Water Master Plan

City of Meridian

February 2025 | Project No. 222269

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CHAPTER 1 - EXECUTIVE SUMMARY

Water master planning is an important recurring task for a public water system as it assists in reassessing needs and priorities, properly allocating budgets to address system deficiencies, and planning for future growth. The City of Meridian (City) last completed an update to its water master plan (WMP) in 2018, and contracted with Keller Associates, Inc. (Keller) in 2023 to perform this subsequent update. Since work began in 2023, analysis of system supply and demand is based on data collected through the end of calendar year 2022. This report was commissioned by the City in an effort to assess the current state of the water system and plan for future needs. It is generally recommended to update a WMP every 5-7 years. This study was funded by the City.

1.1. EXISTING WATER SYSTEM

The City owns and operates a potable water system which serves approximately 130,000 people within their service area as of 2023. The water system consists of 25 wells, two storage tanks, three booster stations, five pressure zones, and almost 700 miles of distribution pipeline. A schematic of the City's water system showing wells, tanks, booster stations, pressure zones, and water control valves (WCVs) is illustrated in Figure 1-1 and a map is provided in Figure 1-2.

The 25 wells have a total pumping capacity of 37,900 gpm and the majority of them have dedicated standby power. Water treatment at all of the wells consists of disinfection, and about half of the wells have treatment for iron and manganese which are secondary contaminants and only result in aesthetic concerns. The five pressures zones are separated by closed valves and WCVs. Each of the zone's target hydraulic grade lines (HGL) are 50 feet apart from each other and range from 2,700 feet in Zone 1 to 2,900 feet in Zone 5. The Ustick Booster Station and Victory Booster Station pump directly out of ground-level storage tanks into their respective zones. The Blackrock Booster Station pumps directly from Zone 4 into Zone 5 and is not used to meet day-to-day demands. The City's two storage tanks; the Ustick Tank in Zone 2 and the Victory Tank in Zone 4 each have a nominal capacity of 2.0 million gallons (MG). The Ustick Tank is made of concrete and the Victory Tank is made of welded steel. Of the approximately 700 miles of distribution pipe, nearly 98% is of PVC material and relatively new pipe. The majority of the pipes are 8-inches and 12-inches in diameter.

FIGURE 1-1: WATER SYSTEM SCHEMATIC

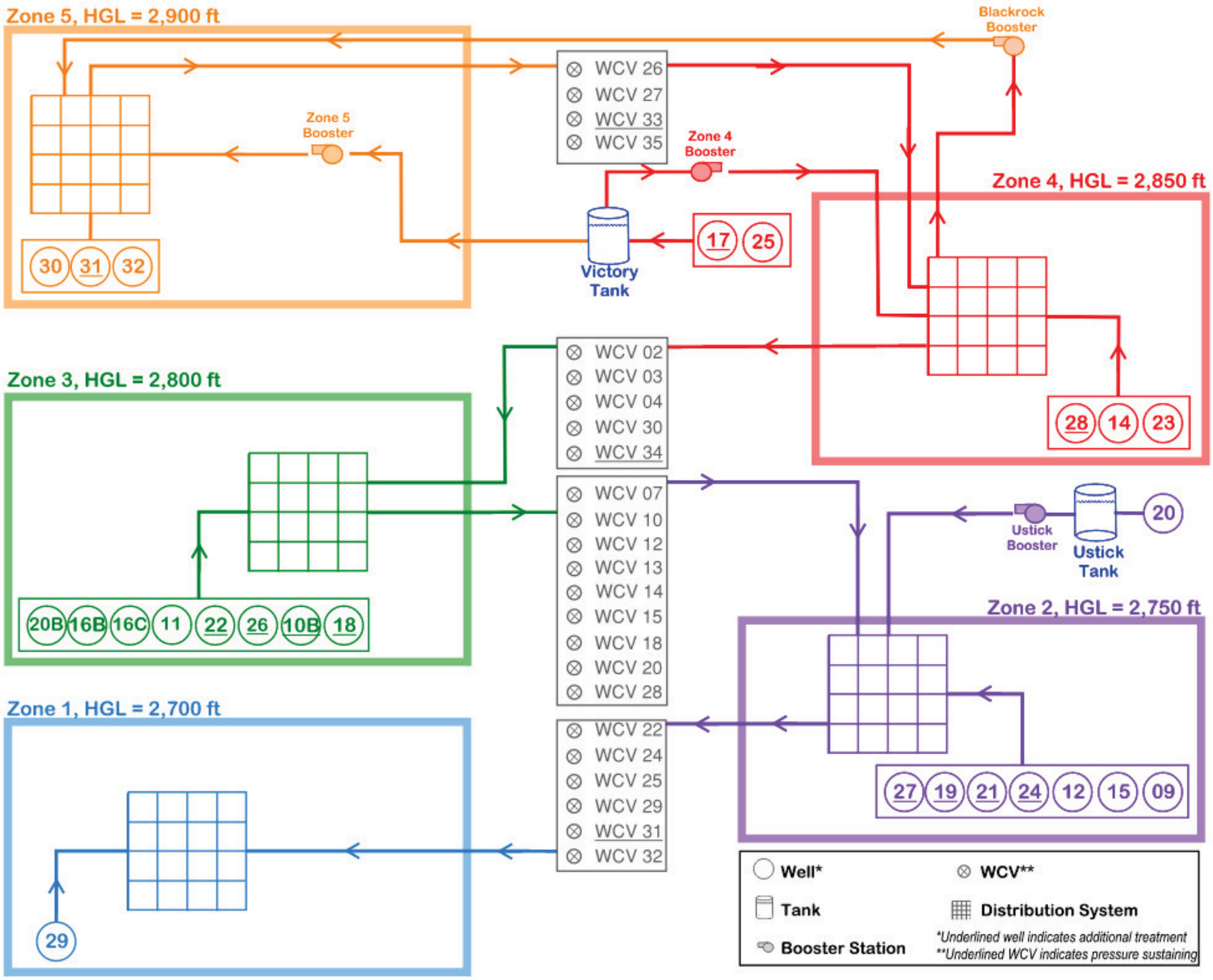
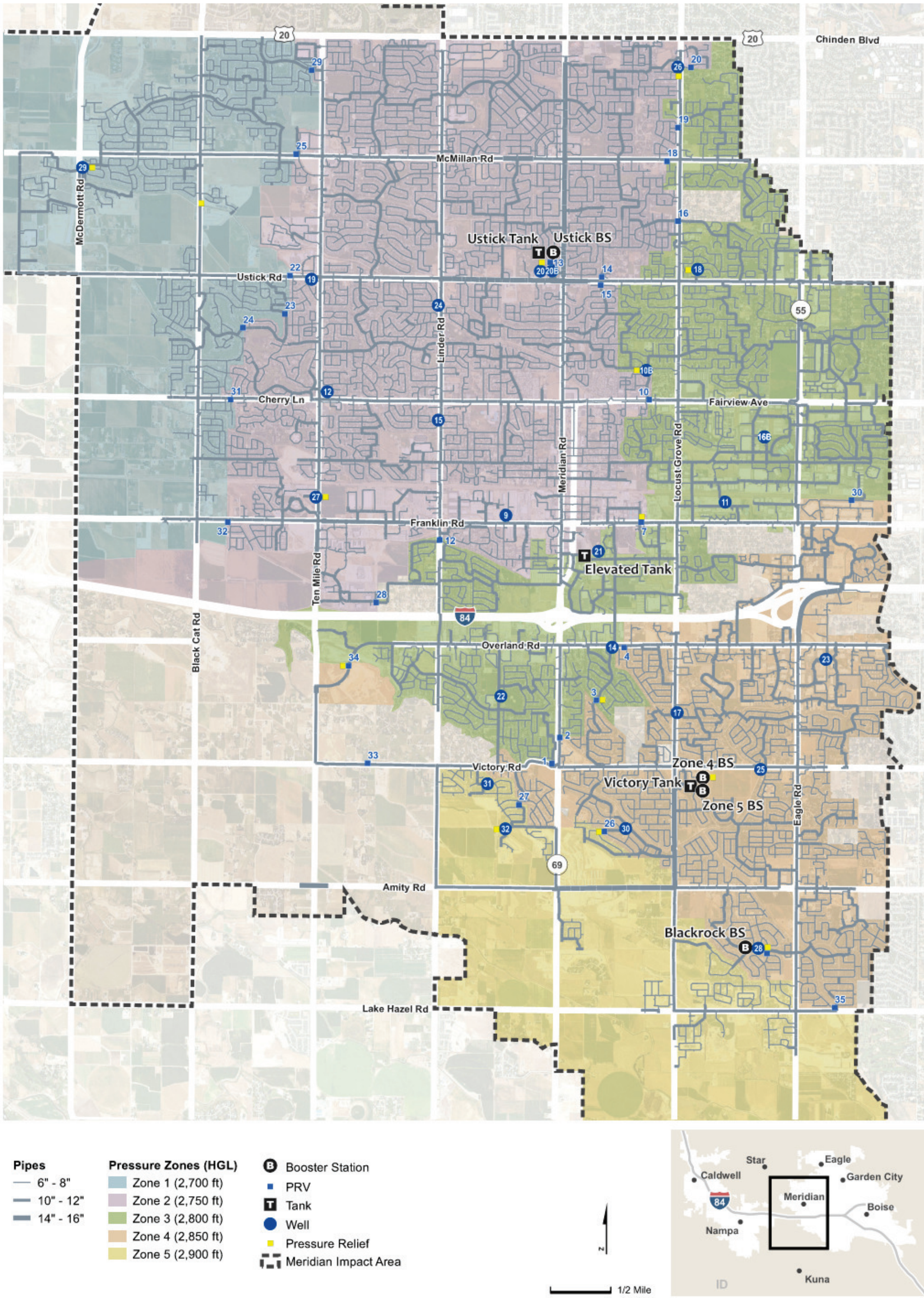


