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City of Meridian
Water Master Plan

MERIDIAN IDAHO

July 2018

Section 1

Executive Summary

1.1 Introduction

The City of Meridian (City) owns and operates a public drinking water system that serves about 33,000 accounts. This Water Master Plan (WMP) documents key water system information and provides analysis and recommendations that inform infrastructure investments and operational decisions by City staff.

1.1.1 How This Plan Should Be Used

This WMP serves as the guiding document for future water system improvements, and should:

- Be reviewed annually to prioritize and budget needed improvement projects.
- Have water geographic information system (GIS) data and corresponding hydraulic model updated regularly to reflect ongoing water system expansion.
- Have the specific project recommendations regarded as conceptual. (The location, size and timing of projects may change as additional site-specific details and potential alternatives are investigated and analyzed in the preliminary engineering phase of project design.)
- Have cost estimates updated and refined with preliminary engineering and final project designs.

1.1.2 Scope of Work

The City selected Murraysmith to update the WMP for its potable water system. The scope of work for this WMP includes the following major tasks and deliverables:

- Describe the City's existing water system.
- Update and calibrate the hydraulic model.
- Develop population and water demand projections.
- Confirm performance criteria for use in identifying deficiencies and sizing improvements.
- Evaluate the water system's hydraulic capacity to identify deficiencies for existing, 5-year, and 20-year planning horizons.

- Review the system's compliance with water quality regulations.
- Provide benchmarking information for the City's system and comparable utilities.
- Develop project recommendations and cost estimates for a capital improvements program (CIP).
- Evaluate system fund adequacy to implement capital improvement projects.

1.1.3 Organization of the WMP

This WMP is organized into nine sections, as described in Table 1-1. Detailed technical information and support documents are included in the appendices.

Table 1-1
WMP Organization

Section	Description
1 – Executive Summary	Purpose and scope of the WMP and summary of key components of each part of the document.
2 – Existing Water System	Description of the service area and overview of the existing system and facilities.
3 – Population and Demand Projections	Population projections and water demand estimates for existing and future service areas.
4 – Water Supply Analysis	Analysis of supply, backup power, storage, and pumping capacity to meet system wide needs.
5 – Distribution System Analysis	Analysis of the City's distribution system's capacity to meet domestic and fire flow demands.
6 – Water Quality and Regulations	Summary of the City's compliance with water quality regulations.
7 – Operations and Maintenance	Description of the City's operation and maintenance programs as well as a benchmarking comparison to similar utilities.
8 – Capital Improvements Program	Improvement project recommendations including cost estimates and timeframe for implementation.
9 – Financial Review	Analysis of fund adequacy to implement proposed capital improvement program projects.

