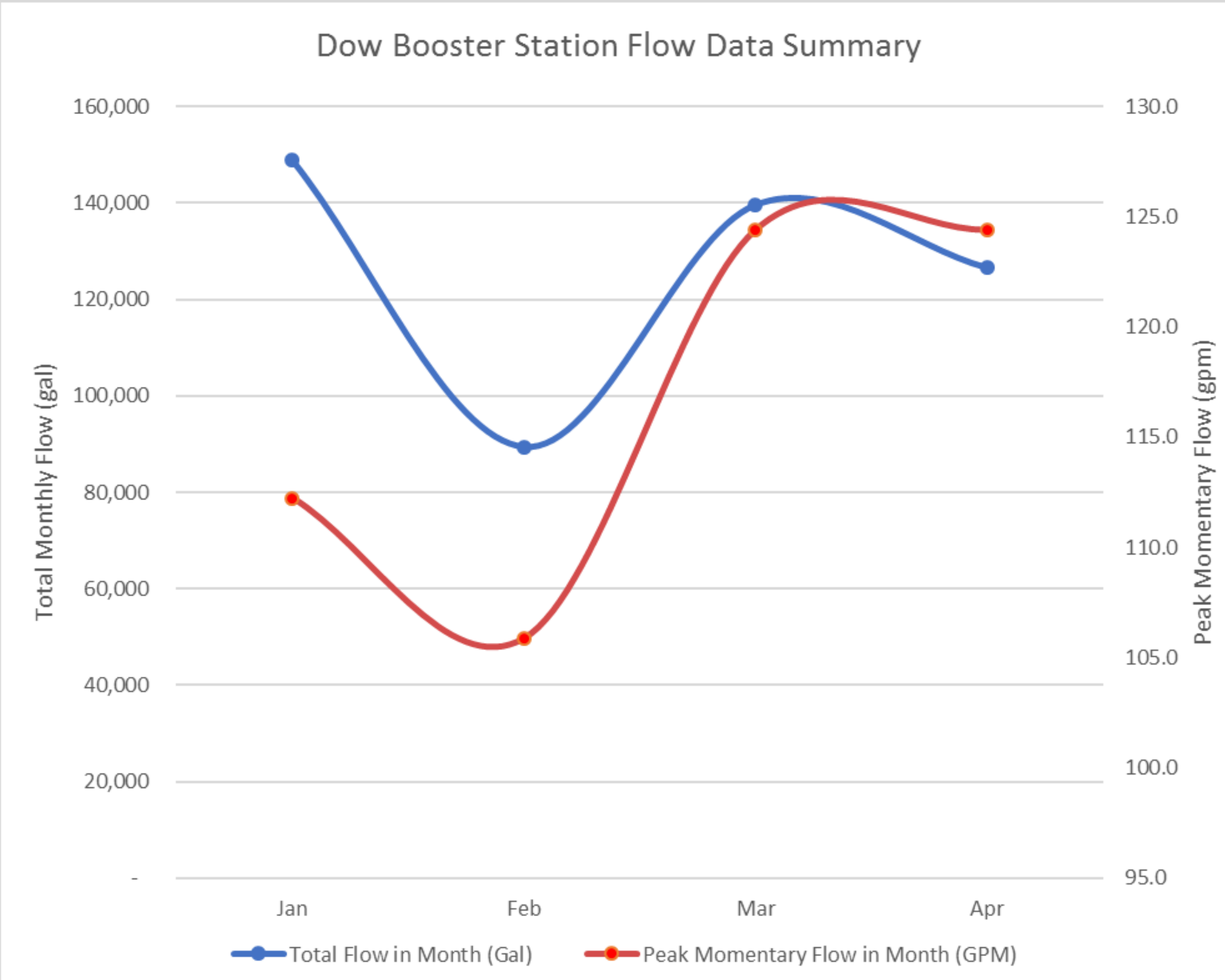
2019 Bighorn West Booster Station Flow Data Summary					
Month	Minimum Flow in Month (GPM)	Peak Momentary Flow in Month (GPM)	Total Flow in Month (Gal)	Peak Day of Month	Total Flow in Peak Day of Month (Gallons)
Jan	0.0	5.2	9,600	1/1/2019	581
Feb	0.0	5.1	9,182	2/17/2019	396
Mar	0.0	5.3	9,280	3/3/2019	386
Apr	0.0	5.2	8,015	2/25/2019	357
May	0.0	5.1	8,629	5/4/2019	321

The flows recorded for this booster station seem to be in error. The flows should be much greater. Bighorn West feeds the Dow Drive booster, so the flows should be at least that of Dow (shown below). City UM is checking on the functionality of the Bighorn West meter.

Pressure Data:

2019	Inlet Pressure (psi)			Outlet Pressure (psi)		
Month	**Ave Inlet**	**Max Inlet**	**Min Inlet**	**Ave Outlet**	**Max Outlet**	**Min Outlet**
Mar	49	119	32	103	137	68
Apr	49	54	33	103	120	84

2.2.4 *Dow Drive Booster Station*

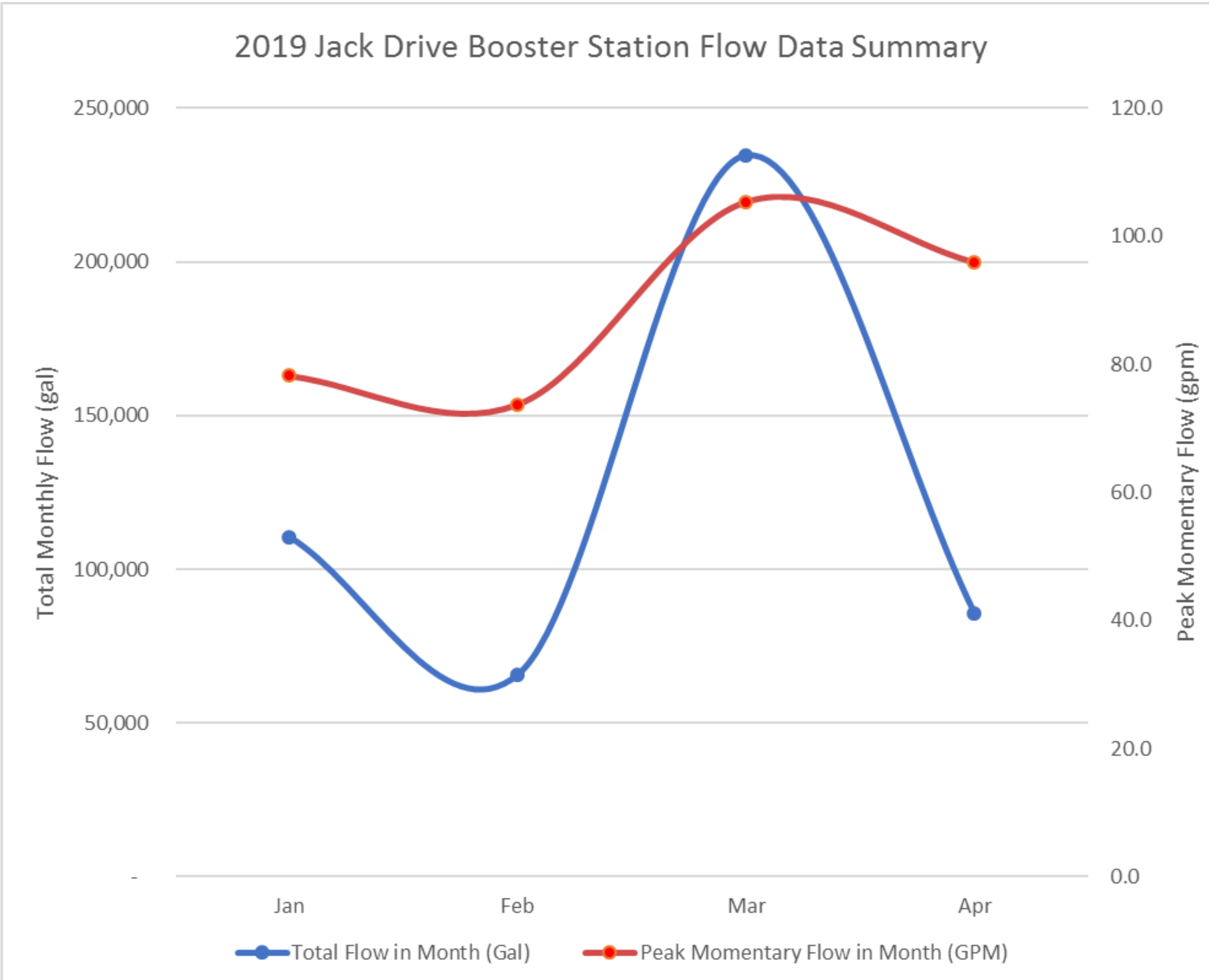


Dow Booster Station Flow Data Summary					
Month	Minimum Flow in Month (GPM)	Peak Momentary Flow in Month (GPM)	Total Flow in Month (Gal)	Peak Day of Month	Total Flow in Peak Day of Month (Gallons)
Jan	0.0	112.2	148,807	1/1/2019	13,445
Feb	0.0	105.9	135,961	2/17/2019	7,507
Mar	0.0	124.4	139,610	3/3/2019	8,229
Apr	0.0	124.4	138,762	4/13/2019	5,741
May	0.0	119.4	150,397	5/4/2019	7,083

Pressure Data:

2019	Inlet Pressure (psi)			Outlet Pressure (psi)		
Month	**Ave Inlet**	**Max Inlet**	**Min Inlet**	**Ave Outlet**	**Max Outlet**	**Min Outlet**
Mar	65	79	45	108	120	100
Apr	65	81	47	108	120	100

2.2.5 *Jack Drive Booster Station*



Jack Drive Booster Station Flow Data Summary					
Month	Minimum Flow in Month (GPM)	Peak Momentary Flow in Month (GPM)	Total Flow in Month (Gal)	Peak Day of Month	Total Flow in Peak Day of Month (Gallons)
Jan	0.0	78.2	110,520	1/3/2019	4,383
Feb	0.0	73.8	98,709	2/17/2019	4,183
Mar	0.0	105.3	234,673	3/24/2019	30,915
Apr	0.0	95.8	93,509	4/21/2019	3,750
May	0.0	182.8	107,568	5/3/2019	4,894

Pressure Data:

2019	Inlet Pressure (psi)			Outlet Pressure (psi)		
Month	Ave Inlet	Max Inlet	Min Inlet	Ave Outlet	Max Outlet	Min Outlet
Mar	116	120	102	69	72	68
Apr	116	120	102	69	72	68

Values recorded were all the same.

DOWL

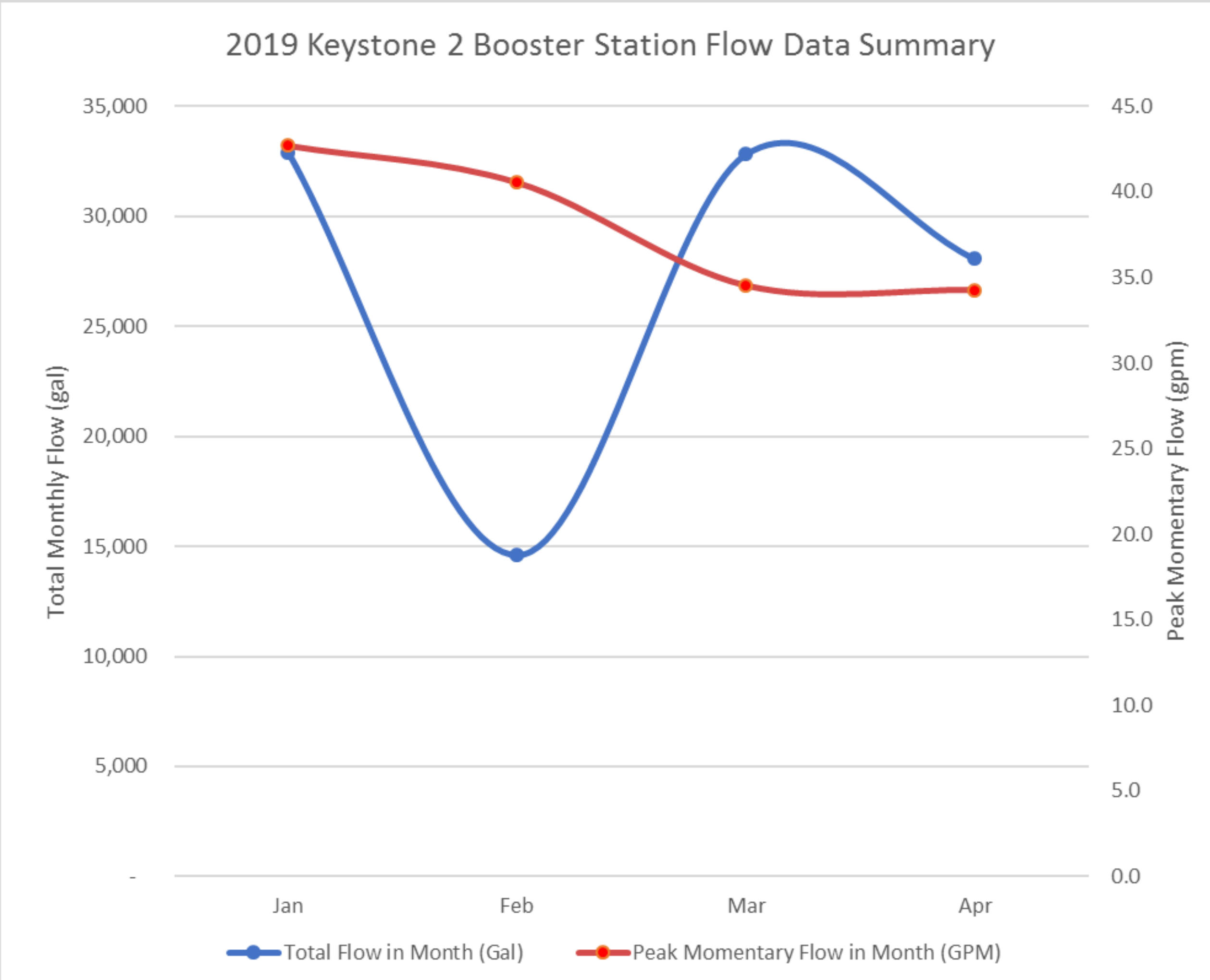
2.2.6 Keystone 1 Booster Station

Data were downloaded in February, March, and April 2019, but the meter did not record any flow. This meter needs to be checked.

Pressure Data:

2019	Inlet Pressure (psi)			Outlet Pressure (psi)		
Month	**Ave Inlet**	**Max Inlet**	**Min Inlet**	**Ave Outlet**	**Max Outlet**	**Min Outlet**
Mar	48	119	15	111	127	68
Apr	47	69	4	110	128	81

2.2.7 *Keystone 2 Booster Station*

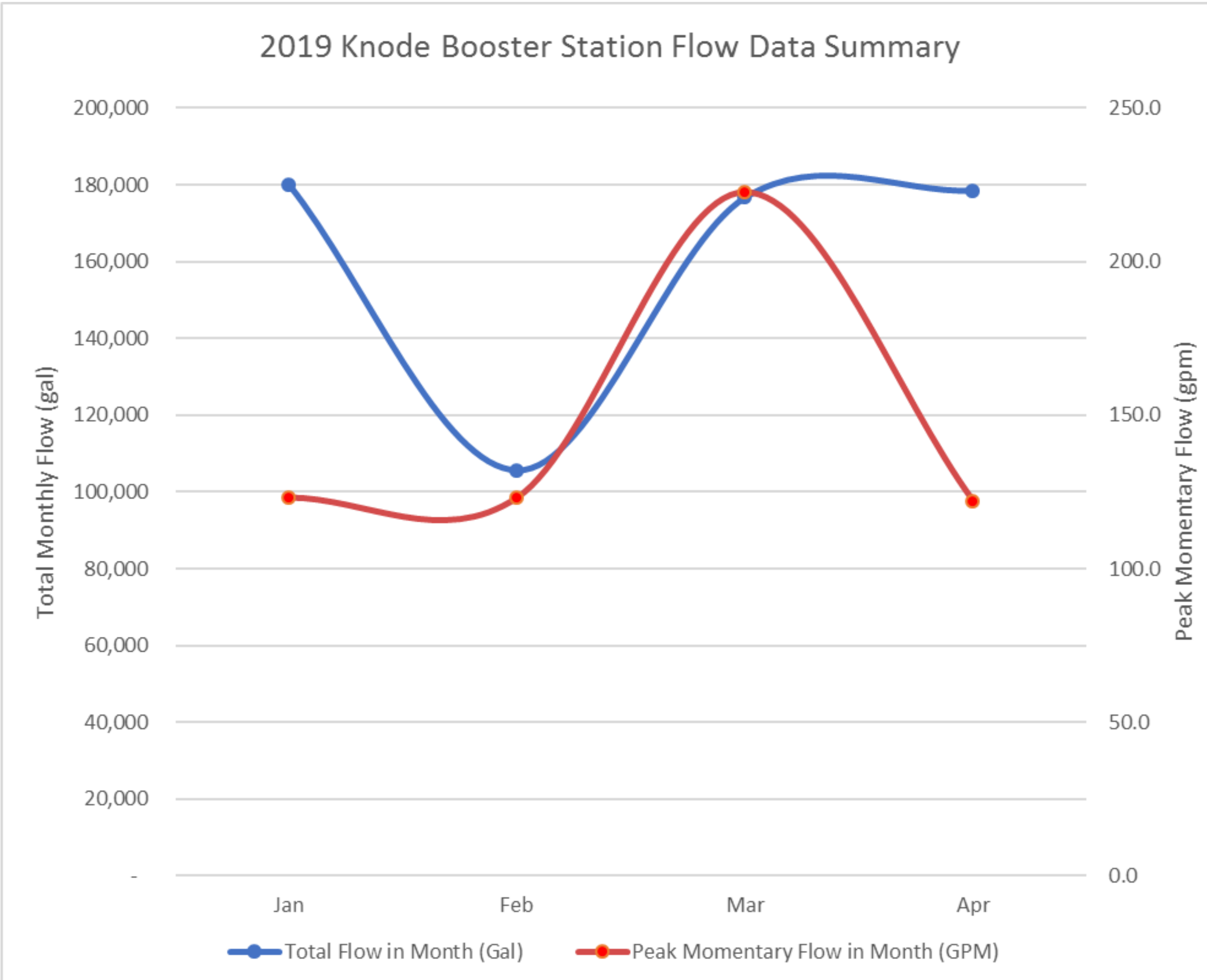


2019 Keystone 2 Booster Station Flow Data Summary					
Month	Minimum Flow in Month (GPM)	Peak Momentary Flow in Month (GPM)	Total Flow in Month (Gal)	Peak Day of Month	Total Flow in Peak Day of Month (Gallons)
Jan	0.0	42.7	32,922	1/6/2019	1,850
Feb	0.0	40.6	26,465	2/2/2019	1,459
Mar	0.0	34.5	32,830	3/15/2019	1,789
Apr	0.0	34.3	28,673	4/6/2019	1,585
May	0.0	32.0	28,741	5/4/2019	1,319

Pressure Data:

2019	Inlet Pressure (psi)			Outlet Pressure (psi)		
Month	Ave Inlet	Max Inlet	Min Inlet	Ave Outlet	Max Outlet	Min Outlet
Mar	69	119	35	123	138	68
Apr	69	75	36	124	138	111

2.2.8 *Knode Booster Station*

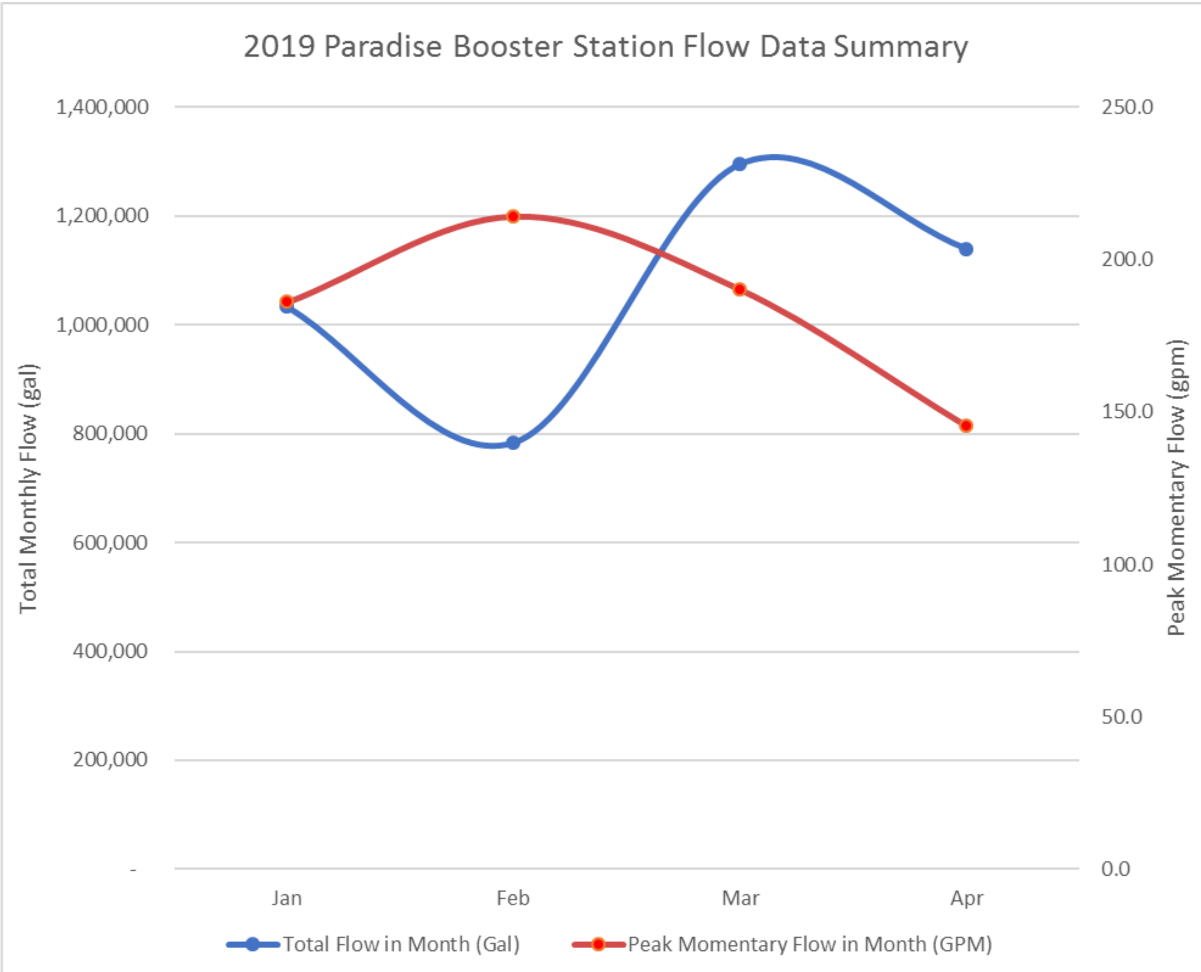


2019 Knode Booster Station Flow Data Summary					
Month	Minimum Flow in Month (GPM)	Peak Momentary Flow in Month (GPM)	Total Flow in Month (Gal)	Peak Day of Month	Total Flow in Peak Day of Month (Gallons)
Jan	0.0	123.1	180,044	1/20/2019	6,963
Feb	0.0	123.1	158,816	2/24/2019	7,506
Mar	0.0	222.7	176,707	3/14/2019	7,870
Apr	0.0	122.2	181,280	4/20/2019	8,773
May	0.0	123.1	190,731	5/4/2019	7,143

Pressure Data:

2019	Inlet Pressure (psi)			Outlet Pressure (psi)		
Month	Ave Inlet	Max Inlet	Min Inlet	Ave Outlet	Max Outlet	Min Outlet
Mar	54	119	36	104	119	68
Apr	56	59	41	104	118	94

2.2.9 <u>Paradise Booster Station</u>

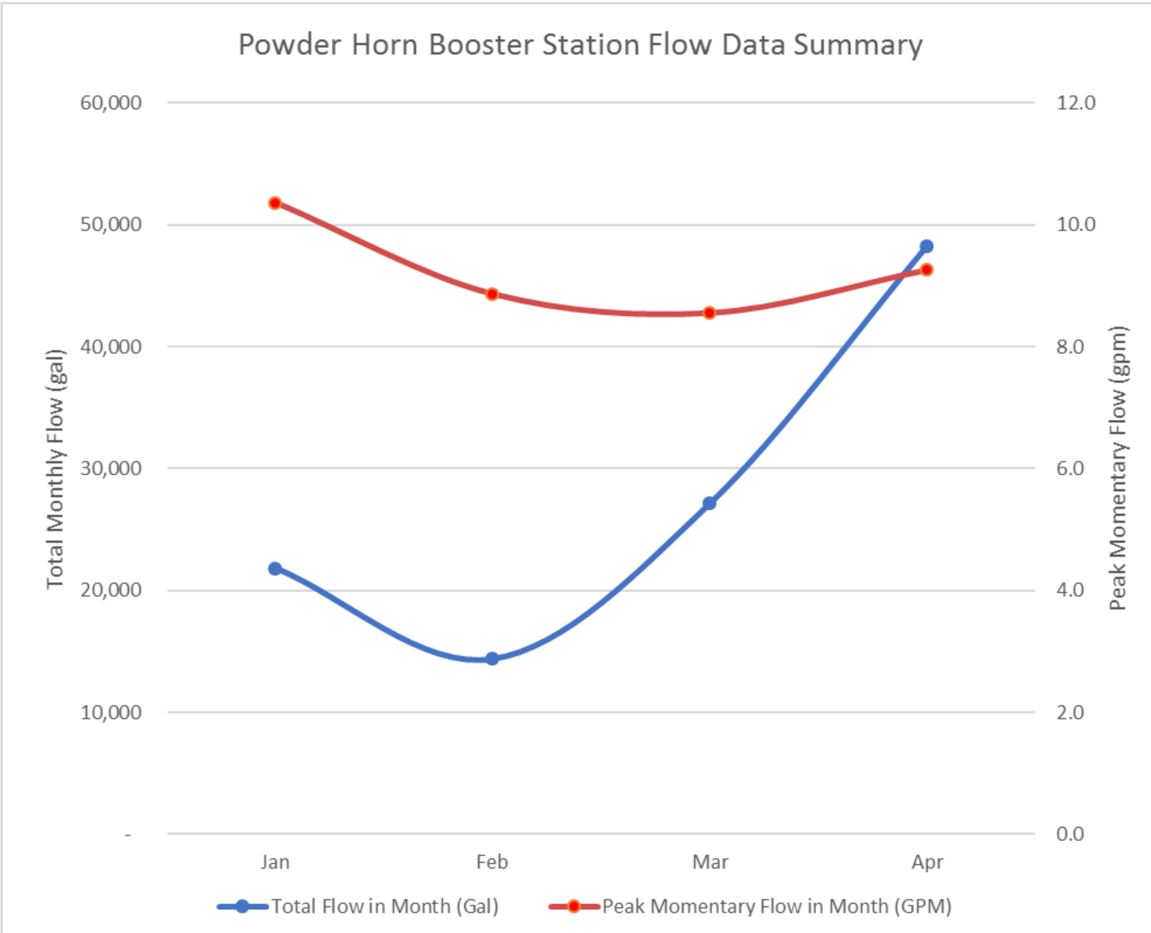


Paradise Booster Station Flow Data Summary					
Month	Minimum Flow in Month (GPM)	Peak Momentary Flow in Month (GPM)	Total Flow in Month (Gal)	Peak Day of Month	Total Flow in Peak Day of Month (Gallons)
Jan	0.1	186.1	1,281,751	1/14/2019	43,100
Feb	0.1	214.3	1,176,855	2/24/2019	43,790
Mar	0.1	190.3	1,295,370	3/17/2019	44,210
Apr	0.1	145.5	1,286,520	4/4/2019	47,340
May	0.1	173.1	1,300,424	5/4/2019	44,230

Pressure Data:

2019	Inlet Pressure (psi)			Outlet Pressure (psi)		
Month	**Ave Inlet**	**Max Inlet**	**Min Inlet**	**Ave Outlet**	**Max Outlet**	**Min Outlet**
Mar	54	119	37	119	130	108
Apr	53	62	27	119	129	108

2.2.10 Powder Horn Booster Station



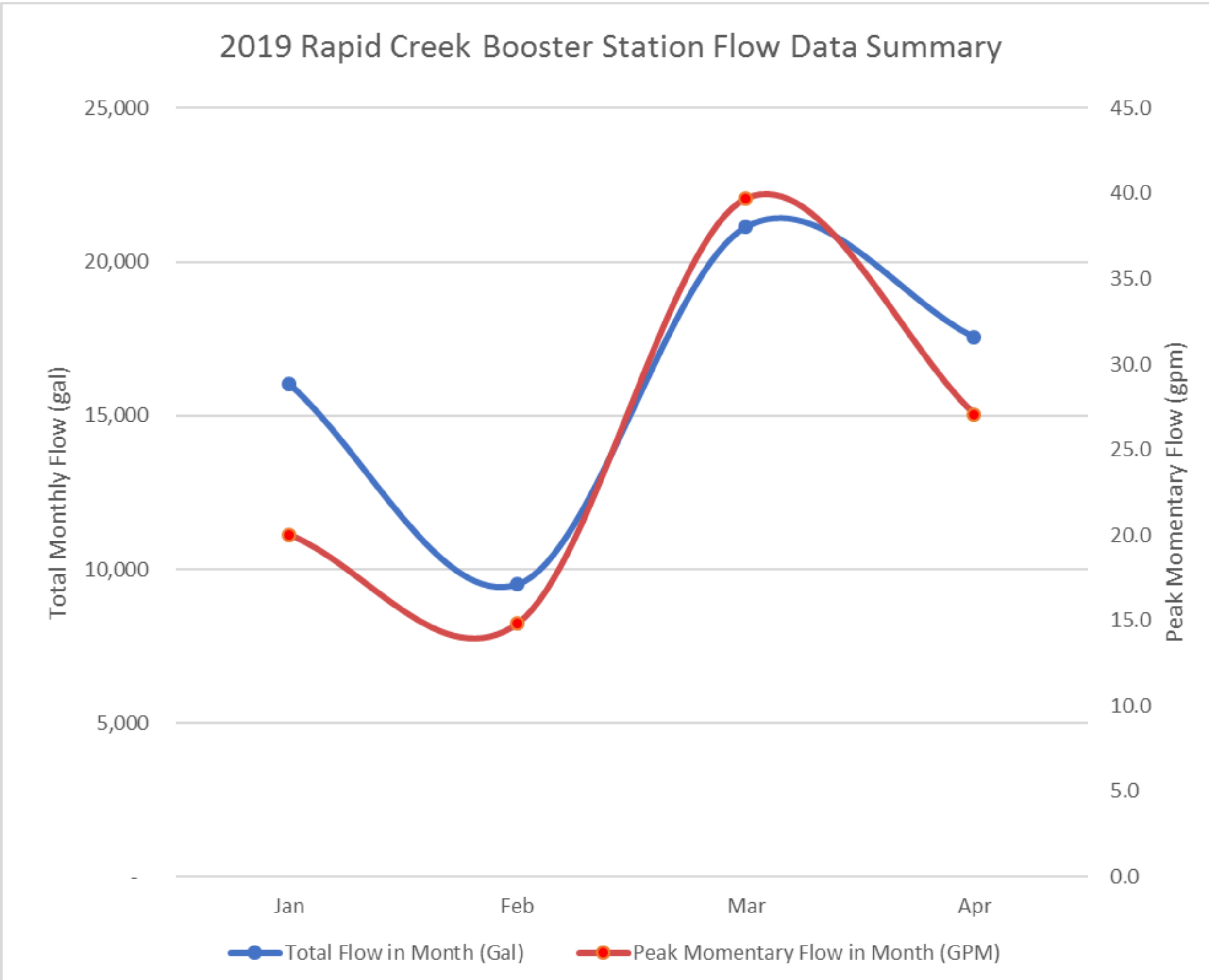
2019 Powder Horn Booster Station Flow Data Summary					
Month	Minimum Flow in Month (GPM)	Peak Momentary Flow in Month (GPM)	Total Flow in Month (Gal)	Peak Day of Month	Total Flow in Peak Day of Month (Gallons)
Jan	0.0	10.4	27,082	1/27/2019	2,100
Feb	0.0	8.9	21,764	2/26/2019	1,110
Mar	0.0	8.6	27,140	3/20/2019	1,330
Apr	0.0	9.3	52,510	4/15/2019	3,450
May	-0.6	158.5	326,817	5/7/2019	35,210

In May the maximum flow recorded (gpm) jumped to around 150gpm every hour whereas in the months before the typical reading was around 5gpm as shown in the graph. Maybe something was fixed on this meter?