FIGURE 1-2: WATER SYSTEM MAP



1.2. STUDY AREA AND DEMOGRAPHICS

The City of Meridian consists of approximately 23,500 acres within its City limits and a total of 38,300 acres within its impact area. The study area is illustrated in Figure 1-3.

This study evaluated the water system under four different planning periods: the existing (2023), 5-year (2028), 20-year (2043), and build-out planning periods. Population and job projections were established for each of these planning periods using Community Planning Association of Southwest Idaho (COMPASS) traffic analysis zone (TAZ) data and based on the future household densities from the City's future land use map. The population and job projections are summarized in Figure 1-4 and Figure 1-5. The rate at which the City will reach a build-out population was uncertain and therefore two average annual growth rates (AAGRs) were considered in this study.

FIGURE 1-3: STUDY AREA

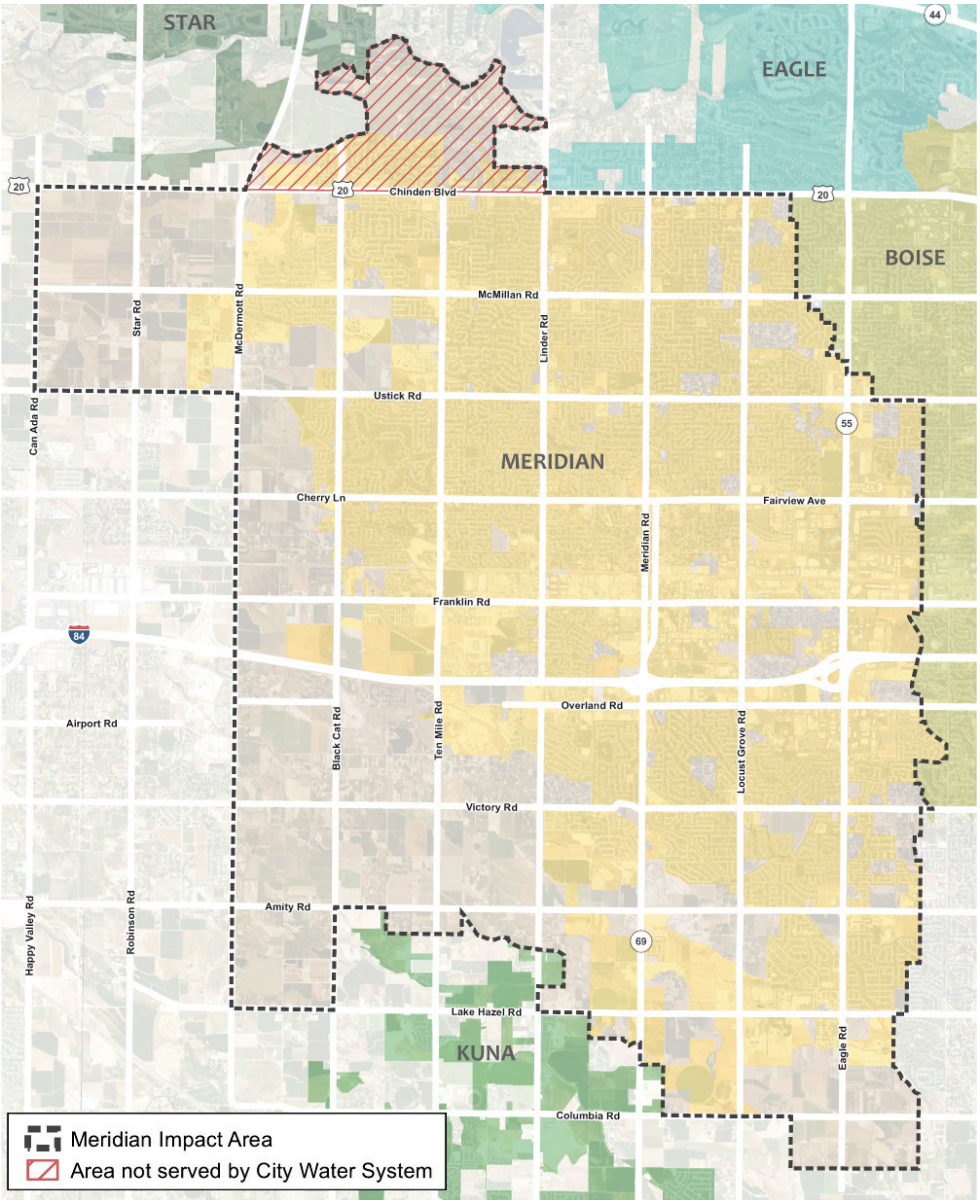


FIGURE 1-4: POPULATION PROJECTIONS

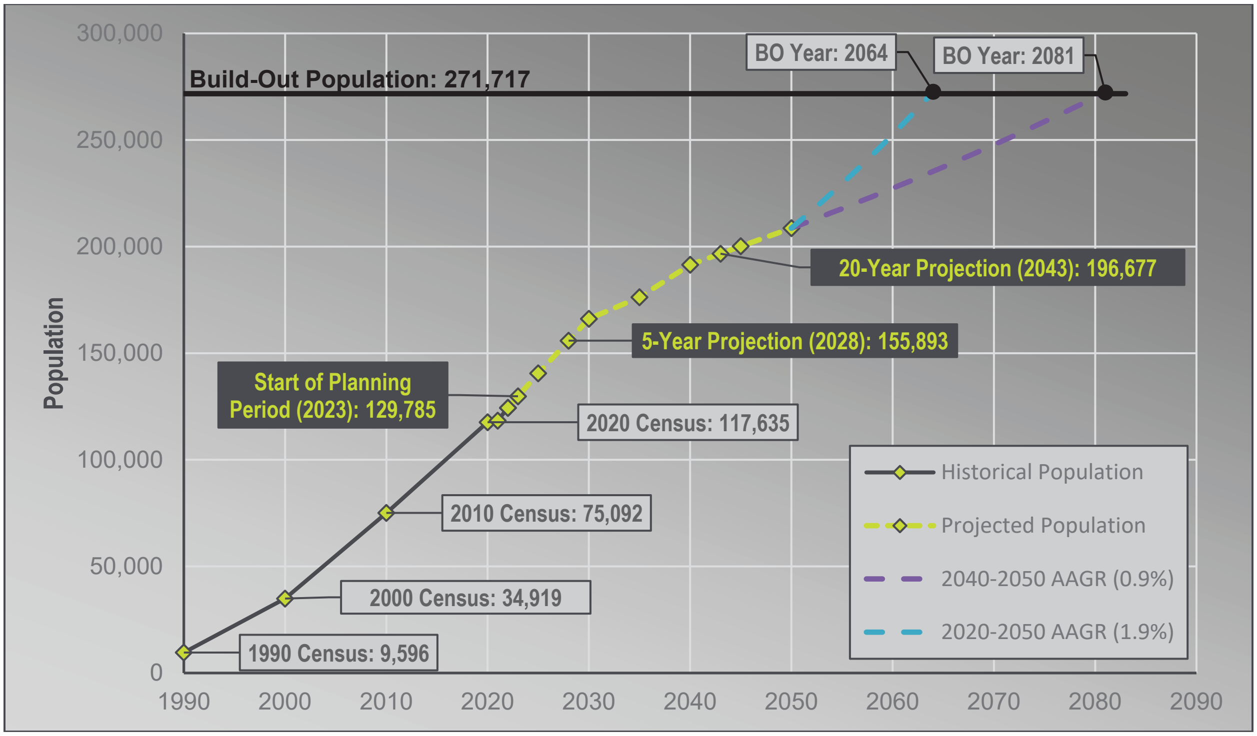
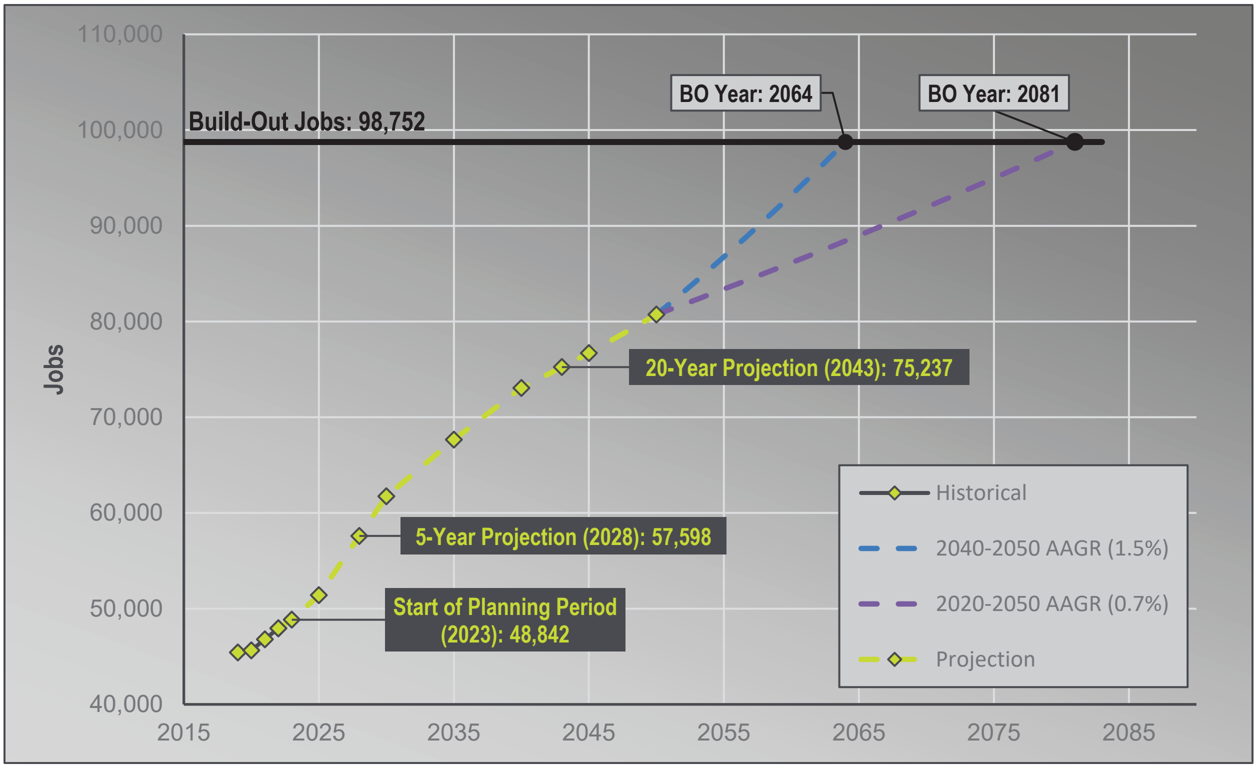


FIGURE 1-5: JOB PROJECTIONS



1.3. HISTORICAL AND PROJECTED WATER DEMANDS

1.3.1. Water Production

Historical water production data was reviewed to establish planning demands for various demand scenarios. Historical water production was also used to establish planning demands per capita and per job which were used to project water demands for the future scenarios.