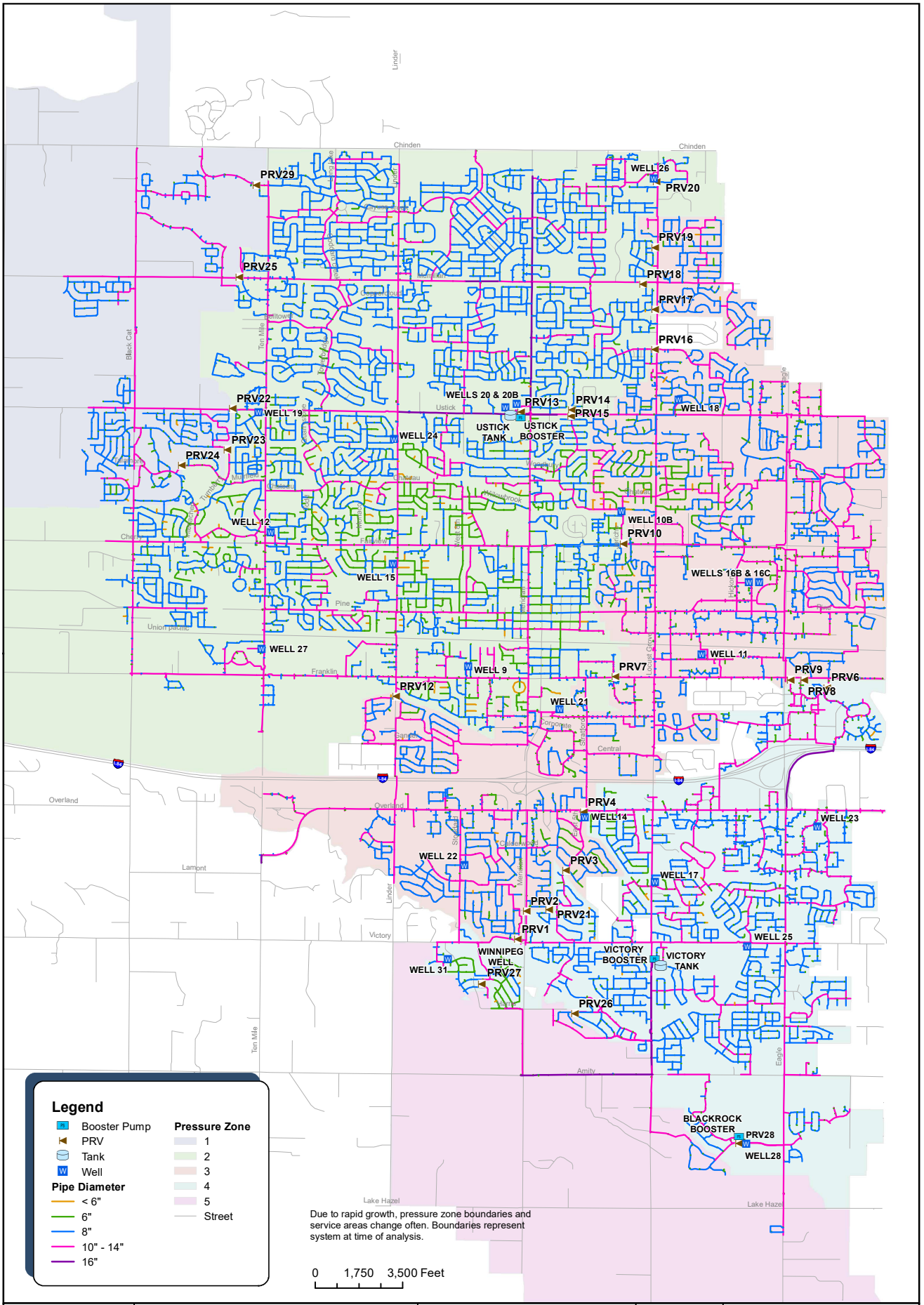
1.2 Existing Water System

Meridian's water system is a public system under the direction of the City government. The Water Division is directed by a Water Superintendent and Assistant Water Superintendent and employs operations and maintenance staff. The Water Superintendent works closely with management from other City divisions, including the Engineering Division, to coordinate operations and maintenance of the system.

The Public Water System (PWSID #4010097) provides service to approximately 33,000 accounts. The existing service area of approximately 26 square miles is smaller than the City limits boundary, because not all residents are currently supplied water by the City. Some of these residents live on property that has not been annexed and have private wells and those City residents north of Chinden Boulevard are served by the private water utility, SUEZ. The planned impact area at build-out encompasses 62 square miles, however it is anticipated that customers residing within this 2.5 square miles at the north end of the impact area will continue to be supplied water by SUEZ and not the City.

Most of the City is also served by home owner association's or irrigation district's non-potable irrigation systems. Currently approximately 18 percent of customers do not have non-potable irrigation, however that percentage continues to decrease as nearly all new customers are in areas with non-potable irrigation.

The City and water system are experiencing rapid growth and new infrastructure is regularly being added, including during the course of this WMP. This WMP represents the system as it was in the beginning of 2017. The system has approximately 550 miles of pipe and approximately 5,100 active fire hydrants. The City's system includes five pressure zones and has 23 existing groundwater wells, with two more starting construction during 2017. There are currently 27 pressure control vaults, three booster stations and two storage tanks. The current service area has five pressure zones and covers elevations ranging from approximately 2,520 to 2,760 feet above mean sea level. A map of the system is shown in Figure 1-1.



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City of Meridian Water Master Plan

Figure 1-1 Existing System

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1.3 Population and Demand Projections

The City has been growing rapidly, at approximately 4 percent additional service connections added annually over the past five years. The population projections reflect a similar average growth rate, with some decline in the average growth rate over the 20-year horizon. Demand projections are based on the 2016 average per capita demand, which is somewhat conservative, as per capita use has been declining. The City currently updates its Water Master Plan about every five years, which gives the opportunity to track the population and demand trends and update projections on a regular basis. The projected demands for the next 20 years were used to evaluate the hydraulic capacity of the system. Improvements are identified to serve growth in the system and are also driven by other factors such as distribution system limitations or water quality concerns. The actual timing of those improvements should be based primarily on when the system reaches certain demand thresholds versus specific predetermined timelines.