Pressure Data:

2019	Inlet Pressure (psi)			Outlet Pressure (psi)		
Month	**Ave Inlet**	**Max Inlet**	**Min Inlet**	**Ave Outlet**	**Max Outlet**	**Min Outlet**
Apr	53	55	43	129	132	112

2.2.11 Rapid Creek Booster Station

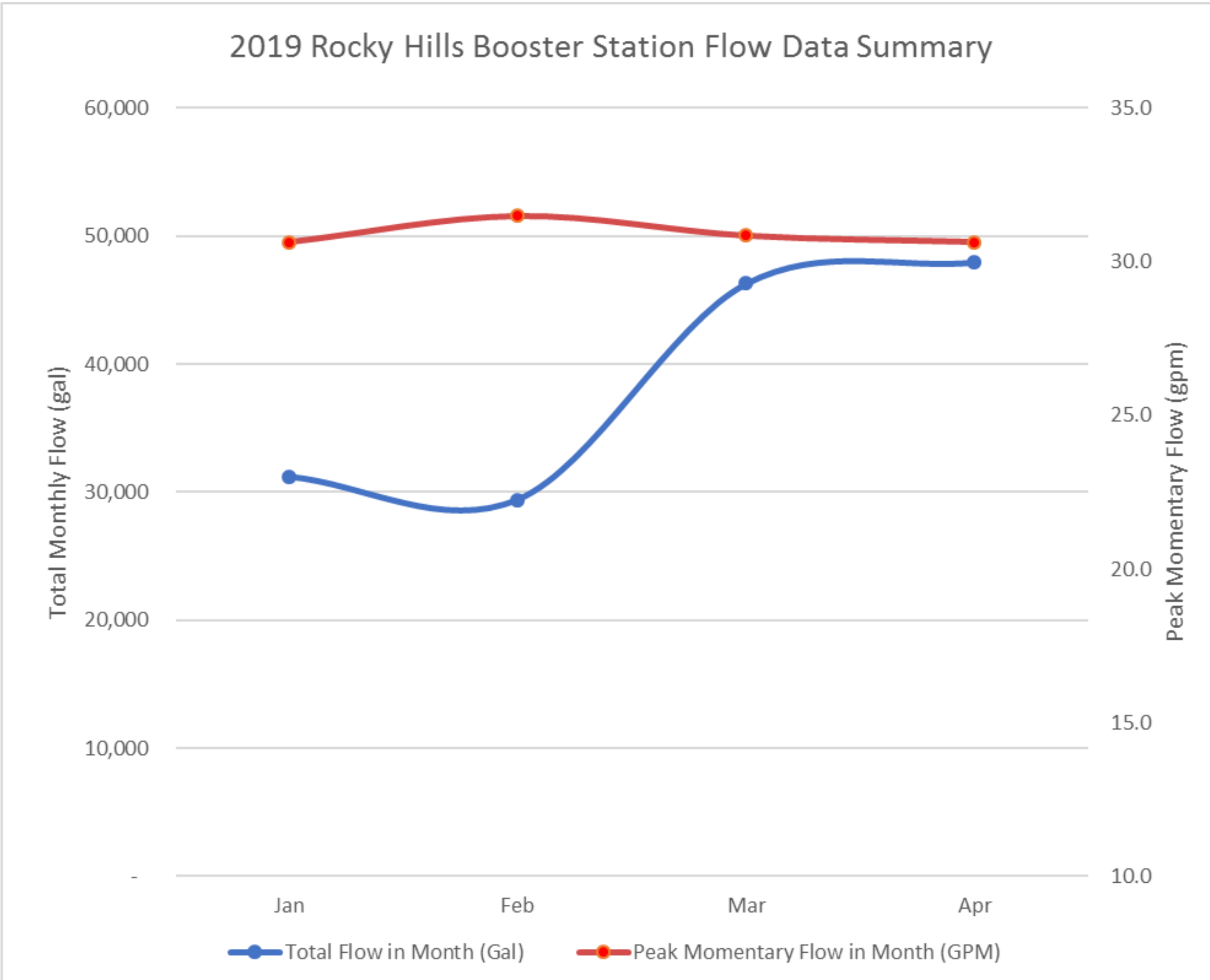


2019 Rapid Creek Booster Station Flow Data Summary					
Month	Minimum Flow in Month (GPM)	Peak Momentary Flow in Month (GPM)	Total Flow in Month (Gal)	Peak Day of Month	Total Flow in Peak Day of Month (Gallons)
Jan	0.0	20.0	19,113	1/12/2019	895
Feb	0.0	14.8	17,181	2/18/2019	810
Mar	0.0	39.7	21,155	3/24/2019	922
Apr	0.0	27.1	17,881	4/8/2019	848
May	0.0	35.6	17,275	4/23/2019	745

Pressure Data:

	Inlet Pressure (psi)			Outlet Pressure (psi)		
Month	**Ave Inlet**	**Max Inlet**	**Min Inlet**	**Ave Outlet**	**Max Outlet**	**Min Outlet**
Apr	82	88	72	141	152	131

2.2.12 Rocky Hills Booster Station

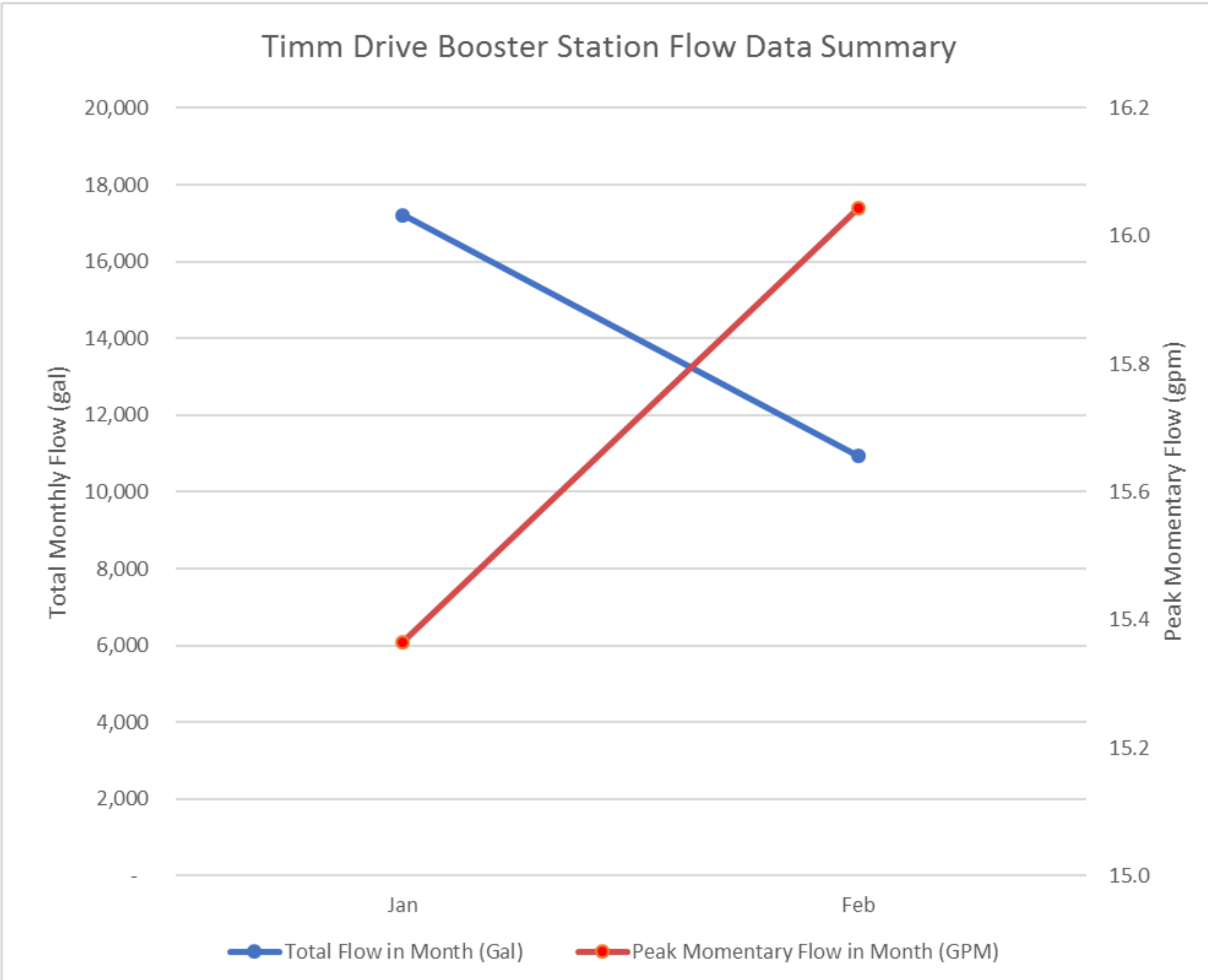


2019 Rocky Hills Booster Station Flow Data Summary					
Month	Minimum Flow in Month (GPM)	Peak Momentary Flow in Month (GPM)	Total Flow in Month (Gal)	Peak Day of Month	Total Flow in Peak Day of Month (Gallons)
Jan	0.0	30.6	38,677	1/31/2019	4,001
Feb	0.0	31.5	44,018	2/28/2019	4,472
Mar	0.0	30.9	46,302	3/20/2019	5,098
Apr	0.0	30.6	47,976	4/6/2019	4,239
May	0.0	30.0	50,470	5/4/2019	1,925

Pressure Data:

2019	Inlet Pressure (psi)			Outlet Pressure (psi)		
Month	Ave Inlet	Max Inlet	Min Inlet	Ave Outlet	Max Outlet	Min Outlet
Mar	51	119	42	89	97	68
Apr	51	57	43	88	97	82
May	52	52	44	88	96	83

2.2.13 *Timm Drive Booster Station*



Timm Drive Booster Station Flow Data Summary					
Month	Minimum Flow in Month (GPM)	Peak Momentary Flow in Month (GPM)	Total Flow in Month (Gal)	Peak Day of Month	Total Flow in Peak Day of Month (Gallons)
Jan	0.0	15.4	20,520	1/20/2019	1,040
Feb	0.0	16.0	19,693	2/24/2019	1,208
Mar	0.0	50.4	23,374	3/17/2019	1,507
Apr	0.0	17.3	19,972	4/2/2019	777

Pressure data:

2019	Inlet Pressure (psi)			Outlet Pressure (psi)		
Month	**Ave Inlet**	**Max Inlet**	**Min Inlet**	**Ave Outlet**	**Max Outlet**	**Min Outlet**
Mar	68	119	56	139	151	68
Apr	67	75	58	140	153	114

3.0 PRESSURE REDUCING VALVE (PRV) STATIONS

3.1 PRV 15 – Upper Don Ena

SAWS Report of Pressures
Upper Don Ena PRV 2019 Monthly Statistics

	PRV15 - Upper Don Ena PRV					
	Inlet Pressure (psi)			Outlet Pressure (psi)		
MONTH	Ave	Max	Min	Ave	Max	Min
March	114	124	48	69	72	46
April	114	123	98	69	72	63
Summary	**114**	**124**	**48**	**69**	**72**	**46**

3.2 PRV 22 – Beaver Creek

SAWS Report of Pressures
Beaver Creek PRV 2019 Monthly Statistics

	PRV22 - Beaver Creek PRV					
	Inlet Pressure (psi)			Outlet Pressure (psi)		
MONTH	Ave	Max	Min	Ave	Max	Min
March	110	123	96	79	84	74
April	110	117	101	59	81	39
Summary	**110**	**123**	**96**	**69**	**84**	**39**

3.3 PRV 27 – Beckton

SAWS Report of Pressures
Beckton Hall PRV 2019 Monthly Statistics

	PRV27 - Beckton Hall PRV					
	Inlet Pressure (psi)			***Outlet Pressure (psi)***		
MONTH	Ave	Max	Min	Ave	Max	Min
March	169	185	130	89	103	82
April	172	194	158	89	97	81
Summary	**170**	**194**	**130**	**89**	**103**	**81**

3.4 PRV 32 – West Brundage Lane

SAWS Report of Pressures
West Brundage Lane PRV 2019 Monthly Statistics

	PRV 32 - West Brundage Lane PRV					
	Inlet Pressure (psi)			***Outlet Pressure (psi)***		
MONTH	Ave	Max	Min	Ave	Max	Min
March	118	127	93	50	53	47
April	118	128	103	49	52	46
Summary	**118**	**128**	**93**	**49**	**53**	**46**

3.5 PRV 44 – Bighorn Wye

SAWS Report of Pressures
Big Horn Wye PRV 2019 Monthly Statistics

	PRV44 - Bighorn Wye PRV					
	Inlet Pressure (psi)			***Outlet Pressure (psi)***		
MONTH	Ave	Max	Min	Ave	Max	Min
March	123	134	102	85	96	90
April	123	134	109	94	96	86
Summary	**123**	**134**	**102**	**89**	**96**	**86**

3.6 PRV 46 – Knode

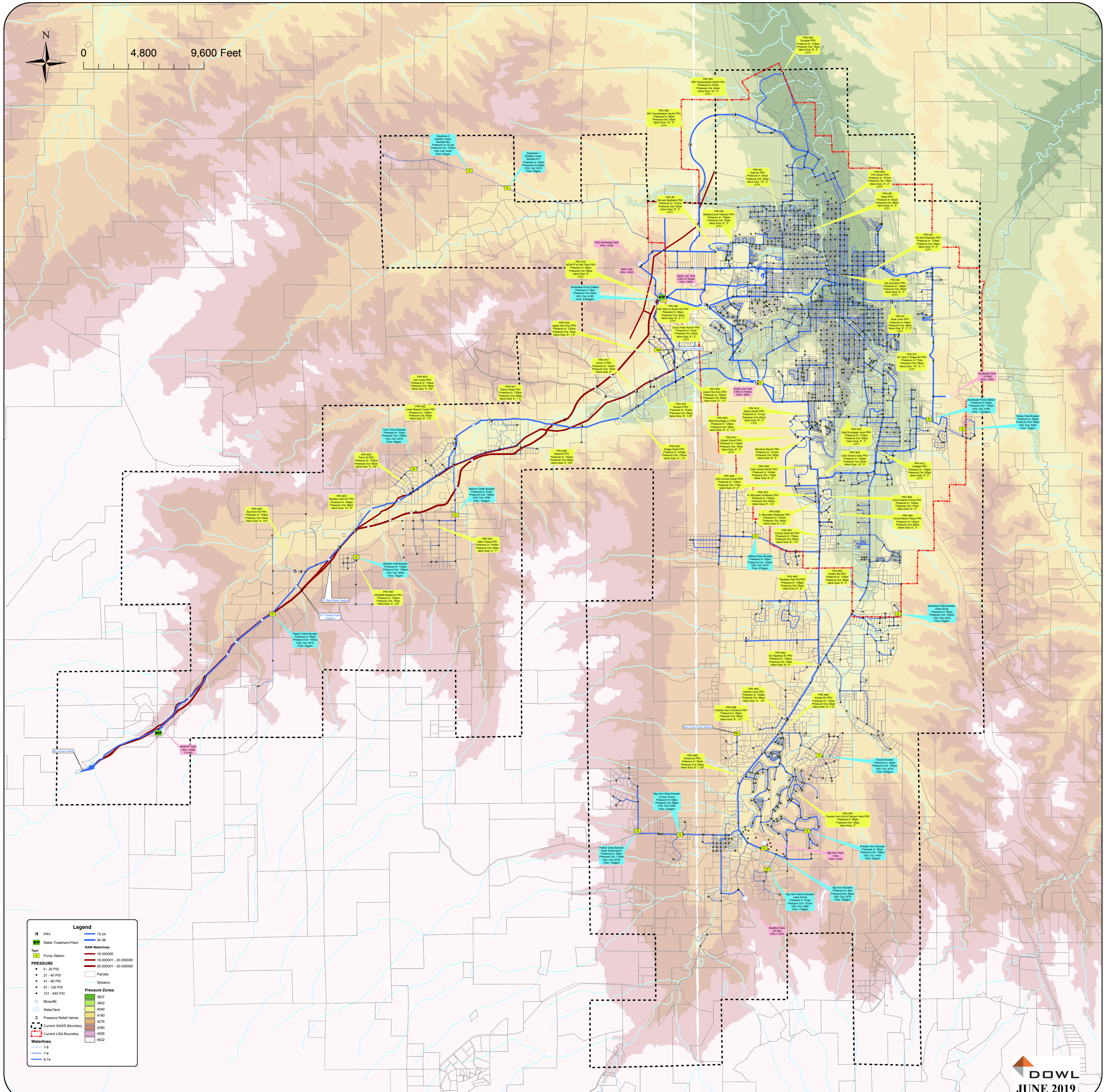
SAWS Report of Pressures
Knode PRV 2019 Monthly Statistics

	PRV 46 - Knode PRV					
	Inlet Pressure (psi)			***Outlet Pressure (psi)***		
MONTH	Ave	Max	Min	Ave	Max	Min
March	100	111	80	82	154	71
April	100	111	85	NA	NA	NA
Summary	**100**	**111**	**80**	**82**	**154**	**71**

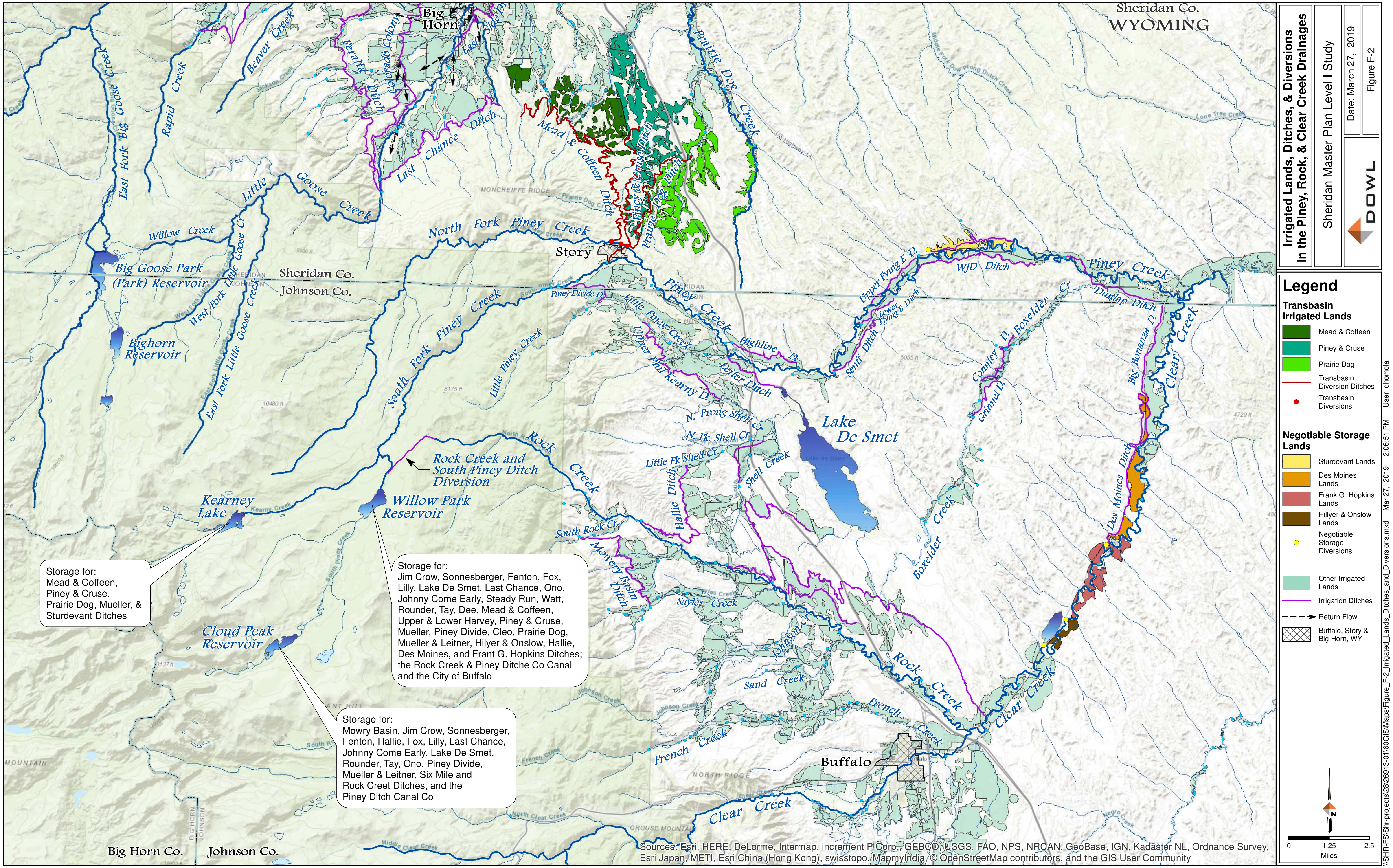
Appendix F Table of Contents

Notes:

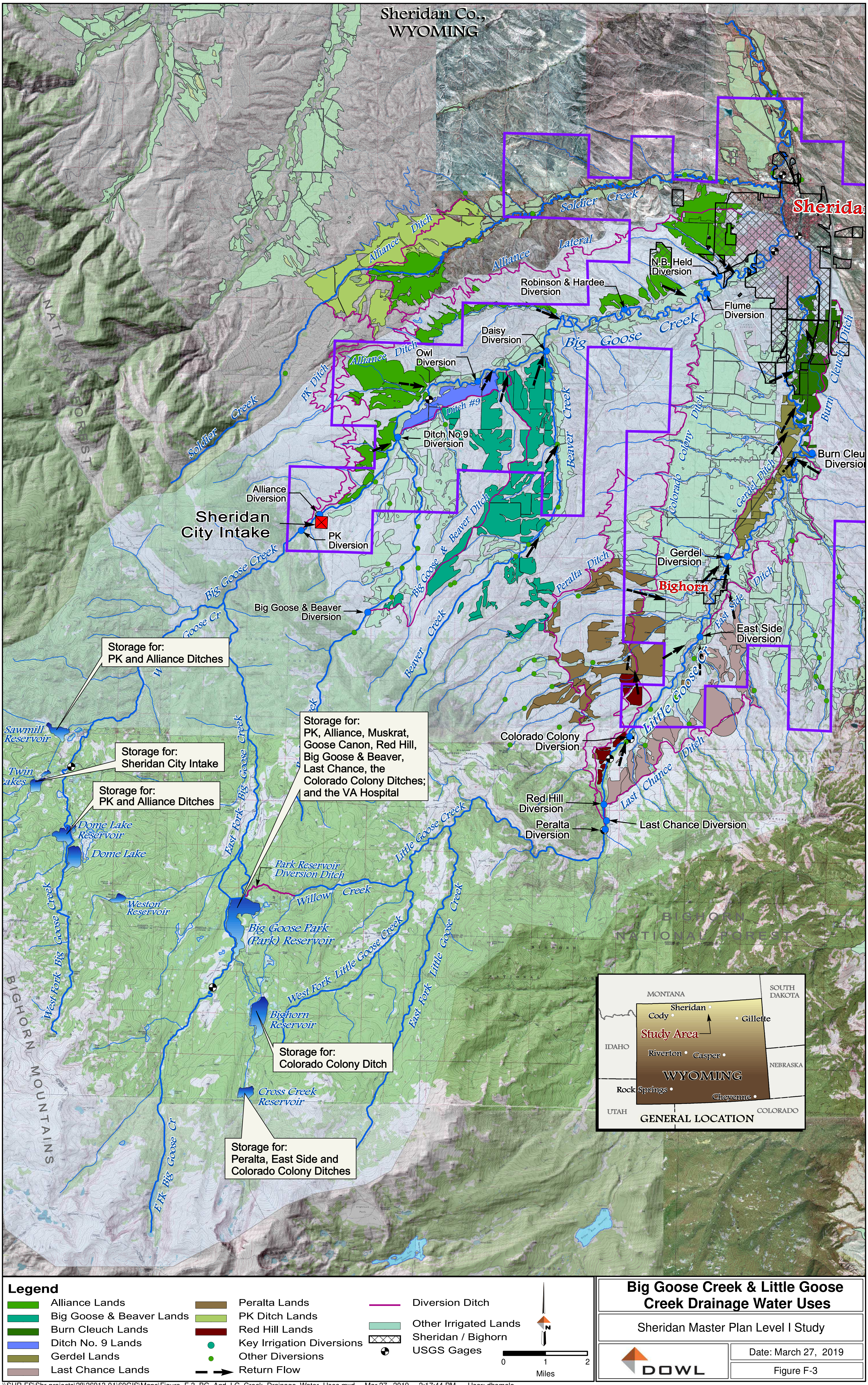
1. Some of the Figures in this Appendix were not developed under this project and are only available in PDF. They are included for the information they provide.
2. Some of the figures may be plotted in a larger size as may be of value. The original size of these figures is noted on them.



This map is normally 36" x 36"



Irrigated Lands, Ditches, & Diversions in the Piney, Rock, & Clear Creek Drainages
Sheridan Master Plan Level I Study
Date: March 27, 2019
Figure F-2
DOWL
Sheridan Co.
WYOMING
Legend
Transbasin Irrigated Lands
Mead & Coffeen
Piney & Cruse
Prairie Dog
Transbasin Diversion Ditches
Transbasin Diversions
Negotiable Storage Lands
Sturdevant Lands
Des Moines Lands
Frank G. Hopkins Lands
Hillyer & Onslow Lands
Negotiable Storage Diversions
Other Irrigated Lands
Irrigation Ditches
Return Flow
Buffalo, Story & Big Horn, WY
0 1.25 2.5
Miles
Storage for:
Mead & Coffeen,
Piney & Cruse,
Prairie Dog, Mueller, &
Sturdevant Ditches
Storage for:
Jim Crow, Sonnesberger, Fenton, Fox,
Lilly, Lake De Smet, Last Chance, Ono,
Johnny Come Early, Steady Run, Watt,
Rounder, Tay, Dee, Mead & Coffeen,
Upper & Lower Harvey, Piney & Cruse,
Mueller, Piney Divide, Cleo, Prairie Dog,
Mueller & Leitner, Hilyer & Onslow, Hallie,
Des Moines, and Frant G. Hopkins Ditches;
the Rock Creek & Piney Ditche Co Canal
and the City of Buffalo
Storage for:
Mowry Basin, Jim Crow, Sonnesberger,
Fenton, Hallie, Fox, Lilly, Last Chance,
Johnny Come Early, Lake De Smet,
Rounder, Tay, Ono, Piney Divide,
Mueller & Leitner, Six Mile and
Rock Creet Ditches, and the
Piney Ditch Canal Co
Rock Creek and South Piney Ditch Diversion
Big Goose Park (Park) Reservoir
Bighorn Reservoir
Kearney Lake
Willow Park Reservoir
Cloud Peak Reservoir
Lake De Smet
Big Horn
Story
Buffalo
Sheridan Co.
Johnson Co.
Big Horn Co.
Johnson Co.
East Fork Big Goose Creek
Rapid Creek
Beaver Creek
Little Goose Creek
Willow Creek
West Fork Little Goose Creek
East Fork Little Goose Creek
Peralta Ditch
Colorado Colony
East Side Ditch
Last Chance Ditch
Mead & Coffeen Ditch
Piney & Cruse Ditch
Prairie Dog Ditch
Prairie Dog Creek
North Fork Piney Creek
South Fork Piney Creek
Little Piney Creek
Piney Creek
Piney Divide D.
Upper Hill Kearny D.
Leiter Ditch
Highline D.
N. Prong Shell Cr.
N. Fk. Shell Cr.
Little Fk Shell Cr.
Shell Creek
Hallie Ditch
Rock Creek
South Rock Cr.
Mowery Basin Ditch
Sayles Creek
Johnson Cr.
Sand Creek
French Creek
Clear Creek
Upper Fying E D.
Lower Flying E Ditch
WJD Ditch
Senff Ditch
Dunlap Ditch
Boxelder Cr
Boxelder Creek
Conley D.
Grinnel D.
Big Bonanza D.
Des Moines Ditch
Clear Creek
MONCREIFFE RIDGE
NORTH RIDGE
GROUSE MOUNTAIN
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
\\SHR-FS\Shr-projects\28\26913-01\60GIS\Maps\Figure_F-2_Irrigated_Lands_Ditches_and_Diversions.mxd Mar 27, 2019 2:06:51 PM User: dhomola