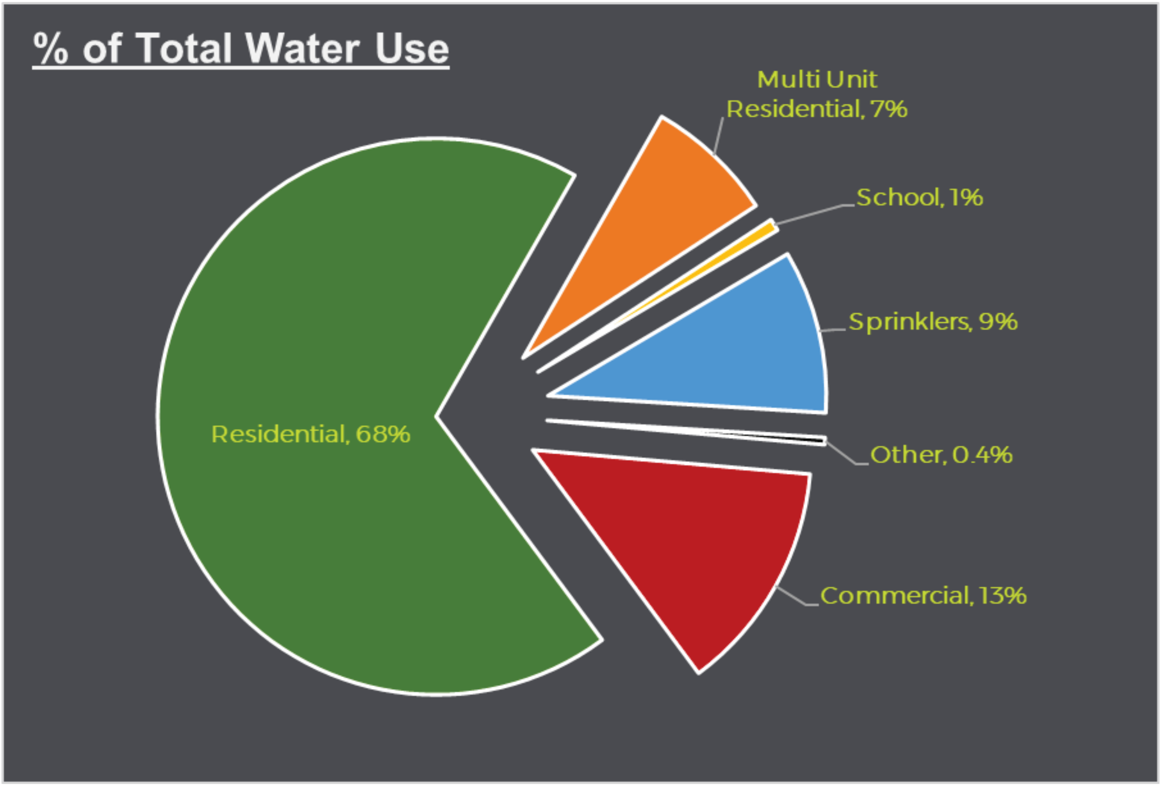
The water demands increase during the summer months beginning in April and ending in October, which is typical for a potable water system. In comparison to other water systems in Idaho, Meridian has a low demand per capita due to the presence of separate irrigation systems throughout the service area. These separate irrigation systems utilize surface water delivered by various irrigation districts within the City which reduces the amount of water used from the City's potable system. The demand per capita has decreased since the 2018 WMP, likely due to new developments being required to construct separate irrigation systems, however there are some areas within the City which use potable water for irrigation. These areas either developed prior to the separate irrigation system requirement, or do not have access to surface water for irrigation.

Supervisory control and data acquisition (SCADA) data was reviewed for the peak weeks from 2021 and 2022 to develop a diurnal curve which shows how the water system demands vary throughout a 24-hour period.

1.3.2. Water Use

Over 90% of the City's connections are residential or multi-unit residential connections but they only account for approximately 75% of the annual water use by volume. The City's water use by customer class is illustrated in Figure 1-6. The largest users in the system are medical facilities, water parks, car washes, and irrigation sprinkler systems.

FIGURE 1-6: WATER USE BY CUSTOMER CLASS

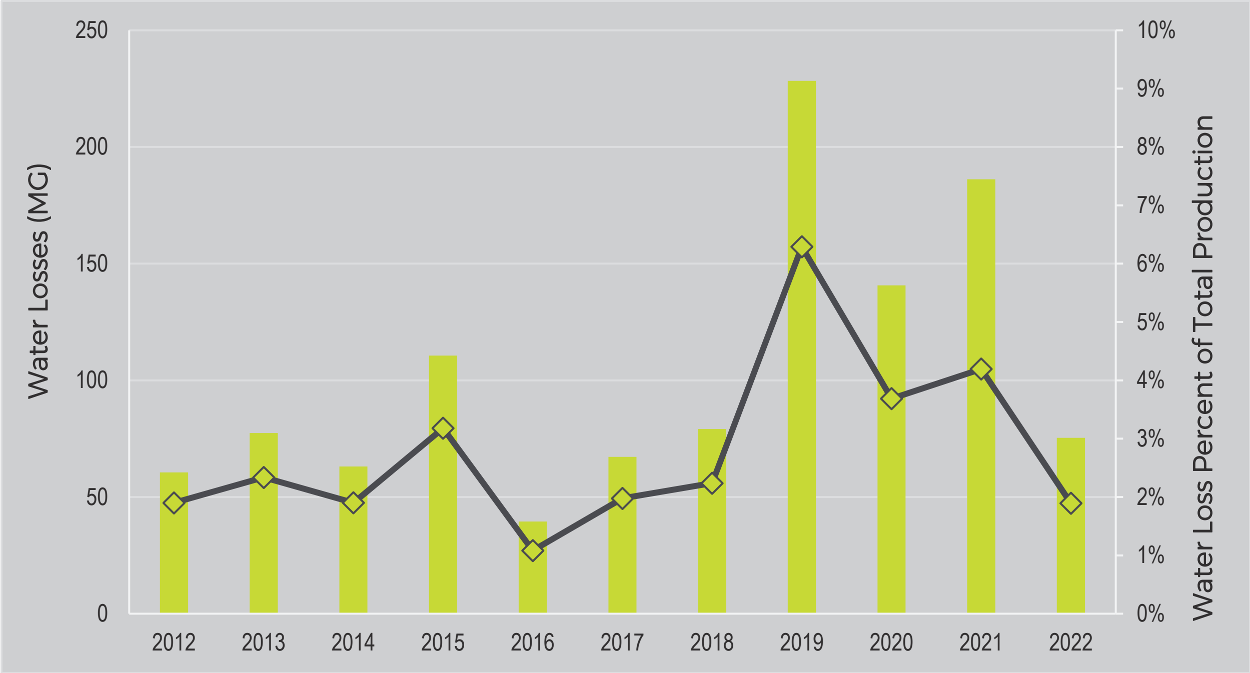


1.3.3. Water Audit

The City maintains a very watertight system and keeps detailed records of water production, billed authorized use (primarily metered usage), and unbilled authorized use (including fire department usage, flushing, construction water, etc.).