A per capita demand of 112 gallons per capita per day (gpcpd) was used in conjunction with future population to project overall demand over the next 20 years. Overall per capita demand is declining, from 147 gallons gpcpd in 2010 to 112 gpcpd for 2016. System projections for average day demand (ADD), maximum day demand (MDD) and peak hour demand (PHD) water demands in million gallons per day (mgd) are shown in Table 1-2. These values were calculated using population projections, average per capita demand, and average peaking factors. A peaking factor of 2 was used for ADD to MDD. A peaking factor of 3 was used for ADD to PHD. The demand within each pressure zone is identified in Table 1-3.

Table 1-2
Service Area Demand Projections

Year	Service Area Population Estimate	ADD (mgd)	MDD (mgd)	PHD (mgd)
2017	92,800	10.3	20.7	31.0
2022	111,100	12.4	24.8	37.2
2037	159,300	17.8	35.6	53.4

Table 1-3
Service Area Demand Projections by Pressure Zone

Zone	Demand	2017 (mgd)	2022 (mgd)	2037 (mgd)
1	ADD	0.4	1.1	2.5
	MDD	0.8	2.2	5.0
	PHD	1.2	3.3	7.5
2	ADD	5.9	6.4	7.9
	MDD	11.8	12.8	15.8
	PHD	17.7	19.2	23.7
3	ADD	2.4	2.7	3.2
	MDD	4.8	5.4	6.4
	PHD	7.2	8.1	9.6
4	ADD	1.6	2.0	3.3
	MDD	3.2	4.0	6.6
	PHD	4.8	6.0	9.9
5	ADD	0.02	0.2	0.9
	MDD	0.04	0.4	1.8
	PHD	0.06	0.6	2.7

1.4 Water Supply Analysis

To adequately plan for future water supply needs, multiple factors must be considered including: demand for water, the physical availability of water and the legal ability to divert water through the City's water rights.

The City has been proactive in planning for its water supply and considering the long-term needs and potential threats to the system. An update to the 2014 Water Supply Planning Report was completed to identify what actions the City should be considering now for the long-term viability of its water supply. There are number of ongoing issues from curtailment to surface water storage projects, to aquifer protection and treatment that the City should continue to monitor and evaluate. The City should also implement an intertie with Suez to have a redundant supply option during emergency conditions. This can benefit both the City and Suez.

As demonstrated by the City's current water rights portfolio and demand projections, the City has adequate water rights to serve demands for several years. The City should follow the recommendations discussed further in the section in order to protect current water rights and find opportunities to diversify their water rights portfolio. The City should also monitor the progress of the SUEZ Integrated Municipal Application Package (IMAP) and apply the knowledge gained to their own reasonably anticipated future needs (RAFN) application if appropriate. The system generally has adequate supply, backup power, storage, and pumping capacity to meet system-wide needs in the near-term and in most instances through the 20-year horizon. This provides flexibility in how the City continues to meet growing demands across the system. However, particularly to meet the demand in Zones 1 and 2 and avoid needing to convey water

from high zones to lower zones on a regular basis, a combination of additional backup power, well supply, storage, and booster pumping capacity will be needed in Zones 1 and 2. Given the robust transmission grid and ability to convey from other zones through PRVs, these needs can be addressed over time and with a combination of solutions. As the City continues to experience rapid growth, a two-well buffer should be maintained above the firm capacity requirement. This is particularly important given some of the water quality issues it has experienced and may continue to experience. It also allows for flexibility when other operations or maintenance issues to arise.

1.5 Distribution System Analysis

A detailed system analysis was performed to assess the ability of the City's existing distribution system to provide water for domestic demands and emergency fire suppression. The analysis was also conducted to determine system improvements for anticipated future water demands and fire flows for the 5-year and 20-year planning horizons compared to regulatory and industry criteria.