Big Goose Creek & Little Goose Creek Drainage Water Uses

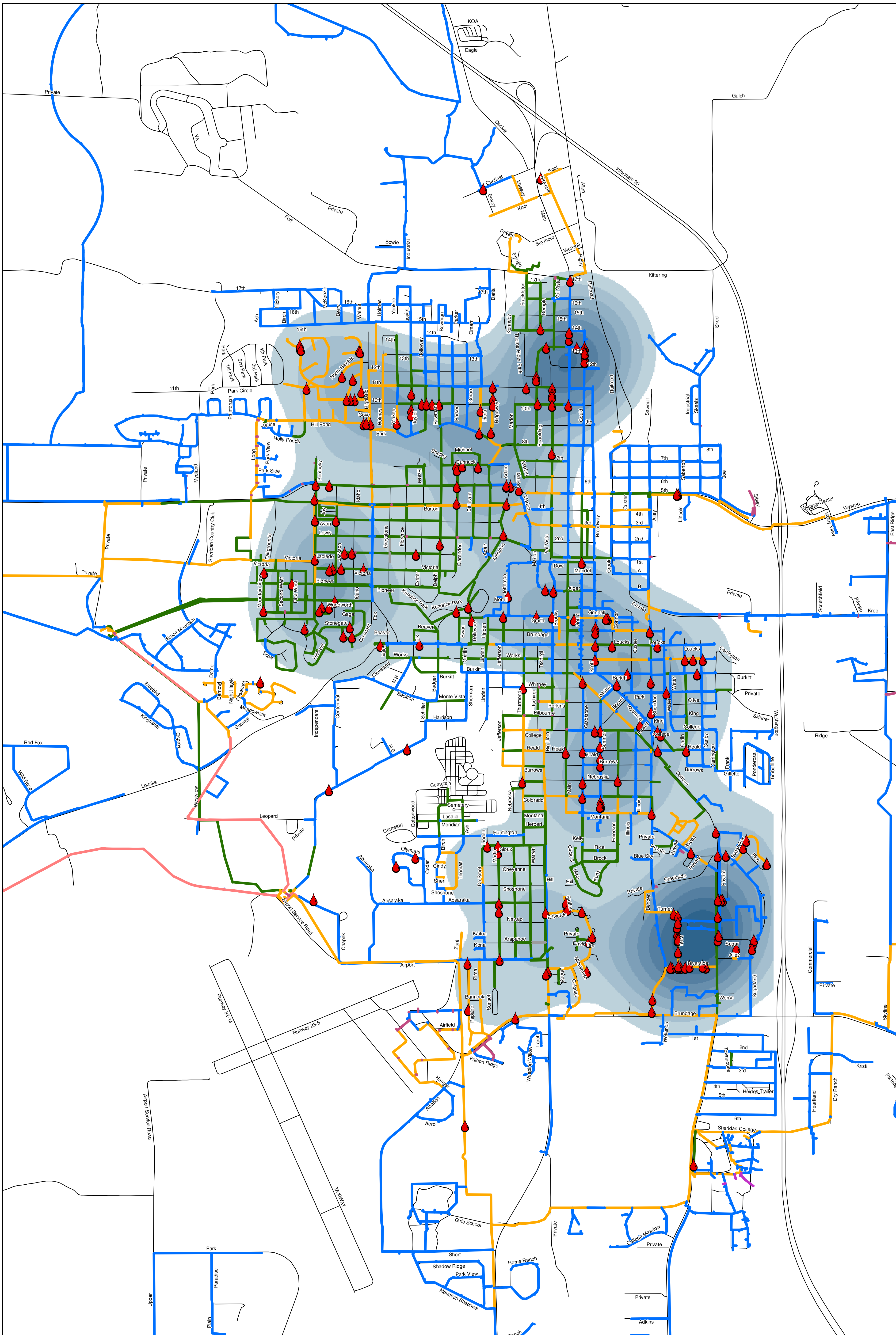
Sheridan Master Plan Level I Study

Date: March 27, 2019

Figure F-3

DOWL

\\SHR-FS\Shr-projects\28\26913-01\60GIS\Maps\Figure_F-3_BG_And_LG_Creek_Drainage_Water_Uses.mxd Mar 27, 2019 2:17:44 PM User: dhomola



Legend

Water Line Leaks 2000-2018

Pipe Material

- CIP
- COPPER
- Concrete
- DIP
- Galvanized Iron
- PVC
- Steel
- Unknown

Streets

0 1,150 2,300
Feet

Water Line Leaks 2000-2018

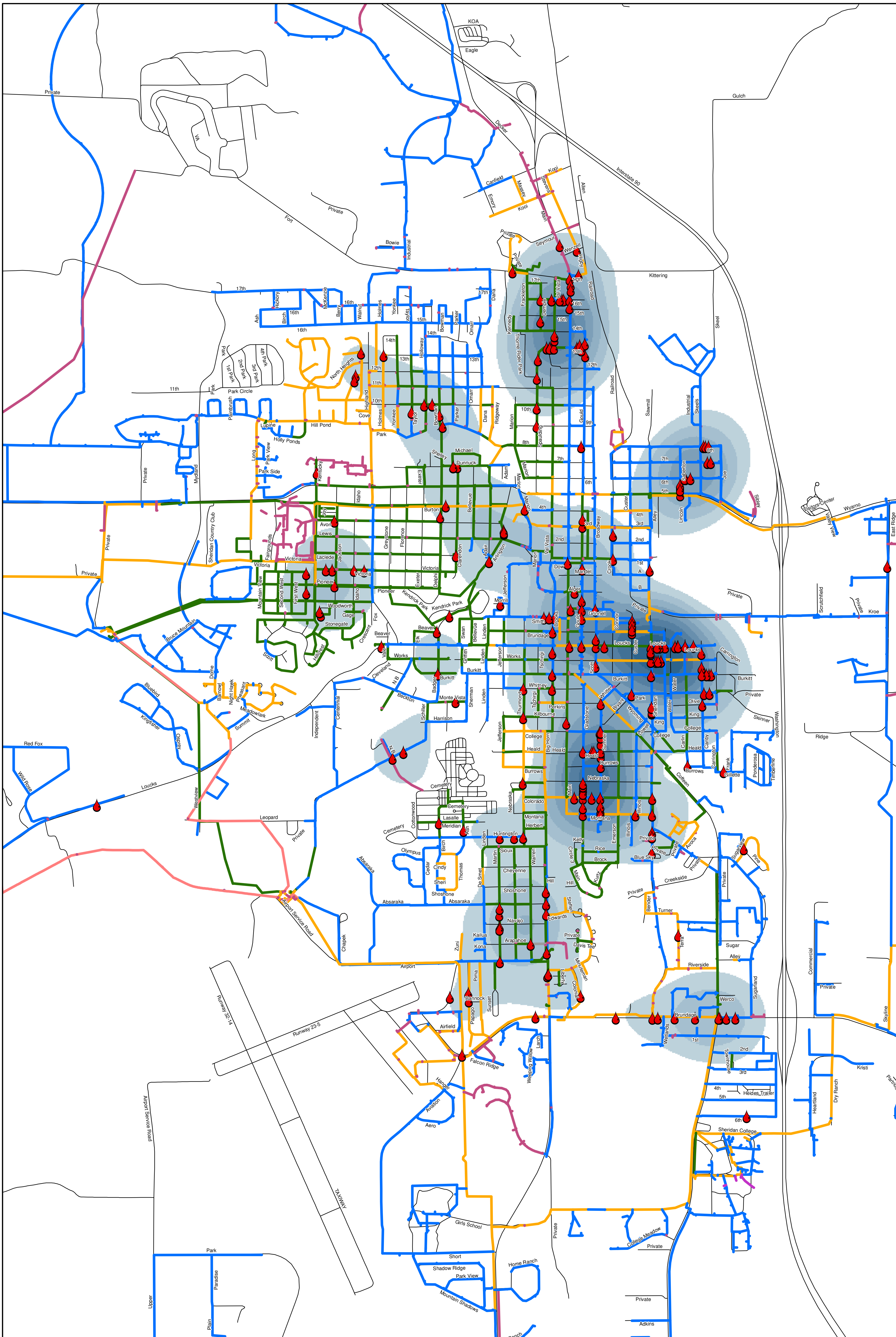
Sheridan Master Plan Level I Study

DOWL

Date: April 02, 2019

Figure F-4

\\SHR-FS\Shr-projects\28\26913-01\60GIS\Maps\Figure_F-4_Water_Line_Leaks_2000_2018.mxd Apr 02, 2019 10:04:11 AM User: dhomola



Legend

Water Line Leaks 1977-1999

Pipe Material

- CIP
- COPPER
- Concrete
- DIP
- Galvanized Iron
- PVC
- Steel
- Unknown

Streets

0 1,150 2,300 Feet

Water Line Leaks 1977-1999

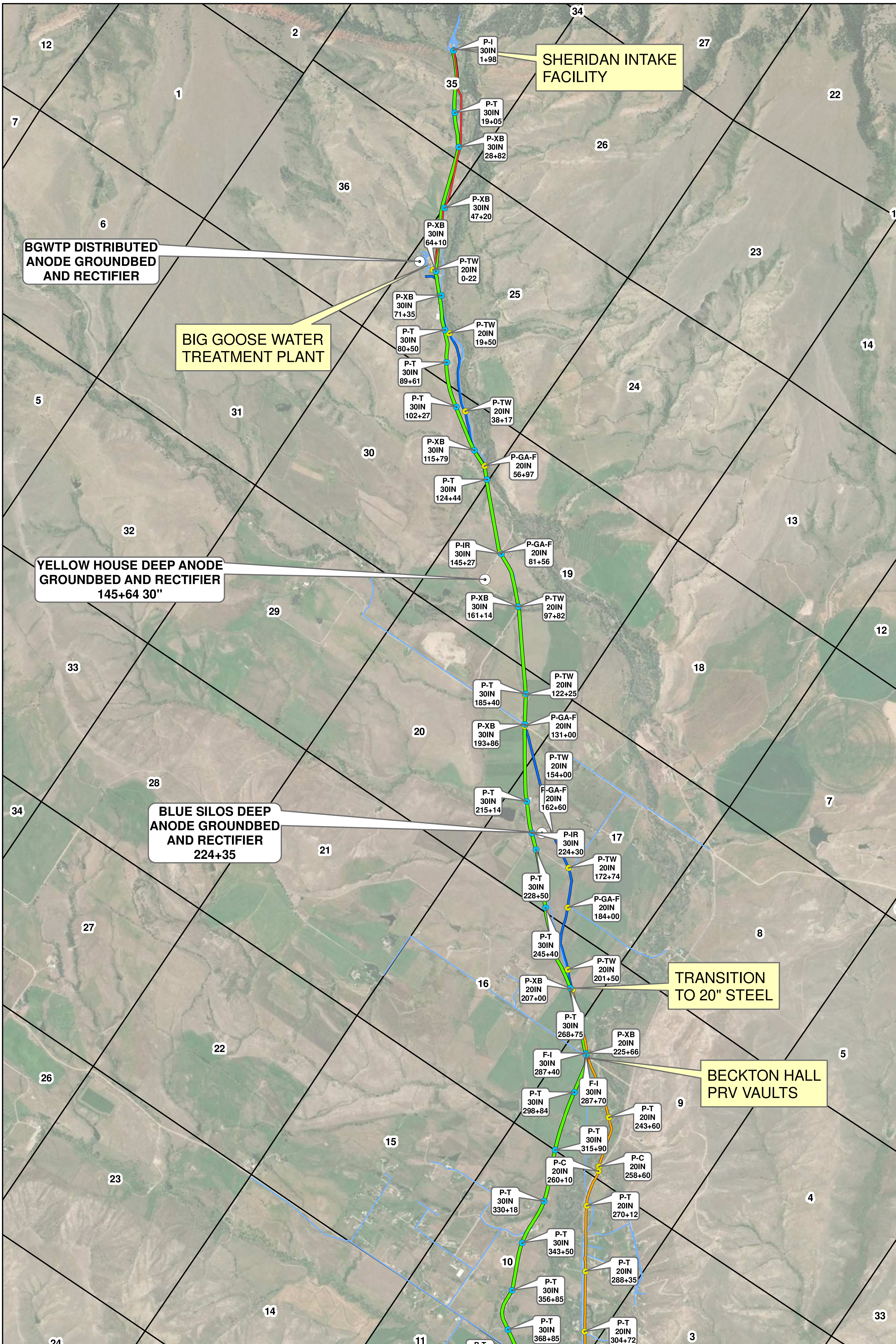
Sheridan Master Plan Level I Study

DOWL

Date: April 08, 2019

Figure F-4

\\SHR-FS\Shr-projects\28\26913-01\60GIS\Maps\Figure_F-4_Water_Line_Leaks_Old_1977_1999.mxd Apr 08, 2019 8:51:59 AM User: dhomola



Legend

- Impressed Current System
- 30" Test Station
- 20" Test Station
- 16" Steel
- 20" Steel
- 20" PVC
- 30" Steel

Section

Type
Pipe Size
Station

TYPE
F-I =
P-C =
P-F =
P-GA-F =
P-I =
P-IR =
P-T =
P-TW =
P-XB =

1 in = 2,500 ft

0 1,375 2,750
Feet

Cathodic Protection West Big Goose

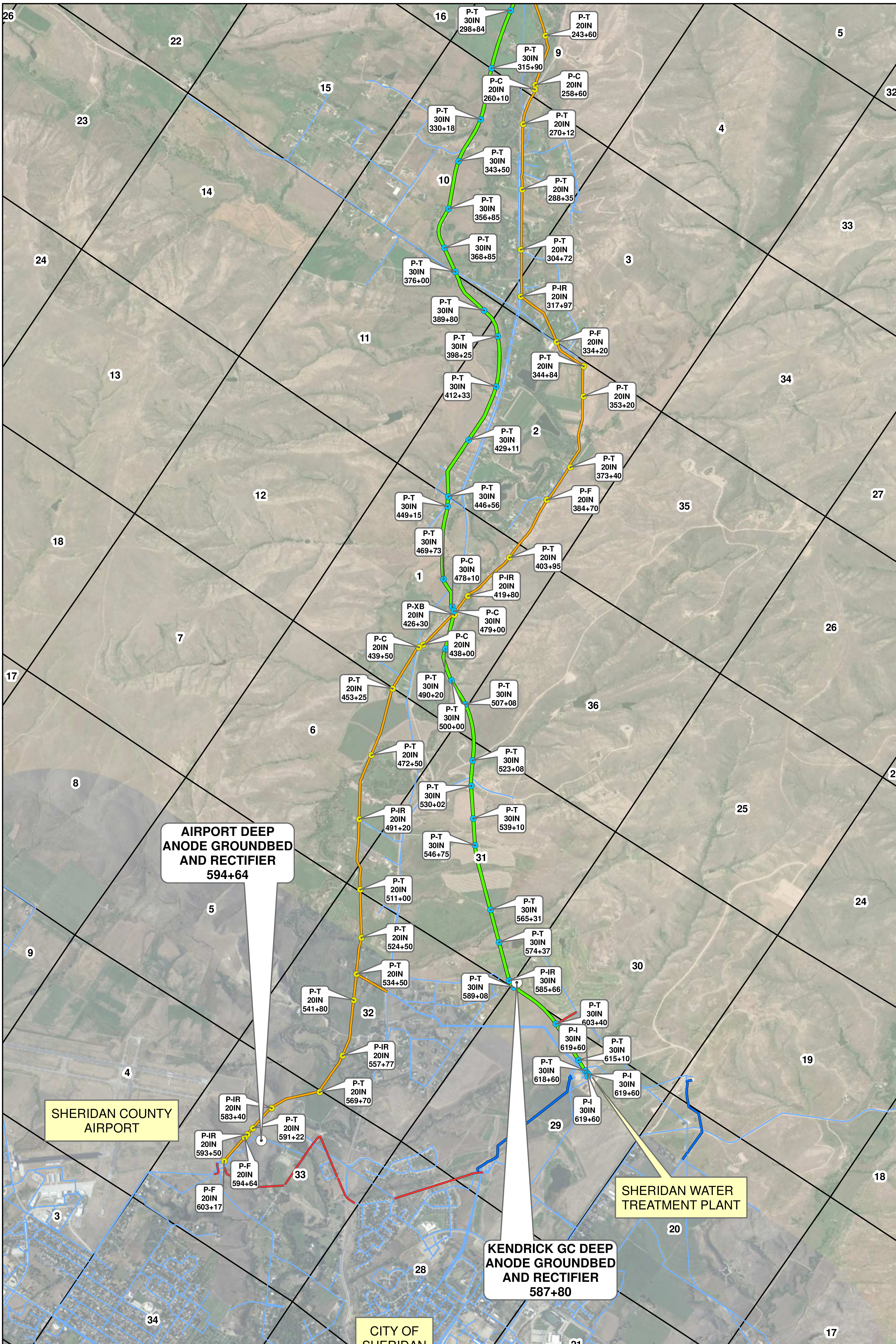
Sheridan Master Plan Level I Study

DOWL

Date: March 27, 2019

Figure F-5 Page 1 of 2

\\SHR-FS\Shr-projects\28\26913-01\60GIS\Maps\Figure_F-5_CP_Intake_11x17.mxd Mar 27, 2019 2:20:15 PM User: dhomola



Legend

- Impressed Current System
- 30" Test Station
- 20" Test Station
- 16" Steel
- 20" Steel
- 20" PVC
- 30" Steel
- Section

Type
Pipe Size
Station

TYPE
F-I =
P-C =
P-F =
P-GA-F =
P-I =
P-IR =
P-T =
P-TW =
P-XB =

1 in = 2,500 ft

0 1,375 2,750
Feet

Cathodic Protection East Big Goose

Sheridan Master Plan Level I Study

DOWL

Date: March 27, 2019

Figure F-5 Page 2 of 2

\\SHR-FS\Shr-projects\28\26913-01\60GIS\Maps\Figure_F-5_CP_Town_11x17.mxd Mar 27, 2019 2:21:46 PM User: dhomola

North Low Tank Site

Sheridan Master Plan Level I Study

Date: May 10, 2019

Figure F-6

DOWL

Legend

- WaterTank
- Isolation Valve
- NC or Zone Valve
- Reg. Hydrant
- Flushing Hydrant
- PRV
- AirVac

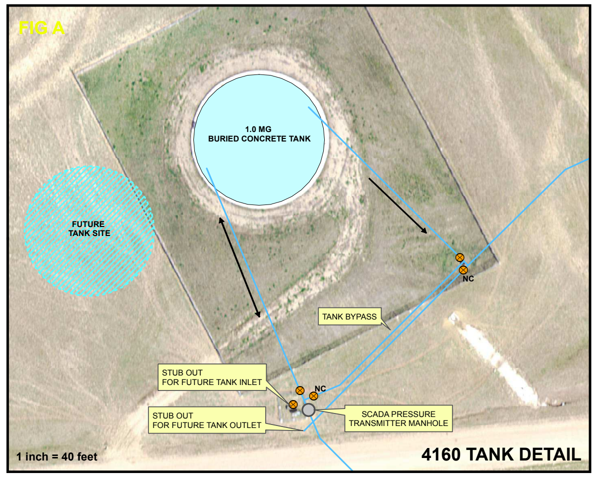
STOP_HGL

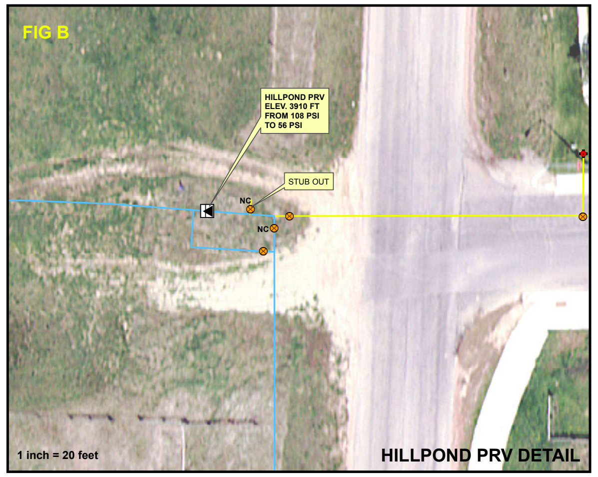
- 3890
- 3952
- 4040
- 4090
- 4160
- 4223
- Above 4223
- Parcels

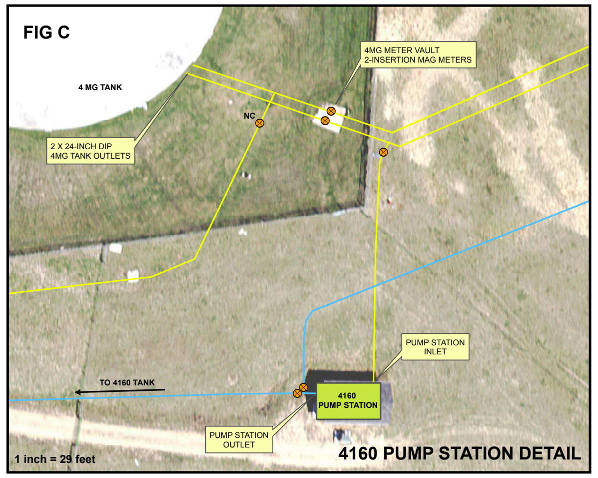
N

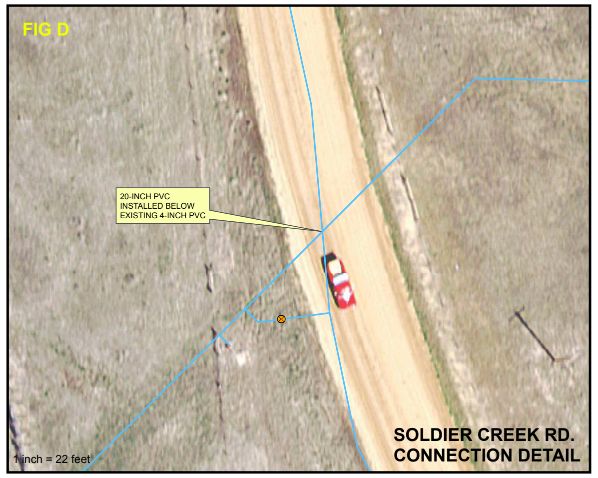
0 37.5 75
Feet

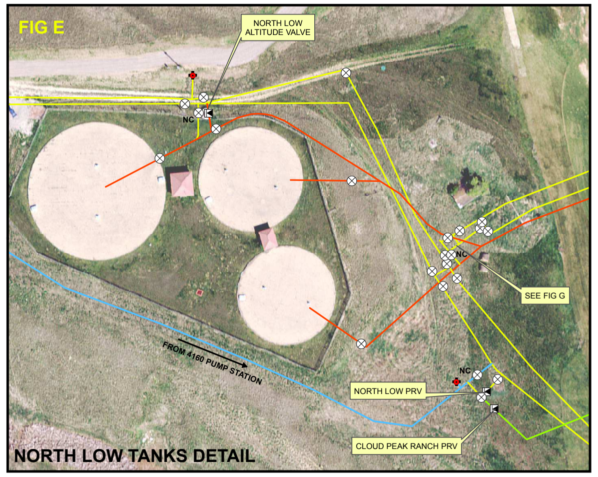
Q:\28\26913-01\60GIS\Maps\Figure_F-6_North_Low_TankSite.mxd May 10, 2019 2:46:32 PM User: trosenlund

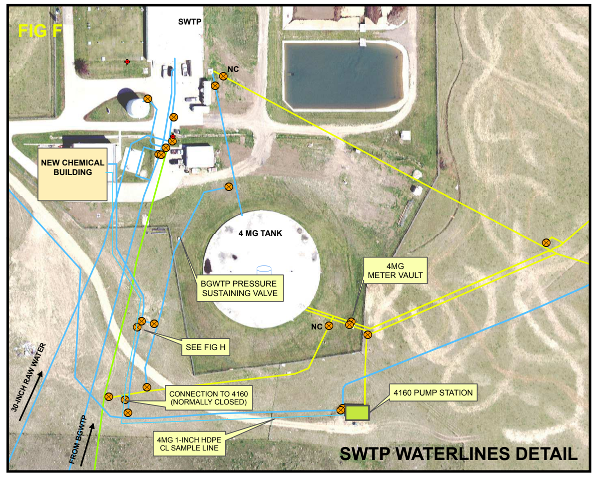


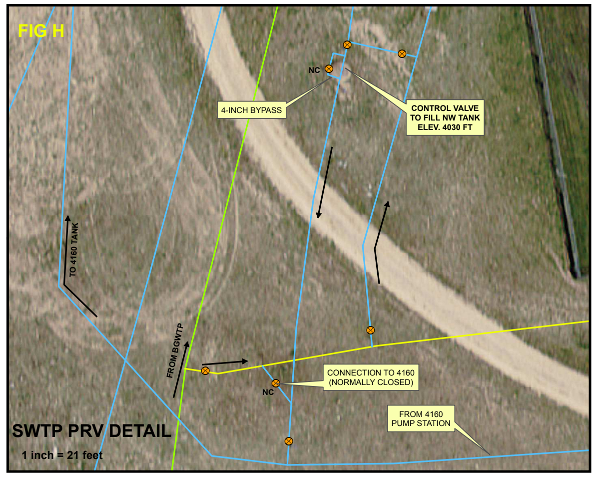












Northwest Water System Improvements Record Drawings

Sheridan Master Plan Level I Study

Date: May 23, 2019

Figure F-7

DOWL

Legend

- PRV
- Hydrant
- Valves

Waterlines

- 3890
- 3952
- 4040
- 4090
- 4160
- 4160 - VAMC
- 4223
- Above 4223

This map is 36"x56"

0 455 910
Feet

Q:\28\26913-01\60GIS\Maps\Figure_F-7_NW_System_Improvements_Record_Drawings_36x56.mxd May 23, 2019 8:52:57 AM User: trosenlund

Legend

Blowoffs	NC or Zone Valve	Pipe Material		Steel	
WaterTank	Reg. Hydrant	CIP		Pipe Size	
Pressure_ReliefValves	Flushing Hydrant	CMP		0 - 6	
PS PumpStation	PRV	DIP		7 - 10	
Isolation Valve	AirVac	HDPE		11 - 18	
		PVC		19 - 40	
		RCP			

0 280 560
Feet

North Low to South Low Tanks

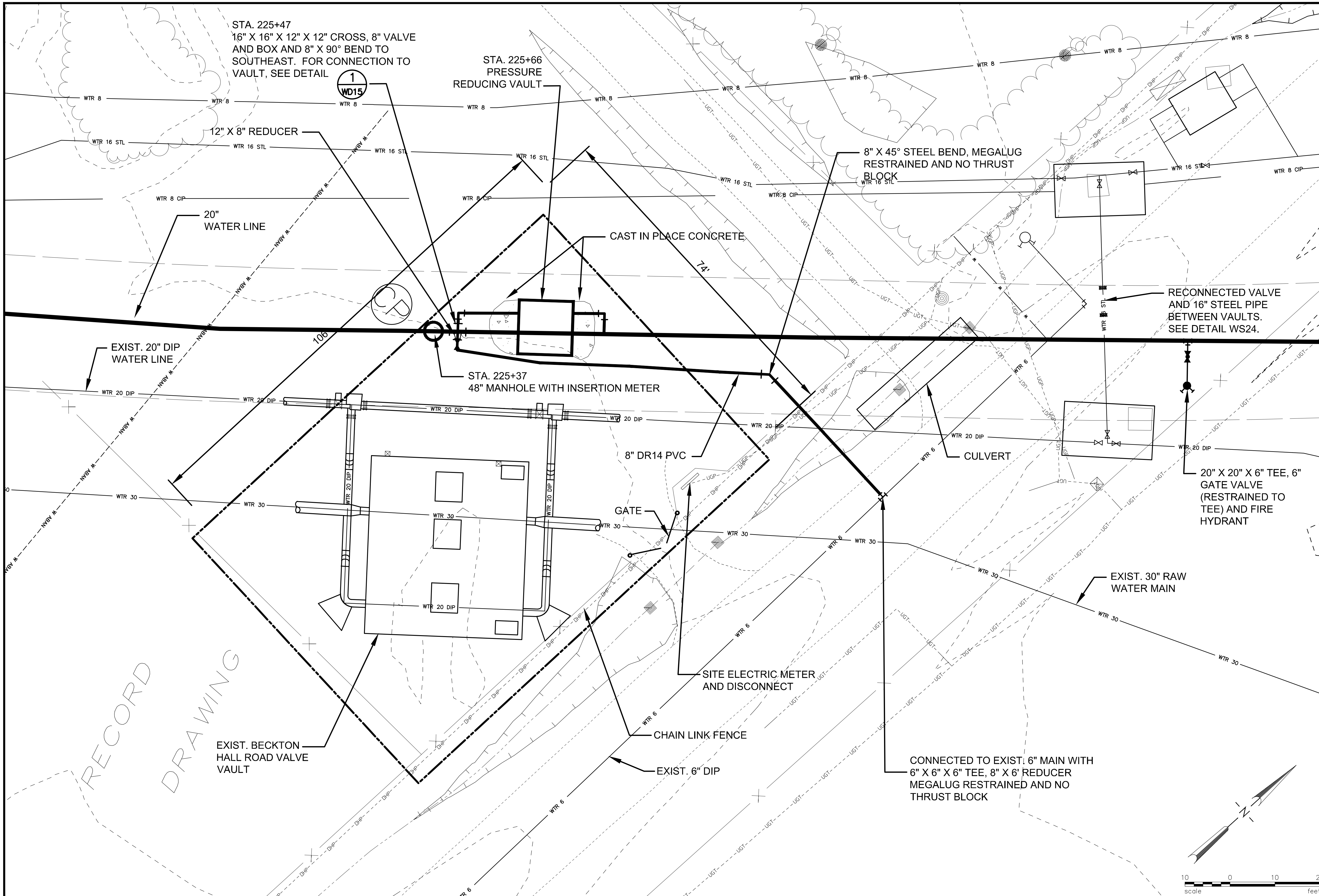
Sheridan Master Plan Level I Study

DOWL

Date: March 27, 2019

Figure F-8

\\SHR-FS\Shr-projects\28\26913-01\60GIS\Maps\Figure_F-8_North_Low_To_South_Low_Tanks.mxd Mar 27, 2019 2:32:31 PM User: dhomola



20" Big Goose Pipeline

Sheridan Master Plan Level I Study

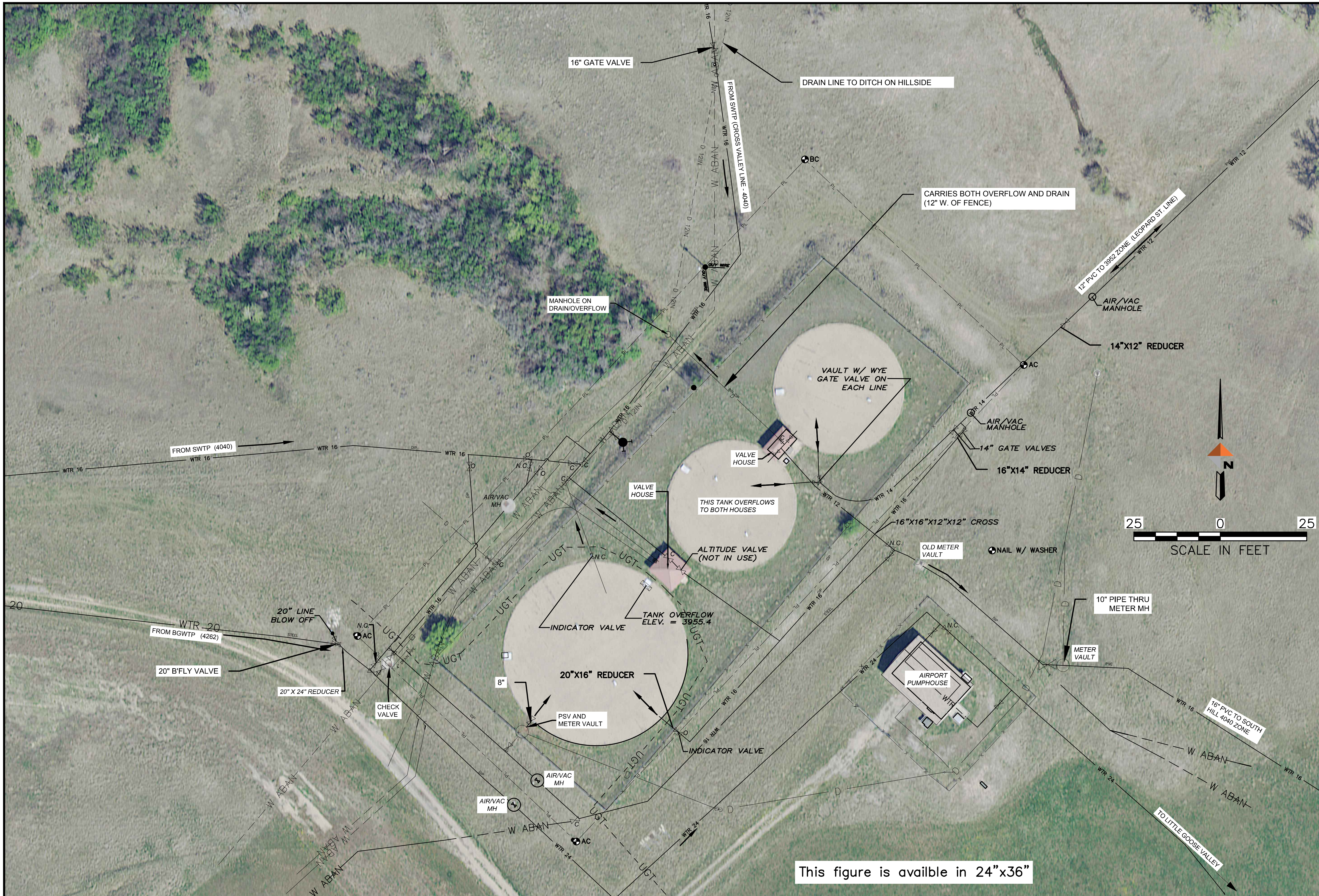
Date: March 27, 2019

Figure F-9

DOWL

BECKTON HALL ROAD CONNECTION
BECKTON PRV VAULTS

\\SHR-FS\Shr-projects\28\26913-01\65CAD\Figure_F-9_Beckton_Hall_Rd_Conn_Beckton_Hall_PRV_Vaults.dwg PLOT DATE 2019-3-27 14:43 SAVED DATE 2019-03-27 14:41 USER: dhomola