Figure 1-7 summarizes the water loss from the previous 11 years. The percentage of unauthorized water usage averages less than 5% of the systemwide production in the last 11 years due to the City's detailed record keeping and the integrity of the water system. The Unavoidable Annual Real Losses (UARL) was calculated to be 278 million gallons (MG) in 2022 utilizing the American Water Works Association (AWWA) M36: Water Audit and Loss Control Software. This UARL provides a starting point for the minimum amount of waterloss a utility should target based on their systems size, operating pressure, and connection types. Comparing the City's water loss in 2022 of 75 MG to the calculated UARL, shows that the City's water loss is approximately 27% of the UARL, indicating that the City is significantly below the AWWA standard for water loss.

FIGURE 1-7: WATER LOSSES SUMMARY



1.3.4. Future Water Demands

Future water demands were calculated based on the projected population and job growth and the historical water production and use. The demand criteria used to project future demands are presented in Table 1-1 and the resulting systemwide demands are summarized in Table 1-2.

TABLE 1-1: DEMAND PLANNING CRITERIA

Demand Scenario	Peaking Factor[1]	Total per Capita Planning Criteria (gpcd)[4]	Residential Component (gpcd)[2,4]	Non-Residential Component (gpjd)[3,4]
ADD	1.00	92	70	59
ASD	1.60	147	112	94
AWD	0.66	61	46	39
Max Month	1.78	163	124	104
MDD	1.90	175	133	112
PHD	2.94	270	205	173

1) Equal to the ADD divided by the given demand scenario.

2) Based on 76% of 2021 & 2022 water use classified as residential or multi-family residential.

3) Calculated as percent of non-residential use (24%) of total ADD divided by number of 2023 jobs (48,886). Includes sprinkler accounts.

4) gpcd = gallons per capita per day; gpjd = gallons per job per day

TABLE 1-2: PROJECTED WATER DEMANDS

	2023	2028	2043	Build-Out
Population	129,785	155,893	196,677	271,717
Jobs	48,842	57,598	75,237	98,752
Systemwide Demands (gpm)[1]				
ADD	8,278	9,900	12,595	17,189
ASD	13,275	15,876	20,197	27,564
AWD	5,498	6,574	8,364	11,415
Max Month	14,712	17,595	22,384	30,548
MDD	15,767	18,856	23,988	32,738
PHD	24,371	29,145	37,079	50,603

1) Forecasted demands based gpcd and gpjd criteria established in Table 3-7.

1.4. WATER SYSTEM PLANNING CRITERIA

A summary of the planning criteria used to evaluate the water system in this study is presented in Table 1-3. The criteria were developed based on input from the City Engineering and Fire Departments as well as based on industry standards and to meet or exceed Idaho Code (Idaho Administrative Procedure Act (IDAPA)) Rules for Public Drinking Water Systems requirements.

TABLE 1-3: SYSTEM PLANNING CRITERIA

Criteria	Value	Units	Comments
Distribution System Criteria			
Residential FF Demand	1,500	gpm	Based on input from the City fire department
Residential FF Duration	2	hours	Based on input from the City fire department
Commercial FF Demand	2,500	gpm	Also includes multi-family
Commercial FF Duration	3	hours	
Max Fire Flow Demands	2,500 - 3,500 gpm	gpm	Based on input from the City fire department
Max Fire Flow Duration	3	hours	Based on input from the City fire department
ADD Minimum Pressure	55	psi	City's design standards
PHD Minimum Pressure	45	psi	City's target pressure, but not less than 40 psi
MDD + FF Minimum Residual Pressure	20	psi	DEQ requirement and industry standard
Max Pressure	100	psi	Pressures constantly above 80 psi should have individual pressure regulators
ADD Max Pipe Velocity	5	fps	
PHD & FF Max Pipe Velocity	10	fps	
Fire Hydrant Spacing	300 to 1,000	feet	Depends on land use
Water Supply Criteria			
Systemwide Supply Capacity	Meet MDD w/ firm capacity	n/a	Additionally, a surplus of 2 wells ahead of this criteria
Pressure Zone Supply Capacity	Meet Zone MDD w/ firm capacity	n/a	City's goal
Pressure Zone Delivery Capacity	Meet larger of PHD or MDD+FF w/ firm capacity		City's goal
Target Supply with Backup Power Only	ADD+Fire Flow	n/a	IDAPA 58.01.08
Storage Criteria			
Operational Storage	10% of overall storage	-	Typical industry value
Peaking Storage	Use Diurnal Curve	gallons	Calculated as difference between MDD & PHD on the diurnal curve.
Fire Storage	540,000	gallons	3,000 gpm for 3 hours (max FF demand & duration)
Emergency/Standby Storage	None	gallons	No standby storage needed due to supply redundancy

1.5. WATER SYSTEM CAPACITY ANALYSIS

An analysis of the water system supply, delivery, and storage was completed using the criteria outlined in Table 1-3. It should be noted that these analyses only consider the reported pumping capacities and projected demands and do not account for the spatial allocation of demands, sources, or inter-zone connections. In general, the analyses looked at each pressure zone as an isolated system and assumed no supplemental flow from WCVs in higher zones. This was done to simplify the system and to be conservative in the analyses; however, the City has a much higher actual capacity as transfer between the zones is possible. A summary of the recommended additional supply, delivery, and storage improvements is provided in Table 1-4. The proposed Reservoir 3 and Reservoir 4 were assumed to be 2.0 MG each.

TABLE 1-4: RECOMMENDED SUPPLY AND DELIVERY SOURCES

Source Name	Zone	Added Capacity (gpm)	Earliest Year[1]	Latest Year[1]
Well 29 Upsize[2]	1	1,500	2024	2025
Well 34	1	1,500	2024	2026
Reservoir 3 and Supply Well	1	1,500	2024	2040
Reservoir 3 and Booster Station Z1	1	3,000	2024	2040
Grand Lake Well	1	1,500	2024	2058
McMillan Well	1	1,500	2050	2064
Franklin Well	1	1,500	2060	2064
Well 33	2	1,500	2029	2041
Reservoir 3 and Booster Station Z2[3]	2	1,400	2029	2040
Replace Well 11[4]	3	700	2030	
Overland Well[5]	4.2	1,500	2043	
Ten Mile Well	4.2	1,500	2059	
Black Cat Well[6]	4.2	1,500	Buildout	
Rawson Well[6]	4.2	1,500	Buildout	
Upsize Well 30 or 31[2]	5	1,000	2028	
Reservoir 4 and Supply Well	5	1,500	2044	
Reservoir 4 and Booster Station	5	3,000	2044	
Columbia Well	5	1,500	2057	

1) Earliest and latest years are based on which alternative is used for the Zone 1 and Zone 2 evaluation. In general the earliest year is associated with Alternative 1 and the latest year is associated with Alternative 3. See Chapter 4 for additional details.

2) Equal to added capacity once well is upsized.

3) Once Reservoir 3 is constructed, Well 19 will pump directly to this tank. The added capacity is equal to the booster station capacity dedicated to Zone 2 (3,000 gpm) minus Well 19's capacity (1,600 gpm).

4) Well 11 replacement driven by conditions and need to replace aging infrastructure. Assumed capacity to increase from 800 gpm to 1,500 gpm.