Overall the City's system is robust and provides service that meets the established criteria. There are a few locations with fire flow deficiencies that can be addressed by various solutions, including upsizing pipe, utilizing hydrants on nearby large diameter mains, or moving hydrants and services to higher pressure zones. There are a number of 6-inch diameter pipes in the system that do not meet the City's current standards and result in velocity issues under fire flow conditions. These pipes should be replaced as part of the City's pipe replacement program. The City system is relatively new and has been built over a relatively short period of time. As a result, it is recommended that in the near future the City look into researching its current water infrastructure and develop a plan that addresses financial and physical replacement. Increased investment will be required to reduce the City's current 700 year replacement rate. The City will also need to construct additional wells to meet demand as the system grows to provide adequate supply and avoid the inefficiencies of conveying flow between pressure zones.

1.6 Water Quality and Regulations

The City's water system relies solely on groundwater as its source of supply. Generally, the quality of the groundwater is good. All current actively used City wells comply with the primary drinking water standards.

The City's primary area of concern with the National Primary Drinking Water Regulations (NPDWR) is radionuclides. Uranium is present in several wells and is over the maximum contaminant level in two wells. The City uses numerous strategies to address uranium contamination including: abandonment and redrilling, installing well screen liners, blending, additional monitoring, utilizing multi-level test wells, and when needed transitioning wells to emergency use only. The City also maintains at least two wells beyond the minimum supply requirements to ensure adequate service should water quality issues arise at wells the City typically relies on to meet demand.

The City's National Secondary Drinking Water Regulations (NSDWR) quality issues mainly revolve around iron, manganese, ammonia and sulfide. Although these do not pose a health risk and are

not required to be addressed, the City actively seeks to improve aesthetic quality. They have done this by installing treatment, using multi-level test wells to select higher quality source water locations when possible, and experimenting with aquifer conditioning, which at this point has proven unsuccessful.

The Contaminant Candidate List does not have a direct impact on the City's water system, since they do not currently impose any requirement on public water systems. However, the Environmental Protection Agency may promulgate future regulations based on the listed contaminants, so the City should stay aware of potential future regulations.

Overall, the City has a plentiful, high quality water source that it manages to address uranium and aesthetic issues. It communicates the quality of water in the system to customers through its annual Consumer Confidence Report. As the City continues to grow and requires additional source water, using test wells to identify the most preferable parts of the aquifer will be useful in obtaining the highest quality groundwater. Also, continuing to use techniques such as treatment and blending will be important to provide high quality water to customers. The City should continue to remain vigilant and actively involved in protecting its source water through ongoing work with IDWR to maintain adequate drilling and abandonment practices for private wells thereby reducing the chances for aquifer contamination.

1.7 Operations and Maintenance

A summary of operations and maintenance benchmarking compared the City to eight similar regional utilities was conducted. The benchmark Operations and Maintenance (O&M) information provides the City with a comparison of staffing, budgets, rates, and other system characteristics as needed when considering its operations and funding levels.

The City has formal programs for most operations and maintenance activities in the system. The City should continue to improve documentation for these programs and expand on them as the system grows and staffing allows. The City has piloted a Unidirectional Flushing Program for part of the system and should expand it, along with the necessary resources to cover the entire system, as water treatment is implemented to assist in improving water quality and disinfection control. Consideration should also be given to implementing and staffing a formal supervisory control and data acquisition (SCADA) Program at the Public Works Department level that could incorporate wastewater and water data. The City should also consider fully implementing an Automated Meter Infrastructure (AMI) Program by accelerating the number of new endpoints installed and constructing the necessary communications towers and having a plan for data collection and storage. AMI would allow the City to increase operational efficiency and provide greater information to customers about use and reduce staffing time spent on activating and shutting off meters by having these done remotely, rather than requiring personnel in the field. The City should decide how much construction work it wants to complete internally versus through contractors. This would be particularly important if the City increases the amount of pipe that is replaced each year. If the City implemented a full-time in-house construction crew with adequate equipment,

they could consistently work on larger projects that are currently contracted out, without being interrupted to respond to repairs or other O&M activities.

As the City ages and expands its O&M programs, such as unidirectional flushing, it will need to evaluate adding staff and funding to meet requirements. Including a larger Water Division facility in the future to support the additional staff and equipment required to serve a larger system. Additional study will be needed to determine the size and configuration of the facility required to serve the Water Division's needs into the future. Although it brings challenges, the rapid growth the City has experienced means the infrastructure is relatively new. The City is doing a good job of maintaining its system but will need to consider increased ongoing maintenance requirements and the necessary staffing and funding to support the system as it ages, particularly if growth continues at its recent pace.