South Low Tank Site
Overall Utility Map

Sheridan Master Plan Level I Study

Date: March 27, 2019

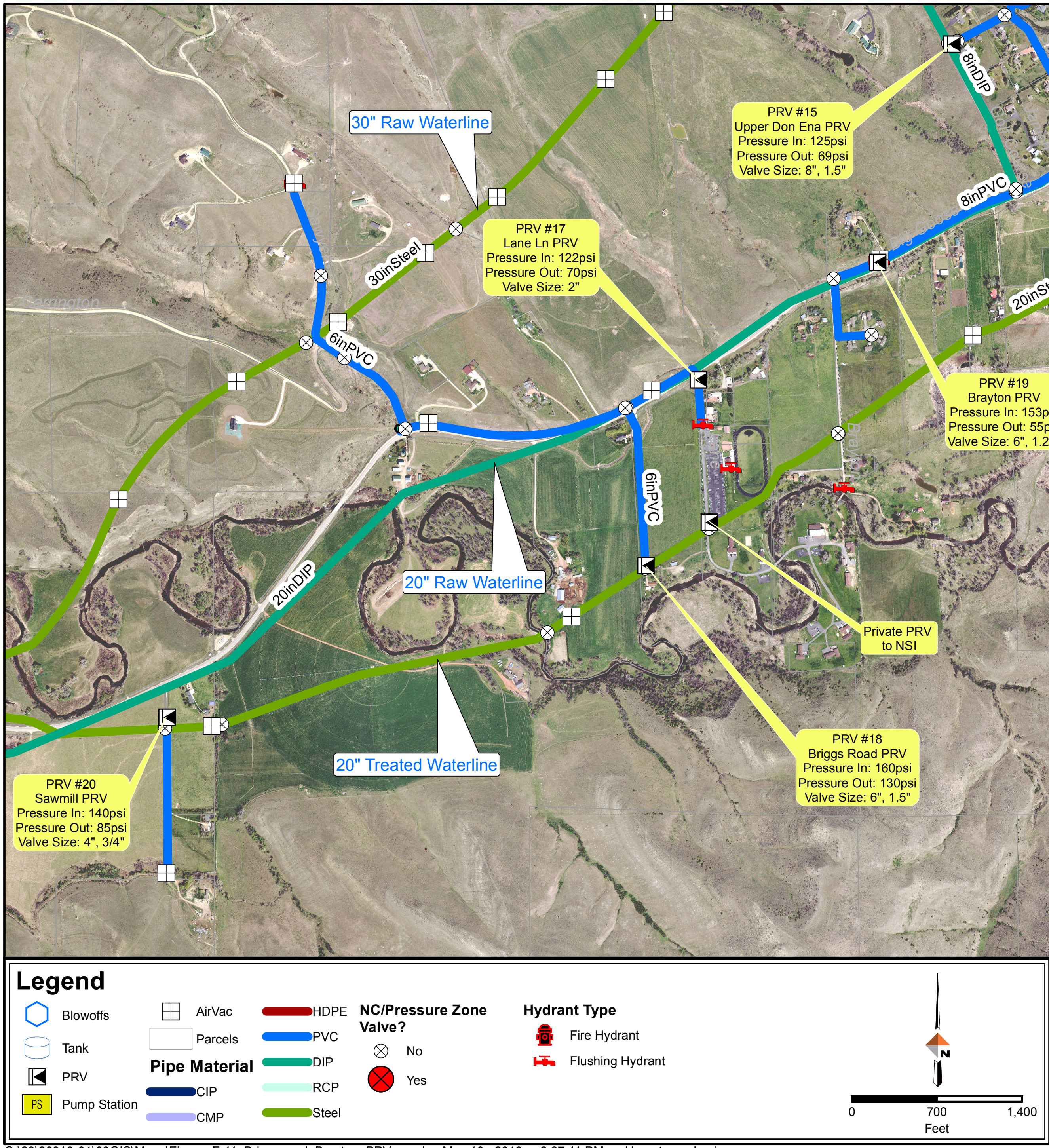
Figure F-10

DOWL

Legend

- Water Valve
- Survey Monument
- Abandoned Waterline
- Waterline
- Drain Line
- Underground Telep.
- Fence
- Property Line
- Air/Vac Manhole
- Power Pole
- Fire Hydrant
- Blowoff
- Normally Closed N.C.
- Perm. Closed Valve C
- Open Valve O

\\SHR-FS\Shr-projects\28\26913-01\65CAD\Figure_F-10_South_Low_Tanksite_11x17.dwg PLOT DATE 2019-3-27 14:45 SAVED DATE 2019-03-26 15:28 USER: dhomola



Briggs and Brayton PRVs

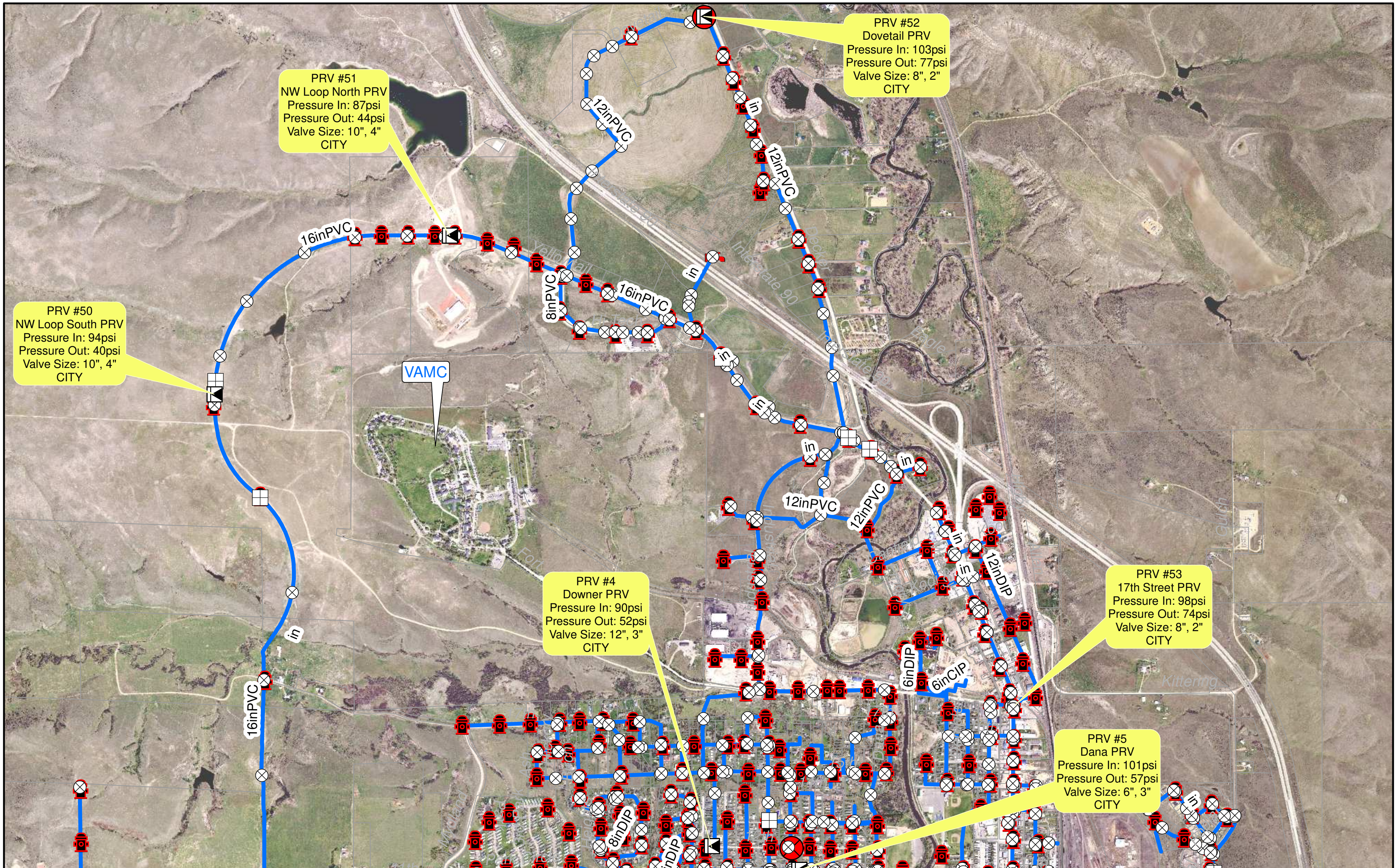
Sheridan Master Plan Level I Study

DOWL

Date: May 10, 2019

Figure F-11

Q:\28\26913-01\60GIS\Maps\Figure_F-11_Briggs_and_Brayton_PRVs.mxd May 10, 2019 2:27:11 PM User: trosenlund



Legend

Blowoffs
Tank
PRV
Pump Station
AirVac
Parcels
Waterlines

NC/Pressure Zone Valve?
No
Yes

Hydrant Type
Fire Hydrant
Flushing Hydrant

0 1,150 2,300
Feet

North End Water System

Sheridan Master Plan Level I Study

DOWL

Date: March 27, 2019

Figure F-12

\\SHR-FS\Shr-projects\28\26913-01\60GIS\Maps\Figure_F-12_North_End_Water_System.mxd Mar 27, 2019 2:35:20 PM User: dhomola

Legend

PumpStation
WaterTank
PRV
AirVac
Waterline

Parcels
Powder Horn

Hydrant Type
Fire Hydrant
Flushing Hydrant

NC/Press. Zone Valve?
No
Yes

N

0 700 1,400
Feet

Powderhorn Area Water System

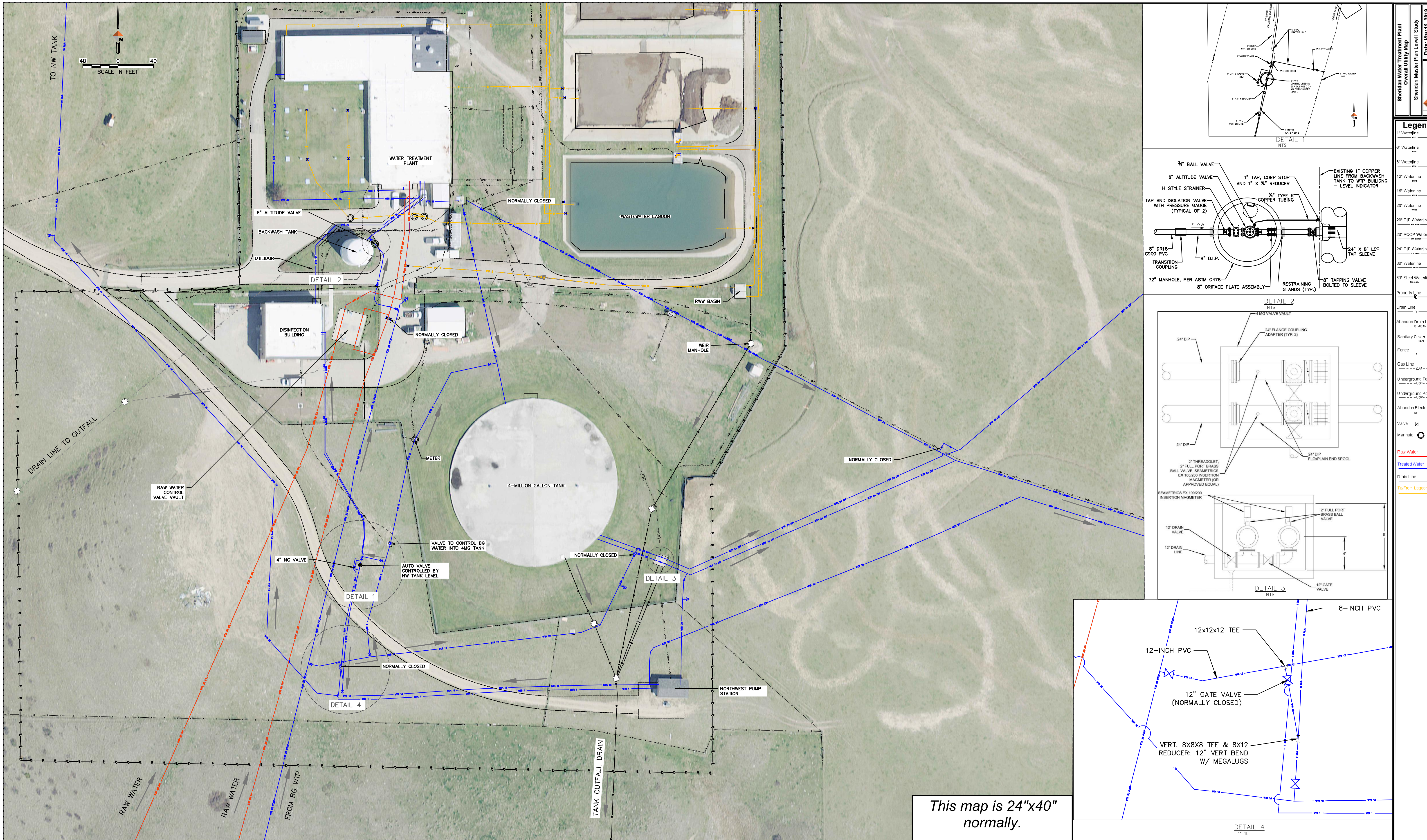
Sheridan Master Plan Level I Study

DOWL

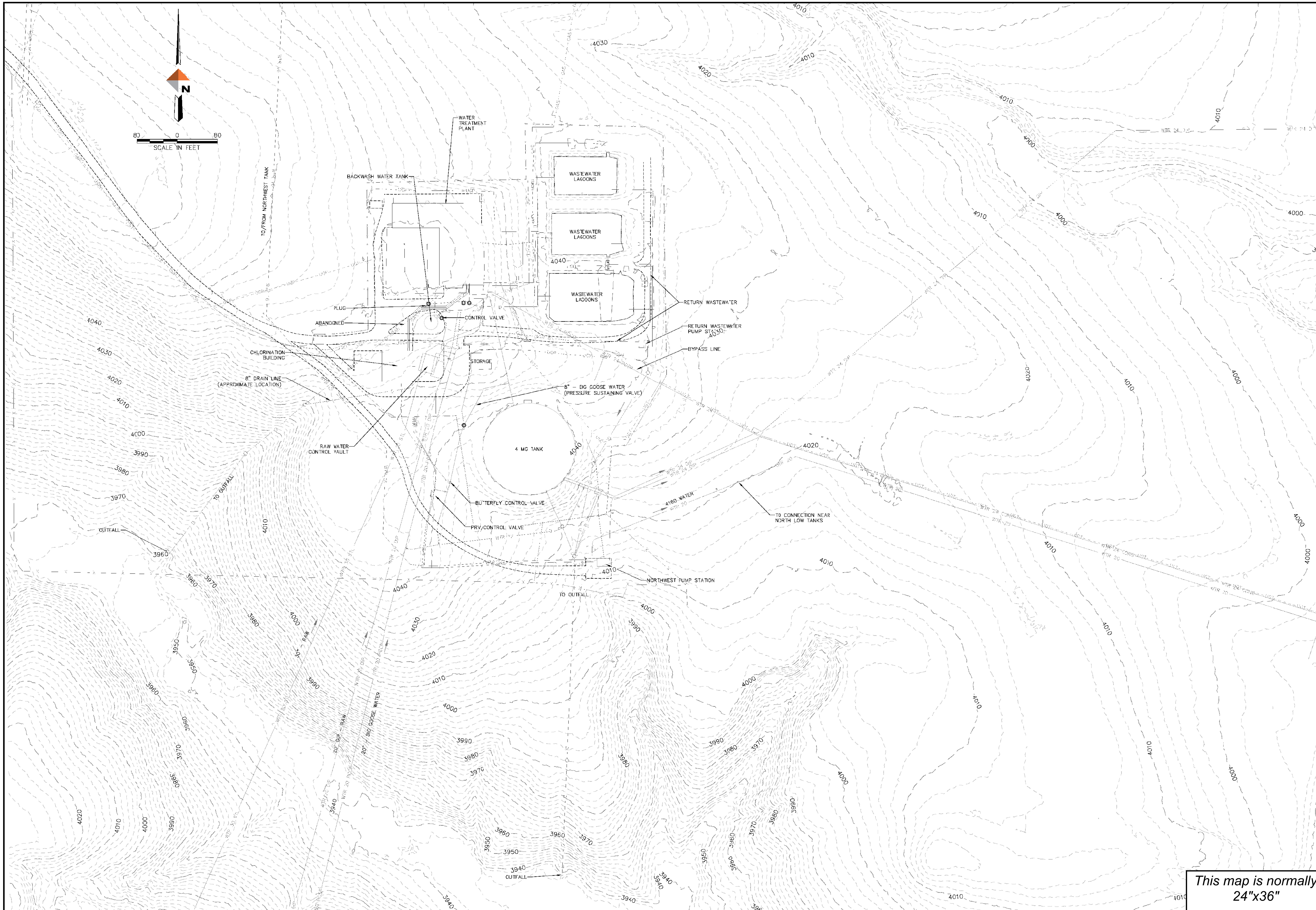
Date: May 31, 2019

Figure F-13

Q:\28\26913-01\60GIS\Maps\Figure_F-13_Powderhorn_Area_Water_System.mxd May 31, 2019 9:42:46 AM User: trosenlund



Sheridan Water Treatment Plant
Overall Utility Map
Sheridan Master Plan Level I Study
Date: May 15, 2019
Figure F.14
SCALE IN FEET
TO NW TANK
WATER TREATMENT PLANT
WASTEWATER LAGOON
8" ALTITUDE VALVE
BACKWASH TANK
UTILIDOR
DETAIL 2
NORMALLY CLOSED
DISINFECTION BUILDING
RWW BASIN
WEIR MANHOLE
METER
4-MILLION GALLON TANK
DRAIN LINE TO OUTFALL
RAW WATER CONTROL VALVE VAULT
VALVE TO CONTROL BG WATER INTO 4MG TANK
4" NC VALVE
AUTO VALVE CONTROLLED BY NW TANK LEVEL
DETAIL 1
DETAIL 3
DETAIL 4
NORTHWEST PUMP STATION
TANK OUTFALL DRAIN
RAW WATER
FROM BG WTP
¾" BALL VALVE
8" ALTITUDE VALVE
H STYLE STRAINER
1" TAP, CORP STOP AND 1" X ¾" REDUCER
TAP AND ISOLATION VALVE WITH PRESSURE GAUGE (TYPICAL OF 2)
¾" TYPE K COPPER TUBING
EXISTING 1" COPPER LINE FROM BACKWASH TANK TO WTP BUILDING - LEVEL INDICATOR
FLOW
8" DR18 C900 PVC
8" D.I.P.
TRANSITION COUPLING
24" X 8" LCP TAP SLEEVE
72" MANHOLE, PER ASTM C478
8" ORIFACE PLATE ASSEMBLY
RESTRAINING GLANDS (TYP.)
8" TAPPING VALVE BOLTED TO SLEEVE
NTS
4 MG VALVE VAULT
24" FLANGE COUPLING ADAPTER (TYP. 2)
24" DIP
24" DIP FLGxPLAIN END SPOOL
2" THREADOLET, 2" FULL PORT BRASS BALL VALVE, SEAMETRICS EX 100/200 INSERTION MAGMETER (OR APPROVED EQUAL)
SEAMETRICS EX 100/200 INSERTION MAGMETER
2" FULL PORT BRASS BALL VALVE
12" DRAIN VALVE
12" DRAIN LINE
12" GATE VALVE
8-INCH PVC
12x12x12 TEE
12-INCH PVC
12" GATE VALVE (NORMALLY CLOSED)
VERT. 8X8X8 TEE & 8X12 REDUCER; 12" VERT BEND W/ MEGALUGS
1"=10'
Legend
1" Waterline
6" Waterline
8" Waterline
12" Waterline
16" Waterline
20" Waterline
20" DIP Waterline
20" PCCP Waterline
24" DIP Waterline
30" Waterline
30" Steel Waterline
Property Line
Drain Line
Abandon Drain Line
Sanitary Sewer Line
Fence
Gas Line
Underground Tele
Underground Power
Abandon Electrical
Valve
Manhole
Raw Water
Treated Water
Drain Line
To/From Lagoons
This map is 24"x40" normally.



REVISIONS

REV	DATE	DESCRIPTION	BY

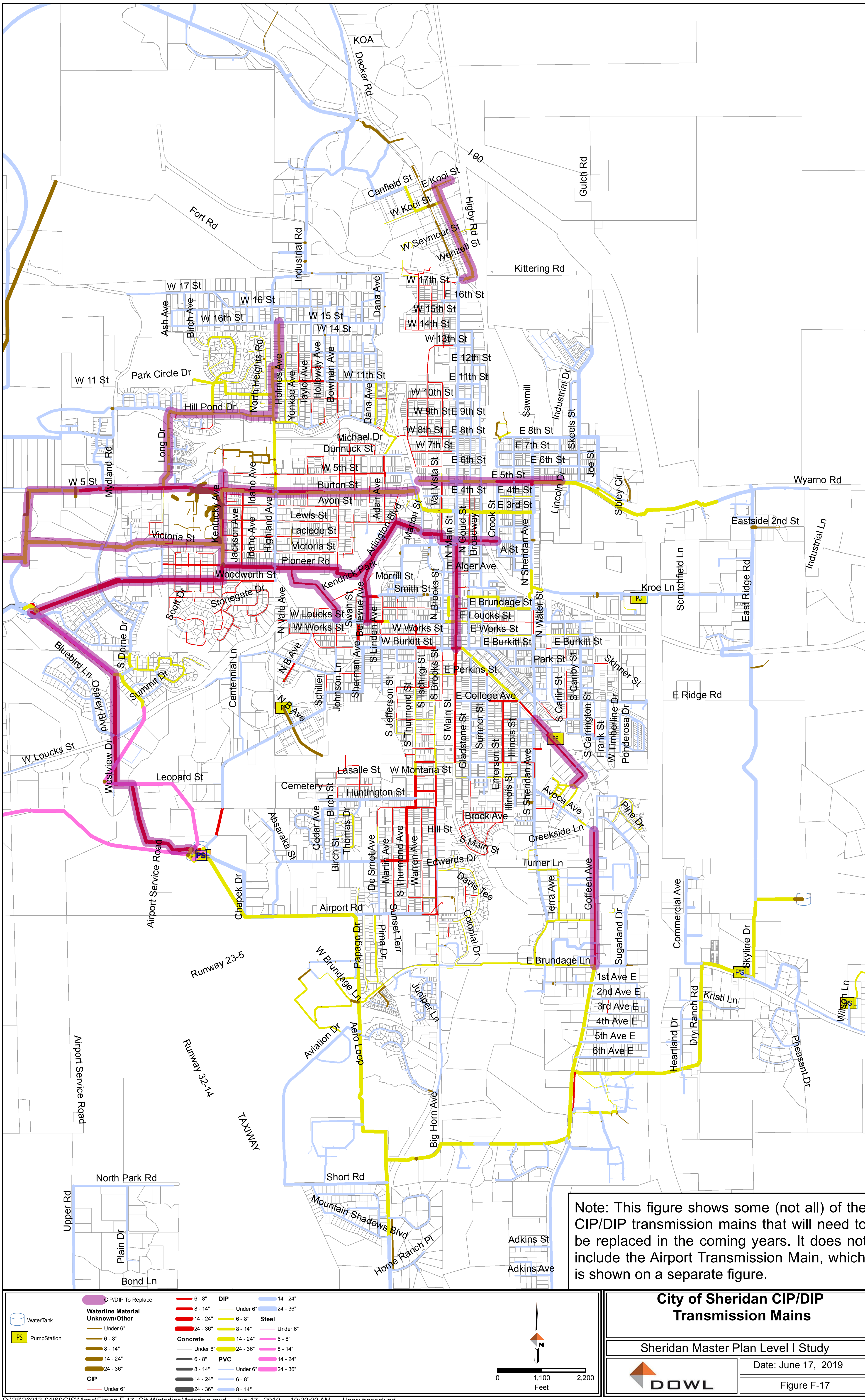
DOWL
www.dowl.com
16 West 8th Street
Sheridan, Wyoming 82801
307.672.9006

CITY OF SHERIDAN
SHERIDAN WATER TREATMENT PLANT
VICINITY MAP

PROJECT 26913.01
DATE 5/15/2019

SHEET
F-15


Airport Transmission Line Leaks
Sheridan Master Plan Level I Study
Date: June 17, 2019
Figure F-16
DOWL
16IN DIP
1996
10IN CIP
January 2001
Airport
10IN CIP
November 1980
8IN PVC
2019
Aviation Drive & Brundage
10IN DIP
Aviation Drive
10IN DIP
November 2007
16IN DIP
March 2002
16IN DIP
February 1996
16IN DIP
October 2006
16" Creek Crossing
16IN DIP
August 2015
16" Creek Crossing
16IN DIP
2016
16IN DIP
May 2016
16IN DIP
June 2013
16IN DIP
October 2017
24
20
16
Legend
WaterLineLeaks_ATM
Waterlines
16" DIP
20" DIP
24" DIP
NEW PVC
OTHER
OTHER DIP
OTHER PVC
Streets
0 500 1,000
Feet
N
Q:\28\26913-01\60GIS\Water Line Leaks\Airport Transmission Main\Water_Line_Leaks_ATM.mxd Jun 17, 2019 9:59:49 AM User: trosenlund



Note: This figure shows some (not all) of the CIP/DIP transmission mains that will need to be replaced in the coming years. It does not include the Airport Transmission Main, which is shown on a separate figure.

City of Sheridan CIP/DIP Transmission Mains

Sheridan Master Plan Level I Study

DOWL

Date: June 17, 2019

Figure F-17

Q:\28\26913-01\60GIS\Maps\Figure F-17_CityWaterlineMaterials.mxd Jun 17, 2019 10:29:00 AM User: trosenlund

Appendix G Table of Contents

RESOLUTION 30-17

CONNECTION CHARGES, PLANT INVESTMENT FEES, AND UTILITY RATES
FOR
WATER AND SEWER SERVICE

A RESOLUTION establishing and directing the levy, charge and collection of connection charges, plant investment fees, and utility rates for water and sewer service as defined and authorized by Sections 28-1, 4.5, 4.6, 35, and 43 of the Sheridan City Code, 1959. This RESOLUTION supersedes previous resolution 41-15. The effective date of this RESOLUTION is September 18, 2017, unless otherwise provided within.

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF SHERIDAN:

Section 1.

(a) All consumer connections to the city water main and all water meters shall hereafter be made, at the expense of the consumer, in accordance with the following schedule of service charges according to the circumstances for the connection:

Line & Meter Size	Meter Fee (1)	Tapping Fee (2)	Radio Read (3)	Total
¾" line with 5/8" meter	$ 180.00	$181.00	$200.00	$ 561.00
1" line with 1" meter	$ 240.00	$190.00	$200.00	$ 630.00
1-1/2" line with 1-1/2" meter	$ 460.00	$245.00	$200.00	$ 905.00
2" line with 2" meter	$ 585.00	$313.00	$200.00	$1,098.00
3" meter	$2,100.00	N/A	$200.00	$2,300.00
4" meter	$3,250.00	N/A	$200.00	$3,450.00
6" meter	$5,800.00	N/A	$200.00	$6,000.00
8" meter	$9,950.00	N/A	$200.00	$10,150.00

(1) The water department of the City shall supply all water meters. When the developer has stubbed out a water service line to the lot as part of the water main infrastructure installation, the tapping fee shall be waived.
(2) For water services 2" or smaller, connection to the city water main shall be made by the water department of the City. All connections larger than 2" shall be made by a licensed utility contractor at the expense of the consumer.
(3) Purchase and installation of radio read units is required on all new meter installations.

Charges for other installations or changes in installation shall be by agreement between the consumer and the water department.

Meter fee service charges shall include the furnishing of the water meter, installation and inspection thereof and necessary maintenance, repair or replacement of the meter resulting from ordinary wear and tear. All excavation and backfilling shall be furnished by the consumer, including charges for paving cuts.

Tapping fee service charges shall include furnishing the corporation cock, tapping saddle, installation and inspection thereof. All excavation and backfilling shall be furnished by the consumer, including charges for paving cuts.

(b) All consumer connections to the sanitary sewer mains shall be made by and at the expense of the consumer under the supervision of a licensed master plumber, upon payment of an inspection fee of fifty dollars.

(c) In instances where water and sewer mains are installed and constructed either in whole or in part by and at the expense of existing special improvement districts, or by individuals, associations or developers, or by the city under any agreement for the special benefit of particular properties, the city council may, for the benefit and recoupment of the agency installing and constructing such mains, establish, levy and collect, in addition to the foregoing service charges, a reasonable connection fee to be paid prior to connection by persons who did not participate in the cost of the construction of such mains or whose property was not assessed therefore

Section 2.

(a) *Plant Investment Fee for Connection to the Municipal Water System*

All persons hereinafter applying for permission to connect to the municipal water system or to increase the size or number of connections thereto, shall first pay to the city a water plant investment fee for each premises to be served, based on the size and number of water meters to be installed upon the premises to be served, in accordance with the amount or amounts set forth in the following schedule:

Water Pipe x Water Meter Size	*Customer Class*	*AWWA M22 Max Flow Rates (gpm)*	*3/4" x 5/8" equivalency ratio*	*Water Plant Investment Fee*	
				Inside City	*Outside City*
¾" x 5/8"	Small Commercial Base Fee	30	0.41	$ 1,230.00	$ 1,537.50
¾" x 5/8"	Small Multi-Family Base Fee	30	0.66	1,980.00	2,475.00
¾" x 5/8"	Single-Family Residential & All Other Base Fee (1)	30	1.00	3,000.00	3,750.00
1" x 1"	All	50	1.67	5,010.00	6,262.50
1½" x 1½"	All	100	3.33	9,990.00	12,487.50
2" x 2"	All	160	5.33	15,990.00	19,987.50
3" x 3"	All	350	11.67	35,010.00	43,762.50
4" x 4"	All	630	21.00	63,000.00	78,750.00
6" x 6"	All	1,300	43.33	129,990.00	162,487.50
8" x 8"	All	2,400	80.00	240,000.00	300,000.00

Provided where the "small multi-family" customer class is defined as duplexes, mixed use developments (like commercial businesses that possess residential apartments), mobile home parks, trailer courts, motels, hotels and all other multi-family apartment units that share a single tap and service line from the City's water main.