5) Well is not needed until 2048 based on delivery analysis, but the hydraulic modeling indicates the need for this well sooner as demands in Zone 4.2 increase.

6) Well is not required based on supply analysis, but hydraulic modeling indicates the need for additional sources in Zone 4.2 due to lack of distribution from Zone 4.

1.6. HYDRAULIC MODEL EVALUATION

The City's existing hydraulic model was updated in order to complete a hydraulic evaluation of the existing and future system. The update consisted of re-allocating demands, updating pump characteristics, updating system controls, and calibrating to recent hydrant testing data. The updated model was used to evaluate the system under existing demands. Future water demands, additional transmission piping, and the proposed supply and delivery sources from Table 1-4 were added to the model to simulate future conditions. The future conditions model was used to identify any additional deficiencies and recommendations.

A summary of the existing system deficiencies, which resulted in recommendations for capital improvement projects, are listed below. There were few deficiencies identified and the water distribution system is in good condition with sufficient redundancy. More deficiencies will be encountered in the future if the recommended supply, storage, and delivery recommendations provided in Table 1-4 are not implemented.

- Available fire flow near 2 ½ Street is less than 1,500 gpm at 20 psi. Recommend looping the dead-end line to improve available fire flow.
- System pressures at ADD in a portion of the southeast part of Zone 2 are below 55 psi. Although this area meets regulatory requirements for pressure, it is considered deficient by Meridian design standards. Recommend modifying Zone 2 / Zone 3 boundary to move this area into Zone 3.
- System pressures at ADD in a portion of the southeast part of Zone 5 are approaching 55 psi. Without a change, additional development in this area will fall below 55 psi at ADD. Recommend creating a new pressure zone (Zone 6) by constructing a new booster station. Fire flow can be met by installing check valves which will open from Zone 5 in the event of a fire.

1.7. WATER QUALITY

In general, the water quality of the City's wells is good. There are some naturally occurring low levels of uranium, iron, and manganese that the City is actively addressing. A summary of the recommendations for additional water quality and treatment suggestions are provided below.

- Lead - The City has not identified any lead service lines and the lead concentrations have not exceeded the maximum contaminant limit (MCL). The City should continue to monitor for lead within the distribution system and at service connections. No additional treatment improvements are recommended for lead at this time. Also, the City is prepared for corrosion control if ever required in the future due to new water sources. The City’s CCT study provides recommendations for this if needed.
- Iron and Manganese - It is recommended that the City continue implementing the chemical oxidation and pressure filtration treatment process at wells with higher concentrations of iron and manganese. This practice is deemed as a cost-effective approach with successful removal rates of iron and manganese. This process has been successful and is familiar to the City’s operations staff. All new sources were assumed to have water quality treatment facilities as part of this study; associated costs are provided in the capital improvement plan (CIP). However, the City should continue to evaluate the need for treatment based on new test well data as it is obtained.
- Ammonia – Several of the City’s wells have elevated concentrations of ammonia present. The main areas impacted by these wells include Zone 3 south of Interstate 84 and the southern part of Zone 2 along Linder Road. The City reported the taste and odor associated with the ammonia is improved by exposing the raw water to atmosphere before distribution. It is recommended to pump these wells directly to a tank, if possible, to improve the taste and odor. For wells that are not near an existing tank, it is recommended that a small tank with aeration is constructed at the well site with a booster pump to re-pressurize the water into the distribution system. This approach has been piloted in small scale, but will be tested at full scale with the transmission line from Well 17 to the Victory Tank. Prior to moving forward with the smaller storage tanks at wells not near larger system tanks, the City should check that the Well 17 pumping to the Victory Tank is effective at reducing the ammonia.
- Disinfection and Disinfection Byproducts – The City does not have concerns regarding disinfection byproducts, primarily because their system relies on groundwater and the majority of wells do not have a background organic content to react with the chlorine and form DBPs. Well 22 and 31 have some organic content and have the potential to produce DBPs. The City should continue to monitor for DBPs as required, but is not likely a concern at this time. Regarding water age, it is recommended that the City adjust operational setpoints during lower demand periods to reduce water age in the system, specifically in the storage tanks. The City should consider taking chlorine residual samples within the northeast area of Zone 2 where the water age is anticipated to be the oldest.

- Uranium - It is recommended that the City continue implementing their blending and controls strategies for wells with higher uranium concentrations as this strategy is working well to meet current regulatory requirements. The City is in the process of constructing dedicated supply lines from Well 17 and Well 25 to fill the Victory Tank which will allow the City to better blend these sources. Future storage tanks will provide additional flexibility for blending sources if dedicated supply lines are constructed. The City should reconsider uranium treatment processes if blending and control strategies are not effective at maintaining uranium concentrations below the MCL in the future.

- Per- and Polyfluoroalkyl Substances (PFAS) - PFAS is a newly regulated contaminant in the water industry. At the writing of this report the City has completed sampling, and concentrations have been below the MCL. It is not anticipated that the City will need to implement any PFAS treatment technologies. While many treatment technologies are being developed, in general, the most widely implemented process for PFAS removal is GAC.

1.8. OPERATIONS AND MAINTENANCE

The City's current operations and maintenance (O&M) practices were documented and compared to industry standards. The City's current O&M practices are in line with industry standards. The Water Division's staffing levels were also documented and compared to other utilities in the northwest. In summary, the City's water system is rapidly growing which results in more assets to maintain and longer travel times to complete the target activities. The Water Division is also implementing new technologies which will provide improved efficiency for some tasks. For example, they are currently in the process of converting to AMI water meters which will eliminate the need to drive-by connections to get meter usage data. While this reduces efforts for meter reading, the improved technology has new capabilities such as flagging accounts with meter leakage or atypical usage. The amount of time spent responding to new problem areas and customer complaints could increase as a result of this. The capital improvement plan for the potable water system will add new facilities which the Division must operate and maintain including wells, booster stations, and storage tanks. Additionally, development driven pipelines will be constructed adding to the total length of pipe to maintain in the system.

Ultimately, FTE should be added incrementally based on the needs specific to the City's water system. Priorities and activities may change over time and reallocation of staffing may be necessary to meet the changing system needs. For example, if new development slows down, the utility locate demand will be reduced and those staff can assist with other O&M activities. Based on the analysis included in this master plan, the Water Division could benefit from additional staffing to better meet the level of service goals. Considerations for covering employees taking time off should also be considered.

1.9. CAPITAL IMPROVEMENT PLAN (CIP)

Table 1-5 summarizes proposed capital improvement projects, their goal, and anticipated project cost and Figure 1-8 shows their location. The 10-year capital improvement plan schedule is provided in Table 1-6.