1.8 Capital Improvements Program

The City has developed a very robust water system, which provides good supply, transmission, and distribution capability and overall redundancy. As a result, there are relatively few areas that do not meet Idaho Department of Environmental Quality requirements over the 20-year planning horizon. This allows the City to focus on projects to upsize substandard size pipe and complete projects that will continue to maintain redundancy and flexibility within the system, particularly in terms of supply. The parameters of a formal pipe replacement program are being evaluated internally and may result in additional funding requirements to increase the replacement rate above the current level. Projects are divided into two timeframes, the 5-Year and 6-20-Year. Approximately $21.4 million in projects are scheduled through 2022. Projects and their associated costs are shown in Table 1-4.

Table 1-4
Capital Improvement Projects

Project	5-Year CIP[1]	6-20 Year CIP[1]	Total
Water Main Extensions	$5,000,000	$4,700,000	$9,700,000
Water Main Replacement	$3,800,000	$12,000,000	$15,800,000
Well 15 Condition Rebuild	$300,000	-	$300,000
Well 11 Condition Rebuild	$500,000	$600,000	$1,100,000
Well 9 Reconstruction	$1,200,000	-	$1,200,000
New Well 32 - Biltmore	$900,000	-	$900,000
New Well 33 - Bridgetower	$1,550,000	-	$1,550,000
Additional Well 23B Blending Well	$380,000	$300,000	$680,000
New Well 34 - Autumn Faire	-	$1,550,000	$1,550,000
Well 35 and Treatment, Victory Reservoir	$450,000	$2,200,000	$2,650,000
Well 36, Zone 5 (Park)	-	$1,550,000	$1,550,000
Well 10B Water Treatment	$1,600,000	-	$1,600,000
Well 17 Water Treatment	$800,000	$800,000	$1,600,000
Well 22 Water Treatment	$900,000	-	$900,000
Well 28 Water Treatment	$1,600,000	-	$1,600,000
Well 31 Water Treatment	$900,000	-	$900,000
Well 32 Water Treatment	-	$1,600,000	$1,600,000
New 3 MG Ground Reservoir #3 and Booster Station	-	$6,100,000	$6,100,000
New 3 MG Ground Reservoir #4 and Booster Station	-	$6,100,000	$6,100,000
Water Division Facility	-	$5,900,000	$5,900,000
Water Master Plan Updates	-	$900,000	$900,000
SCADA Control and Telemetry Upgrades	$500,000	$1,900,000	$2,400,000
Water Rights Acquisition	$1,000,000	-	$1,000,000
TOTAL	$21,380,000	$46,200,000	$67,580,000

Note:
1. Costs are in 2018 dollars

1.9 Financial Review

Overall, as noted in several WMP sections, the City has been extremely proactive in maintaining their water system and consistently provides a high level of service to their customers. The City evaluates their financial status regularly to ensure there is adequate funding to implement the CIP and no rate increases are necessary to cover the 5-year CIP identified. One area that the current projections do not address is an ongoing, long-term replacement plan for water mains. To adequately fund such an effort, other funding approaches or rate design changes will need to be

explored to insure proper funding levels can be reached to accommodate whatever strategy the City decides to pursue.

1.10 Summary and Overall WMP Recommendations

This WMP constituted a significant investment of time for City staff and provides a valuable resource for how to continue providing adequate quantity and quality water to the system's customers. This WMP utilized State and industry standards to identify system deficiencies and recommended improvement projects. The system is quite new and robust with very few deficiencies. The City is doing a good job of addressing the continual adjustments needed to support rapid system growth and should continue to be forward looking and in particular develop a plan for a long term pipe replacement program. Capital projects have been identified and phased over the next 20 years that will enable the City to continue meeting required standards and providing quality water to its customers.

As a result of this WMP, the following recommendations are made:

- Continue to be proactive in planning for water supply and considering the long-term needs of the system and potential threats to the system
- Continue pipe replacement and establish a formal replacement program
- Continue to research and use techniques such as treatment and blending to provide high quality water to customers
- As the City continues to experience rapid growth it should maintain at least a two-well buffer above the firm capacity requirement to maintain adequate supply and to mitigate for unexpected water quality or operational issues.
- Construct additional wells to meet demand as the system grows to provide adequate supply and avoid the inefficiencies of conveying flow between pressure zones, particularly in Zones 1 and 2.
- Evaluate adding staff and increasing funding to address regulatory and operations requirements as the system continues to grow