Provided where the "small commercial" customer class is defined as office buildings that do not possess an irrigation system served by a single ¾ inch tap and service line.

Provided, where the size or number of meters upon any premises is to be increased, the plant investment fee shall be an amount equal to the difference between the scheduled amount for the existing meter or meters and the scheduled amount for the meter or meters to be installed.

(b) *Plant Investment Fee for Connection to the Municipal Sewer System*

All persons hereinafter applying for permission to connect to the municipal sewer system or to increase the size or number of connections thereto, shall first pay to the city a sewer plant investment fee for each premises to be served, based upon the size and number of water meters installed, to be installed or which would be required upon the premises to be served, in accordance with the amount or amounts set forth in the following schedule:

Water Pipe x Water Meter Size	*Customer Class*	*AWWA M22 Max Flow Rates (gpm)*	*3/4" x 5/8" equivalency ratio*	*Sewer Plant Investment Fee*	
				Inside City	*Outside City*
¾" x 5/8"	Small Commercial	30	0.41	$ 1,230.00	$ 2,460.00
¾" x 5/8"	Small Multi-Family	30	0.66	1,980.00	3,960.00
¾" x 5/8"	Single-Family Residential & All Other	30	1.00	3,000.00	6,000.00
1" x 1"	All	50	1.67	5,010.00	10,020.00
1½" x 1½"	All	100	3.33	9,990.00	19,980.00
2" x 2"	All	160	5.33	15,990.00	31,980.00
3" x 3"	All	350	11.67	35,010.00	70,020.00
4" x 4"	All	630	21.00	63,000.00	126,000.00
6" x 6"	All	1,300	43.33	129,990.00	259,980.00
8" x 8"	All	2,400	80.00	240,000.00	480,000.00

Provided where the "small multi-family" customer class is defined as duplexes, mixed use developments (like commercial businesses that possess residential apartments), mobile home parks, trailer courts, motels, hotels and all other multi-family apartment units that share a single tap and service line from the City's sewer main.

Provided where the "small commercial" customer class is defined as office buildings that are served by a single tap and service line.

Where the size or number of meters upon any premises is to be increased, the plant investment fee shall be an amount equal to the difference between the scheduled amount for the existing meter or meters and the scheduled amount for the meter or meters to be installed.

Where the premises to be served do not have municipal water service, and where water from private sources is to be discharged to the municipal sewer, the plant investment fee for sewer service shall be computed on the basis of the size or number of meters which would have been required to service the premises with municipal water.

Section 3.

The following rates are established and shall be charged and paid on a monthly basis for all metered water service from the municipal water system.

WATER UTILITY RATES

The following minimum charges shall apply to each monthly billing period. The indicated minimum water use is included in the minimum charge.

(a) *Minimum charges.* The minimum water use is to be credited against the water used in a monthly billing cycle with the following water charge schedule applying based upon meter size.

Meter Size (inches)	*Minimum Water Use Gallons*	*Monthly Minimum Charge*	
		Inside City	*Outside City*
≤ ¾	1,496	$18.88	$23.60
1	2,992	$22.26	$27.82
1½	5,984	$27.66	$34.56
2	8,976	$33.04	$41.30
3	22,440	$56.63	$70.80
4	37,400	$83.60	$104.51
6	74,800	$150.26	$188.77
8	149,600	$302.02	$377.54

(b) *Excess Water Charges.* For water use in excess of the minimum water use included in the minimum charge, charges shall be assessed based upon two tiers as follows:

Tier 1 - Water use above the minimum allowance identified in (a) shall be charged the following Tier 1 rate per 100 cubic feet up to Tier 1 water use allowance for each meter size as identified below.

Charge Per 748 Gallons	
Inside City	*Outside City*
$1.37	$1.73

Meter Size (inches)	*Tier 1 Water Use (Gallons)*
≤ ¾	5,984
1	11,220
1½	22,400
2	33,660
3	84,524
4	140,624
6	280,500
8	561,000

Tier 2 – the following water use charge shall be applied for each 748 gallons of water use in excess of the minimum allowance and the Tier 1 water allowance identified above.

Inside City	*Outside City*
$1.87	$2.34

Section 4.

The following rates are established, and shall be charged and paid on a monthly basis for all sanitary sewer service from the municipal sanitary sewer system.

SEWER UTILITY RATES
Minimum Charges

Water Meter Size (inches)	*Sewer Contributions Allowed With Minimum (Gallons)*	*Monthly Minimum Charge* *Inside City*	*Outside City*
≤ ¾	1,496	$12.70	$25.40
1	2,992	$19.36	$38.74
1½	5,984	$30.10	$60.19
2	8,976	$40.76	$81.51
3	22,440	$87.96	$175.26
4	37,400	$141.13	$282.25
6	74,800	$274.95	$549.91
8	149,600	$549.91	$1,099.82

(a) For sewer use in excess of the minimum sewer contribution included in the minimum charge, the following charges shall be made.

Charge Per 748 Gallons	
Inside City	*Outside City*
$1.92	$3.84

(b) The charges for private sewer discharge at the city wastewater treatment plant are as follows:

Septage Disposal $75.00 per 1,000 gallons
Grease Disposal $275.00 per 1,000 gallons

(c) The customer's monthly sewage contribution for residential and multi-unit customers is to be based upon the customer's water usage during the winter for four billing periods in the months of December, January, February and March and redetermined annually on or about April 1st.

(d) Sewer service charges for other than residential and multi-unit customers are to be based upon the indicated water usage plus any water contributed from private wells. In the event that any customer can show (by meter) that a portion of the metered water does not enter the sanitary sewer system, the customer(s) are to be charged for only that volume entering the sanitary sewers. The customer may be required to install a meter in his system to record the difference between sewage and non-sewage flows.

(e) A surcharge is to be imposed on individual, commercial and/or industrial customers for contributed sewage strength in excess of two hundred twenty-five mg/l five-day biochemical oxygen demand and two hundred twenty-five mg/l suspended solids. If the industrial waste is delivered to the wastewater treatment plant for private sewer discharge, this surcharge shall be in addition to the fee identified in (c) above. The surcharge is to be based upon the following formula:

$$S = V_s \times (Z\,(BOD_5 - 225) + Y\,(SS - 225))$$

Where:

S	=	Surcharge in dollars.
V_s	=	Sewage volume in 1000 gallons.
Z	=	Unit charge for BOD ($Z = 0.0007273$).
BOD_5	=	Five-day biochemical strength index in milligrams per liter (mg/l) by weight.
255	=	Allowed BOD_5 strength in mg/l by weight.
Y	=	Unit charge for suspended solids ($Y = 0.001818$).
SS	=	Suspended solids strength index in mg/l by weight.
225	=	Allowed SS strength in mg/l by weight.

(f) A statement for charges for sewer service shall be dated and sent out to users at regular intervals. Such statements shall be added to and made a part of the water bill, if customers receive water service from the city or by separate billing if water service is from other than the city. Provisions of this code relative to the payment of delinquent water bills shall also apply to delinquent sewer bills in all aspects, including the discontinuance of water service for nonpayment of sewer charges. Any payment received for combined water and sewer bills which are for less than the sum of the water and sewer bills shall be first applied to the sewer charge, and any remainder to the water charge.

For customers not receiving city water service, these same provisions shall apply, except that instead of discontinuance of water, a one-dollar late charge shall be added to the next bill at the time of billing, to cover additional accounting costs. If a sewer charge is not paid in nine months a lien shall be filed on the property for the balance then due, plus filing fees. If the lien is not paid in fifteen months, the service line shall be disconnected from the city's main and plugged. Service shall not be restored until the account is paid in full plus the actual cost of disconnecting the service line. Reconnection shall be the responsibility of the owner. If such disconnection is required, the city shall notify the agency furnishing water to the premises of the action to be taken.

(g) Owners or agents in charge of business blocks or other buildings occupied by more than one tenant using water from the same service pipe and/or discharging sewage through the same service sewer shall be required to pay the same rate for the whole of such building, unless a separate water meter is installed for each tenant. In case of a delinquent bill by a tenant the owner shall be responsible for the charges.

(h) If the city executed all agreements with the owner or developer of property, wherein utility facilities are installed with sufficient excess capacities in order to serve other properties, the city shall be entitled to collect from the owners or developer of such other properties served, amounts proportionate to the service rendered. Such collection shall be for the benefit of the party contracting for, and installing, the oversized facility.

Such agreements shall be for a fixed period of time and may include interest or other charges above the amount expended. The city Utilities Director is empowered to execute such agreements on behalf of the city.

(i) These rates and charges are established so that each user class pays its proportionate share of the costs of wastewater treatment services and the city Utilities Director is directed to annually review the charge structure to assure that proportionality between user classes is maintained and to recommend modifications as appropriate. Each user shall be notified annually by the city of its user charges.

Section 5.

(a) Service Charges.
A service charge of $40.00 shall be assessed for each account that requires termination of water service. An additional service charge of $40.00 shall be assessed for re-activation of water service that was previously turned-off. These service charges shall be assessed each time service is terminated or re-activated either at the customer's request, or for other reasons as identified within Chapter 28 of Sheridan City Code. Non-emergency services requested for after standard business hours (Monday - Friday, 8:00 a.m. – 5:00 p.m.) will be assessed a fee of twice the current rate."

(b) Late Fees for non-payment.
A late fee shall be applied to the unpaid balance of the utility bill for each account that is not paid within five (5) calendar days of the due date. Late fees will be assessed at a rate not to exceed 1.5% per billing cycle (9% per annum). Late fees will accumulate and be assessed on a monthly basis until the account balance is paid, or until such time payment is tendered by a collection agency, under contract with the City.

PASSED, ADOPTED, AND APPROVED 18th day of September, 2017.

CITY OF SHERIDAN, WYOMING

Roger Miller, Mayor

(SEAL)

ATTEST:

City Clerk

RESOLUTION No. 18-07-11

A RESOLUTION AUTHORIZING CHANGE IN THE BILLING RATES UNDER EXISTING RULES

WHEREAS, the Sheridan Area Water Supply Joint Powers Board ("SAWSJPB"), adopted Resolution 17-07-12, July 12, 2017 which provides, in part, at Rule 5 as follows:

5. Customer Rates

The following Customer rates are established and shall be charged and paid on a monthly basis.

Minimum Base Rate for All Customers

Meter Size	Rate
¾"	$47.68
1"	$73.10
1 ½"	$87.34
2" and larger	$91.19

Tiered Water Usage Rate for All Customers and All Meter Sizes

Usage Rate	
0 – 8,000 gallons	$1.83/1,000 gallons
8,001 gallons and greater	$3.84/1,000 gallons

WHEREAS, SAWSJPB Rule 5.b. expressly authorizes the SAWSJPB Board to modify existing water rates and charges by Board Resolution; and,

WHEREAS, the SAWSJPB Board's financial plan sets forth certain financial goals which require an increase in the SAWSJPB water rates,

NOW, THEREFORE BE IT RESOLVED that pursuant to SAWSJPB Rule 5.b. and effective beginning with water used in August 2018 and billed in September 2018, the existing monthly rates for water service shall be as follows:

5. Customer Rates

The following Customer rates are established and shall be charged and paid on a monthly basis.

Minimum Base Rate for All Customers

Minimum Base Rate/1 month billing cycle	
Meter Size	**Rate**
¾"	$48.75
1"	$74.74
1 ½"	$89.31
2" and larger	$93.24

Tiered Water Usage Rate for All Customers And All Meter Sizes

Usage Rate	
0 – 8,000 gallons	$1.87 /1,000 gallons
8,001 gallons and greater	$3.93 /1,000 gallons

Approved and adopted this 11th day of July, 2018.

Roger Miller, Chair

Attest:

Rich Bridger, Secretary

Sheridan Area Water Supply Joint Powers Board

SAWSJPB CONNECTION AND PLANT INVESTMENT FEES

Meter Size (Inches)	One-Time Plant Investment Fee (PIF)	Corporation Stop (valve at main)	Meter	Radio Read	Total
¾	$5,380	$216	$192	$300	$6,088
1	$12,440	$234	$288	$300	$13,262
1 1/2	$24,880	$336	$576	$300	$26,092
2	$39,810	$372	$798	$300	$41,280
3	$79,630	*	*	*	*
4	$124,410	*	*	*	*
6	$248,830	*	*	*	*

If you have any questions or comments, please call or write to:

Dan Coughlin
Sheridan Area Water Supply Project Manager
224 S. MAIN STREET, SUITE 428,
SHERIDAN, WY 82801

307-674-2920 ext. 2930
dcoughlin@sheridancounty.com

City

CITY OF SHERIDAN
Water Fund - Summary
Fiscal Year 2020 Budget

Line #		ACTUAL FY16	ACTUAL FY17	ACTUAL FY18	FY19 April YTD	Budget FY2019	Budget FY2020
1	**Water Revenue**	**7,304,286**	**4,860,584**	**4,762,450**	**4,106,301**	**4,909,195**	**5,149,498**
2							
3	Water Admin	2,161,556	1,986,517	1,959,891	2,248,236	2,694,006	2,423,918
4	Customer Service	396,345	246,898	258,371	-	-	-
5	Source of Supply	225,313	206,391	209,874	141,858	208,800	206,575
6	Water Distribution	574,046	540,345	622,474	560,751	623,480	631,830
7	SAWS	270,708	251,046	228,435	179,532	259,280	228,725
8	Sheridan WTP	749,820	617,048	643,242	568,181	748,820	675,345
9	Big Goose WTP	491,471	506,369	501,602	415,084	546,860	510,084
10	WW Collection	426,540					
11	WW Treatment	964,604					
12	**Total Water Expenses**	**6,260,404**	**4,354,614**	**4,423,889**	**4,113,641**	**5,081,246**	**4,676,477**
13							
14	**Revenues over Expenses**	**1,043,882**	**505,970**	**338,561**	**(7,341)**	**(172,051)**	**473,021**

FY16 Water & Sewer Funds were combined.

#4 FY19 moved Customer Service to General Fund

CITY OF SHERIDAN

Water Fund Revenue

Fiscal Year 2020 Budget

Line #	ACCOUNT DESCRIPTION	ACTUAL FY16	ACTUAL FY17	ACTUAL FY18	FY19 April YTD	Budget FY2019	Budget FY2020
9	SAWS Contribution - Watershed Control Plan	-	-	-	440	-	-
11	Other County - SAWS	883,670	773,194	851,932	672,360	875,982	893,500
12	Grease/Septage Fees	69,259	-	-	-	-	-
13	Water Sales	3,474,557	3,704,460	3,422,510	2,871,813	3,553,761	3,560,400
14	Water Connection Charges	35,220	32,941	51,005	34,960	32,000	32,640
15	Water Card /Hydrant Sales	77,613	90,496	89,540	90,543	95,000	110,000
16	Sewer Fees	2,271,801	-	-	-	-	-
17	Sewer Inspection Fees	10,200	-	-	-	-	-
18	Hydropower Revenue	-	-	4,803	13,343	43,350	32,000
19	PIFF	390,170	186,043	218,955	275,690	227,418	228,900
20	Interest	21,581	33,695	44,452	71,999	45,826	90,000
22	Appreciation/Depreciation	492	(1,341)	(1,474)	286	-	-
23	Other Miscellaneous	2,675	1,496	4,313	18,209	-	166,200
24	Sale of Fixed Assets	27,448	-	956	20,801	-	-
26	Transfer from Solid Waste	36,000	36,000	36,000	-	-	-
27	Transfer from Sewer	-	-	35,858	35,858	35,858	35,858
28	Transfer from Weed & Pest	3,600	3,600	3,600	-	-	-
29							
30	**Total Water Fund Revenue**	**7,304,286**	**4,860,584**	**4,762,450**	**4,106,301**	**4,909,195**	**5,149,498**

FY16 Water & Sewer Funds were combined.

#11 Formula based on the operating agreement between the City and SAWS

#13 Factors in a recommended 2.5% rate adjustment, effective January 2020

#19 Large size taps for projects like VacuTech and Weatherby increased PIF revenues over typical projections for FY19

#23 Recoupment payment from SCSD#2 for North End Utilities (currently in escrow).

#27 Transfer from Sewer Fund to pay their portion of JPA Loan and Excavator Lease

CITY OF SHERIDAN

Administration Dept - Water

Fiscal Year 2020 Budget

Line #	ACCOUNT DESCRIPTION	ACTUAL FY16	ACTUAL FY17	ACTUAL FY18	FY19 April YTD	Budget FY2019	Budget FY2020
1	Salaries and Wages	302,432	189,114	178,685	150,040	172,800	178,000
2	Part-time/Seasonal Wages	3,125	4,864	3,708	5,113	-	-
3	Overtime	472	361	282	347	300	400
4	Payroll Taxes	21,725	14,070	13,424	11,176	13,300	13,700
5	Retirement	28,613	18,295	16,436	14,833	17,500	18,900
6	Unemployment and Worker's comp	5,498	6,666	4,596	4,324	4,800	5,000
7	Employee Insurance	55,354	36,453	32,474	26,387	30,900	29,200
9	Outside Services	2,250	3,367	12,391	-	-	-
10	Insurance Property	3,434	2,319	2,471	-	-	-
11	Telephone & Internet	2,945	3,217	3,142	2,404	2,784	2,800
12	Repairs & Maint. Vehicles/Equip.	159	169	109	171	200	600
14	Copier & Printer Costs	3,602	2,454	1,563	1,291	1,900	1,950
16	Computer Hardware	2,739	-	3,405	25	300	900
17	Software Expense	36,069	22,613	33,409	21,869	35,000	31,100
18	Supplies	1,342	1,488	2,800	1,847	2,700	2,400
19	Office Supplies	1,608	1,027	1,523	574	1,100	1,050
20	Uniform Supplies	126	151	-	221	425	350
21	Gasoline Oil Diesel Supplies	1,929	1,157	1,378	1,265	1,300	1,800
22	Professional Services	73,162	61,995	60,539	21,129	52,740	40,000
24	Insurance Vehicle	-	-	-	49	60	60
25	Insurance Liability	-	-	-	1,614	1,620	1,650
26	Insurance - Claims	1,372	-	-	-	-	-
27	Travel, Training & Memberships	4,879	2,502	2,913	3,640	3,900	3,960
28	Job Recruitment Costs	-	-	359	-	-	-
29	Publications Advertising and Printing	1,125	1,921	1,139	47	1,000	800
31	**Total Water Admin Operations**	**553,960**	**374,204**	**376,744**	**268,366**	**344,629**	**334,620**
32							
35	Capital Outlay - Watershed Control	-	907	11	3,531	50,000	-
61	Capital Outlay - Machinery and Equip.	-	-	20,102	-	-	-
65	**Total Water Admin Capital**	**-**	**907**	**20,113**	**3,531**	**50,000**	**-**
66							
67	Principal - DWSRF #37	30,734	32,019	32,230	32,888	32,888	33,711
68	Principal - DWSRF #110	75,445	78,135	82,251	81,012	81,012	83,009
69	Principal - 20" Big Goose	49,060	50,286	51,543	52,832	52,832	54,153
70	Principal - PMTF Loan	15,111	15,483	15,865	16,256	16,256	16,657
71	Principal - CWSRF #109	61,961	-	-	-	-	-
72	Principal - DWSRF #101	18,280	18,502	18,910	18,773	18,773	18,950
73	Principal - CWSRF #47	55,144	-	-	-	-	-
75	Principal - CAT Leases	-	7,444	7,735	13,394	13,394	13,917
77	Principal - CWSRF #154	-	-	-	-	-	34,978
78	Principal - DWSRF Loans	16,009	28,473	53,140	44,158	44,159	-
79	Principal - DWSRF #165	-	-	-	-	-	20,634
80	Principal - DWSRF #155	-	-	-	-	-	54,096
81	Principal - DWSRF #156	-	-	-	31,120	31,418	31,121
82	Principal - DWSRF #135	-	-	-	-	-	17,525
83	Principal - DWSRF #148	-	-	-	-	-	11,955
84	Principal - DWSRF #123	-	-	-	95,003	95,003	97,345
85	Principal - DWSRF #187	-	-	-	-	-	76,500
86	Principal - DWSRF #157	-	-	-	-	-	19,754
87	Principal - DWSRF #199	-	-	-	-	-	17,888
88	Principal - DWSRF #166	-	-	-	-		15,773
89	Principal - DWSRF #208	-	-	-	-	-	60,000
90	Principal - JPA Loans	31,178	17,730	31,242	32,441	32,441	33,939
91	Interest - DWSRF #37	8,360	7,075	6,864	6,206	6,206	5,383
92	Interest - DWSRF #110	35,746	33,056	28,941	30,180	30,180	28,183
93	Interest - 20" Big Goose	20,260	19,034	17,777	16,488	16,488	15,167
94	Interest - PMTF Loan	10,660	10,288	9,906	9,515	9,515	9,114
95	Interest - DWSRF #101	3,416	3,194	2,786	2,923	2,924	2,747

CITY OF SHERIDAN

Administration Dept - Water

Fiscal Year 2020 Budget

Line #	ACCOUNT DESCRIPTION	ACTUAL FY16	ACTUAL FY17	ACTUAL FY18	FY19 April YTD	Budget FY2019	Budget FY2020
96	Interest - CWSRF #47	15,369	-	-	-	-	-
98	Interest - CAT Leases	-	4,396	4,106	6,340	6,341	5,818
99	Interest - DWSRF Loans	9,372	33,075	18,572	480,372	480,373	-
100	Interest - DWSRF #165	-	-	-	-	46,133	13,236
101	Interest - DWSRF #135	-	-	-	-	-	7,857
102	Interest - DWSRF #148	-	-	-	-	-	6,097
103	Interest - DWSRF #123	-	-	-	48,609	48,609	56,978
104	Interest - DWSRF #187	-	-	-	-	-	46,000
105	Interest - DWSRF #157	-	-	-	-	45,703	12,616
106	Interest - DWSRF #199	-	-	-	-	-	5,956
107	Interest - DWSRF #166	-	-	-	-	-	8,270
108	Interest - DWSRF #208	-	-	-	-	-	25,000
109	Interest - JPA Loans	31,100	24,216	38,668	37,469	37,469	35,971
110	**Total Water Admin Debt**	**487,206**	**382,406**	**420,534**	**1,055,978**	**1,148,117**	**996,298**
111							
112	Transfer to General Fund - Support Costs	555,000	275,000	455,000	569,167	683,000	693,000
115	Trfr to Spec Rev - WWTP Dewatering	195,391	-	-	-	-	-
116	Trfr to Spec Rev - Meter Replacement	-	-	-	1,125	1,500	-
117	Trfr to Spec Rev - Sheridan Hydropower	-	-	15,000	10,500	14,000	-
118	Trfr to Spec Rev - BGWTP Hypochlorite Con	-	-	-	-	-	200,000
119	Trfr to Spec Rev - Street Overlay Program	50,000	50,000	50,000	37,500	50,000	50,000
124	Trfr to Spec Rev - West Downtown	100,000	200,000	-	-	-	-
127	Trfr to Spec Rev - East Downtown Impr	-	50,000	85,000	-	-	-
128	Trfr to Spec Rev - Leopard St Waterline	-	16,500	35,000	7,500	10,000	-
129	Trfr to Spec Rev - Loucks St & Waterline	140,000	387,500	387,500	-	-	-
130	Trfr to Spec Rev - Creek Crossing Replaceme	-	250,000	-	-	-	150,000
131	Trfr to Spec Rev - Mydland-Dome PRVs		-	115,000	-	-	-
132	Trfr to Spec Rev - W 5th St Waterline	80,000	-	-	-	-	-
133	Trfr to Spec Rev - BGWTP Utilidor	-	-	-	292,500	390,000	-
135	Trfr to Spec Rev - CIP Master Plan Study	-	-	-	2,070	2,760	-
137	**Total Water Admin Transfer**	**1,120,391**	**1,229,000**	**1,142,500**	**920,362**	**1,151,260**	**1,093,000**
138							
139	**Total Water Admin**	**2,161,556**	**1,986,517**	**1,959,891**	**2,248,236**	**2,694,006**	**2,423,918**

FY16 Water & Sewer Funds were combined.

#1 Utilities Director 50%, 3 other employees charged at 60%
#9 Moved to Professional Services
#10 FY19 - New allocation formula for property, vehicle & liability insurance; result, no cost assigned to administration
#12 Covers two vehicles split 60% to Water Fund and 40% to Sewer Fund
#16 Surface Pro $840, $60 Misc.
#17 CityWorks($13,800), Flowmaster/WaterGEMS($2,400); ESRI GIS($6K); Connect Sheridan App($3,240); XC2 for backflow($1,200); Microsoft Office Suite/Adobe/Apple Dev/Doodle/LucidChart($480); Respond CityWorks App($3,600); Misc.($380)
#18 1st Floor Conference Room Furnishings
#21 Increase in gas prices
#22 CityWorks Development ($15K); Water Modeling Support ($5K); Consulting Contingency $17K & APWA, AWWA, WWA Dues $3K
#24 FY19 - New allocation formula for property, vehicle & liability insurance
#25 FY19 - New allocation formula for property, vehicle & liability insurance
#26 Moved charges to water distribution; claims not paid by insurance
#27 D. Roberts, AWWA Mgrs Conf ($900); M. Peacock, WSWRA/CityWorks ($1,500); J. Rizer, SQL Train/MS Excel ($480); C. Drell, GIS Train ($1,080)
#28 Job Recruitment Costs moved to HR
#35 Watershed Control Plan Implementation
#61 FY18 - 60% of Fleet pick-up for Utility Services, 40% is recorded in Sewer Admin
#67 South Hill Waterline Replacement
#68 Sugarland Utility Repairs
#69 20" Pipeline Loan w/SAWS

CITY OF SHERIDAN

Administration Dept - Water

Fiscal Year 2020 Budget

Line #	ACCOUNT DESCRIPTION	ACTUAL FY16	ACTUAL FY17	ACTUAL FY18	FY19 April YTD	Budget FY2019	Budget FY2020
#70	Loan payment to SAWS						
#71	Loan moved to Sewer Fund - N. Main Street						
#72	N. Main Street						
#73	Loan moved to Sewer Fund - Grease & Septic WWTP						
#75	CAT 314CLCR Excavator						
#77	Meter Replacement Project						
#78	FY20 - Budgeted to individual loan line items						
#79	4MG Tank Repairs						
#80	Meter Replacement Project						
#81	Sheridan Hydropower						
#82	Wyo/Park Street Phase II						
#83	Wyo/Park Street Phase III						
#84	Water Treatment Plant Conventional Upgrades						
#85	N. Sheridan Interchange (Est. First Loan Pymt)						
#86	Leopard Street Waterline Replacement						
#87	Loucks Street Phase II & Waterline Replacement						
#88	5th St Waterline Replacement						
#89	North End Utilities (Est. First Loan Pymt)						
#90	UM Svc Center New Bldg Construction						
#91	South Hill Waterline Replacement						
#92	Sugarland Utility Repairs						
#93	20" Pipeline Loan w/SAWS						
#94	SAWS						
#95	N. Main Street						
#96	Loan moved to Sewer Fund - Grease & Septic WWTP						
#98	CAT 314CLCR Excavator						
#99	FY20 - Budgeted to individual loan line items						
#100	4MG Tank Repairs						
#101	Wyo/Park Street Phase II						
#102	Wyo/Park Street Phase III						
#103	Water Treatment Plant Conventional Upgrades						
#104	N. Sheridan Interchange (Est. Interest Pymt)						
#105	Leopard Street Waterline Replacement						
#106	Loucks Street Phase II & Waterline Replacement						
#107	5th St Waterline Replacement						
#108	North End Utilities (Est. Interest Pymt)						
#109	UM Svc Center New Bldg Construction						
#112	General Fund Transfer for Operations Support Costs calculated at 14% of Gross Revenue						
#119	Fire hydrant replacements for annual street overlay						

CITY OF SHERIDAN

Customer Service - Water

Fiscal Year 2020 Budget

Line #	ACCOUNT DESCRIPTION	ACTUAL FY16	ACTUAL FY17	ACTUAL FY18	FY19 April YTD	Budget FY2019	Budget FY2020
1	Salaries and Wages	163,255	99,718	96,951	-	-	-
2	Part-time/Seasonal Wages	11,910	-	-	-	-	-
3	Overtime	2,342	2,660	2,253	-	-	-
4	Payroll Taxes	12,850	7,474	7,299	-	-	-
5	Retirement	15,583	9,633	9,359	-	-	-
6	Unemployment and Worker's comp	3,209	3,457	2,464	-	-	-
7	Employee Insurance	27,458	14,622	14,376	-	-	-
8	Temporary Services Labor	-	-	768	-	-	
9	Contractual Services	-	-	-	-	-	-
10	Outside Services	1,111	1,177	321	-	-	-
11	Telephone & Internet	1,542	994	1,076	-	-	-
12	Repairs & Maint. - Other	-	-	-	-	-	-
13	Copier & Printer Costs	254	282	795	-	-	-
14	Equipment, Non-capitalized	-	-	-	-	-	-
15	Computer Hardware	3,681	1,279	873	-	-	-
16	Software Expense	5,636	11,329	12,009	-	-	-
17	Supplies	-	-	-	-	-	-
18	Office Supplies	6,061	3,328	2,046	-	-	-
19	Professional services	138,592	89,408	108,256	-	-	-
20	Insurance Liability	157	109	110	-	-	-
21	Travel, Training & Memberships	713	214	176	-	-	-
22	Publications Advertising and Printing	388	59	646	-	-	-
23	Uncollectible Accounts	1,602	1,156	(1,408)	-	-	-
24	**Total Customer Service Operations**	**396,345**	**246,898**	**258,371**	**-**	**-**	**-**

FY16 Water & Sewer Funds were combined.

FY19 moved Customer Service to General Fund

CITY OF SHERIDAN

Source of Supply

Fiscal Year 2020 Budget

Line #	ACCOUNT DESCRIPTION	ACTUAL FY16	ACTUAL FY17	ACTUAL FY18	FY19 April YTD	Budget FY2019	Budget FY2020
1	Salaries and Wages	77,564	61,667	78,055	64,684	76,900	78,800
2	Part-time/Seasonal Wages	1,749	6,035	8,645	3,435	8,400	8,600
3	Overtime	2,036	1,504	1,263	1,156	1,600	1,600
4	Payroll Taxes	5,549	5,206	6,291	5,047	6,600	6,700
5	Retirement	7,445	6,261	8,004	6,800	8,400	9,000
6	Unemployment and Worker's comp	1,436	2,469	(2,334)	1,932	2,400	2,500
7	Employee Insurance	14,383	12,971	18,597	14,108	18,100	18,200
8	Outside Services	23,540	41,250	20,386	-	-	-
9	Utilities	8,963	6,833	7,642	6,394	8,500	9,000
10	Repairs & Maint. - Buildings/grounds	2,475	7,517	6,648	686	8,500	6,500
11	Insurance Property	2,697	3,035	3,234	3,735	4,150	4,000
12	Telephone & Internet	2,225	2,357	3,217	2,856	2,300	3,650
13	Repairs & Maint. Vehicles/Equip.	1,410	2,349	5,159	2,594	1,950	3,200
14	Repairs & Maint. - Infrastructure	53,856	12,062	21,492	6,257	20,000	5,000
16	Copier & Printer Costs	-	-	-	-	-	850
17	Equipment Non-capitalized	1,195	1,666	3,073	1,383	1,200	2,100
18	Computer Hardware	-	-	1,018	-	-	-
19	Supplies	4,404	2,348	2,694	1,486	2,250	2,200
20	Office Supplies	311	330	229	168	350	200
21	Uniform Supplies	385	804	683	250	650	675
22	Gasoline Oil Diesel Supplies	1,119	1,218	1,049	1,255	1,200	1,500
23	Professional Services	2,525	1,395	4,720	10,195	27,000	14,000
24	Insurance Vehicle	294	331	353	41	50	50
25	Insurance Liability	-	-	-	795	800	800
26	Travel, Training & Memberships	1,752	1,781	2,219	1,646	2,500	2,450
27	**Total Source of Supply Operations**	**217,313**	**181,391**	**202,336**	**136,902**	**203,800**	**181,575**
28							
29	Capital Outlay - Infrastructure	-	-	7,538	-	-	-
30	Capital Outlay - Buildings	8,000	-	-	-	-	25,000
31	Capital Outlay - Improvements	-	-	-	4,956	5,000	
32	**Total Source of Supply Capital**	**8,000**	**-**	**7,538**	**4,956**	**5,000**	**25,000**
33							
34	Trfr to Spec Rev - Conv WTP Upgrades		25,000	-	-	-	-
35	**Total Source of Supply Transfer**	**-**	**25,000**	**-**	**-**	**-**	**-**
36							
37	**Total Source of Supply**	**225,313**	**206,391**	**209,874**	**141,858**	**208,800**	**206,575**

#8 Moved to Professional Services

#9 Adding Infrared heat to pipe chamber - expect increase

#11 FY19 - New allocation formula for property, vehicle & liability insurance

#12 We upgraded our service last year which increased cost.