TABLE 1-5: CAPITAL IMPROVEMENT PROJECT SUMMARY

Project ID	Project Name	Project Purpose	Total Estimated Cost (2024 Dollars)[1]	Report Reference
Priority 1 Improvements (2024-2028)				
1.1	Well 10B Water Treatment	Project in progress	N/A	N/A
1.2	Construct Well 34	Project in progress	N/A	Section 4.4.1
1.3	Well 24 Water Treatment	Improve water quality	$4,310,000	Section 6.3
1.4	2-1/2 Street Looping	Fire flow below 1,500 gpm	$150,000	Section 5.2.3
1.5	Replace Well 11	Replace aged infrastructure	$5,640,000	Section 4.4.2
1.6	Well 25 Pump Upgrade and Transmission to Victory Tank	Improve water quality	$2,010,000	Section 6.9
1.7	Well 30 Upsize	Water supply and delivery	$793,000	Section 4.4.4
1.8	Victory Booster Jockey Pump Upgrade	City CIP	$190,000	Section 8.6
1.9	Fire Hydrant Additions	Improve fire hydrant spacing	N/A	Section 8.5
		Total Priority 1 Improvements (rounded)	**$13,093,000**	
Priority 2 Improvements (2029-2035)				
2.1	Well 32 Water Quality Improvement	Improve water quality	$5,580,000	Section 6.3
2.2	Water Administration and Operations Building	City CIP	$6,300,000	Section 8.5
2.3	Construct Well 33	Water supply and delivery	$6,980,000	Section 4.4.1
2.4	New Test Well 12	Aging infrastructure	$1,030,000	Section 4.4.1
2.5	Water Master Plan Update	Recommended timeline	$400,000	Section 8.6
2.6	Well 22 Water Quality Improvement	Improve water quality	$1,340,000	Section 6.8.1
2.7	Pressure Zone 2 Modification	Low operating pressures	$290,000	Section 5.7.1
2.8	Zone 6 Booster Station	Low operating pressures	$2,940,000	Section 5.7.3
2.9	Well 31 Water Quality Improvement	Improve water quality	$1,340,000	Section 6.3
2.10	Ustick Booster Station and Well 20B Upgrades	Water supply and delivery	$5,950,000	Section 4.4.1
2.11	Construct Grand Lake Well	Water supply and delivery	$5,350,000	Section 4.4.1
2.12	Well 34 Water Treatment	Improve water quality	$4,310,000	Section 8.6
		Total Priority 2 Improvements (rounded)	**$41,810,000**	
Priority 3 Improvements (2036-2064)				
3.1	Water Master Plan Update	Recommended timeline	$400,000	Section 8.7
3.2	Construct Reservoir 3, Well, and Booster	Water supply and delivery	$21,060,000	Section 4.4.1
3.3	Well 19 Transmission to Reservoir 3	Improve water quality	$1,330,000	Section 4.4.1
3.4	Construct New Well 12 and Land Acquisition	Aging infrastructure	$7,230,000	Section 4.4.1
3.5	Well 11 Water Treatment	Improve water quality	$4,310,000	Section 8.7
3.6	Construct Overland Well	Water supply and delivery	$8,040,000	Section 5.5.2
3.7	Grand Lake Well Water Treatment	Improve water quality	$4,310,000	Section 8.7
3.8	Replace Well 15	Aging infrastructure	$8,200,000	Section 4.4.1
3.9	Construct Reservoir 4, Well, and Booster	Water supply and delivery	$17,510,000	Section 4.5.1
3.10	Construct McMillan Well	Water supply and delivery	$8,000,000	Section 4.4.1
3.11	Construct Columbia Well	Water supply and delivery	$8,000,000	Section 4.4.4
3.12	Construct Ten Mile Well	Distribution	$8,000,000	Section 4.4.3
3.13	Construct Franklin Well	Water supply and delivery	$8,000,000	Section 4.4.1
3.14	Construct Rawson Well	Distribution	$8,000,000	Section 5.6
		Total Priority 3 Improvements (rounded)	**$112,390,000**	
		TOTAL WATER SYSTEM IMPROVEMENTS COSTS (rounded)	**$167,293,000**	

1) The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our opinion of probable costs at this time and is subject to change as the project design matures. Keller Associates has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Keller Associates cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented herein.