#13 Pickup tires and tractor front tires

#14 Major decrease with confidence in our equipment

#16 Added $850 to cover 1/3 new copier

#23 Pest control $1500; lawn care, audiograms, pulmonary function test, $1,900; Service agreement HACH $1,042; Professional laboratory fees $6,100; scada mods $3,458.

#24 FY19 - New allocation formula for property, vehicle & liability insurance

#25 FY19 - New allocation formula for property, vehicle & liability insurance

#26 Includes professional memberships, host training; RMAWWA, WARWS, WWQPCA

#30 Remove wall/LP tank at Twin, Install double doors

CITY OF SHERIDAN

Water Distribution

Fiscal Year 2020 Budget

Line #	ACCOUNT DESCRIPTION	ACTUAL FY16	ACTUAL FY17	ACTUAL FY18	FY19 April YTD	Budget FY2019	Budget FY2020
1	Salaries and Wages	220,329	229,129	245,667	193,453	213,500	233,800
2	Part-time/Seasonal Wages	8,092	9,259	9,359	10,560	10,700	21,600
3	Overtime	11,342	18,145	21,407	17,380	16,000	19,000
4	Payroll Taxes	17,044	18,228	19,743	15,696	16,900	19,300
5	Retirement	22,417	23,634	25,283	21,022	21,500	24,700
6	Unemployment and Worker's comp	7,110	8,643	6,837	6,127	6,200	7,000
7	Employee Insurance	60,912	55,657	59,234	48,350	55,300	70,600
8	Contractual Services	-	-	163	-	-	-
9	Outside Services	3,448	2,670	7,691	-	-	-
10	Utilities	24,268	23,483	28,315	23,004	25,000	27,000
11	Repairs & Maint. - Buildings/grounds	1,398	1,251	1,728	630	2,500	2,000
12	Insurance Property	392	442	470	2,032	2,260	2,180
13	Telephone & Internet	11,354	7,464	9,106	7,374	8,600	8,800
14	Utilities - Other than Building	666	-	-	-	-	-
15	Repairs & Maint. Vehicles/Equip.	11,030	12,315	9,086	7,151	8,000	9,000
16	Repairs & Maint. - Infrastructure	49,627	54,697	48,770	36,572	47,000	45,000
17	Copier & Printer Costs	-	483	312	399	800	600
18	Equipment Non-capitalized	7,105	3,711	9,704	5,402	6,500	5,000
19	Computer Hardware	140	1,009	536	1,690	1,600	1,920
20	Software Expense	4,258	4,943	3,301	15,178	15,700	18,200
21	Supplies	36,472	30,888	47,856	32,147	33,000	38,000
22	Office Supplies	1,437	907	765	566	900	950
23	Uniform Supplies	760	2,880	3,284	2,921	3,000	3,300
24	Gasoline Oil Diesel Supplies	14,192	14,655	17,135	15,173	16,500	18,000
25	Professional services	9,324	4,341	943	6,301	12,000	11,000
26	Insurance Vehicle	2,527	2,953	2,818	1,281	1,200	1,380
27	Insurance Liability	-	-	-	2,064	2,070	2,100
28	Insurance - Claims	-	3,141	-	-	5,000	5,000
29	Travel, Training & Memberships	6,815	5,414	5,147	5,262	7,500	7,600
30	Job Recruitment Costs	-	-	673	-	-	-
31	Publications Advertising and Printing	818	-	-	45	850	800
32	**Total Water Distribution Operations**	**533,278**	**540,345**	**585,336**	**477,780**	**540,080**	**603,830**
33							
34	Capital Outlay - Infrastructure	27,190	-	-	-	-	10,000
35	Capital Outlay - Buildings	445	-	-	38,600	38,400	12,000
38	Capital Outlay - Machinery and Equip.	13,134	-	37,138	44,370	45,000	6,000
46	**Total Water Distribution Capital**	**40,768**	**-**	**37,138**	**82,971**	**83,400**	**28,000**
47							
48	**Total Water Distribution**	**574,046**	**540,345**	**622,474**	**560,751**	**623,480**	**631,830**

#8-9 Moved to Professional Services

#11 Misc. repairs for city pump stations ($500), and Shop - $1,500 Shop gutters and irrgation repairs other 50% in Collection

#12 FY19 - New allocation formula for property, vehicle & liability insurance

#13 SCADA, Shop, Stipends, Tablets, Fiber

#15 Light and heavey equipment repairs, tires, services, etc..

#16 Repair clamps ($4k), backfill ($10k), pipe ($4k), Crushed base ($10k), Pea gravel ($10k) Misc. large fittings($7k)

#17 Split with collection department

#18 Locators, power tools, air monitors, data loggers, etc.

#19 60% Distribution - 40% Collection split -Cew PC, KF PC, IPad

#20 (1.6k) Boarder States (SCADA) split 50/50 w/collection; (14k) Mueller MiNet (software support for hardware); $2.6k software upgrade to water sales

#21 Shop supplies ($5k), meters ($10k), 6"HB Mag meter ($5k) cathodic protection ($1k), tapping, fittings, pipe,($17k),

#23 50% of staff @ $300/ea safety boots, winter gear, uniforms, gloves etc...

#25 SCADA ($5k), Mowing ($1k), Comtronix ($400), Office cleaning($3.4k), Med Cabinet ($200) Electrical/Plumbing services ($1k)

#26 FY19 - New allocation formula for property, vehicle & liability insurance

#27 FY19 - New allocation formula for property, vehicle & liability insurance

#28 Anticipated verified insurance claim payouts

#29 60% of 10 staff @ $1,100/ea: Mueller, RMAWWA, WARWS, WWQPCA; add $1k for KF to attend City Works

CITY OF SHERIDAN

Water Distribution

Fiscal Year 2020 Budget

Line #	ACCOUNT DESCRIPTION	ACTUAL FY16	ACTUAL FY17	ACTUAL FY18	FY19 April YTD	Budget FY2019	Budget FY2020
#30	Job Recruitment Costs moved to HR						
#31	Protecting service lines from freezing mailer (didn't send out in FY19)						
#34	Purchase of 3 new fire hydrants						
#35	Security fencing for UM service center (12k) 60/40 with sewer colletion						
#38	Replace 1996 4 wheeler (6k) 60/40 with collection department						

CITY OF SHERIDAN

SAWS

Fiscal Year 2020 Budget

Line #	ACCOUNT DESCRIPTION	ACTUAL FY16	ACTUAL FY17	ACTUAL FY18	FY19 April YTD	Budget FY2019	Budget FY2020
1	Salaries and Wages	100,014	109,743	102,198	87,803	105,700	95,800
2	Part-time/Seasonal Wages	207	7,941	8,656	3,730	10,700	-
3	Overtime	2,901	4,641	4,511	5,261	4,500	4,600
4	Payroll Taxes	7,286	8,840	8,300	6,909	9,000	7,400
5	Retirement	9,707	11,114	10,195	9,235	10,900	10,200
6	Unemployment and Worker's comp	1,819	4,220	2,803	2,674	3,300	2,700
7	Employee Insurance	27,213	27,316	24,689	19,594	27,400	26,700
8	Contractual Services	15,180	-	-	-	-	-
9	Outside Services	5,851	2,698	6,988	-	-	-
10	Utilities	24,847	27,214	23,818	21,097	21,000	25,000
11	Repairs & Maint. - Buildings/grounds	2,005	1,987	1,639	-	7,300	5,000
12	Insurance Property	8,645	9,728	10,366	3,778	2,540	4,050
13	Telephone & Internet	1,568	2,849	605	860	1,750	1,500
14	Repairs & Maint. Vehicles/Equip.		-	642	-	800	-
15	Repairs & Maint. - Infrastructure	19,152	18,077	11,561	8,990	21,500	16,500
17	Equipment Non-capitalized	-	-	1,500	-	-	-
19	Supplies	19,955	8,109	8,918	6,197	11,500	11,000
20	Chemical and Material Supplies	1,246	742	933	435	1,100	975
21	Professional Services	1,474	2,684	113	1,879	9,200	6,200
22	Insurance Liability	-	-	-	1,088	1,090	1,100
23	Insurance - Claims	-	3,141	-	-	-	-
25	**Total SAWS Operations**	**249,069**	**251,046**	**228,435**	**179,532**	**249,280**	**218,725**
26							
27	Capital Outlay - Infrastructure	21,194	-	-	-	-	-
28	Capital Outlay - Buildings	445	-	-	-	10,000	10,000
29	**Total SAWS Capital**	**21,639**	**-**	**-**	**-**	**10,000**	**10,000**
30							
31	**Total SAWS**	**270,708**	**251,046**	**228,435**	**179,532**	**259,280**	**228,725**

#1-2 Administrative adjustment of wages to Water Distribution Dept
#8-9 Moved to Professional Services
#10 This year adding MDU power to 6 PRV stations and the SAWS MiNet repeater on West 5th St.
#11 Heater and electrical repairs for 30 pump/PRV stations($3k), Fence repair at S.E. ($2k)
#12 FY19 - New allocation formula for property, vehicle & liability insurance
#13 SCADA line costs
#15 Pipe Fittings ($7k); repair clamps ($2k),; Pump station repairs and Back Fill material ($7.5k)
#19 Meters(5k), cathodic protection(1k), tapping fittings(2k), pipe (3k) , etc..
#20 CL2 tablets, CL17
#21 SCADA repairs ($2k), mowing ($3k), plumbing, electrical, generator service ($1K), locates ($200)
#22 FY19 - New allocation formula for property, vehicle & liability insurance
#28 Roof repairs at SE pump station

CITY OF SHERIDAN

SWTP

Fiscal Year 2020 Budget

Line #	ACCOUNT DESCRIPTION	ACTUAL FY16	ACTUAL FY17	ACTUAL FY18	FY19 April YTD	Budget FY2019	Budget FY2020
1	Salaries and Wages	210,292	185,191	200,015	163,273	192,300	197,500
2	Part-time/Seasonal Wages	18,192	7,833	9,160	5,700	8,000	8,200
3	Overtime	6,262	7,268	8,340	3,425	6,300	6,400
4	Payroll Taxes	16,652	14,819	15,580	13,047	15,400	15,800
5	Retirement	21,855	19,614	20,359	17,898	20,100	21,600
6	Unemployment and Worker's comp	4,311	7,099	5,412	5,073	5,600	5,700
7	Employee Insurance	58,158	50,659	51,988	40,356	51,400	47,700
10	Outside Services	21,029	20,117	23,669	-	-	-
11	Utilities	57,187	53,826	58,990	43,904	55,000	54,000
12	Repairs & Maint. - Buildings/grounds	5,893	19,190	10,828	8,641	12,000	12,000
13	Insurance Property	8,112	9,128	9,726	11,131	12,370	11,920
14	Telephone & Internet	11,900	10,976	11,141	7,862	12,000	9,800
16	Repairs & Maint. Vehicles/Equip.	4,636	5,903	7,399	2,428	6,000	5,500
17	Repairs & Maint. - Infrastructure	45,213	26,076	34,147	14,146	28,000	18,000
19	Copier & Printer Costs	20	-	-	-	900	850
20	Equipment Non-capitalized	5,848	18,873	6,418	3,277	7,500	6,150
21	Computer Hardware	599	-	1,375	2,498	2,700	-
22	Software Expense	2,043	1,907	2,176	495	1,600	2,400
23	Supplies	11,268	10,415	12,737	5,964	12,000	8,000
24	Office Supplies	1,802	2,501	2,123	846	2,500	1,500
25	Uniform Supplies	1,213	1,705	973	698	1,250	1,275
26	Gasoline Oil Diesel Supplies	3,675	3,803	4,094	4,518	3,700	5,400
27	Chemical and Material Supplies	161,397	118,265	97,375	82,159	125,000	105,000
28	Professional services	14,388	9,391	6,539	22,337	34,000	28,000
29	Insurance Vehicle	519	589	612	243	320	270
30	Insurance Liability	5,788	6,959	6,076	1,871	1,880	1,880
31	Travel, Training & Memberships	3,338	1,936	2,862	5,828	4,200	5,600
32	Job Recruitment Costs	-	159	478	-	-	-
33	Publications Advertising and Printing	1,871	2,846	3,530	26	1,800	2,900
35	**Total Sheridan WTP Operations**	**703,461**	**617,048**	**614,121**	**467,644**	**623,820**	**583,345**
36							
37	Capital Outlay - Infrastructure	23,900	-	-	-	-	36,000
38	Capital Outlay - Buildings	14,003	-	-	-	-	24,000
40	Capital Outlay - Machinery and Equip.	8,456	-	29,121	29,287	30,000	32,000
41	**Total Sheridan WTP Capital**	**46,359**	**-**	**29,121**	**29,287**	**30,000**	**92,000**
42							
43	Trfr to Spec Rev - Sodium Hydrochlorite Tank	-	-	-	71,250	95,000	-
44	**Total Sheridan WTP Transfer**	**-**	**-**	**-**	**71,250**	**95,000**	**-**
45							
46	**Total Sheridan WTP**	**749,820**	**617,048**	**643,242**	**568,181**	**748,820**	**675,345**

#10 Moved to Professional Services

#13 FY19 - New allocation formula for property, vehicle & liability insurance

#17 Deferred maintenance items addressed in previous fiscal years

#21 No replacements according to FY20 Computer Replacement Plan

#26 Increase due to current and projected future fuel pricing

#27 Budget reduced by $13,000 for fluoride removal

#28 Equipment service agreements $7500; Professional laboratory services $7400; Scada repairs/mods, Annual audiograms, Pulmonary function tests and Lawn care $13,100

#29 FY19 - New allocation formula for property, vehicle & liability insurance

#30 FY19 - New allocation formula for property, vehicle & liability insurance

#31 4 employees @ $1,400/ea: Includes professional memberships, host training; RMAWWA, WARWS, WWQPCA;

#32 Job Recruitment Costs moved to HR

#33 Expenses primarily in June for EPA Consumer Confidence Report

#37 MicroClor Cell Replacement, 5 yr interval

#38 Expand Perimeter Securty fencing $24k

#40 Replace 2-78 with 1/2 ton 4x4, crew cab

CITY OF SHERIDAN

BGWTP

Fiscal Year 2020 Budget

Line #	ACCOUNT DESCRIPTION	ACTUAL FY16	ACTUAL FY17	ACTUAL FY18	FY19 April YTD	Budget FY2019	Budget FY2020
1	Salaries and Wages	137,620	169,134	160,897	143,730	169,500	179,000
2	Part-time/Seasonal Wages	-	5,935	8,336	3,617	8,000	8,200
3	Overtime	6,623	4,533	3,659	2,951	5,500	5,600
4	Payroll Taxes	10,864	12,377	12,342	10,656	13,600	14,400
5	Retirement	14,236	16,454	16,109	14,808	17,800	19,600
6	Unemployment and Worker's comp	10,605	5,932	4,287	4,182	5,000	5,200
7	Employee Insurance	27,827	40,472	42,782	38,969	48,500	50,000
11	Outside Services	33,294	10,052	4,683	-	-	-
12	Utilities	34,082	37,786	38,719	28,739	36,000	36,000
13	Repairs & Maint. - Buildings/grounds	6,819	8,430	9,355	4,478	9,500	4,500
14	Insurance Property	4,983	5,607	5,975	9,706	10,790	10,400
15	Telephone & Internet	6,483	6,153	6,881	6,767	5,850	8,200
16	Repairs & Maint. Vehicles/Equip.	5,022	7,497	3,238	3,261	7,000	4,800
17	Repairs & Maint. - Infrastructure	26,350	15,754	47,378	20,613	18,500	19,500
19	Copier & Printer Costs	-	-	-	-	-	850
20	Equipment Non-capitalized	8,823	14,017	9,226	7,596	9,000	9,500
21	Computer Hardware	62	-	-	820	900	-
22	Software Expense	2,043	1,907	2,176	495	1,700	2,400
23	Supplies	7,100	6,992	9,391	4,409	7,000	6,500
24	Office Supplies	558	316	261	447	600	500
25	Uniform Supplies	1,902	1,184	1,616	1,142	1,600	1,650
26	Gasoline Oil Diesel Supplies	2,520	2,485	1,931	2,047	2,500	2,650
27	Chemical and Material Supplies	32,403	44,562	62,638	37,477	80,000	49,500
28	Professional Services	12,985	13,241	9,563	18,660	24,500	24,000
29	Insurance Vehicle			-	178	160	200
30	Insurance Liability	5,788	6,959	6,076	1,658	1,660	1,660
31	Travel, Training & Memberships	1,700	3,489	4,552	5,677	4,200	6,074
32	Job Recruitment Costs	-	397	639	-	-	-
33	Publications Advertising and Printing	1,905	-	-	-	1,500	700
34	**Total Big Goose WTP Operations**	**402,596**	**441,664**	**472,709**	**373,084**	**490,860**	**471,584**
35							
36	Capital Outlay - Infrastructure	-	-	28,893	-	-	-
37	Capital Outlay - Buildings	-	11,072	-	-	-	30,000
38	Capital Outlay - Machinery and Equip.	28,875	-	-	-	-	8,500
40	**Total Big Goose WTP Capital**	**28,875**	**11,072**	**28,893**	**-**	**-**	**38,500**
41							
42	Trfr to Spec Rev - BGWTP Upgrades	60,000	-	-	42,000	56,000	-
43	Trfr to Spec Rev - Conv WTP Upgrades		53,633	-	-	-	-
44	**Total Big Goose WTP Transfer**	**60,000**	**53,633**	**-**	**42,000**	**56,000**	**-**
45							
46	**Total Big Goose WTP**	**491,471**	**506,369**	**501,602**	**415,084**	**546,860**	**510,084**

#11 Moved to Professional Services

#14 FY19 - New allocation formula for property, vehicle & liability insurance

#15 New internet provider, primarily fixed monthly costs.

#17 Unexpected major repairs in FY18

#19 Includes $850 to cover 1/3 new copier

#27 Budget reduced by $5,500 for fluoride removal

#28 Professional laboratory services for UCMR4. DBP Precursors; pest control, garbage collection, HACH annual service agreement, Annual audiograms, Pulmonary function tests, SCADA repairs, Lawncare services. etc

#29 FY19 - New allocation formula for property, vehicle & liability insurance

#30 FY19 - New allocation formula for property, vehicle & liability insurance

#31 Includes professional memberships, host training; new apprenticeships RMAWWA, WARWS, WWQPCA

#32 Job Recruitment Costs moved to HR

#33 Expenses primarily in June for EPA Consumer Confidence Report

#37 Paint upper room walls

#38 FY20 - New lab meter

FY 7/1/19-6/30/20

SAWS

Proposed Budget

Sheridan Area Water Supply Joint Powers Board

224 S. Main St., Suite 428		Budget Hearing Information
Sheridan, Wyoming 82801	**Location:**	224 S. Main St., Room 220
(307)675-2930	**Date:**	7/10/2019
	Time:	12:00 PM
Sheridan County	**Budget Prepared by:**	Dan Coughlin

S-A **BUDGET MESSAGE** W.S. 16-4-104(d)

In fiscal year ending June 30, 2019 the following projects were completed:

1. Conventional Treatment upgrades to the Big Goose Water Treatment Plant and Sheridan Water Treatment Plant.
2. Upgrades of the booster pumps with the addition of electrical, electronic remote monitoring and metering.
3. Upgrades of control valves regulating pressures in the water system
4. Replacement of old customer metering system with electronic remote reading system that eliminates vehicle drive-by reading, improves operations and engineering data and provides more rapid detection of service account leaks.
5. Assessment of the wildfire hazard to the Big Horn Mountain reservoirs from which the Sheridan/SAWSJPB system receives its water.

The loans for these projects ranged from 0% to 2.5% annual interest rate and some of the loans received forgiveness of 50% of the principle balance. In fiscal year ending June 30, 2020 payments on these loans will begin and continue for 20 years.

In fiscal year ending June 30, SAWS-JPB anticipates completion of a relocation of a large portion of its Coffeen water transmission main to accommodate the widening of Coffeen by the Wyoming Department of Transportation. WYDOT will reimburse the expense for replacing the existing waterline. There may be a new distribution main installed at SAWS-JPB cost to shorten service lines and remove the risk of long service lines under the new highway.

Engineering, design and construction of another transmission main may also be undertaken. This is a City of Sheridan Main which also transports water to SAWS-JPB's Little Goose/Powder Horn/Big Horn areas. Funding may be available from the Wyoming Water Development Commission and other sources through the State Lands and Investment Board.

Engineering and some level of stream stabilization may be undertaken to protect water system infrastructure.

SAWS-JPB will continue to purchase availble shares in Park Reservoir Company as it has in the past with Wyoming Water Development Commission grant assistance for 67% of the cost.

SAWS-JPB will receive a payment from the City of Sheridan for 16 connections which were transfered to the City in the Sheridan Commercial Park Annexation per Amendment #1 to the Ownership Agreement.

As in previous years the rates for customer service will increase by 2.25%, consistent with the financial plan for the water system. The will increase the cost for use of 10,000 gallons/month by $1.60.

S-B **RESERVE DESCRIPTION**

Reserves have been established for the debt service requirements for the 20 inch water line and the projects mentioned above.Also the Capital Improvement Depreciation reserves will be increased a minimum of $100,000.

S-C

Names of Board Members	Date of End of Term
Tom Ringley	1/1/21
Roger Miller	1/1/20
Jacob Martin	1/1/21
Nick Siddle	1/1/22
Christi Haswell	1/1/20
Aaron Linden	1/1/22

Does the district have regular office hours exceeding 20 hours per week? Yes

If Yes, enter

Address of office:	224 S. Main St., Suite 428
City, State, Zip:	Sheridan, Wyoming 82801
Phone Number:	(307)675-2930
Hours Open:	8:00AM - 5:00PM

Where are the minutes of your board meeting available for public review?

On the Sheridan County's Website- www.sheridancounty.com/joint-powers-boards/saws/

How and where are the notices of meeting posted for the public?

The 2019 Meeting Schedule was posted in the Sheridan Press in the public notice section and is posted at the above website.

Where are the public meetings held?

They are held at the Sheridan County Court House in the Commissioners Board Room 220.

PROPOSED BUDGET SUMMARY

	OVERVIEW	2017-2018 Actual	2018-2019 Estimated	2019-2020 Proposed	Pending Approval
S-1	**Total Budgeted Expenditures**	$1,712,974	$2,297,229	$3,730,165	[illegible]
S-2	**Total Principal to Pay on Debt**	$252,821	$259,054	$374,808	[illegible]
S-3	**Total Change to Restricted Funds**	$100,000	$100,000	$100,000	[illegible]
S-4	**Total General Fund and Forecasted Revenues Available**	$3,264,871	$3,258,434	$5,262,438	[illegible]
S-5	*Amount requested from County Commissioners*	$0	$0	$0	$0
S-6	**Additional Funding Needed :**			$0	$0

	REVENUE SUMMARY	2017-2018 Actual	2018-2019 Estimated	2019-2020 Proposed	Pending Approval
S-7	**Operating Revenues**	$1,460,571	$1,574,861	$1,613,384	[illegible]
S-8	**Tax levy (From the County Treasurer)**	$0	$0	$0	$0
S-9	**Government Support**	$0	$0	$0	$0
S-10	**Grants**	$0	$0	$0	$0
S-11	**Other County Support (Not from Co. Treas.)**	$0	$0	$0	$0
S-12	**Miscellaneous**	$207,496	$196,043	$2,381,600	[illegible]
S-13	**Other Forecasted Revenue**	$260,515	$151,240	$162,000	[illegible]
S-14	**Total Revenue**	$1,928,581	$1,922,144	$4,156,984	[illegible]

FY 7/1/19-6/30/20 — Sheridan Area Water Supply Joint Powers Board

	EXPENDITURE SUMMARY	2017-2018 Actual	2018-2019 Estimated	2019-2020 Proposed	Pending Approval
S-15	**Capital Outlay**	$206,456	$901,724	$1,878,167	[illegible]
S-16	**Interest and Fees On Debt**	$85,834	$285,255	$107,043	[illegible]
S-17	**Administration**	$809,666	$540,481	$1,117,197	[illegible]
S-18	**Operations**	$607,649	$567,111	$624,758	[illegible]
S-19	**Indirect Costs**	$3,369	$2,659	$3,000	[illegible]
S-20R	**Expenditures paid by Reserves**	$0	$0	$0	$0
S-20	**Total Expenditures**	$1,712,974	$2,297,229	$3,730,165	[illegible]

	DEBT SUMMARY	2017-2018 Actual	2018-2019 Estimated	2019-2020 Proposed	Pending Approval
S-21	**Principal Paid on Debt**	$252,821	$259,054	$374,808	[illegible]

	CASH AND INVESTMENTS	2017-2018 Actual	2018-2019 Estimated	2019-2020 Proposed	Pending Approval
S-22	**TOTAL GENERAL FUNDS**	$1,336,289	$1,336,289	$1,105,454	[illegible]
	Summary of Reserve Funds				
S-23	**Beginning Balance in Reserve Accounts**				
S-24	a. Depreciation Reserve	$1,566,922	$1,566,922	$1,566,922	[illegible]
S-25	b. Other Reserve	$5,969,257	$6,069,257	$6,169,257	[illegible]
S-26	c. Emergency Reserve (Cash)	$0	$0	$0	$0
	Total Reserves (a+b+c)	$7,536,179	$7,636,179	$7,736,179	[illegible]
S-27	**Amount to be added**				
S-28	a. Depreciation Reserve	$0	$0	$0	$0
S-29	b. Other Reserve	$100,000	$100,000	$100,000	[illegible]
S-30	c. Emergency Reserve (Cash)	$0	$0	$0	$0
	Total to be added (a+b+c)	$100,000	$100,000	$100,000	[illegible]
S-31	**Subtotal**	$7,636,179	$7,736,179	$7,836,179	[illegible]
S-32	**Less Total to be spent**	$0	$0	$0	$0
S-33	**TOTAL RESERVES AT END OF FISCAL YEAR**	$7,636,179	$7,736,179	$7,836,179	[illegible]

End of Summary

Date adopted by Special District ____________

Budget Officer / District Official (if not same as "Submitted by")

DISTRICT ADDRESS: 224 S. Main St., Suite 428
Sheridan, Wyoming 82801

PREPARED BY: Dan Coughlin

DISTRICT PHONE: (307)675-2930

Prepared in compliance with the Uniform Municipal Fiscal Procedures Act (W.S. 16-4-101 through 124) as it applies.

Proposed Budget

Sheridan Area Water Supply Joint Powers Board
NAME OF DISTRICT/BOARD

FYE 6/30/2020

PROPERTY TAXES AND ASSESSMENTS

		2017-2018 Actual	2018-2019 Estimated	2019-2020 Proposed	Pending Approval
R-1	**Property Taxes and Assessments Received**				
R-1.1	**Tax Levy (From the County Treasurer)**	$0	$0	$0	
R-1.2	Other County Support	$0	$0	$0	

FORECASTED REVENUE

		2017-2018 Actual	2018-2019 Estimated	2019-2020 Proposed	Pending Approval
R-2	**Revenues from Other Governments**				
R-2.1	State Aid	NA	NA	NA	NA
R-2.2	Additional County Aid (non-treasurer)	NA	NA	NA	NA
R-2.3	City (or Town) Aid	NA	NA	NA	NA
R-2.4	Other (Specify)	NA	NA	NA	NA
R-2.5	**Total Government Support**	$0	$0	$0	$0
R-3	**Operating Revenues**				
R-3.1	Customer Charges	$1,432,602	$1,553,432	$1,588,384	$1,588,384
R-3.2	Sales of Goods or Services	$26,028	$19,829	$23,000	$23,000
R-3.3	Other Assessments	$1,941	$1,600	$2,000	$2,000
R-3.4	**Total Operating Revenues**	$1,460,571	$1,574,861	$1,613,384	$1,613,384
R-4	**Grants**				
R-4.1	Direct Federal Grants				
R-4.2	Federal Grants thru State Agencies				
R-4.3	Grants from State Agencies				
R-4.4	**Total Grants**	$0	$0	$0	$0
R-5	**Miscellaneous Revenue**				
R-5.1	Interest	$107,221	$115,000	$125,000	$125,000
R-5.2	Other: Specify 220-453 SSWS/WWDC	$99,176	$81,043	$336,000	$336,000
R-5.3	Other: See Additional	$1,099		$1,920,600	$1,920,600
R-5.4	**Total Miscellaneous**	$207,496	$196,043	$2,381,600	$2,381,600
R-5.5	**Total Forecasted Revenue**	$1,668,066	$1,770,904	$3,994,984	$3,994,984

R-6	**Other Forecasted Revenue**				
R-6.1	a. Other past due-as estimated by Co. Treas.				
R-6.2	b. Other forecasted revenue (specify):				
R-6.3	120-432 Plant Investment Fees	$259,920	$150,640	$161,400	$161,400
R-6.4	220-452 SLWA	$595	$600	$600	$600
R-6.5					
R-6.6	**Total Other Forecasted Revenue (a+b)**	$260,515	$151,240	$162,000	$162,000

Proposed Budget

Sheridan Area Water Supply Joint Powers Board
NAME OF DISTRICT/BOARD

FYE 6/30/2020

CAPITAL OUTLAY BUDGET

			2017-2018 Actual	2018-2019 Estimated	2019-2020 Proposed	Pending Approval
E-1	**Capital Outlay**					
E-1.1		Real Property				
E-1.2		Vehicles				
E-1.3		Office Equipment				
E-1.4		Other (Specify)				
E-1.5		Share of City Cap. Out.	$46,341	$0	$34,478	$34,478
E-1.6		Booster Control Valves	$156,787	$873,413	$0	
E-1.7		see additional details	$3,328	$28,311	$1,843,689	$1,843,689
E-1.8	**TOTAL CAPITAL OUTLAY**		$206,456	$901,724	$1,878,167	$1,878,167

ADMINISTRATION BUDGET

			2017-2018 Actual	2018-2019 Estimated	2019-2020 Proposed	Pending Approval
E-2	**Personnel Services**					
E-2.1		Administrator				
E-2.2		Secretary				
E-2.3		Clerical				
E-2.4		Other (Specify)				
E-2.5		220-704 County Admin.	$129,406	$159,848	$159,848	$159,848
E-2.6						
E-2.7						
E-3	**Board Expenses**					
E-3.1		Travel				
E-3.2		Mileage				
E-3.3		Other (Specify)				
E-3.4						
E-3.5						
E-3.6						
E-4	**Contractual Services**					
E-4.1		Legal	$5,206	$7,316	$10,000	$10,000
E-4.2		Accounting/Auditing	$20,948	$34,835	$35,000	$35,000
E-4.3		Other (Specify)				
E-4.4		220-733 Prof. Serv.	$37,060	$14,932	$40,000	$40,000
E-4.5		220-742,743 CTY Admin	$164,747	$320,888	$363,549	$363,549
E-4.6						
E-5	**Other Administrative Expenses**					
E-5.1		Office Supplies	$9	$299	$500	$500
E-5.2		Office equipment, rent & repair	$0	$0	$0	
E-5.3		Education	$621	$112	$500	$500
E-5.4		Registrations				
E-5.5		Other (Specify)				
E-5.6		220-718 Postage	$10	$50	$100	$100
E-5.7		220-720 Advertising	$1,553	$700	$2,000	$2,000
E-5.8		see additional details	$450,106	$1,500	$505,700	$505,700
E-6	**TOTAL ADMINISTRATION**		$809,666	$540,481	$1,117,197	$1,117,197

Proposed Budget

Sheridan Area Water Supply Joint Powers Board

FYE 6/30/2020

OPERATIONS BUDGET

			2017-2018 Actual	2018-2019 Estimated	2019-2020 Proposed	Pending Approval
E-7	**Personnel Services**					
E-7.1		Wages--Operations				
E-7.2		Service Contracts				
E-7.3		Other (Specify)				
E-7.4						
E-7.5						
E-7.6						
E-8	**Travel**					
E-8.1		Mileage				
E-8.2		Other (Specify)				
E-8.3						
E-8.4						
E-8.5						
E-9	**Operating supplies (List)**					
E-9.1						
E-9.2						
E-9.3						
E-9.4						
E-9.5						
E-10	**Program Services (List)**					
E-10.1		220-721 Watershed Cont	$1,000	$440	$1,000	$1,000
E-10.2						
E-10.3						
E-10.4						
E-10.5						
E-11	**Contractual Arrangements (List)**					
E-11.1		220-744,1,5,6 City per Op	$585,811	$560,334	$597,158	$597,158
E-11.2		220-739 Prop. Tax - Park	$1,660	$1,719	$1,800	$1,800
E-11.3		220-735 Repairs & Mainte	$15,183	$0	$20,000	$20,000
E-11.4		220-747 Res. Asmts	$1,708	$2,331	$2,500	$2,500
E-11.5						
E-12	**Other operations (Specify)**					
E-12.1		220-734 Booster Lease	$2,287	$2,287	$2,300	$2,300
E-12.2						
E-12.3						
E-12.4						
E-12.5						
E-13	**TOTAL OPERATIONS**		$607,649	$567,111	$624,758	$624,758

Proposed Budget

Sheridan Area Water Supply Joint Powers Board

FYE 6/30/2020

INDIRECT COSTS BUDGET

			2017-2018 Actual	2018-2019 Estimated	2019-2020 Proposed	Pending Approval
E-14	**Insurance**					
E-14.1		Liability				
E-14.2		Buildings and vehicles				
E-14.3		Equipment				
E-14.4		Other (Specify)				
E-14.5		Insurance 220-738 Insur	$3,369	$2,659	$3,000	$3,000
E-14.6						
E-14.7						
E-15	**Indirect payroll costs:**					
E-15.1		FICA (Social Security) taxes				
E-15.2		Workers Compensation				
E-15.3		Unemployment Taxes				
E-15.4		Retirement				
E-15.5		Health Insurance				
E-15.6		Other (Specify)				
E-15.7						
E-15.8						
E-15.9						
E-17	**TOTAL INDIRECT COSTS**		$3,369	$2,659	$3,000	$3,000

DEBT SERVICE BUDGET

			2017-2018 Actual	2018-2019 Estimated	2019-2020 Proposed	Pending Approval
D-1	**Debt Service**					
D-1.1		Principal	$252,821	$259,054	$374,808	$374,808
D-1.2		Interest	$85,834	$285,255	$107,043	$107,043
D-1.3		Fees				
D-2	**TOTAL DEBT SERVICE**		$338,655	$544,309	$481,851	$481,851

Proposed Budget

Sheridan Area Water Supply Joint Powers Board **FYE** 6/30/2020

NAME OF DISTRICT/BOARD

GENERAL FUNDS

		End of Year 2017-2018 Actual	Beginning 2018-2019 Estimated	Beginning 2019-2020 Proposed	Pending Approval
C-1	**Balances at Beginning of Fiscal Year**				
C-1.1	General Fund Checking Account Balance	$882,901	$882,901	$645,244	$645,244
C-1.2	Savings and Investments Account Balance	$453,389	$453,389	$460,210	$460,210
C-1.3	General Fund CD Balance		$0		
C-1.4	All Other Funds		$0		
C-1.5	Reserves (From Below)	$7,636,179	$7,636,179	$7,836,179	$7,836,179
C-1.6	**Total Estimated Cash and Investments on Hand**	$8,972,468	$8,972,468	$8,941,633	$8,941,633

		2017-2018 Actual	2018-2019 Estimated	2019-2020 Proposed	Pending Approval
C-2	**General Fund Reductions:**				
C-2.1	a. Unpaid bills at FYE				
C-2.2	b. Reserves	$7,636,179	$7,736,179	$7,836,179	$7,836,179
C-2.3	**Total Deductions (a+b)**	$7,636,179	$7,736,179	$7,836,179	$7,836,179
C-2.4	**Estimated Non-Restricted Funds Available**	$1,336,289	$1,236,289	$1,105,454	$1,105,454

SINKING & DEBT SERVICE FUNDS

		2017-2018 Actual	2018-2019 Estimated	2019-2020 Proposed	Pending Approval
C-3					
C-3.1	Beginning Balance in Reserve Account (**end of previous year**)	$1,566,922	$1,566,922	$1,566,922	$1,566,922
C-3.2	*Date of Reserve Approval in Minutes:* *Various*				
C-3.3	Amount to be added to the reserve				
C-3.4	*Date of Reserve Approval in Minutes:* *Various*				
C-3.5	SUB-TOTAL	$1,566,922	$1,566,922	$1,566,922	$1,566,922
C-3.6	Identify the amount and project to be spent				
C-3.7	a.				
C-3.8	b.				
C-3.9	c.				
C-3.10	*Date of Reserve Approval in Minutes:*				
C-3.11	TOTAL CAPITAL OUTLAY (a+b+c)	$0	$0	$0	$0
C-3.12	Balance to be retained	$1,566,922	$1,566,922	$1,566,922	$1,566,922

RESERVES

		2017-2018 Actual	2018-2019 Estimated	2019-2020 Proposed	Pending Approval
C-4					
C-4.1	Beginning Balance in Reserve Account (end of previous year)	$5,969,257	$6,069,257	$6,169,257	$6,169,257
C-4.2	*Date of Reserve Approval in Minutes:* *various*				
C-4.3	Amount to be added to the reserve	$100,000	$100,000	$100,000	$100,000
C-4.4	*Date of Reserve Approval in Minutes:* *Various*				
C-4.5	SUB-TOTAL	$6,069,257	$6,169,257	$6,269,257	$6,269,257
C-4.6	Identify the amount and project to be spent				
C-4.7	a.				
C-4.8	b.				
C-4.9	c.				
C-4.10	*Date of Reserve Approval in Minutes:*				
C-4.11	TOTAL OTHER RESERVE OUTLAY (a+b+c)	$0	$0	$0	$0
C-4.12	Balance to be retained	$6,069,257	$6,169,257	$6,269,257	$6,269,257

BOND FUNDS

		2017-2018 Actual	2018-2019 Estimated	2019-2020 Proposed	Pending Approval
C-5					
C-5.1	Beginning Balance in Reserve Account (end of previous year)		$0	$0	
C-5.2	*Date of Reserve Approval in Minutes:*				
C-5.3	Amount to be added to the reserve				
C-5.4	*Date of Reserve Approval in Minutes:*				
C-5.5	SUB-TOTAL	$0	$0	$0	$0
C-5.6	Identify the amount and project to be spent				
C-5.7	*Date of Reserve Approval in Minutes:*				
C-5.8	Balance to be retained	$0	$0	$0	$0
C-5.9	TOTAL TO BE SPENT	$0	$0	$0	$0

Proposed Budget

Sheridan Area Water Supply Joint Powers Board
NAME OF DISTRICT/BOARD

FYE 6/30/2020

ADDITIONAL DETAILS

Add to Section	Description	2017-2018 Actual	2018-2019 Estimated	2019-2020 Proposed	Pending Approval
		DATA INPUT			
R-5.3 Miscellaneous	120-433 City Reimburse 20" Cost Share	$1,099	$0	$600	$600
R-5.3 Miscellaneous	220-425 WYDOT Reimbursement Coffee	$0	$0	$1,870,000	$1,870,000
R-5.3 Miscellaneous	Sheridan Commercial Park Annexation.	$0	$0	$50,000	$50,000
E-1.7 Capital Outlay	125-609 20"Big Goose Waterline	$3,328	$0	$2,000	$2,000
E-1.7 Capital Outlay	125-628 Coffeen Waterline Relocate/WY	$0	$28,311	$1,841,689	$1,841,689
E-5.8 Other	200-127 Park Reservoir Water Purchase	$448,560	$0	$504,000	$504,000
E-5.8 Other	220-731 Dues & Memberships	$925	$1,000	$1,000	$1,000
E-5.8 Other	220-737 Travel and Training	$621	$500	$700	$700

SAWS-JPB
Profit & Loss
July 1, 2018 through June 14, 2019

	Jul 1, '18 - Jun 14, 19
Ordinary Income/Expense	
Income	
CAPITAL REVENUES	
120-432 · Plant Investment Fees	161,400.00
120-450 · Capital Interest Income	104,551.59
Total CAPITAL REVENUES	265,951.59
NON-OPERATING REVENUES	
Interest Income From City	
220-415 · 20" Pipeline Loan	16,488.12
220-416 · PMTF Loan	9,514.52
Total Interest Income From City	26,002.64
220-450 · Investment Income	26,726.06
220-452 · SLWA Royalty	509.87
220-453 · Sheridan Supp Water Supply-WWDC	81,043.20
Total NON-OPERATING REVENUES	134,281.77
OPERATING REVENUES	
120-434 · Tap/Meter Install/Radio Read	14,760.00
220-418 · User Fees	1,372,088.69
220-430 · Operating Interest Income	25,646.57
220-434 · Corp Stop Installation	2,592.00
220-439 · Powder Horn Reimburse Pump Stat	1,611.21
Total OPERATING REVENUES	1,416,698.47
Total Income	1,816,931.83
Gross Profit	1,816,931.83
Expense	
CAPITAL OUTLAYS	
WATER SYSTEM CAPITAL OUTLAYS	
125-622 · Booster Station-Project 3	125,695.89
125-627 · Control Valve Project	747,716.79
125-628 · Coffeen Waterline Relocation	28,311.25
Total WATER SYSTEM CAPITAL OUTLAYS	901,723.93
Total CAPITAL OUTLAYS	901,723.93
NON-OPERATING EXPENSES	
20" BIG GOOSE SRF LOAN PAYMENT	
200-224 · SRF 20" B.G. Loan Principal	256,725.27
220-436 · SRF 20" B.G. Interest Expense	193,623.45
Total 20" BIG GOOSE SRF LOAN PAYMENT	450,348.72
DWSRF#125 Ugrades Loan Payment	
200-227 · DWSRF#125 Principal	22,148.73
220-437 · DWSRF#125 Interest	116,592.82
Total DWSRF#125 Ugrades Loan Payment	138,741.55
DWSRF#126 Boosters Loan Payment	
220-442 · DWSRF#126 Loan Interest	86,496.77
Total DWSRF#126 Boosters Loan Payment	86,496.77
DWSRF#209 Control ValveLoan Pmt	
220-441 · DWSRF#209 Loan Interest	5,291.64
Total DWSRF#209 Control ValveLoan Pmt	5,291.64
Total NON-OPERATING EXPENSES	680,878.68

SAWS-JPB
Profit & Loss
July 1, 2018 through June 14, 2019

			Jul 1, '18 - Jun 14, 19
OPERATING EXPENSES			
CITY ADMINISTRATION EXPENSES			
220-741 · City - Big Goose WTP	90,071.14		
220-742 · City - Admin and Engineering	173,305.94		
220-743 · City - Billing and Collection	84,558.00		
220-744 · City - Supply and Purification	137,423.20		
220-745 · City - Transmission	94,779.74		
220-746 · City - Dist and Meter Reading	239,672.10		
Total CITY ADMINISTRATION EXPENSES		819,810.12	
PERSONNEL SERVICES			
220-704 · Admin	146,528.25		
Total PERSONNEL SERVICES		146,528.25	
SERVICES & OTHER CHARGES			
220-717 · Office Supplies	299.15		
220-718 · Postage	109.70		
220-720 · Advertising	676.40		
220-721 · Watershed Management Program	439.95		
220-730 · Financial Services	34,835.00		
220-731 · Dues and Membership Fees	480.00		
220-732 · Legal Fees	7,316.31		
220-733 · Professional Services-Misc.	14,932.25		
220-734 · Airport Booster Lease	2,287.00		
220-737 · Travel and Training	111.79		
220-738 · Insurance and Bonds	2,659.00		
220-739 · Property Taxes	1,718.69		
220-747 · Reservoir Assessments	2,330.86		
Total SERVICES & OTHER CHARGES		68,196.10	
Total OPERATING EXPENSES			1,034,534.47
Total Expense			2,617,137.08
Net Ordinary Income			-800,205.25
Other Income/Expense			
Other Expense			
220-725 · Depreciation and Amoritization			527,087.00
220-762 · Robason Claim			17,000.00
Total Other Expense			544,087.00
Net Other Income			-544,087.00
Net Income			**-1,344,292.25**

Status of Accounts

April 2019 - Treasurer's Report

Operating Checking Account-- First Federal Savings Bank-(102-OP)

Monthly User Fees, Meter Read/Radio Install, Corp Stop, Annual City Loan Payments

Beginning Balance as of 04/01/2019	**$**	**883,905.72**
Cleared Transactions		(156,481.81)
Revenue		132,142.54
Interest		1,690.91
Balance as of 04/30/2019	**$**	**861,257.36**
Checks (see Bills)		($216,013.34)
Uncleared Deposits		
Uncleared Checks		
Balance as of 05/03/2019	**$**	**645,244.02**

Capital Checking Account-- First Federal Savings Bank-(102-FF) PIF's

PIF's & City Reimbursement for Capital Projects

Beginning Balance as of 04/01/2019	**$**	**665,528.93**
Cleared Transactions		(9,338.75)
Revenue		38,240.00
Interest		1,352.93
Balance as of 04/30/2019	**$**	**695,783.11**
Checks (see Bills)		($7,383.75)
Uncleared Deposits		
Uncleared Checks		
Balance as of 05/03/2019	**$**	**688,399.36**

Water Supply Checking Account-- First Federal Savings Bank

Water Supply Purchases

Beginning Balance as of 04/01/2019	**$**	**689,458.83**
Cleared Transactions		-
Revenue		-
Interest		1,366.45
Balance as of 04/30/2019	**$**	**690,825.28**
Checks (see Bills)	$	-
Uncleared Deposits	$	-
Uncleared Checks	$	-
Balance as of 05/03/2019	**$**	**690,825.28**

Investment Accounts

April 2019 Treasurer's Report

Wyo-Star Accounts

State Investment Pool (Mutual Fund)

Wyo-Star Account	Yield	Balance as of 3/31/19
5253-1082 - Depreciation *Annually 100k set aside*	2.3051%	$ 1,651,059.86
5312-1184 - Long Term Water Supply *Original Capital Facilities Tax - Water supply purchased owned City 2/3rd/SAWSJPB 1/3rd.Ownership agreement section 9.*	2.3051%	$ 3,121,738.09
5600-2354 - 20 Inch Main *Funds left from project. Annual payment for 20" Big Goose SRF (20 year) note due December 1st; through 2028. Payment comes from User Fees, City of Sheridan & 20" watermain reserve.*	2.3051%	$ 1,396,612.42
5356-1280 - O&M Fund *Operating Savings Account*	2.3051%	$ 460,210.09
5623-2378 - Booster Stations DWSRF #126 *20 year note beginning one year after completion date*	2.3050%	$ 54,211.55
5624-2379 - Conventional Treatment Upgrades DWSRF #125 *20 year note beginning one year after completion date*	2.3051%	$ 37,588.11
5674-2884 - Water Meter Replacement DWSRF #158 *20 year note beginning one year after completion date*	2.3050%	$ 47,237.39
5704-3050 - Control Valve Project DWSRF #209 *20 year note beginning one year after completion date*	2.3050%	$ 54,846.91

Budget vs Actual FY 18-19
Monthly Accrual Basis
July 1, 2018 - May 3, 2019

April 2019 Treasurer's Report	July 1 - May 3	Budget	$ Over Budget	% of Budget
OPERATING REVENUES				
120-434 · Tap/Meter Install/Radio Read	11,316.00	14,760.00	-3,444.00	76.67%
220-418 · User Fees	1,268,687.50	1,495,662.00	-226,974.50	84.82%
220-430 · Operating Interest Income	23,251.36	17,500.00	5,751.36	132.87%
220-434 · Corp Stop Installation	1,944.00	6,480.00	-4,536.00	30.0%
220-439 · Powderhorn Ranches Phase VII Pump Station	1,130.52	3,100.00	-1,969.48	36.47%
Total OPERATING REVENUES	1,306,329.38	1,537,502.00	-231,172.62	84.96%
OPERATING EXPENSES				
220-741 · City - Big Goose WTP	78,676.10	96,534.00	-17,857.90	81.5%
220-742 · City - Admin and Engineering	160,694.05	149,332.32	11,361.73	107.61%
220-743 · City - Billing and Collection	79,971.68	70,452.68	9,519.00	113.51%
220-744 · City - Supply and Purification	122,591.87	180,069.00	-57,477.13	68.08%
220-745 · City - Transmission	84,430.05	89,812.00	-5,381.95	94.01%
220-746 · City - Direct Bill Dist & Meter Reading	220,230.67	259,280.00	-39,049.33	84.94%
Total CITY ADMINISTRATION EXPENSES	746,594.42	845,480.00	-98,885.58	88.3%
PERSONNEL SERVICES				
220-704 · Admin	133,207.50	159,849.00	-26,641.50	83.33%
Total PERSONNEL SERVICES	133,207.50	159,849.00	-26,641.50	83.33%
SERVICES & OTHER CHARGES				
220-717 · Office Supplies	299.15	500.00	-200.85	59.83%
220-718 · Postage	50.00	50.00	0.00	100.0%
220-720 · Advertising	676.40	1,500.00	-823.60	45.09%
220-721 · Watershed Management Program	439.95	0.00	439.95	100.0%
220-726 · Bad Debt Expense	0.00	0.00	0.00	0.0%
220-730 · Financial Services	34,772.50	40,000.00	-5,227.50	86.93%
220-731 · Dues and Membership Fees	480.00	425.00	55.00	112.94%
220-732 · Legal Fees	7,061.31	10,000.00	-2,938.69	70.61%
220-733 · Professional Services-Misc.	12,774.00	30,000.00	-17,226.00	42.58%
220-734 · Airport Booster Lease	2,287.00	2,400.00	-113.00	95.29%
220-735 · Repairs & Maintenance	0.00	10,000.00	-10,000.00	0.0%
220-737 · Travel and Training	111.79	2,000.00	-1,888.21	5.59%
220-738 · Insurance and Bonds	2,159.00	4,000.00	-1,841.00	53.98%
220-739 · Property Taxes	1,718.69	1,800.00	-81.31	95.48%
220-740 · Office Rent *included in 220-704 admin	0.00	0.00	0.00	0.0%
220-747 · Reservoir Assessments	2,330.86	1,900.00	430.86	122.68%
Total SERVICES & OTHER CHARGES	65,160.65	104,575.00	-39,414.35	62.31%
Total OPERATING EXPENSES	944,962.57	1,109,904.00	-164,941.43	85.14%

Budget vs Actual FY 18-19
Monthly Accrual Basis
July 1, 2018 - May 3, 2019

April 2019 Treasurer's Report	July 1 - May 3	Budget	$ Over Budget	% of Budget
CAPITAL REVENUES				
120-432 · Plant Investment Fees	123,740.00	161,400.00	-37,660.00	76.67%
120-433 · City Reimburse 20" Cost Share Remed.	0.00	0.00	0.00	0.0%
120-450 · Capital Interest Income	92,341.72	52,500.00	39,841.72	175.89%
Total CAPITAL REVENUES	216,081.72	213,900.00	2,181.72	101.02%
CAPITAL OUTLAYS				
WATER SYSTEM CAPITAL OUTLAYS				
125-609 · 20" Big Goose Waterline	0.00	5,000.00	-5,000.00	0.0%
125-622 · Booster Station-Project 3	125,695.89	177,172.00	-51,476.11	70.95%
125-623 · Meter Replacement Project	0.00	910,000.00	-910,000.00	0.0%
125-624 · H2O/Service Line Remediation	0.00	5,000.00	-5,000.00	0.0%
125-625 · City Cap Outlay - SAWS portion	0.00	143,219.00	-143,219.00	0.0%
125-628 . Coffeen Waterline Relocation	16,722.50	0.00	16,722.50	100.0%
125-627 · Control Valve Project	747,716.79	767,000.00	-19,283.21	97.49%
Total WATER SYSTEM CAPITAL OUTLAYS	890,135.18	2,007,391.00	-1,117,255.82	44.34%

	July 1 - May 3	Budget	$ Over Budget	%of Budget
220-725 · Accured Depreciation	479,170.00	575,004.00	-95,834.00	83%

To be funded this year	100,000.00
Unfunded this year	475,004.00
TO DATE	
Current System Value	38,381,527.39
Total Depreciation	8,420,708.13
Total Funded Depreciation	1,004,874.99
Total Unfunded Depreciation	7,721,076.88

Budget vs Actual FY 18-19
Monthly Accrual Basis
July 1, 2018 - May 3, 2019

April 2019 Treasurer's Report	July 1 - May 3	Budget	$ Over Budget	% of Budget
NON-OPERATING REVENUES				
220-424 · City 20" B.G. Loan Contribution**	69,319.98	69,320.00	-0.02	100.0%
220-428 · City PMTF Loan Payment*	25,771.00	25,771.00	0.00	100.0%
Total 20" BIG GOOSE SRF LOAN PAYMENT	95,090.98	95,091.00	-0.02	100.0%
NON-OPERATING EXPENSES				
20" BIG GOOSE SRF LOAN PAYMENT				
200-224 · 20" B.G. Loan Principal	256,725.27	259,054.00	-2,328.73	99.1%
200-224 · 20" B.G. Add'l Loan Principal	0.00	0.00	0.00	0.0%
220-436 · 20" B.G. Interest Expense	81,929.45	79,600.00	2,329.45	102.93%
Total 20" Big Goose SRF Loan Payment	338,654.72	338,654.00	0.72	100.0%
220-438 · Depreciation Sinking Fund	0.00	100,000.00	-100,000.00	0.0%

*City PMTF Loan Payment: The City of Sheridan had annually contributed Twenty-Five Thousand Seven Hundred and Seventy One Dollars ($25,771.00 US) to Sheridan Area Water Supply Joint Powers Board for its share of the annual Debt Service on the Original Project Permanent Mineral Trust Fund Loan No. SL1989CH230. When SAWSJPB paid the loan in full in 2012, a loan to the City of Sheridan from SAWSJPB was established on September 4, 2012 in the amount of Four Hundred Eighty Three Thousand Two Hundred Sixty-Five Dollars and Five Cents ($483,265.05 US) with annual payments of Twenty-Five Thousand Seven Hundred Seventy One Dollars ($25,771.00 US) at an interest rate of Two and Five Tenth's percent (2.50%) per annum for a loan term of twenty-five (25) years.

**20" Big Goose Water Line SRF (State Revolving Fund) Loan: Payments began December 1, 2009. Total annual payment is $338,654.12, of which the City of Sheridan contributes $69,319.98. Each year the City of Sheridan is invoiced by SAWSJPB in August and pays the invoice in September. The payment is approved by the SAWSJPB at the November meeting and remitted to the State of Wyoming by December 1 of each year. This loan is fully paid on December 1, 2028.

Treasurer's Report Acceptance:

Accepted by ______________________________

Attested by ______________________________

Wyoming Office of State Lands and Investments
Herschler Bldg. 1E
122 West 25th Street
Cheyenne, WY 82002
Phone: 307-777-6645

PAY OFF WORKSHEET

Borrower Name : Sheridan Area Water Supply JPB

Loan Number : DW125

Pay Off Date : 11/20/18

Principal Balance	$ 1,121,904.00
+ Interest Balance	$ 113,865.91
+ Rate Fee Balance	$ 0.00
+ Release Fee Amount	$ 0.00
+ Unpaid Late Penalty	$ 0.00
Pay Off =	$ 1,235,769.91

Per Diem interest amount = $ 76.84

Please be certain check arrives by the above indicated payoff date.

Mail checks to:

Wyoming Office of State Lands and Investments
Herschler Bldg. 1E
122 West 25th Street
Cheyenne, WY 82002

Thank you,

Rebecca Webb

SHERIDAN AREA WATER SUPPLY
I certify, under penalty of perjury, that this fully itemized voucher is correct, reasonable and has not been paid.
Approved By Dan Caughlin
Date 11/16/18
Acct. # 220-437 DWSRF #125 Interest
Check # 4140
Operating

DRINKING WATER SRF

"LOAN DRAFT REQUEST"
APPLICATION AND CERTIFICATION FOR PAYMENT

Date Submitted February 22, 2019

Loan Number: DWSRF-126

TO: WYOMING STATE LOAN & INVESTMENT BOARD
OFFICE OF STATE LANDS & INVESTMENTS
122 WEST 25TH STREET, 3RD FLOOR WEST
HERSCHLER BUILDING
CHEYENNE, WYOMING 82002-0600

SLIB 96% LOCAL 0% OTHER 4%

REQUESTED BY: **Sheridan Area Water Supply Joint Powers BoardBoard**

PROJECT DESCRIPTION: **Replacement of Booster Stations Metering**

Loan Draft Request # 22

	SLIB Amount	SLIB Amount of Engineering
A. Amount of Previous Requests Approved	$ 1,521,783.96	$ 301,543.34

(List and Attach Invoices Separately)

Company Name	Invoice #	Inv. Date	Total Invoice	SLIB Amount	SLIB Amount of Engineering
DOWL	5028-26584.02 - 02	7/5/2018	$ 1,497.50	$ 1,437.60	$ 1,437.60
DOWL	5028-26584.02 - 03	8/29/2018	$ 3,912.50	$ 3,756.00	$ 3,756.00
DOWL	5028-26584.02 - 04	10/4/2018	$ 2,652.50	$ 2,546.40	$ 2,546.40
DOWL	5028-26584.02 - 05	10/31/2018	$ 735.00	$ 705.60	$ 705.60
DOWL	5028-26584.02 - 06	11/27/2018	$ 2,493.75	$ 2,394.00	$ 2,394.00
DOWL	5028-26584.02 - 07	1/3/2019	$ 9,398.75	$ 9,022.80	$ 9,022.80
DOWL	5028-26584.02 - 08	1/29/2019	$ 2,703.75	$ 2,595.60	$ 2,595.60
DOWL	5028-26584.02 - 09	2/19/2019	1,261.25	$ 1,210.80	$ 1,210.80
Westin Mechanical	Pay Estimate #1	12/7/2018	$ 71,042.94	$ 68,201.22	$
Westin Mechanical	Pay Estimate #2	12/27/2018	$ 8,814.06	$ 8,461.50	$
Westin Mechanical	Pay Estimate Final	1/8/2019	$ 4,203.00	$ 4,034.88	$
OMP Engineering	OMP-1218-01	12/21/2018	$ 4,605.82	$ 4,421.59	$ 4,421.59
Sheridan Press	Ad#94383	1/23/2019	$ 253.65	$ 243.50	$

Attach separate sheet if needed

	Total Invoice	SLIB Amount	SLIB Amount of Engineering
B. Current Request for Payment	$ 113,574.47	$ 109,031.49	$ 28,090.39
C. Total Funds Approved to Date (A+B)	$	1,630,815.45	$ 329,633.73

Office Use Only

OSLI Approval: ______________ Date ______________

WDO Approval: ______________ Date ______________

Engineering RECAP

Amount of Engineering Approved for Project:		$ 340,000.00
Less Previously Requested	301,543.34	
Less Current Request	28,090.39	
Total Engineering Approved to Date		329,633.73
Balance of Engineering Undisbursed:		$ 10,366.27

Funding RECAP

D. Amount of Funds Approved for Project		$ 1,700,000.00
E. Less Funds Previously Requested (A) $	1,521,783.96	
F. Less Current Request (B) $	109,031.49	
G. Total Requests Approved to Date (E+F)		$ 1,630,815.45
Balance of Loan Funds Undisbursed (D-G)		$ 69,184.55

I hereby certify that the above requested funds by: Sheridan Area Water Supply Joint Powers BoardBoard for the amount on Line B is a true and accurate request for funds from the WYOMING STATE LOAN & INVESTMENT BOARD.

NOTE: All Signatures Must be Original - Photocopy of facsimile Signatures are NOT Acceptable - Document will be Returned.

BY: Tom Ringley
TOM RINGLEY, CHAIRMAN

ATTEST: Nick Siddle
NICK SIDDLE, SECRETARY

Name of contact person for this Loan Draft Request: DAN COUGHLIN

Phone Number: 307-674-2920 **E-mail Address:** dcoughlin@sheridancounty.com

Revised 07/09

DRINKING WATER SRF

"LOAN DRAFT REQUEST"
APPLICATION AND CERTIFICATION FOR PAYMENT

Date Submitted March 14, 2019 **Loan Number:** DWSRF#209

TO: WYOMING STATE LOAN & INVESTMENT BOARD
OFFICE OF STATE LANDS & INVESTMENTS
122 WEST 25TH STREET, 3RD FLOOR WEST
HERSCHLER BUILDING
CHEYENNE, WYOMING 82002-0600

SLIB 100% LOCAL 0% OTHER 0%

REQUESTED BY: **SHERIDAN AREA WATER SUPPLY JOINT POWERS BOARD**

PROJECT DESCRIPTION: **CONTROL VALVE UPGRADE**

Loan Draft Request # 6

	SLIB Amount	SLIB Amount of Engineering
A. Amount of Previous Requests Approved	$ 824,061.64	$ 113,097.99

(List and Attach Invoices Separately)

Company Name	Invoice #	Inv. Date	Total Invoice	SLIB Amount	SLIB Amount of Engineering
OMP Engineering, Inc.	OMP-1219-01	3/4/2019	$ 11,340.00	$ 11,340.00	$ 11,340.00

Attach separate sheet if needed

	Total Invoice	SLIB Amount	SLIB Amount of Engineering
B. Current Request for Payment	$ 11,340.00	$ 11,340.00	$ 11,340.00
C. Total Funds Approved to Date (A+B)		$ 835,401.64	$ 124,437.99

Office Use Only

OSLI Approval: ____________ Date ____________

DEQ Approval: ____________ Date ____________

Engineering RECAP

Amount of Engineering Approved for Project:	$ 167,400.00
Less Previously Requested	113,097.99
Less Current Request	11,340.00
Total Engineering Approved to Date	124,437.99
Balance of Engineering Undisbursed:	$ 42,962.01

Funding RECAP

D. Amount of Funds Approved for Project		$ 837,000.00
E. Less Funds Previously Requested (A)	$ 824,061.64	
F. Less Current Request (B)	$ 11,340.00	
G. Total Requests Approved to Date (E+F)		$ 835,401.64
Balance of Loan Funds Undisbursed (D-G)		$ 1,598.36

I hereby certify that the above requested funds by: SHERIDAN AREA WATER SUPPLY JOINT POWERS BOARD for the amount on Line B is a true and accurate request for funds from the WYOMING STATE LOAN & INVESTMENT BOARD. I further certify to the best of my knowledge and belief that this report is accurate and correct and that this project complies with the requirements of 29 CFR 5.5(a)(1) and that all laborers and mechanics employed by contractors and subcontractors reimbursed on this request were paid wages at rates not less than those listed on the prevailing wage rate contained in the contract documents and that all applicable provisions of the Davis Bacon Prevailing Wage Standards have been met.