FIGURE 1-8: CAPITAL IMPROVEMENT PLAN PROJECTS

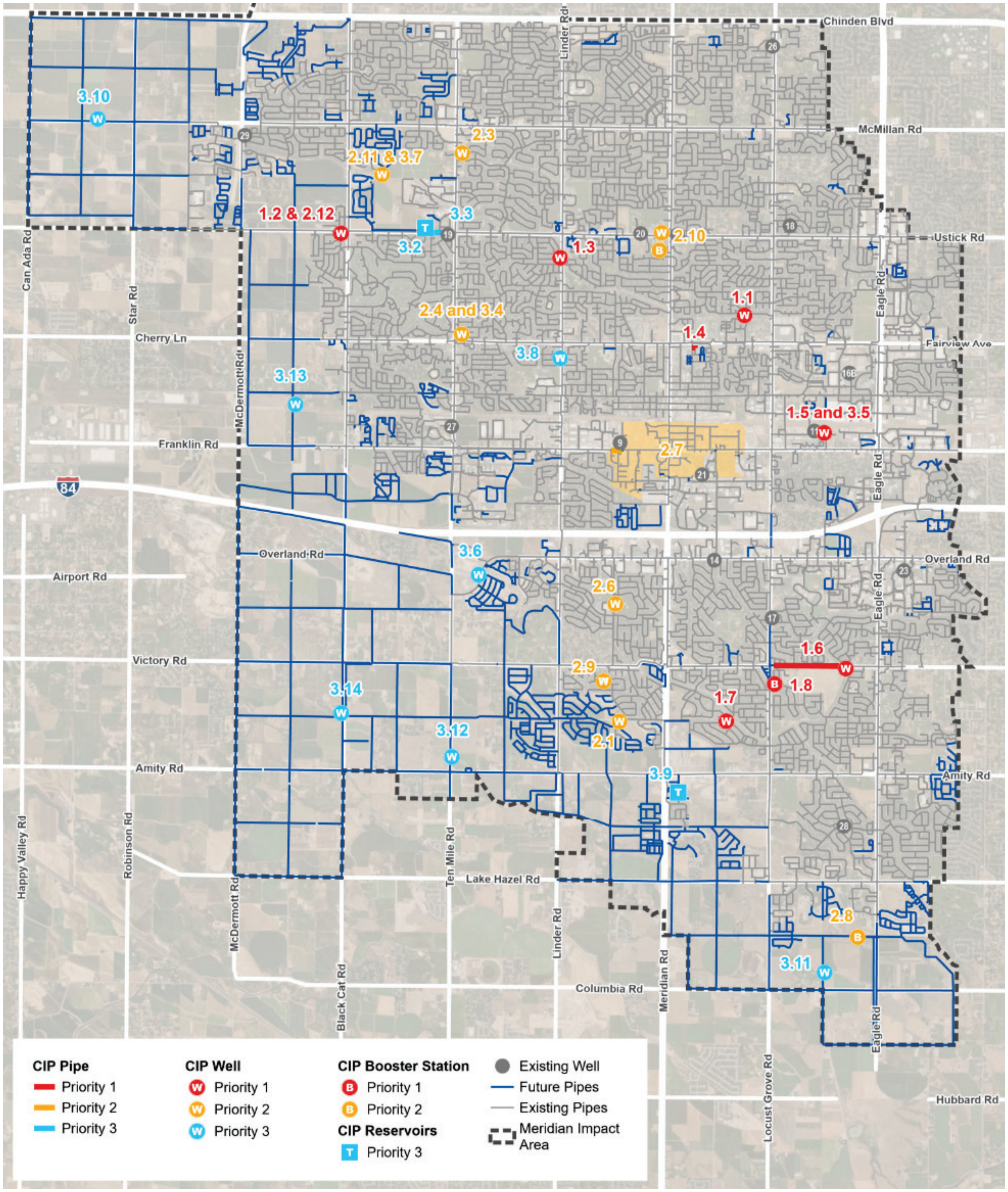


TABLE 1-6: 10-YEAR CAPITAL IMPROVEMENT PLAN

CIP ID	Description	Cost (2024 dollars)	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032	FY 2033	FY 2034	FY 2035
1.3	Well 24 Water Treatment	$ 4,310,000	$ 862,000	$ 3,448,000									
1.4	2-1/2 Street Looping	$ 150,000		$ 30,000	$ 120,000								
1.5	Replace Well 11	$ 5,640,000		$ 282,000	$ 1,128,000	$ 1,128,000	$ 2,820,000	$ 282,000					
1.6	Well 25 Pump Upgrade and Transmission to Victory Tank	$ 2,010,000			$ 402,000	$ 1,608,000							
1.7	Well 30 Upsize	$ 793,000				$ 793,000							
1.8	Victory Booster Jockey Pump Upgrade	$ 190,000				$ 190,000							
2.1	Well 32 Water Quality Improvement	$ 5,580,000					$ 1,116,000	$ 1,116,000	$ 3,348,000				
2.2	Water Administration and Operations Building	$ 6,300,000					$ 95,000	$ 465,000	$ 2,870,000	$ 2,870,000			
2.3	Construct Well 33	$ 6,980,000					$ 1,396,000	$ 1,396,000	$ 1,396,000	$ 2,792,000			
2.4	New Test Well 12	$ 1,030,000						$ 1,030,000					
2.5	Water Master Plan Update	$ 400,000						$ 400,000					
2.6	Well 22 Water Quality Improvement	$ 1,340,000							$ 268,000	$ 1,072,000			
2.7	Pressure Zone 2 Modification	$ 290,000							$ 290,000				
2.8	Zone 6 Booster Station	$ 2,940,000							$ 588,000	$ 2,352,000			
2.9	Well 31 Water Quality Improvement	$ 1,340,000								$ 268,000	$ 1,072,000		
2.10	Ustick Booster Station and Well 20B Upgrades	$ 5,950,000									$ 1,190,000	$ 1,190,000	$ 3,570,000
2.11	Construct Grand Lake Well	$ 5,350,000									$ 1,070,000	$ 1,070,000	$ 3,210,000
2.12	Well 34 Water Treatment	$ 4,310,000										$ 862,000	$ 3,448,000
	Total Capital Costs[1,2]	$ 54,903,000	$ 862,000	$ 3,760,000	$ 1,650,000	$ 3,719,000	$ 5,427,000	$ 4,689,000	$ 8,760,000	$ 9,354,000	$ 3,332,000	$ 3,122,000	$10,228,000
	Total Phased Annual Replacement Funding	-	$ 3,027,000	$ 3,319,000	$ 3,612,000	$ 3,904,000	$ 4,200,000	$ 4,496,000	$ 4,792,000	$ 5,088,000	$ 5,384,000	$ 5,680,000	$ 5,976,000
	Total FY Cost	-	$ 3,889,000	$ 7,079,000	$ 5,262,000	$ 7,623,000	$ 9,627,000	$ 9,185,000	$13,552,000	$14,442,000	$ 8,716,000	$ 8,802,000	$16,204,000

1) For pipeline projects 20% of the cost was assumed to be spent in the year before construction to cover permitting and engineering. Well project schedules were determined based on City input.

2) For tank and booster station projects 20% of project costs were assumed to be spent the year before construction to cover permitting and engineering. 20% was assumed to be spent for the second year of construction and the remainder of the budget to be spent the third year.

1.10. WATER DISTRIBUTION SYSTEM REPLACEMENT PROGRAM RECOMMENDATIONS

In addition to the CIP projects, the City should prepare for the replacement of existing infrastructure as it ages. The City currently funds water service meter and pipeline replacement programs. In addition, the water service meters and pipeline replacement programs, a comprehensive approach should address the rehabilitation of wells, and replacement of fire hydrants, well pumping facilities and treatment facilities, booster stations, and storage tanks. Appendix K includes breakdowns of the recommended replacement programs for the following system components:

- Water Service Meters
- Pipelines
- Fire Hydrants
- Well Rehabilitation (i.e., adding a liner)
- Well Replacement
- Well Facilities
- Well Facilities with Treatment
- Booster Stations
- Storages Tanks

Table 1-7 provides the recommendations for the currently funded City replacement programs. The total annual program funding for the water service meters and pipeline replacement is $2.8 million. The additional recommended replacement programs are summarized in Table 1-8, and they represent ideal scenarios for replacements. However, immediately allocating an additional $4.1 million to fund these programs is not realistic. To make these programs more feasible, a phased approach is recommended to prioritize the replacement of older assets first. This gradual implementation will allow the City to address the most critical needs while spreading the financial impact over time. A detailed phasing plan that outlines the recommended timeline is provided in Appendix J, and the total phased annual replacement funding is included in the 10-Year CIP Schedule. Assumptions regarding replacement costs and typical useful life for each asset are included in Appendix K.

TABLE 1-7: CURRENTLY FUNDED REPLACEMENT PROGRAM RECOMMENDATIONS

Category	Annual Program Funding
Water Service Meters	$ 1,666,000
Pipeline Replacements[1]	$ 1,131,000
Total Annual Program Funding	**$ 2,797,000**

1) Assumes replacing the non-plastic pipes during a 20 year period, and cost includes mobilization, contingency, and professional engineering fees.

TABLE 1-8: ADDITIONAL REPLACEMENT PROGRAM RECOMMENDATIONS

Category	Annual Program Funding[1]
Fire Hydrants	$ 846,000
Well Rehabilitation	$ 23,000
Well Replacement	$ 341,000
Well Facilities	$ 829,000
Well Facilities with Treatment	$ 1,717,000
Booster Stations	$ 240,000
Storage Tanks	$ 73,000
Total Annual Program Funding	**$ 4,069,000**

1) All costs include mobilization, contingency, professional engineering fees.

1.11. PLANNING RECOMMENDATIONS

The planning elements used as the basis for the recommendations and CIP projects in this plan may evolve over time and it is recommended that the City continue to maintain the current computer model of the system and review each improvement in more detail a year or two ahead of implementing individual capital of improvements. By reviewing upcoming improvements ahead of time, it will provide the City an opportunity to refine project delivery timelines, scopes, and budgets. A more comprehensive update of the master plan is recommended every 5-7 years to allow for the City to re-assess needs, priorities, and properly allocate budgets to address system deficiencies. The geographic information system (GIS) mapping and hydraulic model should continuously be updated to reflect new developments and improvements which occur to the system.