NOTE: All Signatures Must be Original - Photocopy of facsimile Signatures are NOT Acceptable - Document will be Returned.

BY: Tom Ringley
TOM RINGLEY, CHAIR

ATTEST: Nick Siddle
NICK SIDDLE, SECRETARY

Name of contact person for this Loan Draft Request: DAN COUGHLIN, SAWSJPB PROJECT MANAGER

Phone Number: 307-675-2930 E-mail Address: dcoughlin@sheridancounty.com

Revised 04/10

Financial Analyses Modeling Scenarios
Proposed Improvement Projects
Sheridan Water System Master Plan – Level I Study
June 2019

The following are two improvement projects that are recommended to move forward from this WWDC Level I study. These are presented at this time such that SAWS JPB will be the lead entity for the first project and the City of Sheridan will be the lead entity for the second one.

These projects are presented both since they may be moving forward with funding applications, and also as examples for the use of the recently developed financial model for these two entities, to assist with an analysis of the impact these projects will have on current budgets and rates. These exercises may also provide other financial recommendations that may be appropriate as we proceed with funding applications and final planning for these projects.

Airport Transmission Main – SAWS JPB Project

The Airport transmission main is the highest priority because of its deteriorated condition due to corrosion and its importance to the system. This importance is based on both the amount of water it carries and that it is the sole source of supply for some service areas. While it serves both City and SAWS users, it serves more SAWS users and carries more water for SAWS service areas, so they are lead entity for funding and then designing and constructing the project.

Since this project qualifies for WWDC Level III funding (at 67%), it is assumed they will be the primary funding agency. An AML grant will also be applied for, and at this time, it will be assumed this will be obtained.

Using a rounded estimate of $4.5 million, the following scenarios are presented:

1. 67% WWDC grant for $3 million, and a $1.5 million AML grant so no loans or other local funds will be needed.

2. 67% WWDC grant for $3 million, and a $1.0 million AML grant. Then each entity (SAWS and City) contributes $250,000 by way of a 2.5% SRF loan for 20 years.

3. 67% WWDC grant and no other grant funding. Each entity will cover a $750,000 SRF loan for their share of the remaining funds.

Questions for financial modeler – If scenario #2 is used, what is the impact on rates, and can this modest amount of debt be incorporated into the existing rates and already planned rate increases? When can the project be incorporated into the schedule of projects if an AML grant not be obtained and there is no additional rate increase?

Table 1 – Airport Transmission Main Cost Estimate

Preparation of Final Design, Specs, Bidding (10%)	$ 321,160	
Permitting and Mitigation	$ 10,000	
Legal Fees	$ 10,000	
Acquisition of Access & Easements	$ 90,000	
Pre-Construction Costs (Subtotal)		$ 431,160
Cost of Components:		
Mobilization	$300,000	
7400' of 24" Main @ $156/ft	$1,154,400	
3900' of 20" Main @ $125/ft	$487,500	
6100' of 16" Main @ $97/ft	$591,700	
Borings (600 @ $500/ft)	$300,000	
Metering Upgrade & SCADA	$100,000	
Replace 8" DIP Lateral to Airport (2000' @ $49/ft)	$98,000	
New PRV Station on 8" Lateral	$80,000	
Southeast PRV Bypass	$100,000	
Total Cost of Components	**$3,211,600**	
Construction Engineering Cost	$ 321,160	
Components & Engineering Cost (Subtotal)	$ 3,532,760	
Contingency (Subtotal 15%)	$ 529,914	
Construction Cost Total		$4,062,674
Total Project Cost		$4,493,834

North & South Low Tanks – City of Sheridan Project

This project improves the piping, valving and upgrading of other old facilities at both of these two tank sites. At each site there are three tanks in close proximity, so these improvements will allow better control of flow and taking any tank off line as may be needed. This project also eliminates some older facilities that are in poor condition.

This project is also eligible for a 67% WWDC Level III grant, so its funding should be assumed as 67% WWDC grant and 33% SRF loan at 2.5% for 20 years.

While this project likely will not proceed for 2020 funding, when it is decided to move on this project forward, it's cost should be worked into the already planned rate increases. If this is to be done without further increases, when can this be put into the schedule?

Table 2 – North and South Low Tanks Improvements Cost Estimates

Preparation of Final Design, Specs, Bidding (10%)	$ 77,000	
Permitting and Mitigation	$ -	
Legal Fees	$ -	
Acquisition of Access & Easements	$ -	
Pre-Construction Costs (Subtotal)		$ 77,000
Cost of Components:		
Mobilization	$80,000	
North Low Tank	$360,000	
South Low Tank	$330,000	
Total Cost of Components	**$ 770,000**	
Construction Engineering Cost	$ 77,000	
Components & Engineering Cost (Subtotal)	$ 847,000	
Contingency (Subtotal 15%)	$ 127,050	
Construction Cost Total		$974,050
Total Project Cost		**$1,051,050**

SAWS JPB
Airport Transmission Main – Scenarios

Dayton Alsaker

From: Todd Cristiano <tcristiano@raftelis.com>
Sent: Friday, June 21, 2019 10:14 PM
To: Dan Coughlin; Dayton Alsaker
Subject: SAWS FinPlan Alternatives 6-21-2019.pdf
Attachments: SAWS FinPlan Alternatives 6-21-2019.pdf

Hi Dan-

Attached are updated cash flow alternatives. Please disregard the 'baseline' cash flow and the scenarios I sent on Wednesday. I received some updated information from Anny so those are out of date. Below is the revised summary as I understand the two funding options:

Option 1: $3.0m WWDC grant/$1.5m AML grant: 3.4% annual increases 2020 - 2029
Option 2: $3.0m WWDC grant/$1.0m AML grant/$250,000 SAWS loan/$250,000 'contribution' from Sheridan: 3.75% annual increases 2020 – 2029.

The rate revenue, O&M, and capital projections are based on the budget document you sent last week.

I am in the office all next week. Please give me a call once you've had a chance to review.

Regards,
Todd.

Table 1
SAWS
Water Financial Plan: 2020 Update
Operating Fund Cash Flow Analysis

Funding Option 1
67% WWDC Grant: $3.0 million
AML Grant: $1.5 million

Description	Fiscal Year Ending June 30 (Projected) 2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Beginning Fund Balance	$1,105,454	$998,411	$816,647	$672,253	$567,837	$506,137	$490,019	$522,489	$606,695	$745,936
Sources of Funds										
Retail Rate Revenues	$1,588,384	$1,633,616	$1,707,379	$1,784,269	$1,864,414	$1,947,947	$2,035,004	$2,125,729	$2,220,271	$2,318,785
220-434 Corp Stop Installation	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
R-3.3 Other Assessments	3,000	9,840	9,840	9,840	9,840	9,840	9,840	9,840	9,840	9,840
R-4.3 Grants from State Agencies	2,000	4,320	4,320	4,320	4,320	4,320	4,320	4,320	4,320	4,320
R-5.3 Miscellaneous Other (Reimbursements)	0	0	0	0	0	0	0	0	0	0
120-433 City Reimburse 20" Cost Share	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
220-425 Reimburse Coffeen Waterline Relocate/WYDOT	1,870,000	0	0	0	0	0	0	0	0	0
R-6.3 Other Forecasted Revenues - 120-432 Plant Investme	161,400	161,400	161,400	161,400	161,400	161,400	161,400	161,400	161,400	161,400
R-6.4 Other Forecasted Revenues - 220-452 SLWA	600	600	600	600	600	600	600	600	600	600
220-453 Sheridan Supp Water Supply - WWDC	336,000	336,000	336,000	336,000	336,000	336,000	336,000	336,000	336,000	336,000
WWDC Grant	3,000,000	0	0	0	0	0	0	0	0	0
AML Grant	1,500,000	0	0	0	0	0	0	0	0	0
City of Sheridan Contribution	0	0	0	0	0	0	0	0	0	0
Projected Net Debt Proceeds	0	0	0	0	0	0	0	0	0	0
Interest/Investment Earnings	0	3,698	2,882	2,260	1,845	1,650	1,691	1,983	2,542	3,384
	-------------	-------------	-------------	-------------	-------------	-------------	-------------	-------------	-------------	-------------
Total Sources of Funds	**$8,482,384**	**$2,170,474**	**$2,243,421**	**$2,319,689**	**$2,399,419**	**$2,482,757**	**$2,569,855**	**$2,660,872**	**$2,755,973**	**$2,855,329**
Uses of Funds										
O&M Expenses w/Park Reservoir Purchases	$1,744,000	$1,778,880	$1,814,458	$1,850,747	$1,887,762	$1,925,517	$1,964,027	$2,003,308	$2,043,374	$2,084,241
Airport Transmission Main	0	0	0	0	0	0	0	0	0	0
Debt Service Payments - Outstanding Bonds	440,592	473,358	473,358	473,358	473,358	473,358	473,358	473,358	473,358	473,358
Debt Service Payments - Projected Issues	0	0	0	0	0	0	0	0	0	0
Capital Project Costs	6,404,835	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Costs of Bond Issuance	0	0	0	0	0	0	0	0	0	0
	-------------	-------------	-------------	-------------	-------------	-------------	-------------	-------------	-------------	-------------
Total Uses of Funds	**$8,589,427**	**$2,352,238**	**$2,387,816**	**$2,424,105**	**$2,461,120**	**$2,498,875**	**$2,537,385**	**$2,576,666**	**$2,616,732**	**$2,657,599**
Total Change in Fund Balance	($107,043)	($181,764)	($144,394)	($104,415)	($61,700)	($16,118)	$32,470	$84,206	$139,241	$197,730
Ending Fund Balance	**$998,411**	**$816,647**	**$672,253**	**$567,837**	**$506,137**	**$490,019**	**$522,489**	**$606,695**	**$745,936**	**$943,666**
Target Reserves	**$436,000**	**$444,720**	**$453,614**	**$462,687**	**$471,940**	**$481,379**	**$491,007**	**$500,827**	**$510,843**	**$521,060**
Surplus / Deficiency	*$562,411*	*$371,927*	*$218,638*	*$105,151*	*$34,197*	*$8,640*	*$31,482*	*$105,868*	*$235,093*	*$422,606*
Annual Revenue Adjustment	0.0%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%
Cumulative Revenue Adjustment	0.0%	3.4%	6.9%	10.6%	14.3%	18.2%	22.2%	26.4%	30.7%	35.1%
Debt Service Coverage	6.06	1.77	1.88	1.99	2.12	2.24	2.38	2.53	2.68	2.84

Table 1
SAWS
Water Financial Plan: 2020 Update
Operating Fund Cash Flow Analysis

Funding Option 2
67% WWDC Grant: $3.0 million
AML Grant: $1.0 million
$250,00 SAWS Loan
$250,000 Sheridan Contribution

	Fiscal Year Ending June 30 (Projected)									
Description	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Beginning Fund Balance	$1,105,454	$997,161	$802,114	$650,304	$544,919	$489,312	$487,009	$541,718	$657,337	$837,962
Sources of Funds										
Retail Rate Revenues	$1,588,384	$1,636,489	$1,716,172	$1,799,528	$1,886,724	$1,977,928	$2,073,320	$2,173,084	$2,277,415	$2,386,515
220-434 Corp Stop Installation	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
R-3.3 Other Assessments	3,000	9,840	9,840	9,840	9,840	9,840	9,840	9,840	9,840	9,840
R-4.3 Grants from State Agencies	2,000	4,320	4,320	4,320	4,320	4,320	4,320	4,320	4,320	4,320
R-5.3 Miscellaneous Other (Reimbursements)	0	0	0	0	0	0	0	0	0	0
120-433 City Reimburse 20" Cost Share	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
220-425 Reimburse Coffeen Waterline Relocate/WYDOT	1,870,000	0	0	0	0	0	0	0	0	0
R-6.3 Other Forecasted Revenues - 120-432 Plant Investme	161,400	161,400	161,400	161,400	161,400	161,400	161,400	161,400	161,400	161,400
R-6.4 Other Forecasted Revenues - 220-452 SLWA	600	600	600	600	600	600	600	600	600	600
220-453 Sheridan Supp Water Supply - WWDC	336,000	336,000	336,000	336,000	336,000	336,000	336,000	336,000	336,000	336,000
WWDC Grant	3,000,000	0	0	0	0	0	0	0	0	0
AML Grant	1,000,000	0	0	0	0	0	0	0	0	0
City of Sheridan Contribution	250,000	0	0	0	0	0	0	0	0	0
Projected Net Debt Proceeds	250,000	0	0	0	0	0	0	0	0	0
Interest/Investment Earnings	0	3,658	2,791	2,148	1,746	1,601	1,732	2,158	2,898	3,975
Total Sources of Funds	**$8,482,384**	**$2,173,308**	**$2,252,123**	**$2,334,837**	**$2,421,629**	**$2,512,689**	**$2,608,212**	**$2,708,402**	**$2,813,473**	**$2,923,650**
Uses of Funds										
O&M Expenses w/Park Reservoir Purchases	$1,744,000	$1,778,880	$1,814,458	$1,850,747	$1,887,762	$1,925,517	$1,964,027	$2,003,308	$2,043,374	$2,084,241
Airport Transmission Main	0	0	0	0	0	0	0	0	0	0
Debt Service Payments - Outstanding Bonds	440,592	473,358	473,358	473,358	473,358	473,358	473,358	473,358	473,358	473,358
Debt Service Payments - Projected Issues	0	16,117	16,117	16,117	16,117	16,117	16,117	16,117	16,117	16,117
Capital Project Costs	6,404,835	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Costs of Bond Issuance	1,250	0	0	0	0	0	0	0	0	0
Total Uses of Funds	**$8,590,677**	**$2,368,355**	**$2,403,933**	**$2,440,222**	**$2,477,237**	**$2,514,992**	**$2,553,502**	**$2,592,783**	**$2,632,849**	**$2,673,716**
Total Change in Fund Balance	($108,293)	($195,047)	($151,810)	($105,385)	($55,607)	($2,303)	$54,709	$115,619	$180,625	$249,934
Ending Fund Balance	**$997,161**	**$802,114**	**$650,304**	**$544,919**	**$489,312**	**$487,009**	**$541,718**	**$657,337**	**$837,962**	**$1,087,895**
Target Reserves	**$436,000**	**$444,720**	**$453,614**	**$462,687**	**$471,940**	**$481,379**	**$491,007**	**$500,827**	**$510,843**	**$521,060**
Surplus / Deficiency	*$561,161*	*$357,394*	*$196,690*	*$82,232*	*$17,371*	*$5,629*	*$50,711*	*$156,510*	*$327,118*	*$566,835*
Annual Revenue Adjustment	0.00%	3.75%	3.75%	3.75%	3.75%	3.75%	3.75%	3.75%	3.75%	3.75%
Cumulative Revenue Adjustment	0.00%	3.75%	7.64%	11.68%	15.87%	20.21%	24.72%	29.39%	34.25%	39.28%
Debt Service Coverage	6.06	1.71	1.83	1.96	2.09	2.23	2.38	2.54	2.80	2.98

City of Sheridan

Dayton Alsaker

From: Todd Cristiano <tcristiano@raftelis.com>
Sent: Sunday, June 23, 2019 4:28 PM
To: Dan Roberts; Dayton Alsaker
Subject: Cash flow alternatives
Attachments: Sheridan FinPlan Alternatives 6-23-2019 1.pdf

Dan-

Attached are the cash flow alternatives. My only changes were the capital project additions, the loans and grants. All other assumptions remain the same. I developed two options which are summarized below. The only driver for the revenue increase changes from the original cash flows is the SRF debt payments. Under option 1, they are approximately $38,000 and option 2 is $70,000. Give this a look and call me with any questions.

Regards,
Todd.

Annual Revenue Increases

Fiscal Year	**Funding Option 1** Airport Trans Line $250,000 SRF N&S Low Tanks 66%WWDC/33%SRF	**Funding Option 2** Airport Trans Line $750,000 SRF N&S Low Tanks 66%WWDC/33%SRF
FY20	2.8%	3.2%
FY21	0.0%	0.0%
FY22	2.8%	3.2%
FY23	0.0%	0.0%
FY24	2.8%	3.2%
FY25	0.0%	0.0%
FY26	1.5%	1.5%
FY27	0.0%	0.0%
FY28	1.5%	1.5%

← Projects

Todd Cristiano Senior Manager
O 303 305 1138 / **M** 303 305 1138 / **E** tcristiano@raftelis.com
raftelis.com

Table 1
City of Sheridan, WY
Water Financial Plan
Cash Fund Activity Balance

Funding Option 1
Airport Trans Project: $250,000 SRF
North and South Low Tanks ($1,051,050): 67% WWDC/33%SRF
Tanks: $704,204 WWDC/$346,847 SRF

Description	Projected 2020	Projected 2021	Projected 2022	Projected 2023	Projected 2024	Projected 2025	Projected 2026	Projected 2027	Projected 2028
Indicated Revenue Increase	**2.8%**	**0.0%**	**2.8%**	**0.0%**	**2.8%**	**0.0%**	**1.5%**	**0.0%**	**1.5%**
Beginning Cash & Investment Balance	**$2,097,013**	**$2,473,212**	**$2,725,936**	**$3,010,318**	**$2,468,535**	**$2,317,587**	**$2,129,069**	**$2,136,809**	**$2,175,853**
Sources of Funds									
Retail Rate Revenues	$3,594,814	$3,686,303	$3,755,660	$3,850,744	$3,922,694	$4,021,503	$4,076,097	$4,145,708	$4,201,485
Wholesale/Contract Revenues	55,586	55,000	55,586	55,000	55,586	55,000	55,314	55,000	55,314
Other Revenues	1,249,418	1,122,827	1,113,570	1,120,729	1,154,105	1,154,153	1,173,184	1,192,595	1,212,395
Scenario-Specific Increases/(Decreases) to Revenue	0	0	0	0	0	0	0	0	0
Net Bond Proceeds [1]	596,847	1,076,891	1,214,194	0	0	0	0	0	0
WWDC Grant	704,204	0	0	0	0	0	0	0	202,050
Total Development Fees	202,050	202,050	202,050	202,050	202,050	202,050	202,050	202,050	202,050
Interest Earnings	9,812	12,462	13,801	13,159	11,432	10,585	10,134	10,251	10,903
Total Sources of Funds	**$6,412,730**	**$6,155,533**	**$6,354,861**	**$5,241,682**	**$5,345,867**	**$5,443,291**	**$5,516,778**	**$5,605,604**	**$5,884,197**
Uses of Funds									
Operating and Maintenance Expenses	$3,418,816	$3,599,476	$3,530,266	$3,544,411	$3,691,939	$3,668,878	$3,742,256	$3,817,101	$3,893,443
Debt Service Payments - Outstanding Bonds	608,210	608,210	608,210	608,210	608,210	569,116	592,876	557,276	557,276
Debt Service Payments - Projected Issues	256,686	256,686	326,111	404,388	404,388	404,388	404,388	404,388	404,388
Proposed Debt Service - Airport Trans/N&S Low Tanks	0	38,477	38,477	38,477	38,477	38,477	38,477	38,477	38,477
Capital Project Costs [2]	1,752,819	1,399,958	1,567,414	1,187,979	753,801	950,949	731,042	749,318	768,051
Costs of Bond Issuance	0	0	0	0	0	0	0	0	0
Total Uses of Funds	**$6,036,531**	**$5,902,808**	**$6,070,479**	**$5,783,465**	**$5,496,815**	**$5,631,808**	**$5,509,039**	**$5,566,560**	**$5,661,635**
Total Change in Fund Balance	*$376,199*	*$252,725*	*$284,382*	*($541,783)*	*($150,948)*	*($188,517)*	*$7,740*	*$39,045*	*$222,563*
Ending Cash & Investment Balance	**$2,473,212**	**$2,725,936**	**$3,010,318**	**$2,468,535**	**$2,317,587**	**$2,129,069**	**$2,136,809**	**$2,175,853**	**$2,398,416**
Target Reserves									
O&M	842,996	887,542	870,477	873,964	910,341	904,655	922,748	941,203	960,027
Capital	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000
Total Target Reserves	**$2,042,996**	**$2,087,542**	**$2,070,477**	**$2,073,964**	**$2,110,341**	**$2,104,655**	**$2,122,748**	**$2,141,203**	**$2,160,027**
Annual Surplus / Deficiency	430,216	638,394	939,842	394,571	207,246	24,414	14,061	34,651	238,389
Debt Service Coverage	2.18	1.82	1.82	1.77	1.72	1.92	1.88	1.96	1.96

[1] Includes Airport Trans Main Project for $250,000; North and South Low Tanks for $346,847 (33% SRF of total $1,051,050)
[2] FY20 includes Airport Transmission Main project for $250,000; North and South Tanks for $1,051,050 and $451,768 of other rate funded projects.

Table 1
City of Sheridan, WY
Water Financial Plan
Cash Fund Activity Balance

Funding Option 2
Airport Trans Project: $750,000 SRF
North and South Low Tanks ($1,051,050): 67% WWDC/33%SRF
Tanks: $704,204 WWDC/$346,847 SRF

Description	*Projected* 2020	*Projected* 2021	*Projected* 2022	*Projected* 2023	*Projected* 2024	*Projected* 2025	*Projected* 2026	*Projected* 2027	*Projected* 2028
Indicated Revenue Increase	**3.2%**	**0.0%**	**3.2%**	**0.0%**	**3.2%**	**0.0%**	**1.5%**	**0.0%**	**1.5%**
Beginning Cash & Investment Balance	**$2,097,013**	**$2,478,707**	**$2,713,524**	**$2,985,954**	**$2,441,835**	**$2,295,151**	**$2,121,451**	**$2,144,724**	**$2,200,197**
Sources of Funds									
Retail Rate Revenues	$3,600,226	$3,700,647	$3,775,949	$3,880,769	$3,959,232	$4,068,630	$4,123,863	$4,194,290	$4,250,721
Wholesale/Contract Revenues	55,669	55,000	55,669	55,000	55,669	55,000	55,314	55,000	55,314
Other Revenues	1,249,418	1,122,827	1,113,570	1,120,729	1,154,105	1,154,153	1,173,184	1,192,595	1,212,395
Scenario-Specific Increases/(Decreases) to Revenue	0	0	0	0	0	0	0	0	0
Net Bond Proceeds [1]	1,096,847	1,076,891	1,214,194	0	0	0	0	0	0
WWDC Grant	704,204	0	0	0	0	0	0	0	202,050
Total Development Fees	202,050	202,050	202,050	202,050	202,050	202,050	202,050	202,050	202,050
Interest Earnings	9,812	12,444	13,709	13,032	11,309	10,510	10,135	10,331	11,068
Total Sources of Funds	**$6,918,225**	**$6,169,859**	**$6,375,142**	**$5,271,580**	**$5,382,366**	**$5,490,342**	**$5,564,546**	**$5,654,267**	**$5,933,597**
Uses of Funds									
Operating and Maintenance Expenses	$3,418,816	$3,599,476	$3,530,266	$3,544,411	$3,691,939	$3,668,878	$3,742,256	$3,817,101	$3,893,443
Debt Service Payments - Outstanding Bonds	608,210	608,210	608,210	608,210	608,210	569,116	592,876	557,276	557,276
Debt Service Payments - Projected Issues	256,686	256,686	326,111	404,388	404,388	404,388	404,388	404,388	404,388
Proposed Debt Service - Airport Trans/N&S Low Tanks	0	70,711	70,711	70,711	70,711	70,711	70,711	70,711	70,711
Capital Project Costs [2]	2,252,819	1,399,958	1,567,414	1,187,979	753,801	950,949	731,042	749,318	768,051
Costs of Bond Issuance	0	0	0	0	0	0	0	0	0
Total Uses of Funds	**$6,536,531**	**$5,935,042**	**$6,102,713**	**$5,815,699**	**$5,529,049**	**$5,664,042**	**$5,541,273**	**$5,598,794**	**$5,693,869**
Total Change in Fund Balance	*$381,694*	*$234,817*	*$272,429*	*($544,119)*	*($146,684)*	*($173,700)*	*$23,273*	*$55,473*	*$239,729*
Ending Cash & Investment Balance	**$2,478,707**	**$2,713,524**	**$2,985,954**	**$2,441,835**	**$2,295,151**	**$2,121,451**	**$2,144,724**	**$2,200,197**	**$2,439,926**
Target Reserves									
O&M	842,996	887,542	870,477	873,964	910,341	904,655	922,748	941,203	960,027
Capital	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000
Total Target Reserves	**$2,042,996**	**$2,087,542**	**$2,070,477**	**$2,073,964**	**$2,110,341**	**$2,104,655**	**$2,122,748**	**$2,141,203**	**$2,160,027**
Annual Surplus / Deficiency	435,711	625,982	915,477	367,870	184,810	16,796	21,976	58,994	279,899
Debt Service Coverage	2.19	1.77	1.78	1.74	1.70	1.91	1.86	1.95	1.95

[1] Includes Airport Trans Main Project for $750,000; North and South Low Tanks for $346,847 (33% SRF of total $1,051,050)
[2] FY20 includes Airport Transmission Main project for $750,000; North and South Tanks for $1,051,050 and $451,768 of other rate funded projects.

Dayton Alsaker

From: Todd Cristiano <tcristiano@raftelis.com>
Sent: Sunday, June 23, 2019 2:19 PM
To: Dan Coughlin; Dayton Alsaker
Subject: SAWS FinPlan Alternative 3_ 6-23-2019.pdf
Attachments: SAWS FinPlan Alternative 3_ 6-23-2019.pdf

Dan/Dayton-

Attached is alternative 3 – No AML loan with $750k loan for SAWS and a $750k 'contribution' from City of Sheridan.

Regards,
Todd

Table 1
SAWS
Water Financial Plan: 2020 Update
Operating Fund Cash Flow Analysis

Funding Option 3
67% WWDC Grant: $3.0 million
AML Grant: $0.0 million
$750,00 SAWS Loan
$750,000 Sheridan Contribution

	Fiscal Year Ending June 30 (Projected)									
Description	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Beginning Fund Balance	$1,105,454	$994,661	$774,282	$611,510	$511,116	$478,160	$518,007	$636,339	$786,386	$919,759
Sources of Funds										
Retail Rate Revenues	$1,588,384	$1,643,468	$1,737,610	$1,836,935	$1,941,722	$2,052,262	$2,168,863	$2,239,186	$2,261,871	$2,284,555
220-434 Corp Stop Installation	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
R-3.3 Other Assessments	3,000	9,840	9,840	9,840	9,840	9,840	9,840	9,840	9,840	9,840
R-4.3 Grants from State Agencies	2,000	4,320	4,320	4,320	4,320	4,320	4,320	4,320	4,320	4,320
R-5.3 Miscellaneous Other (Reimbursements)	0	0	0	0	0	0	0	0	0	0
120-433 City Reimburse 20" Cost Share	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
220-425 Reimburse Coffeen Waterline Relocate/WYDOT	1,870,000	0	0	0	0	0	0	0	0	0
R-6.3 Other Forecasted Revenues - 120-432 Plant Investmer	161,400	161,400	161,400	161,400	161,400	161,400	161,400	161,400	161,400	161,400
R-6.4 Other Forecasted Revenues - 220-452 SLWA	600	600	600	600	600	600	600	600	600	600
220-453 Sheridan Supp Water Supply - WWDC	336,000	336,000	336,000	336,000	336,000	336,000	336,000	336,000	336,000	336,000
WWDC Grant	3,000,000	0	0	0	0	0	0	0	0	0
AML Grant	0	0	0	0	0	0	0	0	0	0
City of Sheridan Contribution	750,000	0	0	0	0	0	0	0	0	0
Projected Net Debt Proceeds	750,000	0	0	0	0	0	0	0	0	0
Interest/Investment Earnings	0	3,582	2,624	1,967	1,633	1,650	2,046	2,717	3,425	4,048
Total Sources of Funds	**$8,482,384**	**$2,180,210**	**$2,273,394**	**$2,372,062**	**$2,476,515**	**$2,587,072**	**$2,704,069**	**$2,775,063**	**$2,798,456**	**$2,821,764**
Uses of Funds										
O&M Expenses w/Park Reservoir Purchases	$1,744,000	$1,778,880	$1,814,458	$1,850,747	$1,887,762	$1,925,517	$1,964,027	$2,003,308	$2,043,374	$2,084,241
Airport Transmission Main	0	0	0	0	0	0	0	0	0	0
Debt Service Payments - Outstanding Bonds	440,592	473,358	473,358	473,358	473,358	473,358	473,358	473,358	473,358	473,358
Debt Service Payments - Projected Issues	0	48,351	48,351	48,351	48,351	48,351	48,351	48,351	48,351	48,351
Capital Project Costs	6,404,835	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Costs of Bond Issuance	3,750	0	0	0	0	0	0	0	0	0
Total Uses of Funds	**$8,593,177**	**$2,400,589**	**$2,436,166**	**$2,472,456**	**$2,509,471**	**$2,547,226**	**$2,585,736**	**$2,625,017**	**$2,665,083**	**$2,705,950**
Total Change in Fund Balance	($110,793)	($220,379)	($162,772)	($100,394)	($32,956)	$39,846	$118,333	$150,046	$133,373	$115,813
Ending Fund Balance	**$994,661**	**$774,282**	**$611,510**	**$511,116**	**$478,160**	**$518,007**	**$636,339**	**$786,386**	**$919,759**	**$1,035,572**
Target Reserves	**$436,000**	**$444,720**	**$453,614**	**$462,687**	**$471,940**	**$481,379**	**$491,007**	**$500,827**	**$510,843**	**$521,060**
Surplus / Deficiency	*$558,661*	*$329,562*	*$157,895*	*$48,429*	*$6,220*	*$36,627*	*$145,332*	*$285,559*	*$408,915*	*$514,512*
Annual Revenue Adjustment	0.00%	4.60%	4.60%	4.60%	4.60%	4.60%	4.60%	0.00%	0.00%	0.00%
Cumulative Revenue Adjustment	0.00%	4.60%	9.41%	14.44%	19.71%	25.22%	30.98%	30.98%	30.98%	30.98%
Debt Service Coverage	6.06	1.62	1.76	1.91	2.07	2.24	2.42	2.51	2.77	2.77